

FLORA OF KERALA - GRASSES

P.V. SREEKUMAR

V.J. NAIR



BOTANICAL SURVEY OF INDIA



Flora of India Series 2

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FOREWORD

Botanical Survey of India is actively engaged in the preparation of detailed accounts on the Flora of India under different series namely (1) National Flora of India, (2) State Flora, (3) District Flora or Flora of other smaller botanically interesting areas and (4) Monographs and other works which would not be covered under the other three series. Flora of Kerala: Grasses is one such contribution coming under series 2.

The importance of the family Gramineae to mankind is well known. More than any other group of plants, grasses and bamboos contribute to mankind major staple food, fodder and shelter. Our present civilization roots squarely on this family. Scientists of the Botanical Survey of India have discovered several new species and varieties of grasses. The evolution of their potential uses has to be undertaken. The recent discovery of *Oryza indandamanica*, a wild rice from Andamans has given a wider genetic base for rice. The use of *Oryza malampuzhaensis* for genetic improvement against blast disease is well known. The number of new species and varieties added to the grass flora of Kerala itself shows the vast potential that requires discovery and evaluation.

Kerala supports a luxuriant flora including many endemic elements. This area has attracted the attention of many Botanists from the West, even from the very early times, as is evidenced by the fact that one of the pioneer works on Indian botany, namely *Hortus Malabaricus* (van Rheedee, 1678-1703) is based on the plants of the northern part of this state. Realizing the urgent need for a detailed study of the flora of this state, Botanical Survey of India has been concentrating on intensive explorations and detailed botanical studies of this area. The present publication on the grasses of Kerala is the result of such a study.

I am sure this publication will serve as a resource base for our genetic resources of Kerala.

Calcutta
12-1-1990

M.P. NAYAR
Director
Botanical Survey of India

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INTRODUCTION

The grasses forming a natural and homogenous group of plants with remarkable diversity, belong to Poaceae, the fourth largest family of flowering plants in the world, with over 700 genera and probably 10,000 species. It is an important family of plants playing significant role in the life of human beings and other animals. The economic importance of grasses lies in their paramount role as food: 70% of the world's farmland is planted with crop grasses, and over 50% of world's calories come from grasses. A good number of grasses are cultivated for their grains. In terms of world production of crops today, the first four are grasses: sugarcane, wheat, rice and corn. Several grasses are well-known for their rich fodder value. Grasses control erosion, make turf, form lawns and provide the major source for alcohol.

For proper utilization of raw materials in a developing country like India, the need for basic economic surveys and assessment of the natural resources is often emphasized. To undertake such surveys and investigations it is essential that the flora of the country should be well-known and only when all the plants are correctly named, described and classified it would be possible to recognize useful or potential plants of economic value. The study of grasses has not attracted the desired attention as the group is considered difficult for identification. Their spikelets being minute, the grasses require careful dissection for correct determination. Being a botanically "neglected group" grasses need a separate detailed taxonomic investigation. The present study has been carried out with the broad objective to present a comprehensive floristic account of the grasses of Kerala State, in India.

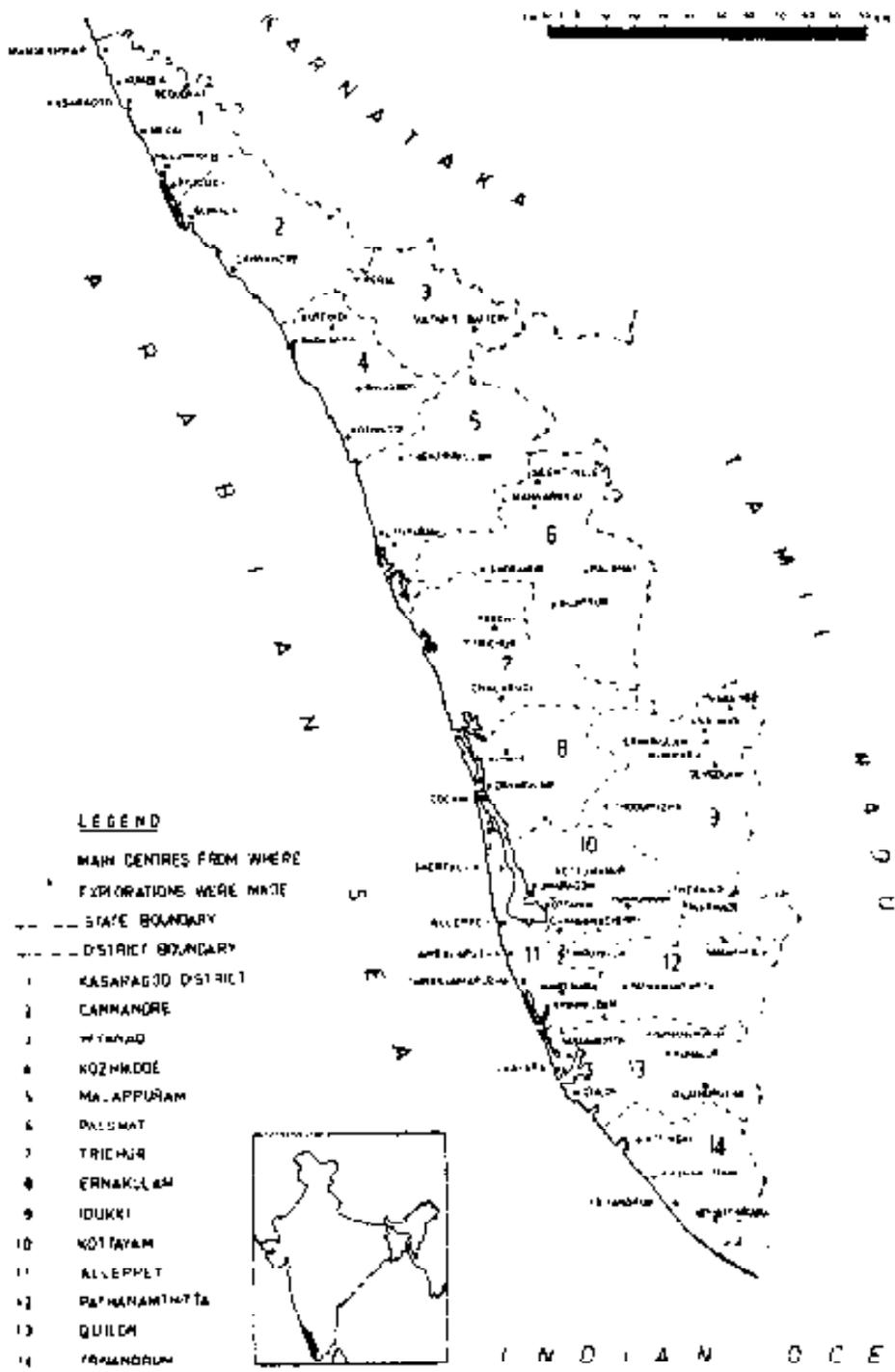
AREA OF STUDY

TOPOGRAPHY

The State of Kerala lies along the southern west coast of India, approximately between the latitudes 8° 18' and 12° 48' N and longitudes 74° 52' and 77° 22' E. It is bounded by Karnataka in the north, Tamil Nadu in the South, Western Ghats in the east and the Arabian Sea in the west. The total land area comes to about 38,864 km². Administratively the state consists of 14 districts. The entire area can be divided into three parallel strips in the north-south direction:

KERALA STATE

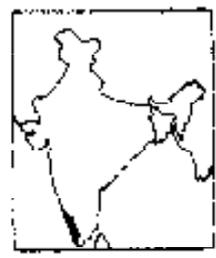
10 20 30 40 50 60 70 80 90 100 Miles



LEGEND

MAIN CENTRES FROM WHERE EXPLORATIONS WERE MADE

- STATE BOUNDARY
- DISTRICT BOUNDARY
- 1 KASARAGOD DISTRICT
- 2 CANNANORE
- 3 HYDRABAD
- 4 KOZHIKODE
- 5 MALAPPURAM
- 6 PALAKKAD
- 7 TRICHUR
- 8 ERNAKULAM
- 9 IDUKKI
- 10 KOTTAYAM
- 11 ALLEPPEY
- 12 PATHANAMTHITTA
- 13 QUILON
- 14 THIRUVANANTHAPURAM



INDIAN OCEAN

(i) **Coastal Region**

The coastal low-land region comprises flat, sandy belts with a series of back-waters and estuaries as intrusions from the sea.

(ii) **Midland Region**

Lying between the coastal region and the mountainous region, the midland consists of highly undulating, lateritic hilly tracts. Most of the midland and coastal regions are now thickly populated and are under aggressive cultivation. The major agricultural crop in the area is paddy and the tree crops being coconut, arecanut, cashew, jack and mango.

(iii) **Mountainous Region**

The mountainous region consists of a series of hilly ranges of Western Ghats clothed with dense forest vegetation. The eastern border of Kerala is bounded by an almost unbroken mountain wall, the Western Ghats, with major hills like Anamala, Choolamala, Elamala, Amruthamala etc. The continuity of the Ghats is broken by a prominent depression, the 'Palghat Saddle' ('Palghat Gap'). South of this gap lies the Anamalais range with the highest peak in Peninsular India (Anamudi, 2,695 m). On the lower south-western side of the Nilgiri Plateau lies the verdant Silent Valley. Along the south, the western Ghats is rather interrupted and extends up to Kanyakumari.

The most magnificent among the backwaters of Kerala are the 'Vembanad lake' which is the largest one in the State and the 'Ashtamudi lake' which is the deepest one. Other important backwaters include Veli, Katinamkulam, Anjango, Edava, Nadayara, Paravoor, Kayamkulam, Kodungallore and Chetua. The 'Sasthamkotta lake' is the only natural fresh water lake in Kerala.

More than forty rivers with their innumerable tributaries originate in Western Ghats and cutting across Kerala join the Arabian Sea. Among these 'Bharathapuzha' is the longest one in the State, which originates from Anamala and falls in the Arabian Sea. 'Pamba' is another important river of Kerala which is otherwise known as the 'Gift of Kuttanad'. Both these rivers are considered sacred by the Hindus. 'Periyaru' the second longest river in Kerala makes its origin from Sabarimala. Other important rivers include 'Meenachilaru', 'Manimalayaru', 'Achenkovilaru', 'Kalladayaru', 'Karamanayaru', 'Neyyaru', 'Chandragiripuzha', 'Valarpattanampuzha', 'Bepurpuzha', 'Chalakkudipuzha' and 'Kabani'. Most of these rivers originate from the western slopes of the Western Ghats and flow westward across the plains, with the exception of three rivers flowing east.

The highest peak is Anamudi (2,695 m) and the lowest land is one metre below the mean sea level in the 'Vembanad' area of Alleppey.

GEOLOGY AND SOIL

Four main types of geological formations occur in Kerala, like recent deposits, Late Tertiary beds (Warkalli beds), Laterite belts formed from the crystalline rocks and the crystalline peninsular gneisses. A small outcrop of Middle Tertiary lime stone is found in Quilon and fossiliferous Miocene beds near Varkala (warkalli beds). The greater part of Travancore is occupied by gneisses belonging to the Charnockites with granulitic structure (Sen Gupta & Chatterjee, 1936).

The main soil types met within Kerala State are (1) Alluvial Soil (2) Peaty Soil (3) Red Soil (4) Laterite and Lateritic Soil and (6) Forest Soil. In Kuttanad areas the soils are alluvial. The alluvia on the banks of the main rivers are fertile. Peaty Soils or 'Kari Soils' are found usually along those areas which get submerged during monsoon. The soils are black, heavy and highly acidic. A major portion of Kerala is covered by Red Soils which are generally well-drained and poor in nutrients. Laterite and Lateritic Soils are seen in the midland as well as parts of the highland regions. These soils are generally poor in NPK and organic matter. The ground of the forest is covered by vegetation and forest litter and hence Forest Soils are black in colour containing much decomposed organic matter.

The soils of Chavara and Neendakara contain rare materials like ilmenite, monasite, silicon, etc., which are isolated by the Titanium Factory at Trivandrum and Rare Earth Factory at Alwaye. Glass is manufactured from the peculiar sandy soils available at Shertallay. Shells obtained from the Vembanad lake are utilised for the manufacture of cement by the Nattakom Factory at Kottayam. Workable reserves of bauxite in Kumbala of Cannanore District, iron ore in Cherupa, Eliottumala, Nanminda and Naduvannoor of Calicut District and graphite reserves in Thodupuzha of Idukki District have been discovered, offering scope for industrial expansion.

CLIMATE

Kerala has a warm, humid, tropical climate with an average rainfall of 3,020 mm per year and a relative humidity ranging between 75 and 92 percent. The State receives both the south-west and the north-east monsoons. A major portion of the annual precipitation is received from the south-west monsoon which showers between June and September. North-east monsoon brings light showers between October and November. March and April are the hottest months. The average annual

rainfall ranges between 1,016 mm to over 7,620 mm in hilly areas like 'Pettimudi'. The average day temperature of plains varies from 23.9-37.7°C and in hilly areas it ranges between 7.2 to 32.2°C.

PREVIOUS WORK

Botanically, the area remained underexplored, and no comprehensive floristic account, especially on the grasses of this region is available.

van Rheede (1678-1703) was one of the pioneers to prepare an account on the plants of this area. In his monumental work, "*Hortus Malabaricus*", among the 784 plants illustrated and described, there are only 20 plates of grasses. But in Hooker's *Flora of British India*, only 13 out of the 20 of these plates belonging to Gramineae have been considered. Moreover, the present concept of plant nomenclature was not adopted in Rheede's work and hence its utility for the determination of plants is limited.

Hooker (1872-1897), in his "*Flora of British India*" treats about 700 species of grasses in 130 genera but mentions only about 20-25 species including one or two endemics, as occurring in Kerala. Rama Rao (1914, in his "*Flowering Plants of Travancore*") gives a mere list of about 21 grasses in 68 genera. Ranga Achariyar & Todulinga Mudaliyar (1921) in their "*Handbook of Some Common South Indian Grasses*" describe and illustrate about 103 species of Poaceae, but unfortunately, most of them are from the plains and only a few grasses are from Kerala State. Fischer (1934-'36) in Gamble's *Flora of Presidency of Madras*, describes more than 350 species of grasses in 126 genera. Out of which, about 200 species according to him, are distributed in Kerala which include 10-15 endemics.

Jacob (1947) published two new species of *Dimeria* and a new variety of *Eragrostis* from Kerala. Puri (1960) included a list of grasses in his publication. Rao (1964) reported the occurrence of *Leptaspis urceolata* in India from Thenmala Forest Division of Quilon. Shetty *et al.* (1973) reported *Eulalia thwaitesii* in India from Anamudi slopes. Ellis and Karthikeyan (1973) published a new variety of *Alloteropsis* sp. from Kerala. Patil & D'Cruz (1974) described a new species of *Ischaemum* from Alleppey. Mitra & Jain (1980) have made critical notes on the identity of four graminaceous plants treated in "*Hortus Malabaricus*". Nair V. J. & Ramachandran (1980) reported the occurrence of *Eragrostis zeylanica* and *Ischaemum zeylanicum* in South India from Cannanore District. Nair *et al.* (1980) reported the occurrence of *Isachne gracilis* in Kerala from Silent Valley. Nair & Bhargavan (1982) published critical notes on a rare grass from Silent Valley.

The herbarium specimens of grasses deposited in MH represent only meagre collections from Kerala. Most of these were made by C. A. Barber (1900-1915), K. C. Jacob (1925-1945), C. E. C. Fischer (1910), G. V. Narayana (1931), P. J. Tommy (1937), K. M. Sebastine (1962-1966), J. L. Ellis (1964-1970) and a few others.

GENERAL PATTERN OF VEGETATION

The following main types of tropical vegetation are met within Kerala :

A. Wet Evergreen Forests

The tropical evergreen forests of Kerala have been continuously subjected to interference by man and are highly deteriorated. Still, patches of typical evergreen forests can be noticed along the western slopes of Agastyamala, Nilgiri complex including Silent Valley, Sabarigiri etc.

The dominant plants in these forests are *Palaquium ellipticum*, *Cullenia exarillata*, *Mangifera indica*, *Canarium strictum*, etc. As a rule, under the full canopy of the evergreen forests, grasses will not develop except the very shade tolerant species like *Centotheca lappacea*, *Leptaspis urceolata*, *Optismenus compositus*, *Lophatherum gracile*, etc. Most of these grasses have comparatively broader leaves.

B. Semi-evergreen Forests

These forests usually occur between the upland wet evergreen above and the lowland moist deciduous below consisting of a mixture of both evergreen and deciduous elements. In Kerala, we come across these forests mainly in Nilambur, Wynad, Palghat, Ranni, Thenmala, etc.

The trees generally found in the semi-evergreen type are *Xylia xylocarpa*, *Vateria indica*, *Terminalia paniculata*, *Mangifera indica*, etc. Along the fringes of these forests *Centotheca lappacea*, *Cyrtococcum oxyphyllum*, *Ichnanthus vicinus*, *Themeda cymbaria*, *Pennisetum polystachyon*, etc. are the few examples of grasses commonly seen.

C. Moist Deciduous Forests

This type is very characteristic in Kerala and it has replaced evergreen forests in several places (Chandrasekharan, 1962).

The most characteristic tree species of this type in Kerala are *Terminalia paniculata* associated with *T. tomentosa*, *Lagerstroemia lanceolata*, *Tectona grandis*, etc. *Bambusa arundinacea* is a typical component of the understory. A few other grasses like *Cymbopogon flexuosus*, *Themeda cymbaria*, *Pennisetum polystachyon*, *Optismenus compositus*, etc. have also been noticed as secondary growths.

D. Dry Deciduous Forests

These forests are of limited occurrence in Kerala, and are found mainly in Walayar, Marayur, and Anjanad Valleys. Occurrence of natural 'sandal forests' in Marayur and 'teak plantations' in Nilambur have also been noticed. Most of the species are deciduous during the dry spell.

The common species are *Tectona grandis*, *Santalum album*, *Butea monosperma*, *Pterocarpus marsupium*, etc. Some grasses like *Aristida setacea*, *Rhynchelytrum repens*, *Panicum notatum*, *Pennisetum polystachyon*, *Digitaria ciliaris*, etc. have also been observed along the scrub jungles.

E. Grasslands

The grasslands of Kerala can broadly be classified into two main types (i) Low Level Grasslands and (ii) High Altitude Grasslands.

(i) Low Level Grasslands

These grasslands lie up to 1000 m altitude and are very scattered and often intermixed with forests. Based on the habitat features, this type can again be divided into (a) Dry Grasslands and (b) Wet Grasslands.

(a) Dry Grasslands

These occur along dry rocky plateau and isolated hills of Kerala in places like Taliparamba, Kasaragod and Bendudka areas of Cannanore and Kasaragod Districts, Pokkunnamala and Chelanur of Calicut District and parts of lower Wynad. Large areas of such grasslands have been noticed in the northern-most areas of Kerala. These grasslands are interspersed here and there with a few scrub jungles of common plants like *Bridelia retusa*, *Butea monosperma*, *Maca-ranga peltata*, etc. The common herbaceous plants in these grasslands are *Calosia argentea*, *Polycarpaea aurea*, *Striga lutea*, *Exacum bicolor*, etc.

The common grass species in these grasslands are *Pseudanthistiria heteroclita*, *Dimeria bialata*, *Heteropogon contortus*, *Ischaemum indicum*, *Arundinella mesophylla*, *Dimeria* spp. etc., along open grasslands and *Arundinella cannanorica*, *Bhidea burnsiiana*, *Danthonidium gammiei*, *Dimeria* spp., etc. along the dry rocky places.

(b) *Wet Grasslands*

These are seen along the margins of water-courses like pools, puddles, backwaters, along marshy places and coastal regions. Along the low-lands reclaimed from Vembanad and Ashtamudi lakes of Alleppey, Kottayam and Kayamkulam areas we can come across this types of grasslands. Some of such areas are below the mean sea-level. Thousands of hectares of such low lying wet grasslands have been noticed at 'R. Block' and 'Chithira-Marthandam' areas of Alleppey.

Common species of grasses along such grasslands are *Eriochloa procera*, *Paspalum conjugatum*, *Paspalidium geminatum*, *Panicum repens*, *Imperata cylindrica*, *Brachiaria mutica*, etc. and most of these species are highly adaptable to their semiaquatic habitat.

Along the coastal margins of Thrikkunnapuzha, Alleppey, Chavara, Neendakara and 'Munrothuruthu' of Quilon, Cochin and Veli a peculiar type of wet grasslands have been noticed. Due to the salinity of water and some other soil conditions met with, most of the species here are stunted in growth and they form 'mattresses' along the banks of lakes and backwaters, and also along estuaries, helping to prevent tidal erosion. The most dominant grass species in such grasslands are *Zoysia matrella*, *Cynodon dactylon*, *Paspalum scrobiculatum*, *Sporobolus virginicus*, etc. along with a few sedges like *Cyperus rotundus*, *C. triceps*, *Fimbristylis* spp. etc.

(ii) *High Attitude Grasslands*

High Altitude Grasslands or 'Montane Grasslands' lie normally above an altitude of 1000 m. Bourdillon designates these grasslands as 'Patenas' which show close resemblance to the 'Patenas of Ceylon'

Such grasslands were observed in Eravikulam, Munnar, Devicolum and Ponnambalamedu of Idukki District, Pokkunnamala of Calicut, Silent Valley in Palghat and western slopes of Agastyamala in Trivandrum. But most of these grasslands are highly deteriorated due to misuse and overgrazing leading to excessive soil erosion.

The Eravikulam National Park, or the 'Hamilton Plateau' is one of the most magnificent grasslands of South India, which is situated along the western slopes of Anamudi. These grasslands are subjected to biotic interference to a lesser degree compared to the Nilgiri and Pulney Hills (Shetty & Vivekananthan, 1971). This national park holds probably half of the total world population of 'Nilgiri Tahr' (*Hemitragus hylocrius* Ogilby), a species which is said to be in danger of extinction (Schaller, 1970).

Grasslands cover 85 percent of the area of the Park and include many grass species other types of herbs, undershrubs and a few shrubs. In the south-west part of Umayamala we come across very extensive grasslands which are dominated by *Chrysopogon zeylanicus* and *Eulalia phaeothrix*. Other species of grasses dominating in these open grasslands are *Dichanthium polytychum*, *Arundinella purpurea*, *A. vaginata*, *Andropogon lividus*, *Helictotrichon virescens*, *Agrostis pilosula*, *Tripogon bromoides*, etc. Along with grasses, terrestrial orchids, balsams and other herbaceous plants are plenty in these grasslands. *Brachycorythis splendida*, *Habenaria hayneana*, *Peristylus aristatus*, *Juncus effusus*, *Viola serpens*, *Swertia corymbosa*, *Impatiens cordata*, *Drosera peltata*, etc. are examples for the ground flora other than grasses.

The vast stretches of grasslands here are interspersed with isolated 'sholas'. *Eurya japonica*, *Ilex denticulata*, *Photonia notoniana* etc. are some of the common trees found in these sholas.

The grasslands of Ponnambalamedu and Sabarigiri areas of Idukki and Quilon districts and Pokkunnamala of Calicut are dominated by grasses like *Chrysopogon zeylanicus*, *Cymbopogon flexuosus*, *Themeda cymbaria*, *Ischaemum indicum*, *Eulalia trispicata*, *Tripogon bromoides* etc. These hilltop grasslands are dotted with *Phoenix humilis*, a fire resistant species.

The shola grassland vegetation of Silent Valley and its surrounding areas is not very far different from that of the adjoining Nilgiri Plateau (Nair et al. 1980). *Cymbopogon flexuosus*, *Themeda cymbaria*, *Chrysopogon zeylanicus*, *Oplismenus compositus*, *Tripogon bromoides*, etc. are examples of some dominant grasses here.

Ecological Status of Shola-grasslands

The ecological status of the shola-grassland formation has been a subject of controversy over the years. It is considered a climatic climax by most of the workers like Ranganathan (1936) with ground

frost as the 'master factor' Bor (1938) considered it to be a 'biotic complex' and he showed the importance of fire. The latter view is commonly accepted by De Rosayro (1945, 47), Holmes (1951), Shankaranarayan (1958), Legris (1960), Gupta (1960), Gupta & Shankaranarayan (1962), Chandrasekharan (1962) and Noble (1967).

The explanation that the fire is the only factor preventing the re-establishment of the shola has been found inadequate (Meher-Homji, 1967). In conclusion, we may say that there are two adverse factors preventing the spread of shola-forest i. e. frost during the cold season and fire during the drier months.

Succession in Grasslands

According to Agarwal *et al.* (1961) *Arundinella* spp. form a higher stage in succession. In a denuded grassland after 2-3 years' protection species like *Chrysopogon zeylanicus* and *Tripogon bromoides* dominate. After a while, *Themeda* sp., *Heteropogon contortus* and *Ischaemum indicum* also appear. Gradually the plant cover percentage increases and now *Arundinella* spp. attain a dominating stand.

The observations and ecological studies made in the high altitude grasslands of Eravikulam National Park (Clifford Rice, unpub.) indicate that *Dichanthium polyptychum* represents the highest stage in these grasslands. Small patches of this species have been noticed to occur in some marshy areas also, near 'Subsidiary Turner's Valley' in Eravikulam. So, it can be safely stated that *Dichanthium polyptychum* represents the highest stage in grassland development in the areas where it occurs.

Grassland Communities

The forest or tree communities develop a specific floristic composition only under definite ecological conditions. This fact is true even in the case of grassland communities to some extent. The high altitude grasslands of South Indian Hills come under the broad *Sehima-Dichanthium* type (Gupta, *et al.* 1967). This association can be noticed along some low level grasslands of the dry rock plateau in Taliparamba, Kasaragod and Wynad areas. *Heteropogon contortus*, *Sehima nervosum*, *Dichanthium* spp., etc. are the dominant species. *Cymbopogon-Themeda cymbaria* type grassland associations occur in the vicinity of Sabrimala, Ponnambalamedu of Idukki District and Peruvannamuzhi, Kakkayam areas of Calicut District. The dominating species of such association are *Cymbopogon flexuosus*, *Themeda cymbaria*, etc. *Saccharum-Imperata-Phragmites* associations have

been noticed along Achenkovil and Kulathupuzha areas of Quilon and also low lying areas of Alleppey like R. Block and Thrikkunnapuzha areas and composed of grasses like *Phragmites karka*, *Saccharum spontaneum*, *Imperata cylindrica*, *Paspalum conjugatum*, etc. *Zoysia-Sporobolus* communities have been observed along the estuaries and coastal margins of littoral vegetation predominant in Thrikkunnapuzha, Alleppey, Cochin, Chavara, Neendakara and Veli. These communities include species like *Zoysia matrella*, *Sporobolus virginicus*, *Cynodon dactylon*, etc.

Secondary Communities of Grasses

In addition to the main and the subtypes of grasslands, the grasses are found to occupy various other situations which are peculiar and specific to certain species. These are :

(i) Wall Grasses

Immediately after monsoon, along the mud walls, rocky fences and broken compound walls of houses and forts, a large number of herbaceous grasses make their appearance. The commonest among these wall grasses are *Arthraxon lancifolius*, *Dimeria ornithopoda*, *Garnotia courtallensis*, *Sporobolus piliferus*, etc., in high ranges and *Aristida depressa*, *Chloris barbata*, *Arundinella pumila*, etc., in the plains.

(ii) Grasses Along Rocky Places

Certain species of grasses are found to be growing in the crevices of moist or dry rocky substrata. In higher altitudes, grasses like *Zenkeria elegans*, *Zenkeria sebastinei*, *Tripogon bromoides*, *Isachne fischeri*, etc. prefer the moist rocky habitat. While in the lower elevations *Bhidaa burnsiana*, *Danthonidium gammiei*, *Arundinella cannanorica*, *Dimeria spp.*, etc. grow along dry rocky plateau.

(iii) Grasses Along Water-courses

The common grasses along the water-courses include *Phragmites karka*, *Arundo donax*, *Saccharum spontaneum*, *Paspalum conjugatum*, etc. as marginal species along the banks of rivers, streams and backwaters. In stagnant waters and marshy areas *Hygroryza aristata*, *Pseudoraphis spinescens*, *Leersia hexandra*, *Sacciolepis interrupta*, *Paspalum distichum*, *Isachne miliacea*, *Paspalidium geminatum*, etc. are invading.

(iv) *Wasteland Grasses*

The uncultivated wastelands along the village areas are dominated by grasses like *Eleusine indica*, *Chloris barbata*, *Panicum repens*, *Dactyloctenium aegyptium*, *Eragrostis tenella*, *E. unioloides*, *Paspalum scrobiculatum*, *Axonopus compressus*, *Alloteropsis cimicina*, etc.

(v) *Grasses as Weeds*

Cultivated fields, plantations and estates are mostly invaded by a large number of obnoxious weedy grasses. Based on their habitat features the weedy grasses can be divided into :

(a) **Wetland weeds :** The weeds along the paddy fields and other wetlands include species like *Echinochloa colona*, *E. crusgalli*, *E. stagnina*, *Eriochloa procera*, *Oryza rufipogon*, *Sacciolepis interrupta*, etc.

(b) **Dryland Weeds :** In plantations, estates and other upland cultivated areas grass weeds are a real menace. Some such common grass weeds are *Panicum repens*, *Chrysopogon aciculatus*, *Alloteropsis cimicina*, *Axonopus compressus*, *Dactyloctenium aegyptium*, *Eleusine indica*, etc.

OBSERVATIONS AND DISCUSSION

A. ENDEMIC GRASSES

J. D. Hooker (1896) reported about 135 genera, 734 species, 2 subspecies and 39 varieties of grasses from the areas of the present day India. Bor (1960) reported about 220 genera and 1165 infrageneric taxa from the present boundary of India, which include about 370 infrageneric taxa (32.7 %) endemic to this continent. Karthikeyan (1983) stated that 16 genera, 299 species, 2 sub-species and 43 varieties are found to be endemic to India.

According to Nayar (1980) there are about 141 endemic genera distributed over 47 families in India, and Acanthaceae and Gramineae have the largest number of endemic genera. It is found that about 16 genera of Gramineae are endemic to India. (Karthikeyan, 1983; Shukla, 1983). Two more genera have been added during the present study.

(i) Grass Genera Endemic to India

The following are the genera of grasses found endemic to Indian sub-continent ;

- | | |
|------------------------------|-----------------------------|
| 1. <i>Bhidea</i> | 2. <i>Cahndrasokharania</i> |
| 3. <i>Cyathopus</i> | 4. <i>Danthonidium</i> |
| 5. <i>Glyphochloa</i> | 6. <i>Hubbardia</i> |
| 7. <i>Indochloa</i> | 8. <i>Indopoa</i> |
| 9. <i>Ischnochloa</i> | 10. <i>Limnopoa</i> |
| 11. <i>Lophopogon</i> | 12. <i>Normanboria</i> |
| 13. <i>Pogonachne</i> | 14. <i>Pseudodanthonia</i> |
| 15. <i>Pseudodichanthium</i> | 16. <i>Silentvalleya</i> |
| 17. <i>Trilobachne</i> | 18. <i>Tripogon</i> |

(ii) Grasses Endemic to Peninsular India

Out of the 18 genera endemic to India, about 13 are found endemic to Peninsular India. The grass genera listed above excluding *Cyathopus*, *Indochloa*, *Ischnochloa*, *Lophopogon* and *Pseudodanthonia* are endemic to peninsular India.

(iii) Grasses Endemic to Kerala

The present study reveals that about 37 endemic species of grasses do occur in Kerala, which is about 11.8% of the total number of species of grasses from the study area. (The species shown with asterisk marks are new discoveries during the present study).

Arundinella kannanorica *, *Bhidea fischeri* *, *Bothriochloa parameswaranii* *, *Chrysopogon tadulingamii* *, *Dimeria borii* *, *D. copeana* *, *D. jainii* *, *D. kanjirappallilana*, *D. keralae* *, *D. kurumthotticalana*, *D. raizadae* *, *Gamotia puchiparensis*, *Isachne fischeri*, *I. setosa*, *Ischaemum agastyamalayyanum* *, *I. calicutensis* *, *I. kannanorensis* *, *I. copeanum* *, *I. elimalayanum* *, *I. jayachandranii* *, *I. keralensis* *, *I. malabaricum* *, *I. nairii* *, *I. raii* *, *I. tadulingamii* *, *I. travancorensis*, *I. vembnadense*, *Limnopoa meeboldii*, *Ochlandra ebracteata*, *O. scriptoria*, *O. travancorica* var. *hirsuta*, *O. wightii*, *Oxytenanthera bourdillonii*, *Silentvalleya nairii* *, *Tripogon anantaswamianus* *, *T. narayanii* *, *Zenkeria jainii* *.

B. RARE GRASSES

The following are some of the rare grass species occurring in Kerala :

| | |
|------------------------------|-------------------------------|
| <i>Anthoxanthum borii</i> | <i>Artharxon lanceolatus</i> |
| <i>Arundinella vaginata</i> | <i>Bhidea burnsiiana</i> |
| <i>Cleisathne sorghoides</i> | <i>Danthonidium gammiei</i> |
| <i>Dimeria connivens</i> | <i>Dimeria deccanensis</i> |
| <i>Dimeria fischeri</i> | <i>Dimeria hohenackeri</i> |
| <i>Isachne fischeri</i> | <i>Isachne gracilis</i> |
| <i>Ischaemum barbatum</i> | <i>Ischaemum thomsonianum</i> |
| <i>Ischaemum tumidum</i> | <i>Limnopoë meeboldii</i> |
| <i>Panicum auritum</i> | <i>Setaria barbata</i> |
| <i>Streptogyna crinita</i> | etc. |

C. COMMON GRASSES

The following are some of the very common grasses found in the wastelands, marshes, wetlands, roadsides and hill slopes in almost all districts of Kerala.

| | |
|--------------------------------|---------------------------------|
| <i>Alloteropsis cimicina</i> | <i>Apluda mutica</i> |
| <i>Brachiaria miliiformis</i> | <i>Brachiaria ramosa</i> |
| <i>Chloris barbata</i> | <i>Chrysopogon eciculatus</i> |
| <i>Coix lacryma-jobi</i> | <i>Cymbopogon flexuosus</i> |
| <i>Cynodon dactylon</i> | <i>Dactyloctenium aegyptium</i> |
| <i>Digitaria ciliaris</i> | <i>Digitaria longiflora</i> |
| <i>Echinochloa colona</i> | <i>Eleusine indica</i> |
| <i>Eragrostis atrovirens</i> | <i>Eragrostis tenella</i> |
| <i>Eragrostis unioloides</i> | <i>Isachne miliacea</i> |
| <i>Panicum repens</i> | <i>Paspalum scrobiculatum</i> |
| <i>Pennisetum polystachyon</i> | <i>Parotis indica</i> |
| <i>Sacciolepis interrupta</i> | <i>Setaria pumila</i> |

STATISTICAL ANALYSIS OF THE GRASS FLORA OF THE REGION

The present systematic study on the grass flora of Kerala for a period of over six years has resulted in the collection of about

1500 field numbers, comprising about 4500 grass specimens. These specimens belong to a total of 296 species distributed in 103 genera (including 10 species and 5 genera of the tribe 'Bambuseae').

The distribution of the genera and species with respect to each tribe is tabulated below : (Infra-specific taxa are not included here)

| Sl. No. | Name of Tribes | Number of genera | Number of species |
|---------|-----------------|------------------|-------------------|
| 1. | Andropogoneae | 31 | 108 |
| 2. | Maydeae | 2 | 2 |
| 3. | Paniceae | 25 | 78 |
| 4. | Aeluropodeae | 1 | 1 |
| 5. | Agrostideae | 1 | 2 |
| 6. | Aristideae | 1 | 3 |
| 7. | Arundineae | 2 | 2 |
| 8. | Arundinelleae | 3 | 12 |
| 9. | Aveneae | 2 | 2 |
| 10. | Bambuseae * | 5 | 10 |
| 11. | Centothecaeae | 2 | 2 |
| 12. | Chlorideae | 2 | 4 |
| 13. | Danthonieae | 2 | 4 |
| 14. | Eragrostaeae | 9 | 31 |
| 15. | Festuceae | 2 | 2 |
| 16. | Garnotieae | 1 | 6 |
| 17. | Isachneae | 3 | 11 |
| 18. | Oryzeae | 3 | 6 |
| 19. | Parotideae | 1 | 1 |
| 20. | Phareae | 1 | 1 |
| 21. | Sporoboleae | 1 | 5 |
| 22. | Streptogyneae | 1 | 1 |
| 23. | Thysanolaenaeae | 1 | 1 |
| 24. | Zoysieae | 1 | 1 |
| TOTAL | | 103 | 296 |

* The study of the tribe "Bambuseae" excluded from the present work, will be carried out in due course. The common 'Bamboos' reported to be occurring in Kerala are *Arundinaria densifolia*, *Bambusa arundinacea*, *Ochlandra beddomei*, *O. rheedii*, *O. scriptoria*, *O. travancorica*, *O. wightii*, *Oxytenanthera bourdillonii*, *O. monodelpha*, *O. rilcheyi*, etc.

RESULTS AND CONCLUSIONS

Through well-planned seasonal exploration trips, most of the grasses previously recorded for the area together with a large number of additions, including several new discoveries, new, rare or endemic records, etc. have been collected and documented.

This first step towards the study on the grasses of Kerala State, yielded about 296 species distributed in 103 genera, which consists of about 26 taxa new to science (2 new genera and 26 new species). In addition to the above novelties about 50 interesting grasses have also been collected from the area. Out of which, 4 are new records to India, 6 new records to South India and the rest form new distribution records or rare grasses for Kerala.

A. NEW DISCOVERIES

(i) New Genera Discovered : (2)

1. *Chandrasekharania* V. J. Nair, V. S. Ramachandran & P. V. Sreekumar
2. *Silentvalleya* V. J. Nair, P. V. Sreekumar, E. Vajravelu & P. Bhargavan

(ii) New Species Discovered (26)

1. *Arundinella kannanorica* V. J. Nair, P. V. Sreekumar & N. C. Nair,
2. *Bhidea fischeri* P. V. Sreekumar & B. V. Shetty
3. *Bothriochloa parameswaranii* P. V. Sreekumar, C. P. Malathi & V. J. Nair
4. *Chandrasekharania keralensis* V. J. Nair, V. S. Ramachandran & P. V. Sreekumar
5. *Chrysopogon tadulingamii* P. V. Sreekumar, V. J. Nair & N. C. Nair
6. *Dimeria borii* P. V. Sreekumar, V. J. Nair & N. C. Nair
7. *Dimeria copeana* P. V. Sreekumar, V. J. Nair & N. C. Nair
8. *Dimeria jainii* P. V. Sreekumar, V. J. Nair & N. C. Nair
9. *Dimeria keralae* N. C. Nair, P. V. Sreekumar, & V. J. Nair
10. *Dimeria raizadae* V. J. Nair, P. V. Sreekumar & N. C. Nair
11. *Ischaemum agastyamalayanum* P. V. Sreekumar, Janarthanam & Henry
12. *Ischaemum calicutensis* P. V. Sreekumar, V. J. Nair & N. C. Nair

13. *Ischaemum kannanorensis* P. V. Sreekumar, V. J. Nair & N. C. Nair
14. *Ischaemum copeanum* P. V. Sreekumar, V. J. Nair & N. C. Nair
15. *Ischaemum elimalayanum* P. V. Sreekumar, V. J. Nair & N. C. Nair
16. *Ischaemum jayachandranii* R. Ansari, V. S. Ramachandran & P. V. Sreekumar
17. *Ischaemum keralensis* P. V. Sreekumar, V. J. Nair & N. C. Nair
18. *Ischaemum malabaricum* P. V. Sreekumar, V. J. Nair & N. C. Nair
19. *Ischaemum nairii* V. J. Nair & P. V. Sreekumar
20. *Ischaemum raii* P. V. Sreekumar, V. J. Nair & N. C. Nair
21. *Ischaemum tadulingamii* N. C. Nair & P. V. Sreekumar
22. *Silentvalleya nairii* V. J. Nair, P. V. Sreekumar, E. Vajravelu & P. Bhargavan
23. *Themeda sabarimalayana* P. V. Sreekumar & V. J. Nair
24. *Tripogon anantaswamianus* P. V. Sreekumar, V. J. Nair & N. C. Nair
25. *Tripogon narayanii* P. V. Sreekumar, V. J. Nair & N. C. Nair
26. *Zenkeria jainii* N. C. Nair, P. V. Sreekumar & V. J. Nair

B. NEW RECORDS

(i) New Records to India

1. *Eragrostis cumingii* Steud.

Previously reported from Burma, Malaysia, Philippines and Australia. Recently collected from Veli, Trivandrum and reported (Mohanani & Sreekumar 1982) first time for India.

2. *Eragrostis subsecunda* (Lam.) Fourn.

Distributed in Assam (Haflong), Bangla Desh (Syihet, Chittagong) and Sri Lanka, but missed by N. L. Bor, when he wrote his Grass. Bur. Cey. Ind. Pak. Now it has been collected from Thrikkunnappuzha (Alleppey District).

3. *Ischaemum indicum* var. *longipilum* (Hack.) Bor

Previously reported only from Sri Lanka. There are a few collections from Cannanore in MH.

4. *Ischaemum indicum* sub-var. *scrobiculatum* (Nees ex Steud.) Bor

This sub-variety was previously known from Sri Lanka. The

present collections from Kerala available in MH, reveal its occurrence in India also.

(ii) New Records to South India

1. *Acroceras munroanum* (Balansa) Henr.

Distributed in Eastern India, Burma, Malaya and Malaysia. Recently reported from Alleppey and Quilon of Kerala (Sreekumar *et al.* (1982).

2. *Dimeria connivens* Hack.

It was previously reported from Bihar and Orissa. The present collection of this rare grass from Cannanore District in Kerala State forms a new record to South India.

3. *Ischaemum indicum* sub-var. *villosum* (Nees) Bor

Previously known from Sri Lanka and Madhya Pradesh. Present collections from Kerala extend its known distribution to South India.

4. *Ischaemum indicum* var. *wallichii* (Hack.) Bor

This variety was earlier known only from Assam. The present collection from Chandanathode in Kerala extends its known range of distribution to Southern India.

5. *Panicum humidorum* Buch. -Ham. ex Hook. f.

Earlier known in India only from Assam and has recently been recorded by Ramachandran *et al.* (1984) for the first time from South India.

6. *Pennisetum orientale* L. C. Rich.

Previously reported from North India. Now it has been collected and reported from Trivandrum (V. J. Nair *et al.* 1982).

(iii) New Distribution Records for Kerala

1. *Anthoxanthum borii* Jain *et al.*

Known earlier only from Nilgiris. Now it has been collected from Idukki, Kerala.

2. *Apocypis mangalorensis* (Hochst.) Henr.

Known earlier to be confined to Bombay, Madras and Sri Lanka. Recently collected from Kasaragod, Kerala.

3. *Arthraxon villosus* Fischer

Previously known only from Mahabaleshwar and North Canara. Now it has been gathered from Munnar, Kerala.

4. *Bhidaa burnsiiana* Bor

A very rare grass so far known only from Bombay and North Canara. Recently collected from Kasaragod, Kerala.

5. *Danthonidium gammiei* (Bhide) C. E. Hubb.

A rare grass reported from Bombay and North Canara. Now it has been collected from Cannanore, Kerala. The present collections of this endemic grass form new representation in MH.

6. *Eragrostis tef* (Zucc.) Trotter

This rare grass was not previously reported from Kerala. The present collection from Alleppey form a new addition to MH.

7. *Ischaemum dalzellii* Stapf ex Bor

So far known only from North Canara and Bombay. Now it has been collected from Cannanore, Kerala.

SYSTEMATIC TREATMENT**KEY TO THE SUB-FAMILIES OF GRAMINEAE**

- 1a. Spikelets with 1-several florets, breaking up at maturity above the glumes, or if falling entire, but then not with 2 florets, often more or less laterally compressed **POOIDEAE**
- 1b. Spikelets strictly with 2 florets, falling entire at maturity, articulated below the glumes, usually with an upper bisexual floret and a lower male or barren, or the latter reduced to lemmas, often dorsally compressed **PANICOIDEAE**

PANICOIDEAE**Key to the tribes of Panicoideae**

- 1a. Spikelets unisexual, male and female spikelets in separate inflorescence or in different positions of the same inflorescence **MAYDEAE**
- 1b. Spikelets bisexual, or with male or barren and bisexual spikelets mixed in the same inflorescence :
- 2a. Spikelets similar, solitary or paired, glumes usually membranous, the lower often smaller or suppressed, lower lemma more or less similar to upper glume in texture; upper lemma usually without awns **PANICEAE**
- 2b. Spikelets dissimilar, often in pairs or in threes, one sessile and the other pedicelled, rarely solitary but then the upper lemma awned; glumes as long as the spikelets and enclosing the florets, more or less rigid; upper lemma usually awned **ANDROPOGONEAE**

PANICOIDEAE ANDROPOGONEAE

ANDROPOGONEAE Dumort

Dumort, Obs. Gram. Belg. 84; 141. 1823; Bor, Grass. Bur. Cey. Ind, Pak. 79. 1950.

Key to the genera of Andropogoneae

- 1a. Spikelets solitary, usually sessile and awned:
- 2a. Inflorescence a solitary, binete, digitate or sub-digitate raceme; spikelets laterally compressed, flat *Dimeria* 12
- 2b. Inflorescence a panicle; spikelets not laterally compressed, terete, chestnut-brown or black when mature *Cleistachne* 9
- 1b. Spikelets paired or rarely in threes, both sessile and pedicelled spikelets present or rarely the pedicelled spikelet reduced:
- 3a. Inflorescence a true or false panicle:
- 4a. Panicles of racemes interrupted by spathes:
- 5a. Aromatic grasses; racemes paired, usually one sessile and the other peduncled, collected into a much branched panicle *Cymbopogon* 10
- 5b. Grasses not aromatic; racemes fascicled:
- 6a. Basal joints of racemes bulbous; spikelets in threes, one sessile and the other two pedicelled; the terminal spikelet reduced to a broad, glume like pedicel *Apluda* 2
- 6b. Basal joints of racemes not bulbous; spikelets not as above:
- 7a. Racemes with 2 pairs of sessile involucral spikelets at base; awnless spikelets either sessile or pedicelled *Themeda* 30

- 7b. Racemes without 2 pairs of sessile involucrel spikelets at base; awnless spikelets always pedicelled *Pseudanthistiria* 22
- 4b. Panicles not interrupted by spathes:
- 8a. Panicles densely silky villous:
- 9a. Spikelets awned; leaves petiolate, elliptic or elliptic-lanceolate; lower glumes truncate and toothed at apex, with 5-9 prominent nerves *Spodiopogon* 23
- 9b. Spikelets awnless; leaves not distinctly petiolate, lanceolate or linear-lanceolate; lower glumes acute or acuminate, with 2-6 faint nerves.
- 10a. Panicles contracted, spiciform, up to 20 cm long; both spikelets in a pair pedicelled; low grasses, culms up to 150 cm high *Imperata* 17
- 10b. Panicles effuse, up to 50 cm long or more; one of the spikelets in a pair sessile, the other pedicelled; rather tall grasses, culms up to 3 m or more high *Saccharum* 25
- 8b. Panicles not silky villous:
- 11a. Lower glumes mucicate or spinulose; spikelets awnless; branches of panicles whorled *Vetiveria* 31
- 11b. Lower glumes smooth, not mucicate or spinulose; spikelets awned or awnless:
- 12a. Joints and pedicels with a translucent median line; upper lemma of the sessile spikelet reduced to a hyaline base of the awn:
- 13a. Branches and branchlets of panicles capillary, leaves up to 20 cm long; glumes never pitted; decumbent or trailing grasses *Capillipedium* 7

- 13b. Branches and branchlets of panicles not capillary; leaves larger, up to 100 cm long; glumes pitted or not, erect grasses *Bathriochloa* 6
- 12b. Joints and pedicels solid, without a translucent median line; upper lemma of the sessile spikelet well-developed, often bifid and awned in the sinus:
- 14a. Spikelets in threes, one sessile, the other two pedicelled; callus often sharp, golden-yellow or rufous-brown hairy; glumes usually aristate, rarely without arista but then low decumbent grasses *Chrysopogon* 8
- 14b. Spikelets paired; callus not as above; glumes never aristate:
- 15a. Spikelets of few pairs in racemes, dorsally compressed; panicles up to 60 cm or more long; primary branches verticillate or alternate; upper lemma of the sessile spikelet entire, 2-toothed or notched at apex *Sorghum* 28
- 15b. Spikelets of many pairs in racemes, not dorsally compressed; panicles up to 15 cm long; primary branches often solitary, alternate; upper lemma of the sessile spikelet deeply notched *Pseudosorghum* 23
- 3b. Inflorescence a solitary, digitate or sub-digitate raceme:
- 16a. Raceme solitary:
- 17a. Joints and pedicels fused; racemes cylindrical; upper lemma of the sessile spikelet awnless:
- 18a. Lower glume of the sessile spikelet orbicular cartilaginous, pitted; racemes fasciated *Hackelochloa* 15

- 18b. Lower glume of the sessile spikelet not as above; racemes not fasciated:
- 19a. Lower glume of the sessile spikelet either winged, or awned or both, often ridged, perforated or muricate *Glyphochloa* 14
- 19b. Lower glume of the sessile spikelet neither winged nor awned, often smooth and glabrous:
- 20a. Sessile spikelets solitary at each node; pedicelled spikelets present; joints and spikelets reduced to a tail like appendage towards apex *Rottboellia* 24
- 20b. Sessile spikelets paired at each node; Pedicelled spikelets absent; joints and spikelets uniformly developed, without a tail like appendage *Mnesithea* 26
- 17b. Joints and pedicels not fused; racemes not strictly cylindrical; upper lemma of the sessile spikelet awned:
- 21a. Lower glume of the sessile spikelet deeply grooved, with lyriform venation; upper glume awned; joints and pedicels clavate; groups of spikelets easily disarticulating *Sahima* 17
- 21b. Lower glume of the sessile spikelet not grooved; upper glume awned or not; joints and pedicels slender, not clavate; spikelets not disarticulating in groups:
- 22a. Upper glume awned; joints, pedicels and callus long bearded; racemes fragile *Pogonatherum* 21
- 22b. Upper-glume not awned; joints, pedicels and callus not as above racemes not fragile:

- 23a. Racemes terete; callus pungent ;
pedicelled spikelets twisted
around the sessile spikelets; awns
hairy, up to 10 cm long *Heteropogon* 17
- 23b. Racemes not terete; callus
obtuse, not pungent; spike-
lets not as above; awns more
or less glabrous, up to 5 cm long *Dichanthium* 11
- 16b. Racemes two to many:
- 24a. Lower glume of the sessile spikelet truncate or emarginate
at apex; spikelets closely imbricate; pedicelled spikelets
much reduced, usually represented by vestigial pedicels *Apocypis* 3
- 24b. Lower glume of the sessile spikelet acute or acuminate,
rarely rounded but never truncate or emarginate;
spikelets not as above:
- 25a. Upper lemma of the sessile spikelet reduced to a
hyaline base of the awn:
- 25a. Joints and pedicels with a translucent median
line; glumes often pitted *Bothriochloa* 6
- 25b. Joints and pedicels opaque or solid,
glumes never pitted *Dichanthium* 11
- 25b. Upper lemma of the sessile spikelet well-
developed, often cleft at apex into 2 lobes,
awned in the sinus:
- 27a. Lower glume of the sessile spikelet
with a median furrow on
dorsal side *Microstegium* 19
- 27b. Lower glume without a median
furrow on dorsal side:
- 28a. Upper lemma of the sessile spikelet
awned from the back, often just above
the base; lower glumes often muriculate or
spinulose, rarely smooth; pedicelled
spikelets reduced or not *Arthraxon* 4
- 28b. Upper lemma of the sessile spikelet awned
from the sinus, often from the middle;
lower glumes not as above; pedicelled spikelets
usually well-developed, rarely reduced but
then the joints toothed:

- 29a. Pedicelled spikelets usually reduced to small aristate glumes; joints and pedicels toothed; racemes solitary, frequently collected into a false panicle *Schizachyrium* 26
- 29b. Pedicelled spikelets well-developed; joints and pedicels not toothed; racemes binate, digitate or corymbose, but never paniced:
- 30a. Spikelets disarticulating in groups; upper glume of the sessile spikelet deeply notched and awned from the sinus; racemes always two *Bhidoa* 5
- 30b. Spikelets not disarticulating in groups; upper glume not deeply notched; racemes two to many:
- 31a. Spikelets of each pair similar, bisexual; racemes usually densely hairy, often 3-15, rarely solitary or 2 but then the glumes brownish *Eulalia* 13
- 31b. Spikelets of each pair dissimilar; sessile spikelets with male and bisexual florets; pedicelled spikelets usually male or rarely bisexual; racemes hairy or glabrous, often binate, rarely more than 3 but then the joints and pedicels slender, toothed:
- 32a. Lower glume of the sessile spikelet always smooth and chartaceous; joints and pedicels slender, solid, rarely toothed *Andropogon* 1
- 32b. Lower glume of the sessile spikelet usually coriaceous with several nodules and wrinkles, rarely smooth and chartaceous, but then racemes binate; joints and pedicels stouter, hollow, never toothed *Ischaemum* 18

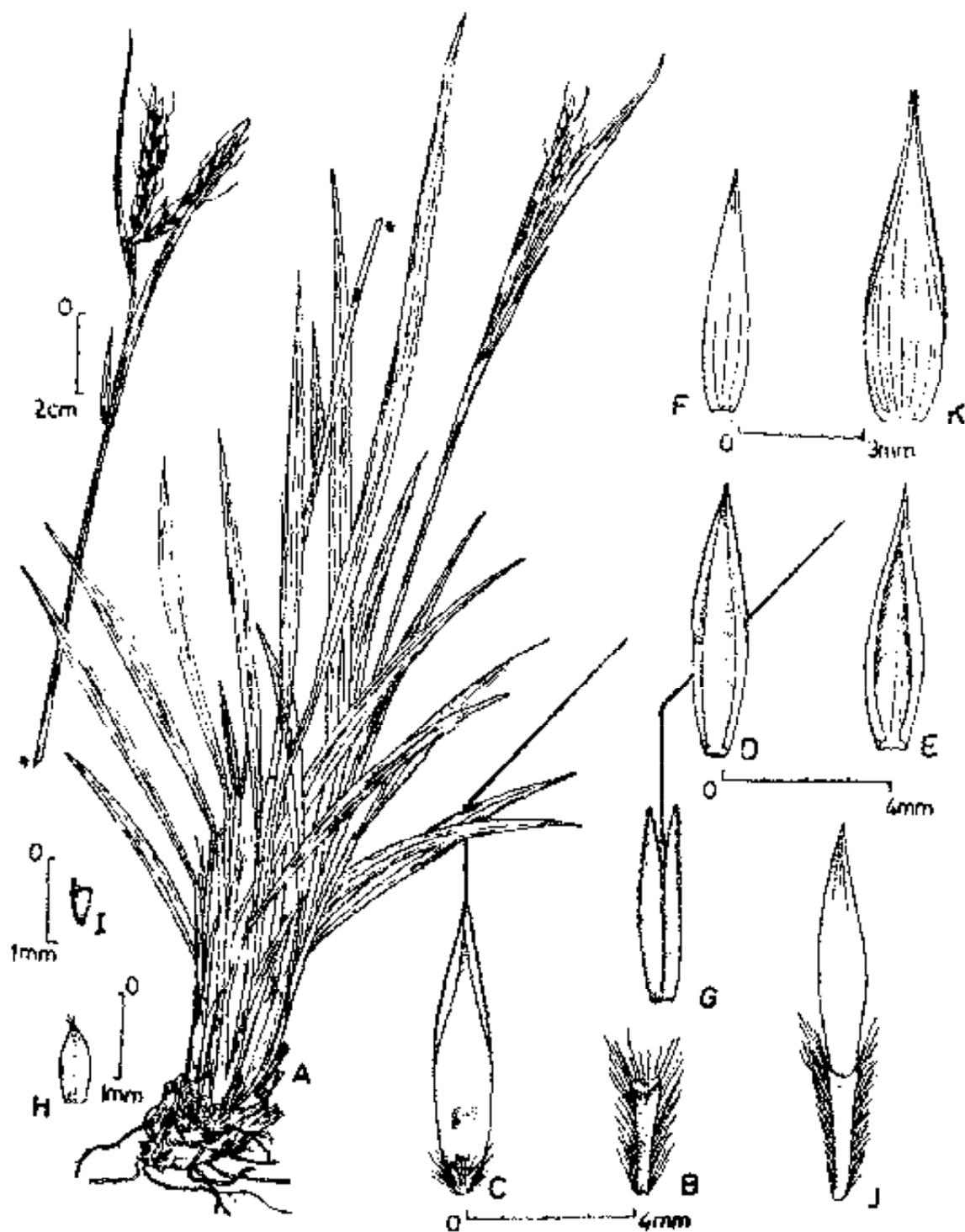


PLATE No. 1: *ANDROPOGON LIVIDUS* Thw.

A. Habit; B. Joint of raceme; C. Sessile spikelet; D. Lower glume of sessile spikelet; E. Upper glume; F. First lemma; G. Second lemma; H. Palea of the second lemma; I. Lodicula; J. Pedicelled spikelet; K. Lower glume of pedicelled spikelet.

1. ANDROPOGON Linn.

Linn. Gen. Pl. ed. 5. 468. 1754; Hook. f. Fl. Brit. Ind. 7: 164. 1896, p. p.; Fischer in Gamble, Fl. Pres. Madr. 1752. 1934 (Repr. ed. 3: 1214. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 89. 1960.

A genus of about 100 species distributed in the tropical regions of the world, of which about 9 occur in India and 2 in Kerala.

Key to the species

- 1a. Keels of the lower glumes of the sessile spikelets winged in the upper half; joints of racemes with denticulate tips *A. lividus* 1
- 1b. Keels of the lower glumes of the sessile spikelets not winged; joints of racemes without denticulate tips *A. polytychus* 2

1. *Andropogon lividus* Thw. Enum. Pl. Zeyl. 367. 1864; Hook. f. Fl. Brit. Ind. 7: 209. 1896; Fischer in Gamble, Fl. Pres. Madr. 1753. 1934 (Repr. ed. 3: 1255. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 91. 1960. PLATE No. 1

Tufted perennials. Culms 15-80 cm high, stout; nodes glabrous. Leaves lanceolate or linear-lanceolate, 5-20 x 0.2-0.6 cm, usually clustered at base, glabrous. Sheaths keeled. Ligules oblong, acute, membranous, 1-3 mm long. Racemes 1-3 together, 2-5 cm long, purplish, stout, sparsely villous; joints 2.5-3 mm, densely ciliate along the margins. Sessile spikelets elliptic-lanceolate, 6-8 mm long; callus shortly bearded; lower glume elliptic-lanceolate, 6-7 x 1-1.25 mm, 2-toothed or mucronate at apex, subcoriaceous, flat with a shallow depression near the base, 3-5-nerved, 2-keeled; upper glume boat-shaped, 6-7 x 1.5-1.75 mm, subcoriaceous, 3-nerved, margins infolded, hyaline, ciliate in the upper 2/3; lower floret empty; upper floret bisexual; first lemma lanceolate, 6-7 mm long, faintly 3-7-nerved, delicate, hyaline, margins infolded, ciliate in the upper 2/3; palea absent; second lemma notched, 4-5 x 0.5-0.7 mm, 3-nerved, median nerve prominent, delicate, hyaline, lobes sharply acute, ciliate on both the margins; awns 10-15 mm long, geniculate, column 5-6 mm long, bristles scabrid; palea oblong, 0.5-1 x 0.4-0.5 mm, acute, delicate, hyaline, with 2-3 long hairs at the tip; lodicules obovate, 0.5 x 0.25 mm, concave and 2 horned at apex; stamens 3, anthers

2-3 mm long; ovary c. 0.5 x 0.25 mm, styles 1-1.25 mm, slender stigmas 1-2 mm, feathery. Pedicelled spikelets elliptic-lanceolate, 6-9 mm long; pedicles c. 3 mm long, margins ciliate; lower glume elliptic-lanceolate, 7-9 x 1.5-2 mm, 2-toothed or mucronate at apex, subcoriaceous, 13-15-nerved, margins minutely winged and scabrid in the upper half; upper glume similar to that of sessile spikelet; lower floret empty; upper floret male; first lemma similar to that of sessile spikelet; second lemma oblong, 3.5-4 x 0.5-1 mm, notched, 3-nerved, delicate, hyaline, margins ciliate in the upper half; awn reduced to a mucron; palea similar to that of the sessile spikelet; stamens 3, anthers c. 2 mm long.

Occasional in grasslands of higher elevations.

Fl. & Fr.: August-February.

Notes: This highly variable species can be distinguished in the field by its peculiar purplish racemes with easily breaking joints.

IDUKKI: Eravikulam National Park, Umayamala, Anamudi slopes.

2. *Andropogon polytychus* Steud. Syn. Pl. Glum. 1: 380. 1854; Hook. f. Fl. Brit. Ind. 7: 198. 1896; Bor, Grass. Burm. Cey. Ind. Pak. 91, t. 1, 1960 (incl. var. *deccanensis*); Gupta in Madr. Agr. J. 51: 398. 1969; Shetty et al. in Bull. Bot. Surv. Ind. 15: 276. 1973. *A. polytychus* Steud. var. *deccanensis* Bor ex W. D. Clayton in Kew Bull. 27: 448. 1972. *Dichanthium polytychum* (Steud.) A. Camus in Bull. Mus. Hist. Nat. Paris 27: 549. 1921; Fischer in Gamble, Fl. Pres. Madr. 1741. 1934 (Repr. ed. 3: 1207. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 135. 1960.

Densely tufted perennials. Culms 50-90 cm high, stout; nodes bearded. Leaves linear-lanceolate or oblanceolate, 5-40 x 0.3-0.8 cm, erect, rigid, mid-rib broad, covered with dense tubercle-based hairs on both sides. Sheaths sparsely villous. Ligules very short, ovate, membranous. Racemes 2-5, 3-10 cm long, shortly peduncled, alternate, axils hairy; peduncle villous or glabrous below; joints 3-4 mm, margins long ciliate. Sessile spikelets oblong-lanceolate, 5-7 x 1-1.5 mm, callus bearded; lower glume lanceolate, 5-6 x 1.5-1.75 mm, chartaceous, 9-nerved, margins infolded, hispid in the upper half; upper glume boat-shaped or ovate-lanceolate when spread, 5-6 x 1-1.75 mm, chartaceous, 3-5-nerved, margins densely ciliate in the upper half. Lower floret empty. Upper floret bisexual. First lemma lanceolate, 6 mm long, delicate, faintly 3-5-nerved, margins ciliate in

the upper half; palea minute or absent. Second lemma shortly notched 2-3 mm long, delicate; awn 12-15 mm long, geniculate, column 5-6 mm long, brownish, bristle pale, scabrid; palea minute or absent, lodicules 2, obovate, each c. 0.5 x 0.25 mm, 2-horned at apex. Stamens 3; anthers 2-2.5 mm long, white with violet margins; ovary oblong, c. 0.5 mm, style 0.5-1 mm long, slender, stigmas 1.5-2.5 mm long, feathery, pink coloured. Pedicelled spikelets oblong-lanceolate, 5-7 x 1-2 mm; pedicels 2-3.5 mm long, ciliate along the margins; lower glume oblong, 5-7 mm long, acute, chartaceous, 13-15-nerved, margins minutely winged, hispid in the upper 3/4; upper glume boat-shaped, 5-5 mm long, chartaceous, 5-nerved, margins hyaline, ciliate in the upper 2/3. Lower floret empty. Upper floret male. First lemma and palea similar to those of sessile spikelet. Second lemma 4-5 mm long, oblong, delicate, faintly 3-nerved median nerve prominent, margins ciliate in the upper half; palea minute or absent. Stamens 3.

Fairly common along shallow streams, in high altitude grasslands, usually in swamps.

Fl. & Fr. : June-February.

Notes : In this species upper lemma of the sessile spikelet is not prominently 2-lobed, unlike other species of the genus. Probably due to this reason, Bor (*l. c.*) has treated this taxon under *Andropogon* Linn. as well as *Dichanthium* Willemet. But later on Clayton (*l. c.*) evaluated the species and treated it under *Andropogon* Linn.

Bor (*l. c.*) thought that the Indian materials belonged to a new variety *deccanensis* Bor and the typical variety is confined to Sri Lanka and Burma. He differentiated the varieties *polyptychus* and *deccanensis* as follows :

- | | |
|--|--|
| <p>1a. Leaves flat; racemes several; peduncle below inflorescence glabrous; awn 1.5 cm long</p> | <p><i>A. polyptychus</i> var. <i>polyptychus</i></p> |
| <p>1b. Leaves teriform; racemes 1 or 2, peduncle hairy below inflorescence; awn over 2 cm long</p> | <p><i>A. polyptychus</i> var. <i>deccanensis</i></p> |

Gupte (*l. c.*) reported the occurrence of *A. polyptychus* Steud. var. *polyptychus* for the first time in India based on the collections from the high altitudes of Nilgiris. After a critical study of Sri Lankan specimens available in MH and other fresh materials collected from

Nilgiris and Anamudi. Shetty *et al.* (*l. c.*) concluded that the two varieties show overlapping characters and all the diagnostic features mentioned by Bor are unreliable. Recent collections from Kerala also exhibit intermediate characters. A varietal or subspecific status for the Indian plant does not seem to be justifiable.

IDUKKI: Eravikulam National Park, Anamudi slopes, Umayamala,

2. APLUDA Linn.

Linn. Gen. Pl. ed. 5. 35. 1754; Hook. f. Fl. Brit. Ind. 7: 150, 1896; Bor, Grass. Bur. Cey. Ind. Pak. 93, 1960.

A monotypic genus in tropical regions of the world.

Apluda mutica Linn Sp. Pl. 82. 1753; Fischer in Gamble, Fl. Pres. Madr. 1750, 1934 (Repr. ed. 3: 1212, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 93. t. 7. 1960; Manilal & Sivaraj. Fl. Calic. 344, 1982. *A. aristata* Linn. Amoen. Acad. 4: 303. 1756; Fischer in Gamble, Fl. Pres. Madr. 1750, 1934 (Repr. ed. 3: 1212, 1957). *A. varia* Hack. in DC. Monogr. Phan. 6: 197. 1889, nom. superfl. based on *A. mutica* Linn.; Hook. f. Fl. Brit. Ind. 7: 150, 1896; Rang. & Tad. Handb. S. Ind. Grass. 171. t. 142-143. 1921.

Annuals or perennials. Culms 30-200 cm or more long, creeping or erect; nodes glabrous. Leaves elliptic-lanceolate or linear-lanceolate, 2-35 x 0.2-1.5 cm, attenuate, usually petiolate, glabrous or shortly villous on nerves. Ligules 1-3 mm, membranous. False panicles 5-50 cm long, interrupted. Racemes solitary from a peduncled spatheole, glabrous. Spatheole broadly-elliptic or ovate, 3-8 x 1-4 mm, acuminate or caudate, several nerved, margins hyaline, purple or green, ciliolate or glabrous. Sessile spikelets 3-8 mm long, laterally compressed, awned; lower glume lanceolate, 3-8 x 1-2 mm, shortly bifid, chartaceous or coriaceous, 9-15-nerved, margins narrowly winged in the upper half; upper glume boat shaped, 3-6 x 1-3 mm, beaked, keeled, chartaceous, faintly 5-11-nerved, keel ciliolate or glabrous; lower floret male. Upper floret bisexual. First lemma oblong-lanceolate, 2.5-5 x 0.5-1 mm, delicate, hyaline, faintly 3-5-nerved. Palea equal to lemma, 2-keeled, 2-nerved. Lodicule obovate, 0.25-0.5 mm, truncate. Stamens 3, anthers 1-2 mm long. Second lemma as long as the sessile spikelet, notched, delicate, hyaline, 3-nerved. Awn 5-15 mm long, glabrous; column 3-6 mm.

chestnut-brown. Palea ovate-acute, 1.5-2.5 x 0.5-1 mm, 2-keeled, delicate, hyaline. Stamens 3, anthers 2-4 mm long, cream with violet margins. Ovary oblong, 0.5-1 mm; styles 1-2 mm long, slender; stigmas 1.5-3 mm, pink, feathery. Sterile pedicelled spikelet lanceolate or slightly falcate, 3-8 x 0.5-1.5 mm, shortly bifid, flat, sub-coriaceous, 5-7-nerved, rarely pubescent, margins ciliate or ciliolate in the upper half. Pedicelled spikelet oblong-lanceolate, 3-6 x 1-1.5 mm; pedicel oblong, 2-5 mm long, flat, faintly 3-5-nerved, margins ciliolate. Lower glume lanceolate, 3-6 x 1-1.5 mm, chartaceous, 11-13-nerved. Upper glume ovate-lanceolate, equal in size and texture, 5-11-nerved, margins infolded. Florets more or less similar to those of sessile spikelet; upper lemma entire, unawned.

Very common, along the margins of streams, in scrub jungles of plains as well as hilly regions, in wastelands and hedges. Usually in shades.

Fl. & Fr. : August-December.

Notes : A highly variable species. Small, slender, annual forms with creeping and rooting culms as well as tall, stout perennial forms with erect and tufted culms were observed in the area. Hackel described several varieties within this species. As Bor (*l. c.*) states, none of them can be maintained as separate entities.

CANNANORE : Ezhimala; IDUKKI : Munnar, Pullupara, Thekadi; KOTTAYAM : Mundakkayam; PALGHAT : Aruvampara, Silent Valley; TRICHUR : Thumbermozhi, Peechi; TRIVANDRUM : Kariavattom, Sreekaryam, Klamala R.F., Neyyar, Kovalam, Kottur; WYNAAD : Meppadi.

3. APOCOPIS Nees

Nees in Proc. Linn. Soc. Lond. 1: 93, 1841; Bor, Grass. Bur. Cey. Ind. Pak. 94, 1960.

A genus of about 10 species, distributed in the eastern Asia, of which about 5 species occur in India and one in Kerala. Occurrence of *A. courtallumensis* in the study area is not certain.

Apocopis mangalorensis (Hochst.) Hem. in Blumea 4: 523, 1941; Bor, Grass. Bur. Cey. Ind. Pak. 96, 1960; Manilal & Sivaraj. Fl. Calic. 332, 1982. *Amblyachyrum mangalorensis* Hochst. Flora 39: 26, 1856.

PLATE No. 2

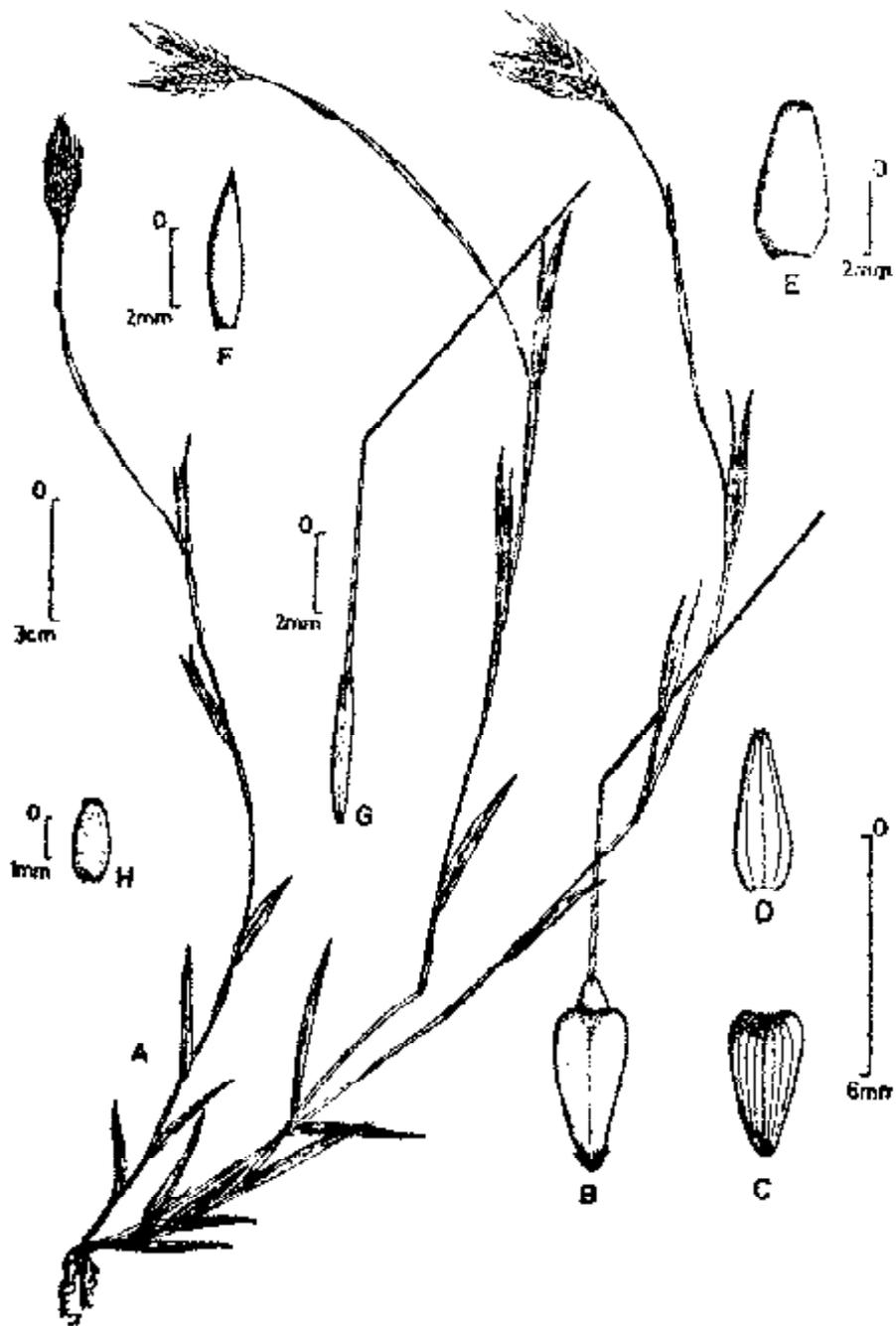


PLATE No. 2: *APOCOPIS MANGALORENSIS* (Hochst.) Henr.

A. Habit; B. Spikelet; C. Lower glume; D. Upper glume; E. First lemma; F. Palea of the first lemma; G. Second lemma; H. Palea of the second lemma.

Annuals. Culms 10-40 cm high, erect or decumbent; nodes glabrous. Leaves lanceolate, 1-4 x 0.2-0.4 cm, covered with tubercled hairs on dorsal side. Sheaths keeled, covered with tubercled hairs towards upper half. Ligules ovate, membranous. Racemes solitary or paired, 1-3 cm long. Spikelets oblanccolate, awned, 4-5 mm long, pale yellow to brown. Lower glume obovate, 3-4 x 2 mm, subcoriaceous, 7-nerved, retuse and cilliolate at apex, softly pubescent along the dorsal side. Upper glume oblong-lanceolate or linear, 3.5-4 x 1-1.5 cm, chartaceous, bifid and cilliolate at apex, 3-nerved, keeled. Lower floret male or empty. Upper floret bisexual. First lemma ovate-oblong, 3.5-4 x 1.5-2 mm, truncate and fimbriate at apex, delicate, hyaline. Palea lanceolate, 3.5-4 x 1 mm, delicate, hyaline. Stamens 2; anthers c. 1.5 mm long, dirty-yellow or pink. Second lemma linear, 3.5-4 x 0.5 mm, chartaceous, 3-nerved, slightly notched, awned; awn 10-15 mm long; column 5-8 mm long. Palea ovate-oblong, c. 2 x 1 mm, fimbriate at apex, delicate, hyaline, glabrous. Stamens 2; anthers c. 2.5 mm long, yellow or pink. Ovary oblong, c. 0.5 mm; styles 1-1.5 mm, stigmas 1-2 mm long, cream-yellow.

Fairly common in dry rocky grasslands, in association with grasses like *Dimeria bialata*, *Heteropogon contortus*, *Danthonidium gammiei*; usually in drier areas.

Fl. & Fr. : August-December.

Notes : This species is often wrongly identified in various herbaria as *A. courtallumensis*. Many specimens at MH wrongly identified as *A. courtallumensis*, turned out to be *A. mangalorensis*. It can easily be distinguished from the former, by the slender, annual habit and smaller spikelets.

CALICUT : Pokkunnamala; CANNANORE : Mukkarikandam, Paramba; PALGHAT : Thiruvizhamkunnu.

4. ARTHRAXON P. Beauv.

P. Beauv. Ess. Agrost. 111; t. 11. 1812; Hook. f. Fl. Brit. Ind. 7: 143. 1896; Fischer in Gamble, Fl. Pres. Madr. 1726. 1934 (Repr. ed. 3: 1196. 1957); Bor. Grass. Bur. Cey. Ind. Pak. 96. 1960; Jain in J. Ind. Bot. Soc. 51: 165. 1972; van Welzen in Blumea 27(1): 260. 1981.

A genus of about 50 species and 20 varieties distributed from Africa through Asia up to Japan in the East and Australia in the South-east, of which about 25 species and 3 varieties occur in India; 5 species in Kerala. Jain (*l.c.*) and van Welzen (*l.c.*) provide excellent treatments of the genus. van Welzen has reduced several Indian species to varieties. However, as the distinction between the different species are very clear within the region of the present study, the views of Bor (*l.c.*) and Jain (*l.c.*) are followed here.

Key to the species

- 1a. Pedicelled spikelets developed:
- 2a. Spikelets 2-3 mm long; glumes aristate; stamens 2; anthers up to 0.5 mm long *A. lanceifolius* 2
- 2b. Spikelets 5-6 mm long; glumes not aristate; stamens 3; anthers 1-2 mm long:
- 3a. Lower glume of the sessile spikelets villous, margins ciliate; nerves on the glumes indistinct; leaves ovate, acute; anthers 1 mm long *A. villosus* 5
- 3b. Lower glume of the sessile spikelets not villous, margins spinulose; glumes with 5-7 distinct nerves; leaves lanceolate, acuminate; anthers 2 mm long *A. lanceolatus* 1
- 1b. Pedicelled spikelets not developed:
- 4a. Pedicels 2-3 mm long, linear; stamens 3; joints 4 mm long, glabrous *A. nudus* 3
- 4b. Pedicels reduced to minute points; stamens 2; joints 2-2.5 mm long, ciliate *A. quartianus* 4

1. *Arthraxon lanceolatus* (Roxb.) Hochst, in Flora 39: 188, 1856; Hook. f. Fl. Brit Ind. 7: 143, 1896; Fischer in Gambia, Fl. Pres. Madr. 172B, 1934 (Repr. ed. 3: 1198, 1957); Bor, Grass. Bur. Cey. Ind. Pak, 100, 1960; Jain in J. Ind. Bot. Soc. 51: 175, 1972; van Welzen in Blumea 27(1): 281, 1981, p. p. *Andropogon lanceolatus* Roxb. Fl. Ind. 1: 262, 1820. PLATE No. 3.

Annuals or stoloniferous perennials. Culms, 20-80 cm long, geniculate; nodes glabrous. Leaves lanceolate, acuminate, 1-5 x 0.2-0.8 cm, rounded at base, margins ciliate towards base. Ligules membranous, thin. Racemes digitate, 2-4 in number, each 2-5 cm long. Joints 2.5-3 mm long, densely ciliate. Sessile spikelets lanceolate,

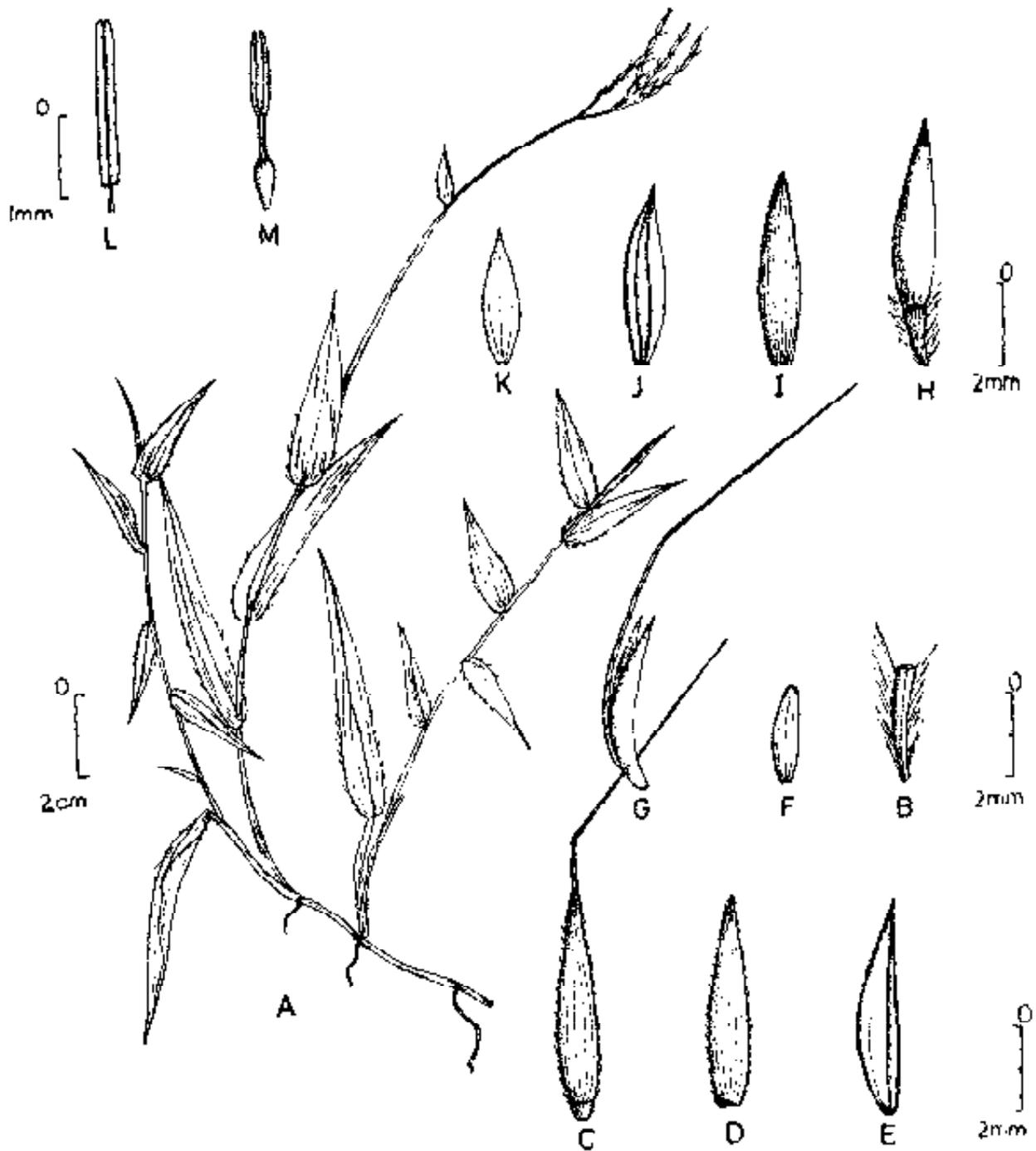


PLATE No. 3: *ARTHRAOXON LANCEOLATUS* (Roxb.) Hochst.

A. Habit; B. Joint of raceme; C. Sessile spikelet; D. Lower glume of sessile spikelet; E. Upper glume; F. First lemma; G. Second lemma; H. Pedicelled spikelet; I. Lower glume of pedicelled spikelet; J. Upper glume; K. Second lemma; L. Stamen; M. Pistil.

5-6 mm long, callus sparsely bearded. Lower glume lanceolate, 5-6 x 1 mm, chartaceous, 7-nerved, margins echinate. Upper glume boat-shaped, c. 5 x 1.5 mm, keeled, chartaceous, 3-nerved, scabrid towards apex, margins hyaline, retrorsely ciliate. Lower floret empty. Upper floret bisexual. First lemma linear-oblong, 2-3 x 0.5 mm, delicate, hyaline, faintly 2-3-nerved. Second lemma deeply notched, c. 4 x 1 mm, delicate, hyaline, awned. Awn 10-12 mm long, column 5-6 mm. Stamens 3, anthers c. 2 mm long. Ovary c. 0.5 mm, oblong or oblanceolate; styles c. 0.5 mm long; stigmas c. 1 mm long, cream coloured. Pedicelled spikelets lanceolate, 4-5 mm long. Pedicels 1-1.5 mm long. Lower glume elliptic-lanceolate, 4.5 x 1 mm, chartaceous, 6-7-nerved, scabrid towards apex. Upper glume elliptic-lanceolate, 4-4.5 x 1 mm chartaceous, faintly 3-5-nerved, margins infolded, hyaline, retrorsely ciliate. Second lemma elliptic-lanceolate, c. 3 x 1 mm, delicate, hyaline, faintly 3-nerved, glabrous. Palea similar to that of the sessile spikelets. Stamens 3; anthers 1-2 mm long.

Rare, along the hill slopes at higher altitudes, usually in moist situations.

Fl. & Fr. : August-December.

Notes : This rare and endemic grass is represented in MH only by two very old collections of C.A. Barber made in 1902 and 1905 from Tamil Nadu. While revising the *Arthraxon* in India, Jain recorded the following note on one of these sheets: 'Preserve this specimen carefully and try to collect the grass again' This clearly emphasizes the rarity of the species. Mehrotra (1979) also indicates the extreme rarity of this grass after analysing the available Indian collections. Recently, this grass was observed to be growing on hill tops in Munnar, Idukki district, where also it was rare.

This species is often confused with *Arthraxon prionodes* but can be distinguished by the peculiar striate ornamentation of the lower glumes.

IDUKKI : Munnar.

2. *Arthraxon lancifolius* (Trin.) Hochst, in Flora 39: 188, 1856; Fischer in Gamble, Fl. Pres. Madr. 1729, 1934 (Repr. ed. 3: 1198, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 100, 1960; Jain in J. Ind. Bot. Soc. 51: 176, 1972; van Walzen in Blumea 27: 288, 1981; Manilal & Sivaraj, Fl. Calic. 334, 1982. *Andropogon lancifolius* Trin. in Mem. Acad. Sci. Petersb. Ser. 6(2):

271. 1832. *Arthraxon microphyllum* (Trin.) Hochst. in Flora 39: 188. 1856; Hook. f. Fl. Brit. Ind. 7: 147. 1896. *Andropogon microphyllum* Trin. l. c. 275.

Annuals. Culms creeping and geniculate; nodes softly hairy. Leaves ovate-lanceolate, acuminate, 0.5-5 x 0.2-1 cm, rounded at base, softly villous or glabrous. Sheaths slightly keeled. Ligule a row of hairs. Racemes digitate, 3-8 in number, each 0.5-3 cm long. Joints 1-1.5 mm long, densely villous, hairs 1-2 mm long. Sessile spikelets lanceolate-acuminate, 2.5-3 mm long, greenish-yellow. Lower glume lanceolate, 2-3 mm long, bifid, shortly aristate, chartaceous, faintly 5-nerved. Upper glume lanceolate, c. 2 mm long (excluding an arista of 1 mm), keeled, chartaceous, margins hyaline. Lower floret empty. Upper floret bisexual. First lemma oblong, 0.5-1 mm, delicate, hyaline, glabrous. Second lemma lanceolate, c. 1 x 0.5 mm, deeply notched, awned, delicate, hyaline. Awn 6-8 mm long, column 2-3 mm. Stamens 2; anthers 0.25-0.5 mm, pink. Ovary linear-oblong, 0.25-0.5 mm; styles very short; stigmas c. 0.5 mm long, white, feathery. Pedicelled spikelet lanceolate, 1.5-2 mm, empty. Lower glume ovate-lanceolate, c. 1.5 x 0.75 mm, chartaceous, faintly 5-nerved, glabrous. Upper glume ovate-lanceolate, 1-1.5 x 0.5 mm, chartaceous.

Fairly common along hill slopes, raised bunds, rocky places and on compound walls, old forts and fences; usually in moist situations.

Fl. & Fr. : September-December.

Notes : This grass can be confused with *Arthraxon quartinianus* by its apparently similar habit and habitat but can be distinguished from the latter by the presence of well developed pedicelled spikelets.

IDUKKI : Peermade; KASARAGOD : Kasaragod.

3. *Arthraxon nudus* (Steud.) Hochst. in Flora 39: 188. 1856; Bor, Grass. Bur. Cey. Ind. Pak. 101. 1960; Jain in J. Ind. Bot. Soc. 51: 178. 1972. *Andropogon nudus* Steud. Syn. Pl. Glum. 1: 383. 1854. *Arthraxon hispidus* auct. non Makino 1912; Fischer in Gamble, Fl. Pres. Madr. 1728. 1934 (Repr. ed. 3: 1198. 1957); van Welzen in Blumea 27: 266. 1981, p. p. *A. ciliaris* sensu Hook. f. Fl. Brit. Ind. 7: 145. 1896, p. p. non P. Beauv. 1812.

Annuals. Culms 20-100 cm long, creeping and geniculate; nodes bearded. Leaves ovate-lanceolate, 1-8 x 0.4-2 cm, cordate or auriculate at base, ciliate along the margins. Sheaths villous and ciliate along the margins. Ligules membranous, thin, fimbriate. Racemes digitate or subdigitate, 3-12 in number, 2-6 cm long. Joint c. 4 mm long, angular. Sessile spikelets lanceolate, 4-5 mm long, callus sparsely bearded. Lower glume lanceolate, c. 4 x 1 mm, chartaceous, 9-nerved, scabrid along the nerves. Upper glume boat-shaped or lanceolate when spread, 3-4 mm long, margins hyaline, retrorsely ciliate. Lower floret empty. Upper floret bisexual. First lemma linear, 2.5-3 x 0.5 mm, 1-nerved, delicate, hyaline, glabrous. Second lemma deeply notched, 2-3 mm long, awned, delicate, hyaline. Awn 10-12 mm, slender, column 4-5 mm long. Stamens 3; anthers 0.25-0.5 mm long, deep violet coloured. Ovary oblong, c. 0.3 mm; styles c. 0.5 mm long; stigmas c. 0.5 mm, pinkish. Pedicelled spikelets reduced to linear pedicels, c. 3 mm long.

Occasional along raised bunds, creeping along the fences, hill slopes and growing as a weed in pepper plantations; usually in moist and shady places.

Fl. & Fr. : September-March.

Notes : This species very closely resembles *Arthraxon hispidus* and to a certain extent *A. quartinianus*, but can be easily distinguished from them by the presence of 3 perfect stamens, minute anthers and long slender pedicels. Fischer (*l. c.*) wrongly identified this species and kept it under *A. hispidus*. He has cited the collections of C. A. Barber from Malabar. But, all the specimens represented in MH including Barber's collections from Malabar belong to *A. nudus* only. Moreover, the other species, *A. hispidus* seems to be confined to eastern India. Bor (*l. c.*) could observe the latter species only from Naga Hills. Jain (*l. c.*) in his revision also says, 'though this grass has been reported from eastern India, I have not seen any specimen which I could refer to this species with certainty'. Critical study of the specimens available in MH reveals that the south Indian material is only *A. nudus*.

This grass has leaves with a very bitter taste; hence cattle and buffaloes do not prefer it.

CANNANORE : Taliparamba ; KASARAGOD : Bandudke;
WYNAAD : Meppadi.

4. *Arthraxon quartinianus* (A. Rich.) Nash in N. Amer. Fl. 17: 99. 1912; Fischer in Gamble, Fl. Pres. Madr. 1728. 1934 (3: 1198. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 102. 1960; Jain in J. Ind. Bot. Soc. 51: 179. 1972; Manilal & Sivaraj. Fl. Calic. 334. 1982. *Alectoridia quartiniana* A. Rich. Tent. Fl. Abyss. 2: 448. t. 99. 1851. *Arthraxon hispidus* sensu van Welzen in Blumea 27: 266. 1981, p. p., non Makino 1912. *A. ciliaris* sensu Hook. f. Fl. Brit. Ind. 7: 145. 1896, p. p., non P. Beauv. 1812.

Annuals. Culms 10-50 cm long, slender, creeping or geniculate; nodes bearded. Leaves ovate-acuminate or lanceolate, 1-5 x 0.3-1 cm, rounded or shallowly cordate at base, villous or glabrous, margins ciliate towards base. Sheaths covered with tubercled hairs. Ligules ovate, membranous, fimbriate. Racemes 3-8 in number, each 1-3 cm long. Joints linear, 2-2.5 mm long, ventrally grooved, ciliate. Sessile spikelets lanceolate, 3-3.5 mm long, laterally compressed, purplish-green; callus shortly bearded. Lower glume ovate-lanceolate when spread, 3-3.5 x 1 mm, acuminate, chartaceous, 7-nerved. Upper glume boat-shaped, lanceolate when spread, 3-3.5 x 1 mm, chartaceous, faintly 3-5-nerved, margins hyaline, apex puberulous. Lower floret empty. Upper floret bisexual. First lemma lanceolate, 1-2 x 0.5 mm, delicate, faintly 1-3-nerved, hyaline. Second lemma deeply notched, 1.5-2 mm long, awned, delicate, hyaline. Awns 5-10 mm long, column 3-4 mm. Stamens 2, anthers 0.5 mm long. Ovary oblong, c. 0.3 mm; styles c. 0.5 mm; stigmas c. 0.4 mm, cream coloured. Pedicelled spikelets reduced to glabrous points.

Often found along roadsides at higher altitudes, hill slopes, swampy places and barren fields forming thick carpets.

Fl. & Fr. : June-January.

Notes : This species shows a gradation of variation in size as well as shape especially in the case of the leaves.

It may be confused with *A. nudus*, but can be distinguished by the presence of 2 perfect stamens only and minute glabrous points of pedicels. The racemes are slender, and more in number, with villous joints and pedicels.

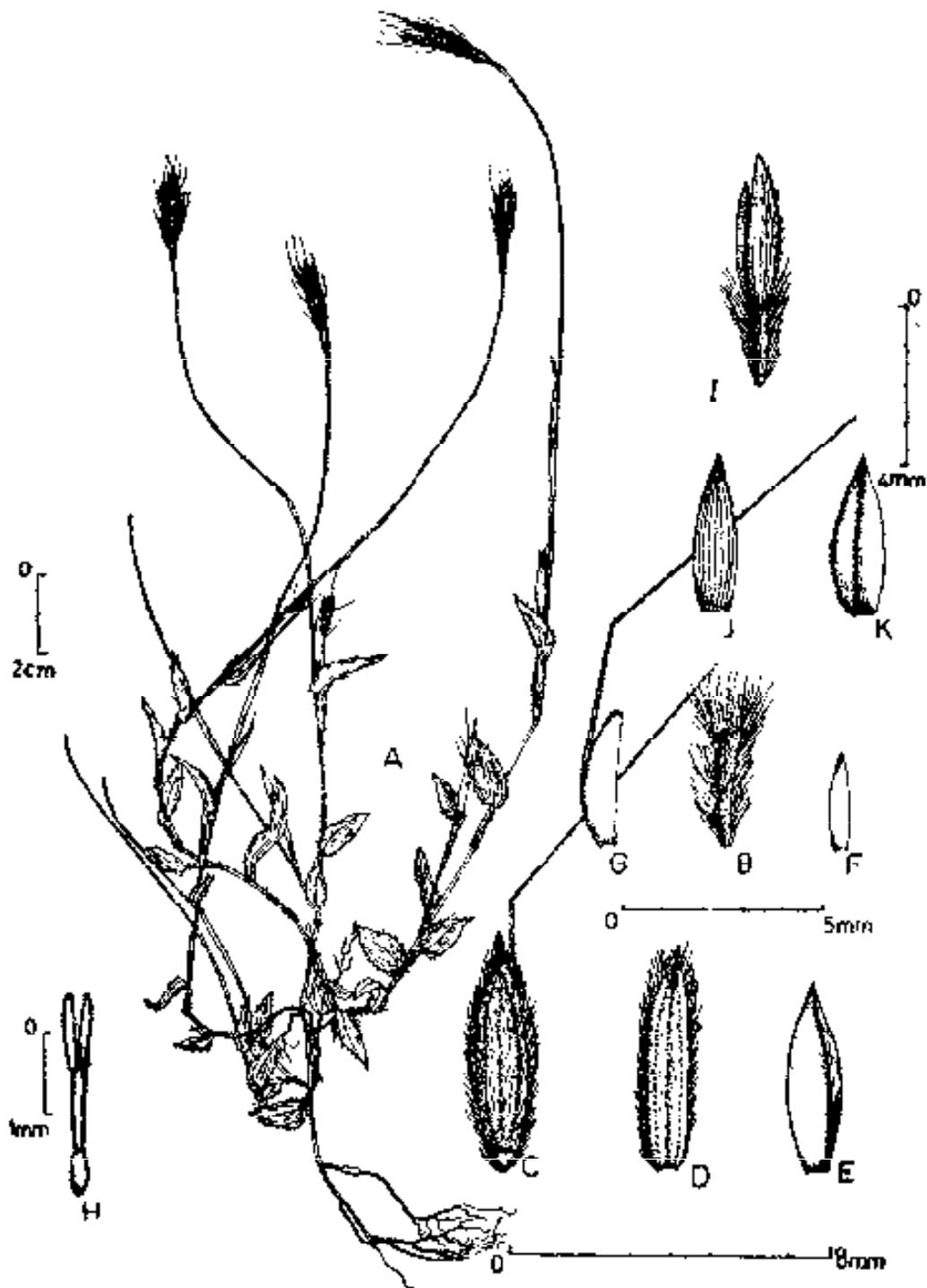


PLATE No. 4: *ARTHRAOXON VILLOSUS* C. E. C. Fischer

A. Habit; B. Joint of raceme; C. Sessile spikelet; D. Lower glume of sessile spikelet; E. Upper glume; F. First lemma; G. Second lemma; H. Pistil; I. Pedicelled spikelet; J. Lower glume of pedicelled spikelet; K. Upper glume.

This grass can be used as a good soil binder, especially for newly raised bunds and road cuttings.

IDUKKI: Munnar, Peermade; WYNAAD: Meppadi.

5. *Arthraxon villosus* C. E. C. Fischer in Kew Bull. 1933: 350, 1933, et in Gamble, Fl. Pres. Madr. 1728, 1934 (Repr. ed. 3: 1198, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 103, 1960, Jain in J. Ind. Bot. Soc. 51: 182, 1972; Nair *et al.* in J. Econ. Tax. Bot. 3: 270, 1982. *A. lanceolatus* (Roxb.) Hochst. var. *villosus* (Fischer) van Welzen in Blumea 27(1): 288, 1981. PLATE No. 4

Annuals. Culms 5-40 cm long, creeping; nodes bearded. Leaves ovate, acute, 0.5-3 x 0.2-0.8 cm, rounded at base, densely villous, margins ciliate. Sheaths villous with tubercled hairs. Ligules ovate, membranous, fimbriate. Racemes 2-3 in number, 1-4 cm long. Joints c. 3 mm long, densely villous. Sessile spikelets lanceolate, c. 6 x 1 mm, densely villous. Lower glume lanceolate, 5-6 mm long, subcoriaceous, densely villous, keeled and echinulate along the margins. Upper glume boat-shaped, 4-5 x 1-1.5 mm, chartaceous, margins hyaline. Lower floret empty. Upper floret bisexual. First lemma oblong-lanceolate, 2-2.5 x 0.5 mm, delicate, hyaline, glabrous. Second lemma deeply notched, 3-3.5 x 1 mm, awned, delicate, hyaline. Awn 12-15 mm long, column 5-6 mm. Stamens 3, anthers c. 1 mm long. Ovary oblong, c. 0.5 mm; stylee c. 1 mm; stigmas c. 1 mm, feathery. Pedicelled spikelets lanceolate c. 4 x 1 mm, usually empty. Pedicels linear-clavate, 2 mm long, densely villous. Lower glume elliptic-lanceolate, 3.5-4 x 1.25 mm, chartaceous, 7-nerved, scabrid towards apex. Upper glume ovate-lanceolate, 3-4 x 1.5 mm, chartaceous, 3-nerved.

Rare, along the moist shady hill slopes at higher elevations.

Fl. & Fr.: October-December.

Notes: Very rare grass. In MH, there is only an incomplete specimen collected from the type locality, on which no data are recorded. Jain (*l. c.*) gives its distribution as Mysore and Maharashtra in Peninsular India. The present collections of this endemic grass from a hilly area of Kerala widens its known range of distribution.

van Welzen (*l. c.*) has treated this grass as a variety of *A. lanceolatus*, in his revision of the genus. He says that this plant also shows a kind of evolutionary sequence in the pubescence and

scabrousness of the lower glumes of the sessile spikelets, like its allied forms. But the typical *A. lanceolatus* differs qualitatively and quantitatively very much from *A. villosus*. The south Indian materials available in MH were critically studied and it was found worth keeping them under separate species. Both of them can easily be distinguished as given in the Table.

| <i>A. lanceolatus</i> | <i>A. villosus</i> |
|--|---|
| 1. Leaves lanceolate, acuminate, glabrous | Leaves ovate-acute, villous. |
| 2. Spikelets glabrous | Spikelets densely villous |
| 3. Lower glumes of the sessile spikelets striate, distinctly nerved, margins spiculate | Glumes densely villous, nerves indistinct, margins ciliate. |
| 4. Keels of the lower glume not winged | Keels of the lower glume winged |

Few of our specimens were examined by van Welzen of Rijksherbarium, Leiden. He opined that (pers. comm.) 'in aberrant forms lower glumes show a gradation in the indumentum' Still it was thought to be better to maintain *Arthraxon villosus* as a separate species till a detailed biosystematic study is made.

IDUKKI : Munnar.

5. BHIDEA Stapf ex Bor

Stapf ex Bor in Kew Bull. 1948: 445, 1949 et in Grass. Bur. Cey. Ind. Pak. 103, 1960.

A genus of about 2 species distributed in India including Kerala, of which one is new to Science.

Key to the species

- 1a. Awns up to 20 mm long, slender; abscission of rachis slightly oblique, 0.5 mm long; joints 2-3 mm long, stout; callus up to 1 mm long; spikelets 6-8 mm long

B. burniana 1

- 1b. Awns 35-45 mm long, stout; abscission of rhachis extremely oblique, 1.5-2 mm long; joints 4-5 mm long, slender; callus 2-3 mm long; spikelets 10-12 mm long

B. fischeri 2

1. *Bhídea burnsiana* Bor in Kew Bull. 1948: 445. 1949 et in Grass. Bur. Cey. Ind. Pak. 103. t. 2. 1960, PLATE No. 5

Annuals. Culms 10-30 cm high, erect; upper nodes villous, lower ones glabrous. Leaves lanceolate, 2-12 x 0.1-0.3 cm, midrib prominent, margins serrulate. Sheaths keeled. Ligules membranous, fimbriate at apex. Racemes 1 or 2, 3-4 cm long, shortly exserted from spathes; joints turbinate, 2-3 mm long, slightly oblique at apex, coriaceous, densely villous on one side. Spikelets greenish-yellow, in groups of 2, one sessile, the other pedicelled. Sessile spikelets lanceolate, 6-7 mm long (excluding an arista, 2-3 mm), awned callus c. 1 mm, densely villous; lower glume lanceolate, 6-7 x 1-1.5 mm, acuminate, coriaceous, faintly 3-5-nerved, keels broadly winged, wings unequal in width, hyaline; upper glume 3-lobed, 4-5 x 1.5-2 mm, with a broad arista 2-3 mm long, subcoriaceous, faintly 5-7-nerved, margins hyaline; lemma notched, 4-5 x 1.5-2 mm, awned, chartaceous, margins hyaline, awns 15-20 mm long, geniculate; column 6-7 mm, chestnut brown, bristle pale, scaberulous; palea ovate-acute, c. 1 x 0.5 mm, delicate, hyaline; stamens 3, anthers 1-2 mm long, cream coloured; ovary c. 0.5 mm, oblong; styles 1.5-2 mm long, slender; stigmas c. 1 mm long, cream coloured; grain oblong, 1.5-2 x 0.5 mm. Pedicelled spikelets oblique lanceolate, 6-7 mm long, empty; pedicels turbinate, 2-3 mm long, densely villous on one side; callus sparsely bearded; lower glume oblique-lanceolate, 6-7 x 1.5-2 mm, chartaceous, faintly 3-5-nerved, broadly winged on one side, wing hyaline; upper glume lanceolate, 6-7 x 1 mm, chartaceous, faintly 3-nerved, keeled, margins delicate, hyaline.

Rare; along dry, rocky grasslands and plateau, along with a few species of *Dimeria*.

Fl. & Fr. : August-December.

Notes : This rare grass was so far known to be endemic to Bombay.

CANNANORE : Periy, Mugu Road,

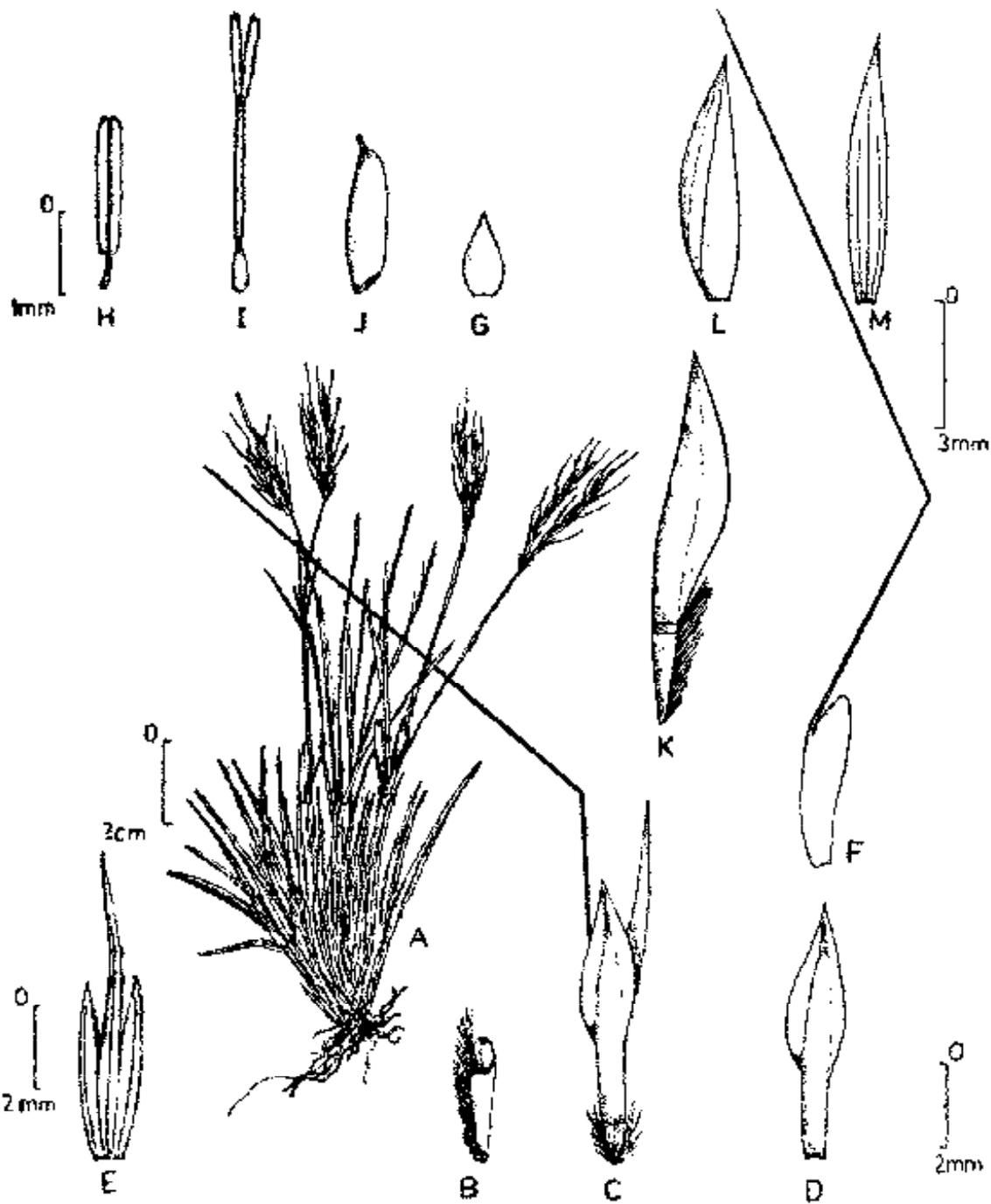


PLATE No. 5: *BHIDEA BURNSIANA* Bor

A. Habit; B. Joint of raceme; C. Sessile spikelet; D. Lower glume of sessile spikelet; E. Upper glume; F. Lemma; G. Palea; H. Stamen; I. Pistil; J. Grain; K. Pedicelled spikelet; L. Lower glume of pedicelled spikelet; M. Upper glume.

2. *Bhidea fischeri* P. V. Sreekumar & B. V. Shetty in Kew Bull, 42(3) : 683-685. 1987. PLATE No. 8

Annuals. Culms 20-40 cm high, erect; upper nodes villous, lower ones glabrous. Leaves lanceolate, 1-8 x 0.1-0.3 cm, base narrow. Sheaths slightly keeled. Ligules membranous, truncate at apex. Racemes 1 or 2, 1-4 cm long, shortly exerted from spathes; joints linear-turbinate, 4-5 mm long, extremely oblique at apex, coriaceous, densely villous on one side. Spikelets greenish-yellow, in groups of 2 or 3, one sessile and the other pedicelled. Sessile spikelets lanceolate, 10-12 mm long (excluding an arista, 4-5 mm), awned; callus sharply acute, 2-3 mm long, densely silky villous; lower glume lanceolate, acuminate, 7-8 x 1-1.5 mm, coriaceous, faintly 3-5-nerved, keels narrowly winged, wings subequal, hyaline; upper glume 3-lobed, 5-6 x 1.5-2 mm, with a broad arista 6-8 mm long, coriaceous, faintly 5-7-nerved, margins infolded, hyaline; lemma notched, 4-5 x 1-1.5 mm, awned, subcoriaceous, margins delicate, hyaline; awns 35-45 mm long, geniculate, column 14-16 mm, chestnut brown, bristle pale, scaberulous; palea ovate-acute, 1.5-2 x 0.75 mm, delicate, hyaline; stamens 3, anthers 1.5-2 mm long; grain oblong, 3-4 x 1 mm. Pedicelled spikelets lanceolate, acuminate, 10-12 mm long, empty; pedicels turbinate, 3-4 mm long, densely villous on one side; callus glabrous or sparsely bearded; lower glume oblique-lanceolate, acuminate, 7-10 x 1.5-2 mm, chartaceous, faintly 7-9-nerved, broadly winged on one side, wing hyaline; upper glume lanceolate, shortly aristate, 10-12 x 1 mm, chartaceous, faintly 3-nerved, slightly keeled, margins hyaline.

Rare, in open grasslands and dry rocky plateau growing along with *Bhidea burnsiiana* Bor and a few *Dimeria* spp.

Holotype: KERALA, CANNANORE: Mukkarikandam, ± 50 m. 18-10-1981, P. V. Sreekumar 71754 (CAL). Isotypes in K and MH.

6. BOTHRIOCHLOA O. Kuntze

O. Kuntze, Rev. Gen. Pl. 2: 762. 1891; Bor, Grass, Bur, Cey. Ind, Pak. 103. 1960.

A genus of about 36 species distributed in tropics, of which 17 are in India; 4 in Kerala.

Hackel (1889) in his monograph of Andropogoneae recognizes 11 subgenera including *Amphilophis* Trin. and *Dichanthium* Hack.

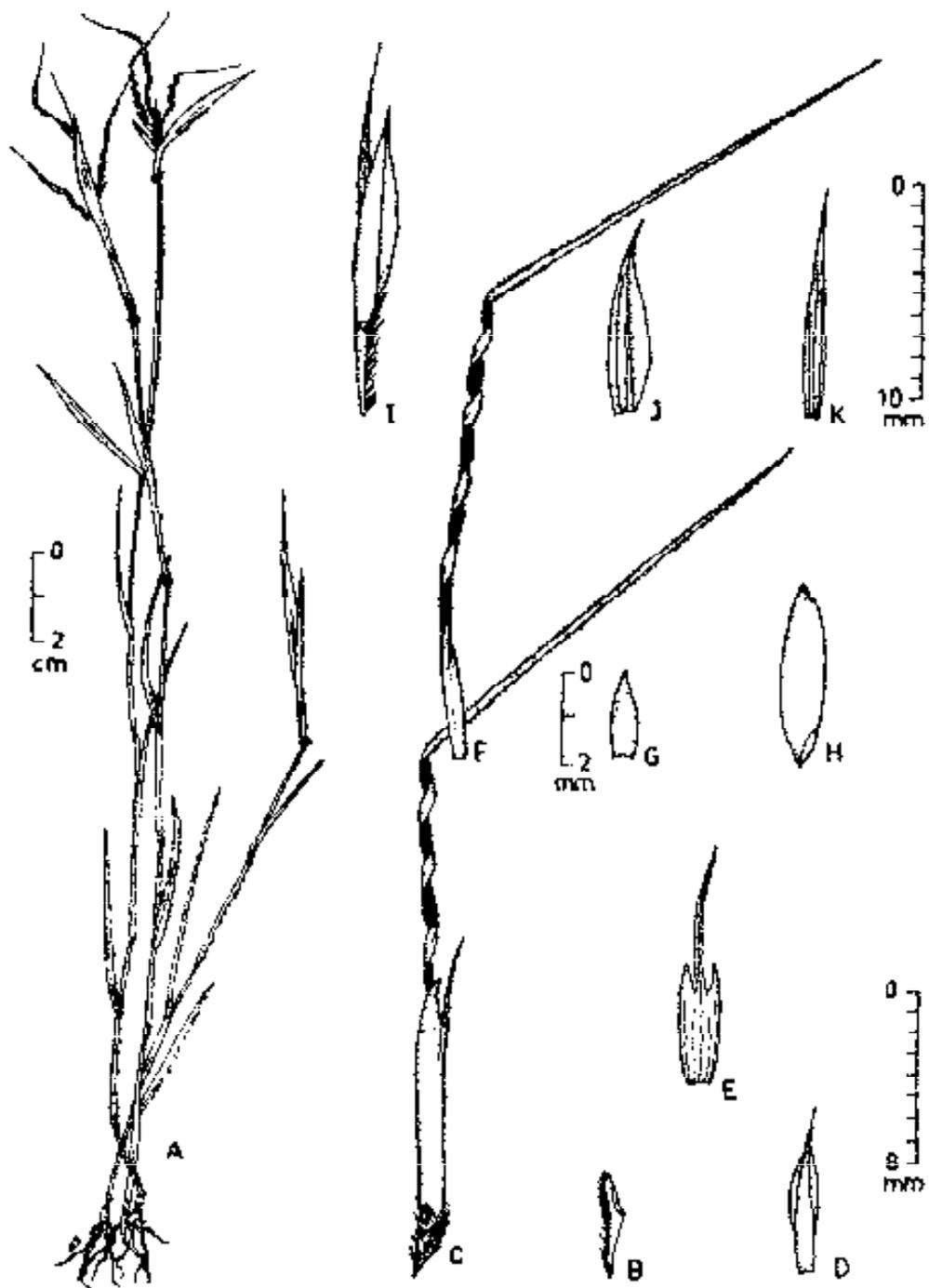


PLATE No. 6: *BHIDEA FISCHERI* P. V. Sreekumar & B. V. Shetty

A. Habit; B. Joint of raceme; C. Sessile spikelet; D. Lower glume;
 E. Upper glume; F. Lemma; G. Palea; H. Grain; I. Pedicelled spikelet;
 J. Lower glume of pedicelled spikelet; K. Upper glume.

within the genus *Andropogon* Linn. Later, Nash (1901) elevated the subgenus *Amphilophis* to generic level and A. Camus (1931) transferred it to *Bothriochloa* O. Kuntze. On the basis of some morphological studies, Ohwi (1947) combined the genera *Capillipedium* Stapf and *Bothriochloa* O. Kuntze, while Gardner (1952) as well as Roberty (1950) merged *Bothriochloa* O. Kuntze with *Dichanthium* Willemet, de Wet & Harlan (1966) based on their cytogenetical studies think that the genera *Bothriochloa* O. Kuntze, *Capillipedium* Stapf and *Dichanthium* Willemet are to be considered congeneric. Their view has been followed by Clayton (1977) and Jain and Deshpande (1978) who have transferred some species of *Bothriochloa* O. Kuntze and *Capillipedium* Stapf to the genus *Dichanthium* Willemet. But, recently Cope (1982) has reinstated all the three genera. The view of Cope (*l. c.*) is followed here.

Key to the species

- 1a. Inflorescence paniculate, with an elongated central axis usually longer than the lowest raceme *B. bladhii* 1
- 1b. Inflorescence digitate or subdigitate, with a central axis always shorter than the lowest raceme:
- 2a. Lower glume of the sessile spikelet hairy below the middle and with a deep circular pit above, rarely with two pits; nodes bearded *B. portusa* 4
- 2b. Lower glume of the sessile spikelet almost glabrous, with or without 1-4 shallow pits; nodes glabrous or bearded:
- 3a. Nodes bearded; joints and pedicels 1.5-2 mm long; culms up to 1 m high *B. insculpta* 2
- 3b. Nodes glabrous; joints and pedicels 2-3 mm long; culms up to 20 cm high *B. paramozwaranii* 3

1. *Bothriochloa bladhii* (Retz.) S. T. Blake in Proc. R. Soc. Queens. 80: 62. 1969; Cope in Nasir & Ali, Fl. Pak. 143: 284. 1982, *Andropogon bladhii* Retz. Obs. Bot. 2: 27. 1781. *A. intermedius* R. Br. Prodr. 202. 1810; Hook. f. Fl. Brit. Ind. 7: 176. 1886. *A. odoratus* Lisboa in J. Bomb. Nat. Hist. Soc. 4: 123. 1889; Hook. f. *l. c.* 177. *Amphilophis glabra* (Roxb.) Stapf in Prain, Fl. Trop. Afr. 9: 172. 1917; Fischer in Gamble, Fl. Pres. Madr. 1732. 1934 (Repr. ed. 3: 1200. 1957). *Bothriochloa glabra* (Roxb.) A. Camus in Ann. Soc. Linn. Lyon, n. s. 76: 164.

1931; Bor, *l. c.* 107. *Andropogon glaber* Roxb. Fl. Ind. 1: 271, 1820. *Bothriochloa intermedia* (R. Br.) A. Camus, *l. c.*: Bor, *l. c.* 108. *Andropogon intermedius* R. Br. Prodr. 202. 1810. *Bothriochloa odorata* (Lisboa) A. Camus, *l. c.* 165; Bor, *l. c.* 106; *B. caucasica* (Trin.) C. E. Hubbard in Kew Bull. 1939: 101, 1939; Bor, *l. c.* 106. *Andropogon caucasicus* Trin. in Mem. Acad. Sci. Petersb. ser. 6, 2: 286. 1832. *Bothriochloa intermedia* (R. Br.) A. Camus var. *punctata* (Roxb.) Keng. Clau. Gram. Prim. Sin. 244. 1957; Bor, Grass. Bur. Cey. Ind. Pak. 108. 1960. *Dichanthium intermedium* (R. Br.) de Wet & Hartlan in Am. J. Bot. 53: 97, 1966. *D. bladhii* (Retz.) W. D. Clayton in Kew Bull. 32: 3. 1977. *D. glabrum* (Roxb.) Jain & Deshpande in Bull. Bot. Surv. Ind. 20: 134. 1978. *D. odoratum* (Lisboa) Jain & Deshpande, *l. c.*; *D. caucasicum* (Trin.) Jain & Deshpande, *l. c.* 133.

Tufted perennials. Culms 50-250 cm high, erect from a short rhizomatous base, often robust; nodes softly hairy. Leaves linear, 10-100 x 0.4-1 cm, base rounded, glaucous or green, midrib prominent. Ligula ovate, 1-2 mm, membranous. Inflorescence with a central axis 5-30 cm long, racemes numerous in irregular whorls upon simple or branched peduncles, altogether forming an oblong or pyramidal false panicle. Racemes 2-10 cm long, whorled or alternate, simple or branched; joints linear, 1.5-2 mm long, flat, margins ciliate. Callus shortly bearded. Sessile spikelets elliptic or oblong, 3-4 mm long; lower glume oblong or ovate-lanceolate, 3-3.5 x 1-1.25 mm, chartaceous, faintly 9-nerved, hairy in the lower half or glabrous, pitted or not, keel pectinate towards apex; upper glume ovate-oblong, 3-3.5 x 1-1.25 mm, chartaceous, faintly 3-nerved; lower floret empty; upper floret bisexual; first lemma ovate-lanceolate or oblong, 2.5-3 x 1 mm, delicate, hyaline; palea absent; second lemma stipitate, 1-2 mm long, awn 10-20 mm long, column c. 8 mm long, brown; palea absent; stamens 3, anthers 1-2 mm long, yellow; ovary oblong, 0.5-0.75 mm long, styles 0.5-1 mm long, stigmas 1-2 mm long, pink, feathery. Pedicelled spikelet oblong, 3-4 mm long; pedicels linear, 1.5-2 mm long, flat, margins ciliate; lower glume oblong, 3-4 x 1-1.25 mm, chartaceous, 9-11-nerved, scabrid along nerves, with or without 1-2 pits, margins infolded, keels shortly pectinate; upper glume oblong lanceolate, 3-3.5 x 1 mm, chartaceous, faintly 3-5-nerved, margins hyaline, villous; lower floret similar to that of sessile spikelet; upper floret male or empty; second lemma 2-2.5 mm long, ovate-oblong, delicate, hyaline; stamens 3, anthers 0.5-1 mm long.

Fairly common along the banks of rivers and streams, growing in large tufts.

Fl. & Fr. : August-December.

Notes : All the specimens having inflorescence with elongated rhachis are included in this species. Here pitted nature and hairiness of glumes vary considerably.

CALICUT : Pavagada; QUILON : Mammood.

2. *Bothriochloa insculpta* (Hochst. ex A. Rich.) A. Camus in Ann. Soc. Linn. Lyon, n. s. 76: 165. 1931; Bor, Grass. Bur. Cey. Ind. Pak, 107. 1960. *Andropogon insculptus* Hochst. ex A. Rich. Tent. Fl. Abyss. 2: 458. 1851. *A. pertusus* Willd. var. *insculptus* Hack. in DC. Monogr. Phan. 6: 482. 1889; Hook. f. Fl. Brit. Ind. 7: 174. 1896. *Amphilophis insculpta* (Hochst. ex A. Rich.) Stapf in Prain, Fl. Trop. Afr. 9: 176. 1917; Fischer in Gamble, Fl. Pres. Madr. 1732. 1934 (Repr. ed. 3: 1200. 1957).

Tufted perennials. Culms 20-100 cm high, erect or geniculate; nodes densely bearded. Leaves lanceolate or linear-lanceolate, 3-30 x 0.2-0.6 cm, base rounded, glabrous or covered with tubercled hairs, green or glaucous, midrib prominent. Sheaths keeled. Ligules ovate, 1-3 mm, acute, membranous, fimbriate at apex. Racemes 2-12 on a peduncle, digitate, each 2-8 cm long; joints linear, 1.5-2 mm, margins ciliate. Sessile spikelets oblong, 3-4 mm long, callus bearded; lower glume oblong, 3-4 x 1 mm, chartaceous, faintly 0-11-nerved, pitted or not, with a shallow depression all along, keels pectinate towards apex; upper glume oblong-lanceolate, 3.5-4 x 1 mm, chartaceous, 3-nerved, margins villous in the upper half; lower floret empty; upper floret bisexual; first lemma ovate-oblong, 3-3.5 x 1 mm, delicate, hyaline, margins ciliolate in the upper half, palea absent; second lemma stipitate, 1-2 mm long, awn 12-15 mm, column 0-8 mm long; palea absent; stamens 3, anthers 1-2 mm long; ovary oblong or oblanceolate, 0.5-0.75 mm, styles c. 1 mm long, stigmas 1-1.5 mm long, feathery; grain obovate, 1-1.5 x 0.5-0.75 mm. Pedicelled spikelets elliptic; 3-5 mm long; pedicels linear, 1.5-2 mm long, margins ciliate; lower glume ovate-oblong, 3.5-4.5 x 1-1.5 mm, chartaceous, faintly 11-15-nerved, with 1-4 pits, keels shortly pectinate; upper glume and lower floret similar to that of sessile spikelet; upper floret male; second lemma linear or oblong, 3-4 x 1 mm, entire, delicate, hyaline; palea absent; stamens similar to those of sessile spikelet.

Common, in grassy slopes of higher elevations, along road-cuttings and also in grasslands. Plants are aromatic.

Fl. & Fr. : September-January.

Notes : Bor (*l. c.*) treats this species under the group with pitted sessile spikelets. But the pitted nature of the lower glumes of sessile spikelets shows considerable variation in this species. Forms with or without pits have been observed from the area.

IDUKKI : Munnar.

3. *Bothriochloa parameswaranii* P. V. Sreekumar, C. P. Melathi & V. J. Nair in J. Bomb. Nat. Hist. Soc. 85(1) : 163-165. 1988.

PLATE No. 7

Perennials. Culms 10-20 cm high, erect or geniculate; nodes glabrous. Leaves lanceolate, 2-10 x 0.2-0.3 cm, base rounded, glabrous or shortly villous, midrib prominent. Ligules ovate, acute, 1-2 mm, membranous. Racemes 2-4 on a peduncle, digitate or subdigitate, each 2-4 cm long, purplish; joints 2-3 mm long, linear, ciliate. Sessile spikelets oblong or elliptic; 3-4 mm long; callus bearded; lower glume oblong, 3-3.5 x 1-1.25 mm, acute or subacute, chartaceous, flat or with a shallow depression, faintly 7-9-nerved, keels pectinate towards apex, margins hyaline, ciliate; upper glume ovate-lanceolate, 3-3.5 x 1-1.5 mm, chartaceous, 3-5-nerved, margins hyaline, villous in the upper half, lower floret empty; upper floret bisexual; first lemma ovate-oblong, 2.5-3 x 1-1.25 mm, rounded at apex, delicate, hyaline; palea absent; second lemma stipitate, 1-2 mm long, awn 10-15 mm long, column 6-8 mm, chestnut brown; palea absent; stamens 3, anthers 1-1.25 mm; ovary oblong, 0.5-0.75 mm; styles c. 1 mm long, stigmas 1-1.5 mm, feathery. Pedicelled spikelet oblong-lanceolate, 3-4 mm long; pedicels 2-3 mm long, villous; lower glume oblong-lanceolate, 3-4 x 1 mm, chartaceous, 11-15-nerved, with 1-4 shallow pits, keels shortly pectinate; upper glume and lower floret similar to those of sessile spikelet; upper floret male or empty; second lemma oblong-acute, 2-3 mm long, delicate, hyaline; lodicules 2, obovate, each c. 0.5 x 0.25 mm, concave at apex.

Rare, along the grasslands of higher elevations.

IDUKKI : Eravikulam National Park.

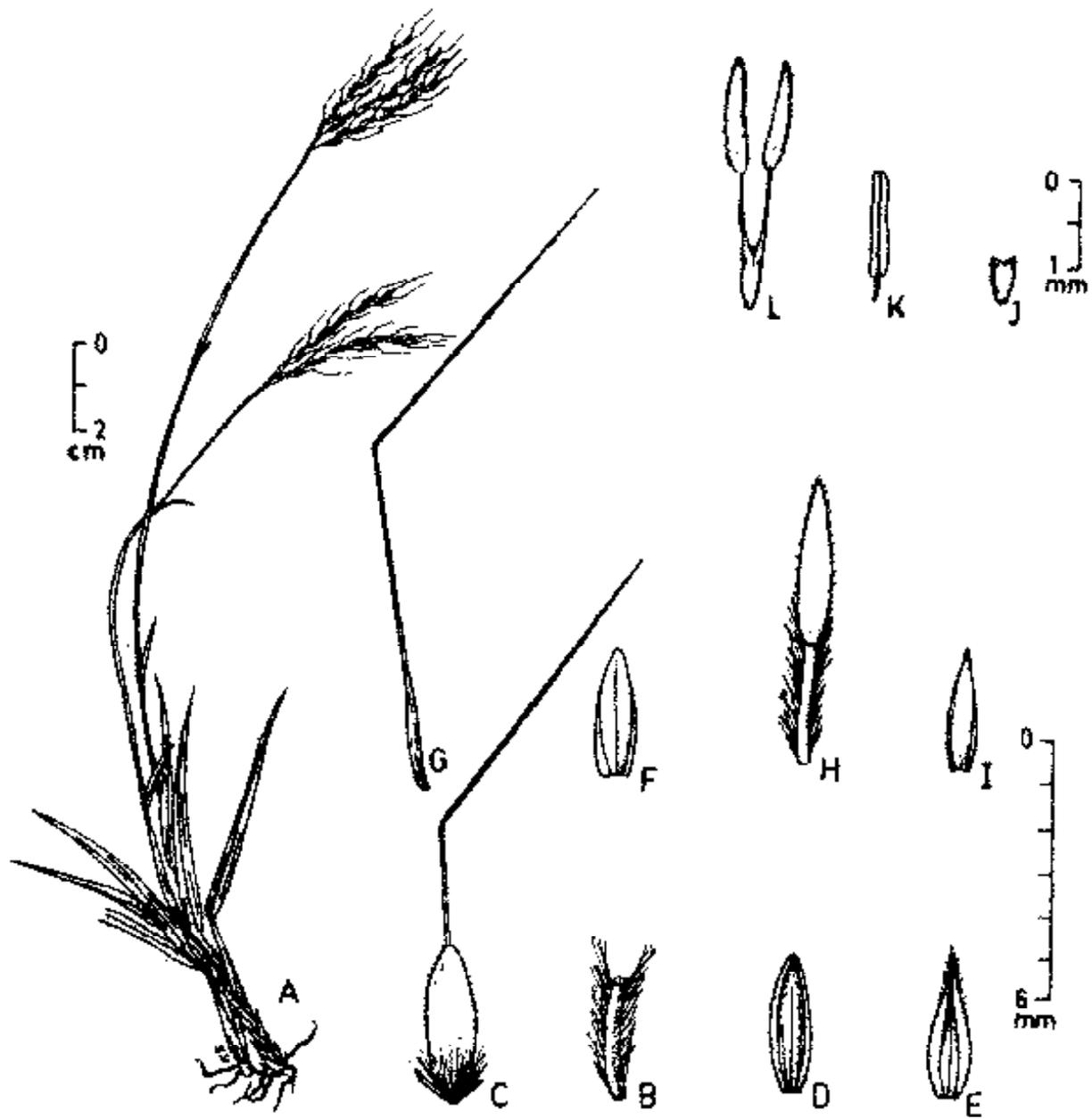


PLATE No. 7: *BOTHRIOCHLOA PARAMESWARANII* P. V. Sreekumar,
C. P. Malathi & V. J. Nair

A. Habit; B. Joint of raceme; C. Sessile spikelet; D. Lower glume
of sessile spikelet; E. Upper glume; F. First lemma; G. Second lemma;
H. Pedicelled spikelet; I. Second lemma of pedicelled spikelet; J. Lodicule;
K. Stamen; L. Pistil.

4. *Bothriochloa pertusa* (Linn.) A. Camus in Ann. Soc. Linn. Lyon, n. s. 76: 164. 1931; Bor, Grass, Bur. Cey. Ind. Pak, 109, 1960. *Holcus pertusus* Linn. Mant. 2: 301. 1771. *Andropogon pertusus* (Linn.) Willd. Sp. Pl. 4(2): 922. 1806; Hook. f. Fl. Brit. Ind. 7: 173. 1896; Rang. & Tad. Handb. S. Ind. Grass. 191. t. 152-153. 1921. *Amphilophis pertusa* (Linn.) Nash ex Stapf in Agr. News, Bridge, 15: 179. 1916 et in Prain, Fl. Trop. Afr. 9: 175. 1917; Fischer in Gamble, Fl. Pres. Madr. 1731, 1934 (Repr. ed. 3: 1200. 1957). *Dichanthium pertusum* (Linn.) W. D. Clayton in Kew Bull, 32: 4. 1977.

Stoloniferous perennials. Culms 15-50 cm long, erect, creeping or geniculate; nodes bearded. Leaves lanceolate, 2-15 x 0.2-0.5 cm, usually crowded at base, glabrous or hairy, glaucous, mid-rib prominent; sheaths keeled. Ligule short, membranous. Racemes 2-10 on a peduncle, digitate or subdigitate, each one 2-8 cm long, shortly pedunculate, densely villous; joints linear, 2-2.5 mm long, densely villous with long hairs. Sessile spikelets elliptic-lanceolate, 3-4 mm long; lower glume elliptic-lanceolate, 3-4 x 1 mm, shortly 2-fid at apex, chartaceous or subcoriaceous, faintly 7-9-nerved, densely hairy below the middle, with a deep circular pit above the middle, sometimes 2-pitted, keels shortly pectinate towards apex; upper glume boat-shaped or oblong-lanceolate, equalling the lower, acuminate, faintly 3-5-nerved; lower floret empty; upper floret bisexual; first lemma ovate-lanceolate, 2.5-3 x 1 mm, delicate, faintly 3-5-nerved or rarely nerveless, hyaline; palea absent; second lemma stipitate, 1-2 mm, awn 15-20 mm long, column 6-8 mm, brown; palea absent; stamens 3, anthers 1-2 mm long, yellow; ovary oblong, 0.3-0.5 mm, styles 2, 1 mm long, stigmas 1-2 mm long, feathery, pink; grain oblong. Pedicelled spikelet oblong or elliptic, 3-4 mm long; pedicels linear, 2-2.5 mm, long villous; lower glume oblong or elliptic, 3-4 x 1 mm, chartaceous, 13-15-nerved, margins hyaline, keels shortly pectinate; upper glume lanceolate, equalling lower, faintly 3-5-nerved, margins hyaline, villous; lower floret similar to that of sessile spikelets; upper floret male or empty; second lemma lanceolate, 3-3.5 x 0.5-0.75 mm, entire, delicate, hyaline; palea absent.

Very common in plains as well as hilly areas, usually along the bunds of fields, wetlands and also in open grasslands.

Fl. & Fr. : August-February.

Notes : This species can easily be distinguished by its hairy racemes and lower glumes with 1-2 peculiar deep circular pits.

TRIVANDRUM : Kovalam.

7 CAPILLIPEDIUM Stapf

Stapf in Prain, Fl. Trop. Afr. 9: 169, 1917; Fischer in Gamble, Fl. Pres. Madr. 1729, 1934 (Repr. ed. 3: 1198, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 110, 1960.

A genus of about 14 species distributed in tropical and subtropical world, of which about 6 occur in India, 2 in Kerala.

Key to the Species

- 1a. Culms slender, filiform, decumbent or trailing; leaves delicate, up to 1 cm long; spikelets 2-3 mm long *C. liliculme* 2
- 1b. Culms stout, erect and robust; leaves chartaceous, up to 20 cm long; spikelets 3-4 mm long *C. assimile* 1

1. **Capillipedium assimile** (Steud.) A. Camus in Lecomte, Fl. Gen. Indo-Chine 7: 314, 1922; Bor, Grass. Bur. Cey. Ind. Pak. 110, 1960. *Andropogon assimilis* Steud. in Zoll, Syst. Verz. 58, 1854 et in Syn. Pl. Glum. 1: 397, 1854; Hook. f. Fl. Brit. Ind. 7: 179, 1896. *Capillipedium glaucopsis* (Steud.) Stapf in Hook. Icon. Pl. 31: t. 3085, 1922; Fischer in Gamble, Fl. Pres. Madr. 1730, 1934 (Repr. ed. 3: 1199, 1957). *Andropogon glaucopsis* Steud. in Zoll, Syst. Verz. 58, 1854. *Capillipedium huegelii* (Hack.) Stapf in Hook. Icon. Pl. 31: t. 3085, 1922; Fischer, l. c.; Bor, l. c. *Andropogon huegelii* Hack. in DC. Monogr. Phan. 6: 492, 1889.

Annuals or perennials. Culms 20-150 cm high, erect or straggling; nodes villous or glabrous. Leaves elliptic-lanceolate, acuminate, 3-20 x 0.4-1 cm. Sheaths slightly keeled, glabrous. Ligules ovate, acute, membranous. Panicles 5-15 cm long, open or contracted; axils of racemes long-villous; joints 1.5-2.5 mm long, ciliate. sessile spikelets ovate-oblong, 2.5-4 mm, hairy or glabrous; callus bearded; lower glume ovate, acute, c. 3-1.5 mm, subcoriaceous or chartaceous, 7-nerved, glabrous or hairy, margins pectinately ciliate towards apex; upper glume boat-shaped or oblong-lanceolate when spread, c. 3 x 1 cm, keeled, chartaceous; lower floret empty; upper floret bisexual; first lemma obovate, 1-1.5 x 0.5-0.75 mm, acute, delicate, hyaline; second lemma 1-2 mm long, delicate; awn 10-15 mm long, column 5-6 mm long; lodicules obovate, c. 0.25 mm long, 2-horned at apex;

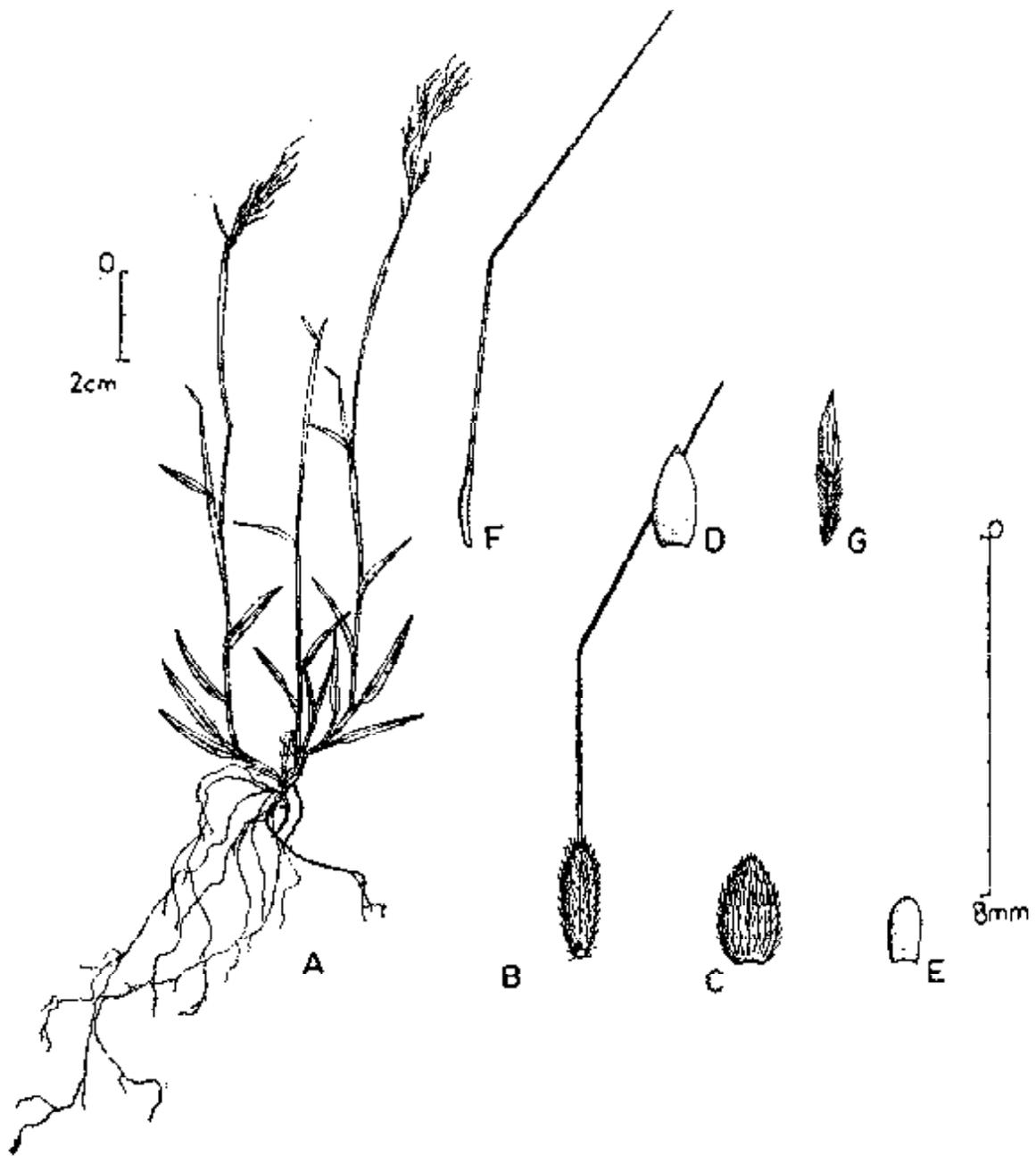


PLATE No. 8: *CAPILLIPEDIUM FILICULME* (Hook. f.) Stapf

A. Habit; B. Sessile spikelet; C. Lower glume of sessile spikelet;
 D. Upper glume; E. First lemma; F. Second lemma; G. Pedicelled
 spikelet.

stamens 3, anthers 1-2 mm long; ovary oblong, 0.25-0.5 mm, styles 0.5-1 mm long, slender; stigmas 1-1.5 mm long. Pedicelled spikelets elliptic-lanceolate, 2.5-4 mm long, unawned; pedicels 1.5-2.5 mm long; lower glume oblong-lanceolate, c. 3 x 1 mm, chartaceous, 11-13-nerved, margins long-ciliate or glabrous. Upper glume lanceolate, c. 3 x 1 mm, chartaceous, 3-5-nerved, margins hyaline, ciliate in the upper half; first lemma ovate-oblong, 2-3 x 1 mm, delicate, hyaline.

Very common along rocky places, wastelands and hillocks, usually trailing and rooting from the nodes.

Fl. & Fr. : May-January.

Notes : This species shows considerable variation in indumentum. Here, callus hairs as well as nodal hairs show a gradation in length. Most of the distinguishing characters mentioned by Bor (*f. c.*) to separate *C. assimile* from *C. huegelii* are quite feeble and often overlapping. Moreover, Bor (*f. c.*) himself says that his concept of *C. huegelii* is unsatisfactory and that it contains discordant elements. *C. huegelii* therefore, is treated here as conspecific with *C. assimile*.

CANNANORE: Kumbala, Payyanur; IDUKKI: Munnar;
PALGHAT: Panthanhode; WYNAAD: Meppadi, Vaytri.

2. *Capillipedium filiculma* (Hook. f.) Stapf in Hook. Ic. Pl. Subtab. 3085, 1922; Fischer in Gamble, Fl. Pres. Madr. 1730, 1934 (Repr. ed. 3: 1199, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 111, 1960; Nair & Bhargavan in J. Econ. Tax. Bot. 3: 299, 1962. *Andropogon filiculmis* Hook. f. Fl. Brit. Ind. 7: 181, 1896. PLATE No. 8

Annuals. Culms 30-80 cm long, slender, weak, creeping or geniculate; nodes villous or glabrous. Leaves lanceolate or elliptic-lanceolate, acuminate, 2-5 x 0.4-0.6 cm. Ligules ovate, acute, membranous. Panicles 3-10 cm long, open or contracted; joints 1-2 mm long, ciliate. Sessile spikelets oblong or elliptic, 2-3 mm, villous or glabrous; callus shortly bearded; lower glume ovate, acute, 2-2.5 x 1 mm long, subcoriaceous, 7-nerved, sparsely villous or glabrous; upper glume oblong-lanceolate, 2-2.5 x 1 mm, chartaceous, faintly 3-5-nerved, margins delicate, hyaline; lower floret empty; upper floret bisexual; first lemma oblong, obtuse, 1-1.5 x 0.75 mm, delicate, hyaline; second lemma stipitate, 1-2 mm, delicate; awn 10-12 mm long, column c. 5 mm long; stamens 3, anthers 1-1.5 mm long; ovary oblong, c. 0.25 mm; styles 0.5-1 mm long, slender.

stigmas 1-1.5 mm long. Pedicelled spikelets usually reduced or sterile; pedicels 1-2 mm long, ciliate.

Occasional along dry rocky places, and also trailing over broken compound walls and forts.

Fl. & Fr. : September-December.

Notes : This species is quite distinct from the other by its peculiar slender, filiform culms which are creeping or trailing over some rocky substratum. Seems to be uncommon in the area. Nair & Bhargavan (*l. c.*) have emphasized its rarity.

CANNANORE : Kumbala.

8. CHRYSOPOGON Trin.

Trin. Fund. Agrost. 187, 1820; Bor, Grass. Bur. Cey. Ind. Pak. 113 1960.

A genus of about 25 species of which about 16 species occur in India and 5 in Kerala.

Key to the species

- 1a. Lower glume of the pedicelled spikelet awned; leaves distichous, base shallowly cordate or semi-amplexicaul; callus sharply acute, 2-4 mm long *C. repens* 2
- 1b. Lower glume of the pedicelled spikelet not awned; leaves not as above:
- 2a. Sessile spikelets aristate, 3-4 mm long; culms creeping and ascending; pedicels more or less glabrous; panicles up to 10 cm long *C. aciculatus* 1
- 2b. Sessile spikelets distinctly awned, not aristate, 5-8 mm long; culms always erect; pedicels villous with brown hairs; panicles often large:
- 3a. Sheaths rounded; leaves narrower, up to 0.2 cm wide, acicular or linear, convolute, glaucous; spikelets very few *C. tadulingamii* 2
- 3b. Sheaths keeled; leaves broader, 0.4-1 cm wide, linear-lanceolate, flat or convolute, green; spikelets numerous:

- 4a. Pedicelled spikelets 5-8 mm long;
pedicels 1-2 mm long; ligule a
tuft of hairs *C. hackettii* 3
- 4b. Pedicelled spikelets 10-12 mm long;
pedicels 4-6 mm long; ligule a thin
fimbriate membrane *C. zeylanicus* 5

1. *Chrysopogon aciculatus* (Retz.) Trin. Fund. Agrost. 181, 1820;
Fischer in Gamble, Fl. Pres. Madr. 1738, 1934 (Repr. ed. 3:
1205, 1957); Bor. Grass. Burm. Cey. Ind. Pak, 115, 1960.
Andropogon aciculatus Retz. Obs. Bot. 5: 22, 1789; Hook. f.
Fl. Brit. Ind. 7: 188, 1896. PLATE No. 9

Perennials. Culms 20-80 cm long, creeping and decumbent; nodes glabrous. Leaves ovate-lanceolate or lanceolate, 1-10 x 0.3-0.6 cm, acute or blunt at apex, margins serrulate. Sheaths slightly keeled. Ligules annular, thin, membranous. Panicles pyramidal, 5-10 cm long, open or contracted. Sessile spikelets lanceolate, 3-4 mm long; callus bearded, pungent; lower glume lanceolate, 3-4 x 1 mm, chartaceous, keels pectinate; upper glume boat-shaped or lanceolate when spread, 3-4 x 1 mm, chartaceous, 3-nerved, keeled; margins hyaline, ciliate; lower floret empty, paleate; upper floret bisexual, paleate; first lemma obovate, 2.5-3 x 1 mm, acute, delicate, 2-keeled, 2-nerved, margins ciliate; second lemma ovate-lanceolate, 2.5-3 x 1 mm, aristate, delicate, 1-3-nerved, arista 3-6 mm long; straight, scabrid; palea oblong, 1.5-2 x 0.5 mm, delicate, hyaline, lodicules obovate, c. 0.5 x 0.25 mm, wavy at apex, many-nerved. Stamens 3, anthers c. 1 mm long; ovary oblong, c. 0.5 x 0.15 mm, styles c. 1 mm long; stigmas 1.5-2 mm long, golden-yellow. Pedicelled spikelets lanceolate or linear-lanceolate, 4-5 mm long, unawned; pedicel 2.5-3 mm long, flat, glabrous or nearly so; lower glume lanceolate, 4-5 x 1 mm, chartaceous, 5-nerved; upper glume lanceolate, 4-5 x 1 mm, chartaceous, 3-nerved, margins ciliate; lower floret empty; upper floret male, paleate; first lemma lanceolate, 3-4 x 0.5-1 mm, delicate, hyaline, faintly 3-5-nerved, margins ciliate; second lemma ovate-lanceolate or lanceolate, 2.5-3 x 0.5-1 mm, delicate, hyaline, faintly 3-nerved, margins ciliate; palea similar to that of the sessile spikelet; stamens 3, anthers 1.5-2 mm long.

Very common along the banks of backwaters, rivers, streams and canals, usually forming dense carpets. Occasional along roadsides and wastelands.

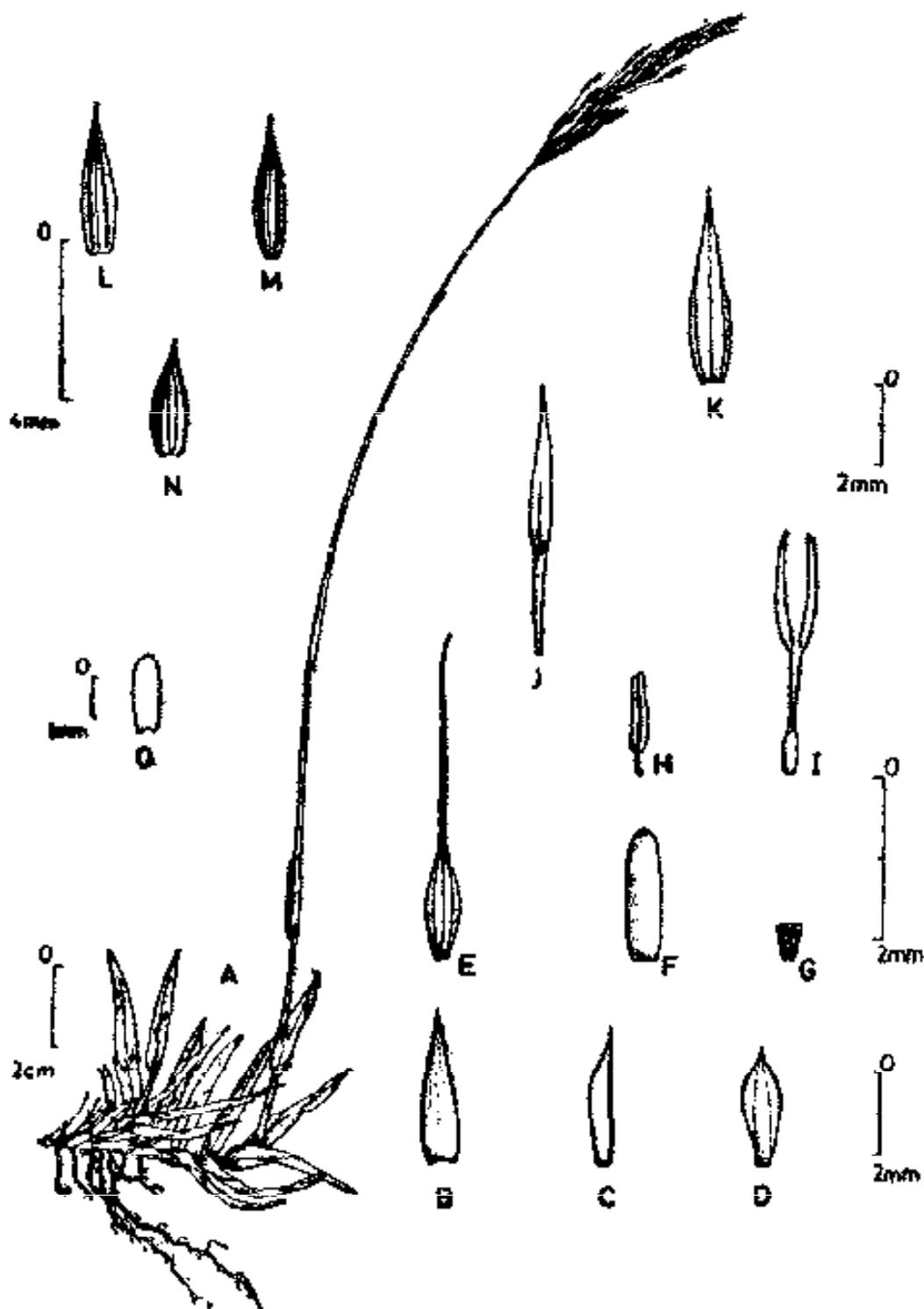


PLATE No. 9: *CHRYSOPOGON ACICULATUS* (Retz.) Trin.

A. Habit; B. Lower glume of sessile spikelet; C. Upper glume; D. First lemma; E. Second lemma; F. Palea of the second lemma; G. Lodicule; H. Stamen; I. Pistil; J. Pedicelled spikelet; K. Lower glume of pedicelled spikelet; L. Upper glume; M. First lemma of pedicelled spikelet; N. Second lemma; O. Palea of the second lemma.

Fl. & Fr. : March-December.

Notes : This species is quite different from all other species of the genus by its peculiar creeping and decumbent habit. The basal prostrate creeping culms form thick carpets along the banks of backwaters and estuaries, and help to prevent tidal erosion. The spikelets are easily disarticulating, acicular and the callus is extremely sharp and often gets attached to the skin and hair of animals and cloths of human beings. Hence it is known as 'Love-Grass'.

ALLEPPEY : Alleppey, Kidangara, Mancombu, Nedumudy, Pallana, Pallathuruthy; CANNANORE : Pappinisseri; PALGHAT : Kanjarampuzha, Walayar; QUILON : Kodumon, Ranni; TRICHUR : Chalekudi; TRIVANDRUM : Pullmath.

2. *Chrysopogon asper* (Heyne ex Hook. f.) Blatt. & McCann, Bomb. Grass. 68, 1935; Fischer in Gamble, Fl. Pres. Madr. 1738, 1934 (Repr. ed. 3 : 1205, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 116, 1960. *Andropogon asper* Heyne ex Hook. f. Fl. Brit. Ind. 7 : 189, 1896; Rang. & Ted. Handb. S. Ind. Grass. 195, t. 155-156, 1921.

Perennials. Culms 50-100 cm high, erect; nodes glabrous. Leaves linear-lanceolate, 10-40 x 0.6-1.5 cm, rounded, shallowly cordate or semi-amplexicaul at base, margins serrulate. Sheaths keeled. Ligules membranous, thin, fimbriate. Panicles 10-20 cm long, lax. Sessile spikelets oblong, 5-6 mm long, awned; callus sharply acute, 2-4 mm long with chocolate-brown hairs; lower glume oblong or linear-oblong, 5-6 x 1 mm, emarginate, subcoriaceous, faintly 3-5-nerved, pectinate towards apex; upper glume ovate-oblong, 5-6 x 1-2 mm, emarginate and awned, subcoriaceous, margins delicate, hyaline, awn 12-15 mm long, scabrid; lower floret empty; upper floret bisexual; first lemma linear-oblong, 3-5 x 1 mm, acute, delicate, hyaline, 2-nerved, margins sparsely ciliate; second lemma oblong, 3-4 x 1 mm, delicate, hyaline, 3-nerved, awned; awn 60-75 mm long, hairy, column 30-35 mm long; stamens 3, anthers 3-4 mm long; ovary oblong, 0.5-1 mm long; styles 1-1.5 mm long, stigmas 1.5-2 mm, feathery. Pedicelled spikelets lanceolate or linear-lanceolate, 10-12 mm long, awned; pedicels 3-4 mm long, flat, margins ciliate; lower glume lanceolate, 10-12 x 1.5-2 mm, acuminate, awned, chartaceous, 7-nerved, keels sparsely ciliate, awn 12-15 mm long; upper glume lanceolate, 10-12 x 1.5-2 mm, sharply acute, chartaceous, 3-nerved, margins hyaline, sparsely ciliate, lower

floret empty; upper floret male; first lemma oblong-lanceolate, 8-10 x 1-1.5 mm, delicate, hyaline, 2-nerved, margins sparsely ciliate; second lemma linear-oblong, 5-6 x 1 mm, acute or rarely notched, delicate, hyaline, 1-nerved; stamens 3, anthers 6-8 mm long.

Rare: in hilly tracts and also high altitude grasslands, occasionally found along the fringes of forests.

Fl. & Fr. : September-December.

Notes : This species show considerable degree of variation. Leaf-sheaths here are often covered with bristles from bulbous bases. But in some plants they are entirely glabrous. *C. asper* has often been confused with *C. orientalis* probably due to this reason, *C. asper* can be distinguished from the latter by its distichous leaves and the unawned upper glumes of the pedicelled spikelets.

IDUKKI : Peermade; PALGHAT : Walayar.

3. *Chrysopogon hackelii* (Hook. f.) : C. E. C. Fischer in Gamble, *Fl. Pres. Madr.* 1739, 1934 (Repr. ed. 3 : 1205, 1957); *Ber. Grass. Bur. Cey. Ind. Pak.* 117, 1960, *Andropogon hackelii* Hook. f. *Fl. Brit. Ind.* 7 : 194, 1896.

Perennials. Culms 80-150 cm high, erect; nodes softly villous or glabrous. Leaves linear-lanceolate, 15-40 x 0.4-1 cm, acute or acuminate. Sheaths keeled. Ligules tufted hairy. Panicles 5-20 cm long, open. Sessile spikelets oblong, 5-6 mm long, awned; lower glume linear-oblong, 5-6 x 1 mm, acute, subcoriaceous, faintly 5-7-nerved; upper glume oblong-lanceolate, 5-6 x 1-1.5 mm, acuminate, awned, chartaceous; awn 3-8 mm long; lower floret empty; upper floret bisexual; first lemma linear-oblong, 4-5 x 1 mm, delicate, hyaline, faintly 3-nerved, margins ciliate; second lemma oblong, 4-5 x 1 mm, awned, delicate, 3-nerved; awn 20-25 mm long, geniculate; column 10-12 mm long; stamens 3, anthers 2-3 mm long; ovary oblong, c. 0.5 mm long, styles c. 1 mm long, stigmas 1-1.5 mm long, plumose. Pedicelled spikelets lanceolate, 5-6 mm long, unawned; pedicels 1.5-2 mm long, flat, margins densely ciliate with long chocolate-brown hairs; lower glume ovate-lanceolate, 5-6 x 2 mm, chartaceous, 7-nerved; upper glume ovate-lanceolate, chartaceous, 3-nerved, margins delicate, sparsely ciliate; lower floret empty; upper floret male; first lemma lanceolate, 4-5 x 1 mm, delicate, 2-nerved, margins ciliate; second lemma oblong, 3-4 x 0.5 mm, acute, delicate, hyaline, 3-nerved, margins sparsely ciliate.

Frequent in hills and mountain valleys, along the margins of forests and also along grassy slopes.

Fl. & Fr. : February-December.

Notes : The presence of keeled leaf-sheaths in this species may lead to some confusion with *C. zeylanicus*. But *C. hackelii* differs from the latter by its smaller pedicelled spikelets and considerably shorter pedicels which are covered with long chocolate-brown hairs along the margins.

CALICUT: Kanjirakkadavu, Pokkunnamala; IDUKKI: Lock-hert gap; PALGHAT: Pottikkal forest; Silent Valley; TRIVANDRUM: Kottur R. F., Kurisimala, Bonecord; WYNAAD: Chandanathode.

4. *Chrysopogon tadulingamii* P. V. Sreekumar, V. J. Nair & N. C. Nair in J. Bombay Nat. Hist. Soc. 80 (1): 198, 1983. PLATE No. 10

Perennials. Culms 30-100 cm tall, tufted, erect, slender; nodes glabrous. Leaves 5-15 x 0.1-0.2 cm, acicular or linear, rigid, convolute, glaucous, base rounded, glabrous or with a few long hairs near the collar. Sheaths 2-6 cm, equal to or shorter than the internodes, closely fitting, rounded, striate and glabrous. Ligule a thin, fimbriate membrane. Panicles 5-15 cm long; branches 1-4 cm long, whorled in the lowest node, alternate above, with very few spikelets, capillary, slender, terete and glabrous; nodes bearded; spikelets in groups of three with a middle sessile spikelet and two lateral pedicelled ones. Sessile spikelet 5-6 mm long, oblong or oblanceolate, laterally compressed, grooved; callus 3-4 mm long, densely bearded with stiff chocolate-brown hairs 1-2 mm long; lower glume 5-5.5 x 0.75-1 mm, linear-lanceolate, coriaceous, brownish, setose towards apex; upper glume 5-6 x 1-1.5 mm, oblong, obtuse and awned at apex, awns 10-15 mm long, straight or slightly curved, scabrid; lower floret empty; lemma 3.5-4 x 0.75-1 mm, linear-oblong, acute, delicate, hyaline, margins long ciliate; upper floret bisexual; upper lemma 4-5 x 0.5-1 mm, linear or oblong ending in a very long, stout awn, 3-nerved, delicate and hyaline in the lower half, coriaceous and rigid in the upper, awn 50-60 mm long, geniculate, column 20-30 mm long, villous with short golden-yellow hairs, bristles scabrid; lodicules 2, each c. 0.4 x 0.3 mm, obovate, 2-lobed at apex; stamens 2-3, anthers 3-4 mm long, deep-yellow, filaments short; ovary 0.4-0.5 mm long, ovate; styles 0.75-1 mm long, slender; stigmas 1-1.5 mm long, pale-yellow, plumose. Pedicelled spikelets 8-10 mm long, purplish; pedicels 5-6 mm long, angular, dilated at the tip, covered with short golden-yellow hairs, callus hairs 0.5-1 mm long, brownish; lower

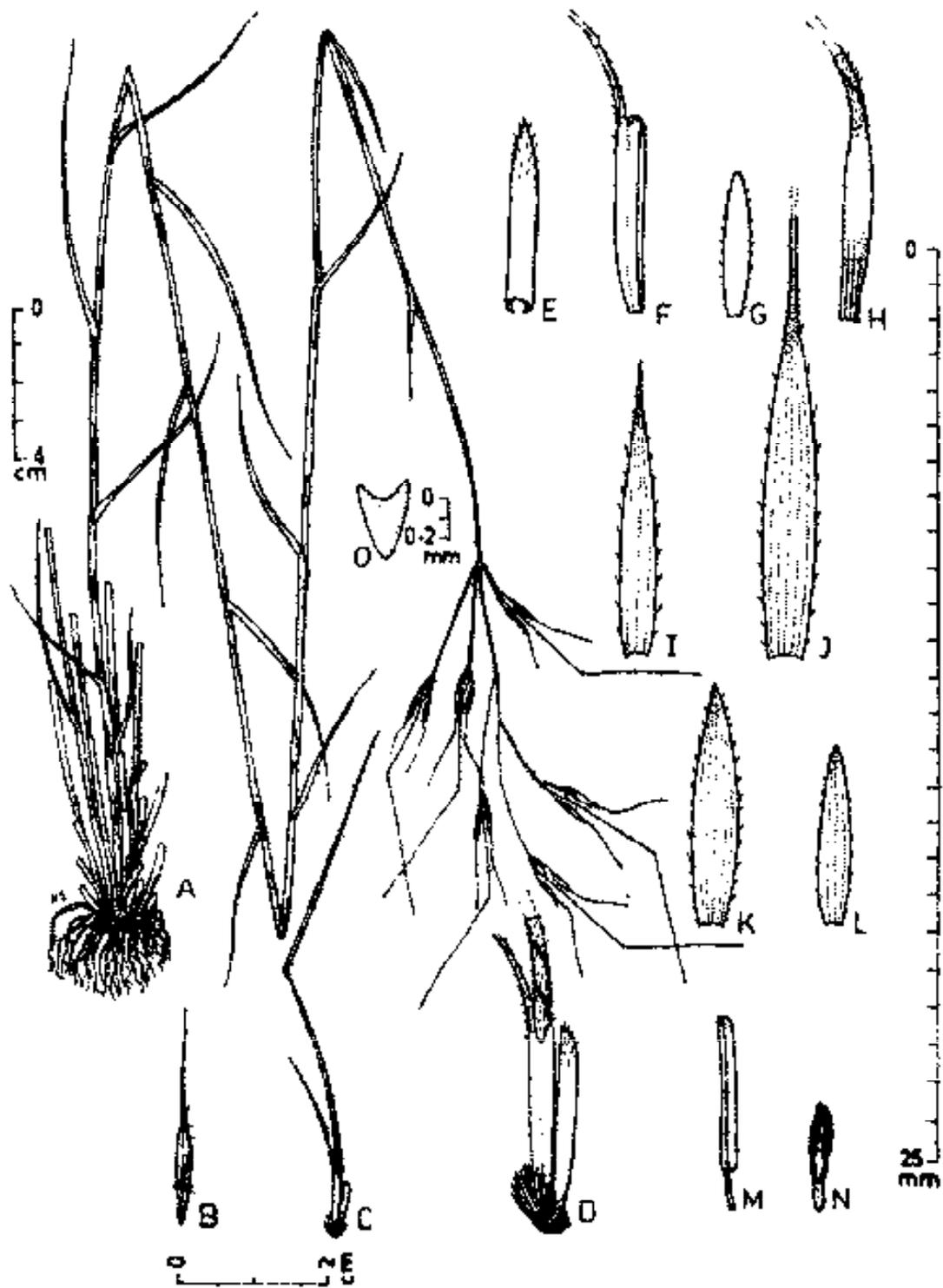


PLATE No. 10: *CHRYSOPOGON TADULINGAMII* P. V. Sreekumar, V. J. Nair & N. C. Nair

A. Plant; B. Pedicelled spikelet; C. Sessile spikelet; D. Sessile spikelet-enlarged with a portion of awn; E. Lower glume of sessile spikelet; F. Upper glume; G. Lower lemma; H. Upper lemma with a portion of awn; I. Lower glume of pedicelled spikelet; J. Upper glume with a part of awn; K. Lower lemma; L. Upper lemma; M. Stamen; N. Pistil; O. Lodicule.

glume 7-8 x 0.75-1 mm, lanceolate, acute or shortly acuminate, 3-nerved, purple, margins infolded, hyaline, glabrous or with a few shaggy hairs; upper glume 8-10 x 1-1.5 mm, lanceolate, acuminate ending in a straight or slightly curved awn, 7-nerved, purple, margins infolded, hyaline, with a few setose hairs especially towards apex, awns 10-15 mm long, straight or slightly curved, scabrid; lower floret empty; lemma 6-8 x 0.75-1 mm, oblong-lanceolate, faintly 3-5-nerved, delicate, hyaline, villous especially along the margins; upper floret male; lemma 4-5 x 0.5-0.75 mm, oblong, acute, faintly 2-3-nerved, delicate, hyaline, shortly ciliate along the margins; lodicules 2, each c. 0.4 x 0.3 mm, obovate, 2-lobed at apex; stamens 2-3, anthers 3-4 mm long, bright-yellow, filaments short.

Rare, along dry rocky hill-slopes and open grasslands, usually in very dry habitats, along with other grasses such as *Themeda triandra* Forssk., *Dimeria bialata* C. E. C. Fischer, *Arundinella mesophylla* Nees etc.

Fl. & Fr.: October.

CANNANORE: Periyar.

5. *Chrysopogon zeylanicus* (Nees ex Steud.) Thw. Enum. Pl. Zeyl. 368. 1864; Fischer in Gamble, Fl. Pres. Madr. 1739. 1934 (Repr. ed. 3: 1205. 1957); Bor. Grass. Bur. Cey. Ind. Pak. 119. 1960, *Andropogon zeylanicus* Nees ex Steud. Syn. Pl. Glum. 1: 397. 1854; Hook. f. Fl. Brit. Ind. 7: 192. 1896.

Perennials. Culms 20-150 cm high, erect, tufted; nodes glabrous. Leaves lanceolate or linear-lanceolate, 5-30 x 0.4-1 cm, flat or convolute, beset with sparse tubercle-based hairs, margins serrulate. Sheaths keeled. Ligules membranous, thin, fimbriate. Panicles pyramidal, 4-25 cm long, open. Sessile spikelets oblong, 6-8 x 1-1.5 mm, awned; callus densely bearded with chocolate brown hairs; lower glume linear-oblong, 5-6 x 1 mm, subcoriaceous, faintly 3-5-nerved, pectinate towards apex; upper glume oblong, 5-6 x 2 mm, notched and aristate at apex, subcoriaceous, faintly 3-nerved, lower floret empty; upper floret bisexual; first lemma elliptic-lanceolate, 4-6 x 1.5-2 mm, delicate, hyaline, faintly 2-3-nerved, margins ciliate; second lemma linear-oblong, 5-6 x 1 mm, delicate, hyaline, 3-nerved, awned; awn 25-30 mm long, column 12-15 mm long; lodicule obovate, c. 1 x 0.5 mm, truncate at apex; stamens 3, anthers 2-3 mm long; ovary linear-oblong, 0.5-1 mm long; styles 0.5-1 mm long; stigmas 2-3 mm long, pink. Pedicelled spikelets

linear-lanceolate, awnless, 10-12 mm long; pedicels flat, 4-6 mm long, densely ciliate with chocolate-brown hairs; lower glume ovate-lanceolate or lanceolate, 10-12 x 1.5-2 mm, chartaceous, 7-nerved; upper glume lanceolate, 8-10 x 1-1.5 mm, chartaceous, 3-nerved, margins hyaline, retrorsely ciliate; lower floret empty; upper floret male; first lemma elliptic-lanceolate or lanceolate, 6-8 x 1 mm, delicate, 2-3 nerved, ciliate; second lemma lanceolate, 5-6 x 1 mm, delicate, 1-nerved, ciliate; stamens 3, anthers 3-4 mm long.

Very common in high altitude grasslands, hillslopes and frequent along fringes of forests and banks of streams and rivulets.

Fl. & Fr. : August-March.

Notes : This grass can be distinguished from the other species of the genus by its strongly keeled lower sheaths and purplish spikelets. It is one of the commonest and a major component of high altitude grasslands. This grass is very difficult to be uprooted. In some places it is used for thatching and as a mulch in 'Cardamom' nurseries.

IDUKKI : Anaimudi slopes, Eravikulam National Park, Munnar,

9. CLEISTACHNE Benth.

Benth, in Hook. *Icon. Pl.* t. 1379, 1882; Hook. *f. Fl. Brit. Ind.* 7: 162, 1896; Fischer in *Gambia, Fl. Pres. Madr.* 1708, 1934 (Repr. ed. 3: 1184, 1957); Bor, *Grass. Bur. Cey. Ind. Pak.* 119, 1960.

A genus of about 4 species distributed in tropics and sub-tropics of the world, of which 1 species occurs in India and Kerala.

Cleistachne sorghoides Benth, in Hook. *Icon. Pl.* t. 1379, 1882; *C. stocksii* Hook. *f. Fl. Brit. Ind.* 7: 162, 1896; Fischer in *Gambia, Fl. Pres. Madr.* 1708, 1934 (Repr. ed. 3: 1184, 1957); Bor, *Grass. Bur. Cey. Ind. Pak.* 119, 1960. PLATE No. 11

Perennials. Culms densely tufted, 80-120 cm high, erect or geniculate; nodes glabrous. Leaves linear or linear-lanceolate, 10-30 x 0.5-1 cm, densely hairy. Ligules ovate, acute, 0.5-1.2 cm long, membranous. Sheaths densely tubercle based hairy. Panicles ovate-oblong or oblong, congested, 5-20 cm long, brownish. Spikelets oblong or ovate-oblong, 4-6 mm long, brownish, densely hairy. Lower glume ovate-oblong or oblong, 3.5-5 x 1.5-2 mm, crustaceous, faintly 5-7-nerved, densely brownish hairy. Upper glume ovate-oblong

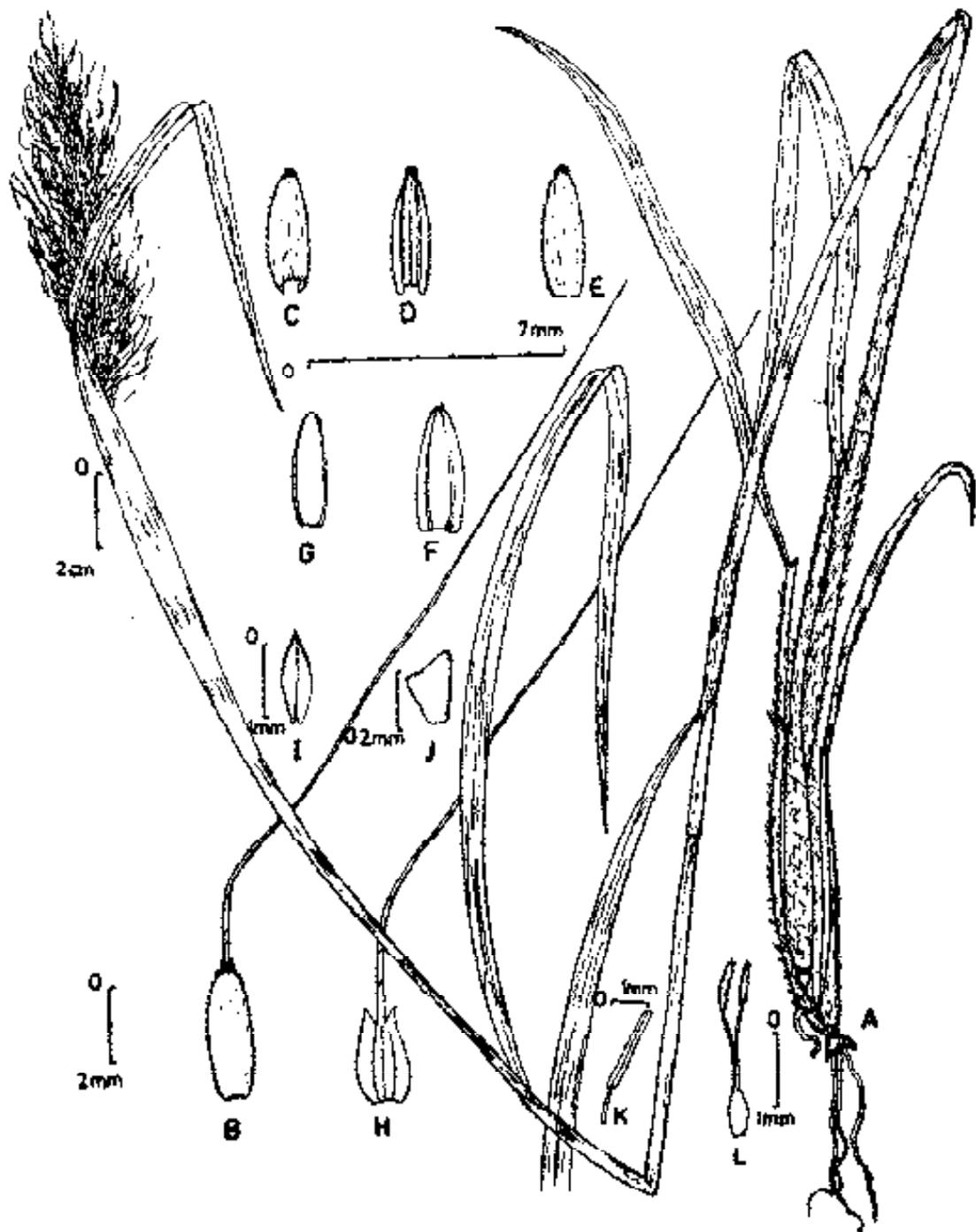


PLATE No. 11: *CLEISTACHNE BORGHOIDES* Benth.

A. Habit; B. Spikelet; C. Lower glume (outer view); D. Same (inner view); E. Upper glume; F. First lemma; G. Palea of the first lemma; H. Second lemma; I. Palea of the second lemma; J. Lodicule; K. Stamen; L. Pistil.

or oblong, 3.5-5 x 1.5-3 mm, crustaceous, densely hairy. Lower floret male or empty. Upper floret bisexual. First lemma ovate-oblong, 3-4 x 1-1.5 mm, delicate, 2-keeled, ciliate towards apex. Palea oblong, 2.5-3 x 0.5-1 mm; delicate. Second lemma broadly ovate-notched, awned in the sinus, 3-4 x 1-1.5 mm, delicate, 3-nerved; awns 20-30 mm long, column 3-6 mm long. Palea elliptic-lanceolate or oblanceolate, 1-1.5 x 0.25-0.5 mm, delicate, 1-nerved, ciliate towards apex. Lodicules obovate, oblique at apex, 0.25 x 0.1 mm. Stamens 3, anthers 2-2.5 mm long. Ovary ovate, 0.5-1 mm long; styles 1-1.5 mm long; stigmas 0.5-1 mm long.

Occasional along the scrub jungles and forest margins, often in hilly areas.

Fl. & Fr. : November-March.

Notes This grass superficially looks like some species of *Sorghum*, but differs in having solitary spikelets. It is quite distinct by the presence of brownish hairs all over the spikelets and panicles. Cope (pers. comm.) of Kew Herbarium has confirmed the identity of our specimens and according to him *C. stocksii* should be treated as synonymous to *C. sorghoides*.

IDUKKI : Idukki; PALGHAT : Silent Valley.

10. CYMBOPOGON Spreng.

Spreng. Pl. Pugill. 2 : 14, 1815; Bor., Grass, Bur. Cey. Ind. Pak. 121, 1960.

A genus of about 60 species in the Old World tropics and subtropics, of which 25 species occur in India and 5 species in Kerala.

The genus *Cymbopogon* is closely related to *Andropogon*, *Apluda* and *Hyparrhenia* and is at times very difficult to separate from them. However, the peculiar aromatic nature of the leaves distinguishes it from the other genera.

This genus shows considerable variation within its species and, in certain cases it is quite difficult to demarcate the barrier between two allied species. Even though various scientists have tried to solve the taxonomic dilemma within the genus, it remains one of the most difficult genera and most of the characters selected for specific delimitation are quite unsatisfactory in many cases.

Key to the Species

- 1a. Sessile spikelets awned, up to 4 mm long, oblong, or elliptic:
- 2a. Pedicels of the lowest pedicelled spikelet in the sessile raceme swollen; panicles contracted or effuse:
- 3a. Lower glume of the sessile spikelet with a narrow slit-like groove in the lower half which appears as a rib on the ventral side; panicles contracted:
- 4a. Leaves cordate at the base, lanceolate, dark green; spikelets broader, oblong or elliptic; upper lemmas present in the pedicelled spikelets *C. martinii* 4
- 4b. Leaves narrowed or rounded at the base, linear-acuminate, glaucous; spikelets narrower, linear-oblong; upper lemmas absent in the pedicelled spikelets *C. caesius* 1
- 3b. Lower glume of the sessile spikelet without a narrow slit-like groove, either flat or with one or two shallow depressions in the lower half; panicles very effuse *C. travancorensis* 5
- 2b. Pedicel of the lowest pedicelled spikelet in the sessile raceme not swollen; panicles very lax with numerous, long, slender flexuous branches *C. flexuosus* 3
- 1b. Sessile spikelets without awns, 4-6 mm long, linear or lanceolate *C. citreus* 2

1. *Cymbopogon caesius* (Nees ex Hook. & Arn.) Stapf in Kew Bull. 1906: 360. 1906; Fischer in Gamble, Fl. Pres. Madr. 1757. 1934 (Repr. ed. 3: 1217. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 125. 1960; Soenarko in Reinwardtia 3: 331. 1977. *Andropogon caesius* Nees ex Hook. & Arn. Bot. Beech. Voy. 244. 1838. *A. schoenanthus* var. *caesius* (Nees ex Hook. & Arn.) Hack. in DC. Monogr. Phan. 6: 610. 1889. *A. schoenanthus* var. *gracillimus* Hook. f. Fl. Brit. Ind. 7: 205. 1896.

Perennials. Culms 50-200 cm high, erect; nodes glabrous. Leaves linear-lanceolate, 10-30 x 0.3-0.8 cm, acuminate. Ligules ovate, acute, membranous, 3-5 mm long. Panicles narrow, contracted, 15-40 cm long. Racemes 1-1.5 cm long; joints 1.5-2 mm,

densely villous, abscission cupuliform. Sessile spikelets linear-oblong, 3-4 x 0.75 mm, callus hairy; lower glume oblong, 3-4 x 1 mm, acute or slightly notched at apex, coriaceous, faintly 3-5-nerved, with a narrow slit in the lower half, keels narrowly winged in the upper half; upper glume elliptic-lanceolate, 3-4 x 1 mm, dorsally keeled, keels narrowly winged in the upper half, margins ciliate; lower floret empty; upper floret bisexual; first lemma oblong-elliptic, 3-3.5 mm, 2-nerved, delicate, hyaline, margins ciliate; palea absent; second lemma notched, 1.5-2 x 0.25 mm, 1-nerved, awned; awn 10-12 mm long, geniculate, column c. 5 mm long, brownish; stamens 3, anthers 1.5-3 mm; ovary oblong, c. 0.5 x 0.15 mm, styles c. 1 mm, feathery. Pedicelled spikelets elliptic, 3-4 x 1 mm, glabrous; pedicels 1-2 mm long, densely long-villous; lower glume elliptic or oblong, 3-4 x 1-1.5 mm, chartaceous, 11-13-nerved, keels scaberulous; upper glume elliptic-lanceolate, 3-4 x 1 mm, chartaceous, 3-nerved, margins hyaline, ciliate; lower floret male; upper floret wanting; first lemma oblong-lanceolate, 3-4 x 1 mm, delicate, faintly 2-3-nerved, margins ciliate; stamens 3, anthers 2-3 mm long.

Fairly common along the hill-slopes and fringes of forests.

Fl. & Fr. : August-December.

Notes : This species is closely related to *C. martinii* but can be distinguished by its wiry, geniculate culms, glaucous, narrower and shorter leaf blades with rounded bases and yellowish panicles (see table under *C. martinii*).

2. *Cymbopogon citratus* (DC.) Stapf in Kew Bull. 1906 : 357, 1906; Fischer in Gamble, Fl. Pres. Madr. 1756, 1934 (Repr. ed. 3 : 1216, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 126, 1960; Soenarko in Reinwardtia 9 : 351, 1977; Manilal & Sivaraj, Fl. Calic. 345, 1982, *Andropogon citratus* DC. Cat. Hort. Monsp. 78, 1813; Hook. f. Fl. Brit. Ind. 7 : 210, 1896.

Perennials. Culms 50-200 cm high, erect; nodes glabrous. Leaves linear-lanceolate, 15-60 x 0.8-1.5 cm, narrowed at base, glaucous. Ligules membranous. Panicles lax, 10-50 cm. Racemes 1-1.5 cm long; joints 2.5-3 mm long, slender, densely villous. Sessile spikelets linear-lanceolate or lanceolate, 5-6 x 0.75 mm, callus shortly bearded; glume ovate-lanceolate or lanceolate, c. 5 x 1 mm, chartaceous, 5-nerved; upper glume lanceolate, 4-5 mm, coriaceous, 3-nerved, margins ciliate; lower floret empty; upper floret bisexual;

second lemma lanceolate, c. 4 x 1 mm, delicate, 2-nerved, hyaline, margins ciliate. Pedicelled spikelets linear-lanceolate or lanceolate, 4-6 x 1 mm; pedicels 2-4 mm long, slender, densely villous; floret male; lemma similar to that of the sessile spikelet.

Frequent along grassy hill slopes, margins of forests and in grasslands.

Fl. & Fr. : July-September.

Notes: This species can easily be distinguished from the other species of the genus, by its unawned spikelets, glabrous smooth leaf, blades and sheaths and the strong smell of lemon. The oil extracted from the leaves is the valuable 'lemon grass oil'. The dried young shoots are at times used for flavouring curries. The common 'West Indian Lemon Grass' is cultivated on a large scale for its reputed aromatic oil.

IDUKKI; Pattumudi; QUILON; Ponnambalamedu.

3. *Cymbopogon flexuosus* (Nees ex Steud.) Wats. in Atkins. Gaz. N. W. Prov. Ind. 392, 1882; Fischer in Gamble, Fl. Pres. Madr. 1768, 1934 (Repr. ed. 3: 1216, 1957); Bor, Grass. Bur. Cay. Ind. Pak. 127, 1960; Soenarko in Reinwardtia 9: 353, 1977. *Andropogon flexuosus* Nees ex Steud. Syn. Pl. Glum. 1: 388, 1854. *A. nardus* Linn. subsp. *flexuosus* (Nees ex Steud.) Hack. in DC. Monogr. Phan. 6: 603, 1889; Hook. f. Fl. Brit. Ind. 7: 207, 1896.

Perennial. Culms 60-300 cm high, erect, tufted; nodes glabrous. Leaves linear, 15-60 x 1-2 cm, rounded at base. Ligules ovate, membranous. Panicles very lax, 15-80 cm long. Racemes 1-1.5 mm; joints c. 2 mm long, densely villous, abscission cupuliform. Sessile spikelets elliptic-lanceolate, 4-5 mm long; lower glume elliptic-lanceolate, c. 4 x 1 mm, sub-coriaceous, faintly 5-7-nerved, keels winged towards apex; upper glume ovate-lanceolate, chartaceous, margins ciliate; lower floret empty; upper floret bisexual; first lemma lanceolate, 3-3.5 x 1 mm, delicate, hyaline, purplish; second lemma deeply notched, c. 2 x 0.4 mm, awned, delicate, hyaline, awns 8-12 mm, geniculate, column 3-5 mm, brownish; lodicules 2, oblanceolate, obtuse at apex, c. 0.5 x 0.25 mm; stamens 3, anthers 1-2 mm long; ovary oblong, c. 0.5 x 0.1 mm, styles 0.5-1 mm, stigmas 1-1.5 mm long; grains elliptic-lanceolate, c. 2 mm long. Pedicelled spikelets lanceolate or elliptic-lanceolate, 3-4 mm

long; pedicels c. 2 mm long, densely villous, abscission cupuliform; lower glume ovate-lanceolate, 3-3.5 x 1 mm, chartaceous, 9-11-nerved, margins ciliate; upper glume elliptic-lanceolate, c. 3 x 1 mm, chartaceous, 3-nerved, margins hyaline, ciliate; lower floret male; upper floret wanting; first lemma elliptic-lanceolate, c. 3 x 1 mm, delicate, hyaline, margins ciliate; stamens 3, anthers 1.5-2 mm long.

Very common in forests as secondary formations, in scrub jungles, hill-slopes, grasslands and, occasionally along the roadsides and banks of rivers; frequently seen in association with grasses like *Themeda cymbaris* and *Pennisetum polystachyon*.

Fl. & Fr. : June-December.

Notes : This species can easily be recognised by its reddish culms, narrowly winged lower glumes of the sessile spikelets with 2-3 shallow wrinkles and 3 nerves on the dorsal side. It may get confused with *C. travancorensis*, but can be distinguished by its reddish culms and inflorescence.

It is often cultivated on a large scale for its valuable aromatic oil ('Malabar Lemon Grass oil').

CALICUT : Kutiyadi, Peruvannamuzhi; CANNANORE : Ambayathode, Taliparamba; IDUKKI : Kuttikanam, Lock-hert gap, Munnar, Paermade, Sabarimala; PALGHAT : Dhoni R. F., Silent Valley, Aruvampara; QUILON : Quilon; TRIVANDRUM : Kariavattom.

4. *Cymbopogon martinii* (Roxb.) Wats. in Atkins, Gaz. N. W. Prov. Ind. 392. 1882; Fischer in Gamble, Ft. Pres. Madr. 1756. 1934 (Repr. ed. 3 : 1217. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 129. 1960; Soenarko in Rainwardtia 9 : 330. 1977. *Andropogon martinii* Roxb. Fl. Ind. 1 : 280. 1820. *A. schoenanthus* Linn. var. *martinii* (Roxb.) Hook. f. Fl. Brit. Ind. 7 : 204. 1896.

Perennial. Culms 60-250 cm high, tufted; nodes glabrous. Leaves lanceolate-acuminate, 10-40 x 0.5-1.5 cm, cordate at base. Ligules ovate, acute, membranous, 3-6 mm. Panicles narrow, contracted, 5-60 cm long. Racemes 1-1.5 cm long; joints 1.5-2 mm, densely villous, abscission cupuliform. Sessile spikelets oblong or elliptic, 3-4 x 1 mm; callus hairy; lower glume oblong, 3-3.5 x 1 mm, subcoriaceous, with a slit-like groove in the lower half; margins

infolded, keels narrowly winged in the upper half; upper glume elliptic-lanceolate, 3-3.5 x 1 mm, subcoriaceous, dorsal side keeled and winged in the upper half, margins hyaline, ciliate; lower floret empty; upper floret bisexual; first lemma oblong, 2-3 x 0.5-0.75 mm, delicate, hyaline, margins ciliate; second lemma notched, c. 2 x 0.5 mm, delicate, hyaline, awned; awns 10-15 mm long, column 4-5 mm, brownish; stamens 3, anthers 1-2 mm long; ovary c. 0.5 mm long, styles 1-1.5 mm, stigmas c. 1.5 mm long. Pedicelled spikelets oblong-lanceolate, 3.5-4 x 1 mm; pedicels 1-2 mm, densely villous, abscission cupuliform; lower glume elliptic-lanceolate, 3.5-4 x 1.5 mm, chartaceous, 11-13-nerved; upper glume lanceolate, 3.5-4 x 1 mm, chartaceous, faintly 3-nerved, margins ciliate; lower floret empty; upper floret male; first lemma oblong, acute, c. 3 x 1 mm, delicate, hyaline, faintly 3-5-nerved, ciliate in the upper half; second lemma oblong, acute, c. 3 x 1 mm, delicate, hyaline, faintly 3-nerved, ciliate in the upper half; stamens 3, anthers 1.5-2 mm.

Fairly common along hill slopes, grasslands and margins of the forests. Often cultivated on a large scale for its essential oil.

Fl. & Fr. : August-December.

Notes : This species resembles *C. caesius* in the structure of the sessile spikelets. Both these species have the lower glume of the sessile spikelets with a deep median groove and broad wings, and the pedicel of the lowest pedicelled spikelets in the sessile racemes are swollen. But both species can be distinguished by the differences shown in the table.

| <i>C. caesius</i> | <i>C. martinii</i> |
|---|---|
| 1. Culms wiry, less robust, geniculate, glaucous | Culms tufted, robust, green |
| 2. Leaf-blades narrower, shorter, glaucous and rounded at bases | Leaf-blades broader, long, green and cordate at bases |
| 3. Panicles greenish or yellowish when mature | Panicles reddish when mature |
| 4. Lower glumes of the sessile spikelets obtuse at apex | Lower glumes acute at apex |

The two different forms of *C. martinii*, popularly known as "motia" and "sofia" are difficult to be separated from each other in herbarium as well as field. But Bor (*l. c.*) says that both the forms can be distinguished in the field by the different patterns of arrangement of the leaves and he has supported the view of Burkill (1909). Gupta (1970) suggested that "motia" being a diploid, should be given a separate specific status and "sofia" a tetraploid should be given a varietal status as *C. martinii* var. *sofia*. However, as it is very difficult to distinguish them by those feeble characters it is better to treat these two forms under one name, *C. martinii* as suggested by Soenarko (1977).

Two kinds of oils are distilled from *C. martinii*; palmerosa oil from the form "motia" and ginger grass oil from the form "sofia"

MALAPPURAM : Nilambur.

5. *Cymbopogon travancorensis* Bor in J. Bomb. Nat. Hist. Soc. 52: 174. 1954 et Grass. Bur. Cey. Ind. Pak. 132. 1960.

Perennials. Culms 60-300 cm high; nodes glabrous. Leaves linear, 15-60 x 0.6-1.5 cm, margins serrulate. Ligules ovate, acute, 5-8 mm long, membranous. Panicles lax, 15-50 cm. Racemes 0.8-1.2 cm long; joints c. 2 mm, densely ciliate. Sessile spikelets oblong, acute, 3-4 x 0.75 mm, awned; callus shortly bearded; lower glume oblong, 3-3.5 x 0.75 mm, with or without a slot in the lower half, chartaceous, keels narrowly winged in the upper half, upper glume boat-shaped or ovate-lanceolate when spread, c. 3 x 1 mm, chartaceous, 3-nerved, margins hyaline, ciliate; lower floret empty; upper floret bisexual; first lemma oblong-acute, c. 3 x 1 mm, delicate, hyaline, 2-nerved, margins ciliate; second lemma notched, awned, 2-3 x 0.5 mm, delicate, 1-3-nerved, margins ciliate, awn 8-10 mm long, column 3-4 mm, brown; stamens 3, anthers 1.5-2 mm; ovary oblong, c. 0.5 mm, styles 1-1.5 mm, stigmas 1-1.5 mm long. Pedicelled spikelets elliptic-lanceolate, 3-4.5 mm long; pedicels 1.5-2 mm long, densely ciliate, lowest one in the sessile raceme swollen; lower glume ovate-lanceolate, 3-4 x 1 mm, chartaceous, 11-nerved; upper glume lanceolate, 3-3.5 x 1 mm, chartaceous, 3-nerved, margins hyaline, ciliate; lower floret male; upper floret wanting; first lemma similar to that of the sessile spikelet; stamens 3, anthers 1.5-2 mm long.

Occasional; along dry rocky places, hill-slopes and margins of the forests.

Fl. & Fr. : September-March.

Notes : This grass may get confused with *C. flexuosus* but can be recognised by its effuse, grey or greenish panicles and swollen pedicels of the lowest pedicelled spikelets in the sessile racemes.

TRIVANDRUM : Sreekariam.

11. DICHANTHIUM Willemet

Willemet in Usteri, Ann. Bot. 18 : 11, 1796; Fischer in Gamble, Fl. Pres. Madr. 1740, 1934 (Repr. ed, 3 : 1206, 1957); Bor, Grass. Bur. Cay. Ind. Pak. 133, 1960.

A genus of about 20 species distributed in the tropics of the world, of which about 12 occur in India, 4 in Kerala.

Key to the species

- 1a. Raceme solitary or rarely 2-3; spikelets obovate, obtuse :
- 2a. Joints 1-1.5 mm long; leaves up to 20 cm long, margins entire; lower glume of the sessile spikelet obovate, obtuse or truncate, without a median nerve; culms below the inflorescence glabrous; perennials *D. caricosum* 2
- 2b. Joints 2-2.5 mm long; leaves up to 10 cm long, undulate on one margin; lower glume oblong, rounded, median nerve prominent; culms below the inflorescence puberulous; annuals *D. oliganthum* 4
- 1b. Racemes 3-10; spikelets oblong, acute :
- 3a. Lower glume of the sessile spikelet oblong, 2.5-3.5 mm long; spikelets ovate, acute; lower lemma up to 2 mm long; joints 1.5-2 mm long; nodes bearded *D. annuletum* 1
- 3b. Lower glume of the sessile spikelet lanceolate or oblong-lanceolate, 4-5 mm long; spikelets oblong-lanceolate; lower lemma 3-4 mm long; joints 2.5-3 mm long; nodes glabrous *D. foulkesii* 3

1. *Dichanthium annulatum* (Forssk.) Stapf in Prain, Fl. Trop. Afr. 9: 178, 1917; Fischer in Gamble, Fl. Pres. Madr. 1741, 1934 (Repr. ed. 3: 1206, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 133, 1960. *Andropogon annulatus* Forssk. Fl. Aegypt. Arab. 173, 1775; Hook. f. Fl. Brit. Ind. 7: 196, 1896; Rang. & Tad. Handb. S. Ind. Grass. 204, t. 160-161, 1921.

Perennials. Culms 50-150 cm high, erect or geniculate; nodes densely villous. Leaves linear-lanceolate, 5-20 x 0.2-0.6 cm. Ligule ovate, acute, membranous. Racemes 3-10 in number, each 2-8 cm long, joints 1.5-2 mm long, ciliate. Sessile spikelets ovate, 2.5-4 mm long, acute; callus densely hairy; lower glume oblong, 2.5-3.5 mm, chartaceous, 7-9-nerved, villous; upper glume lanceolate, 3-3.5 mm long, chartaceous, faintly 3-nerved; lower floret empty; upper floret bisexual; first lemma lanceolate, c. 2 x 1 mm, delicate, hyaline, glabrous; second lemma stipitate hyaline base of the awn, 1.5-2 mm long, awn 15-25 mm long, column 5-6 mm long; stamens 3, anthers c. 2 mm long; ovary oblong, 0.25-0.50 mm, styles 0.5-1 mm, stigmas 1-1.5 mm long; grain elliptic, c. 1 x 0.5 mm. Pedicelled spikelets oblong, 2.5-4 mm, unawned; pedicels 1.5-2 mm long, margins densely villous; lower glume ovate-oblong, 3-4 mm long, chartaceous, 13-15-nerved, densely bristly-hairy, especially along margins; upper glume lanceolate, 1-3 mm long, chartaceous, softly hairy; florets often empty.

Abundant along roadsides, wastelands and also in open grasslands; often in moist situations.

Fl. & Fr. : June-December.

Notes : This is a highly variable species. It can be easily distinguished in the field by the presence of annular hairs at the nodes which is uncommon in all other species of the genus. This is an excellent fodder grass.

ERNAKULAM: Cochin; PALGHAT: Walayar.

2. *Dichanthium caricosum* (Linn.) A. Camus in Bull. Mus. Hist. Nat. Paris 27: 549, 1921; Fischer in Gamble, Fl. Pres. Madr. 1741, 1934 (Repr. ed. 3: 1206, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 134, 1960. *Andropogon caricosus* Linn. Sp. Pl. ed. 2, 1480, 1763; Hook. f. Fl. Brit. Ind. 7: 196, 1896; Rang. & Tad. Handb. S. Ind. Grass. 201, t. 159, 1921.

Perennials. Culms 10-100 cm long, erect or decumbent, sometimes stoloniferous, nodes bearded or glabrous. Leaves lanceolate, 2-20 x 0.2-0.4 cm. Ligules ovate, acute, membranous. Racemes usually solitary, rarely 2-3, 2-6 cm long, joints 1-1.5 mm long. Sessile spikelets obovate, 3-3.5 mm long; callus hairy; lower glume obovate, 3-4 x 1.5-2 mm, obtuse, subcoriaceous, 7-9-nerved, narrowly winged towards apex, margins ciliate; upper glume lanceolate, 3-3.5 x 1 mm, subcoriaceous, keeled on dorsal side; lower floret empty; upper floret bisexual; first lemma ovate-lanceolate, 2-3 x 1 mm, delicate, hyaline, glabrous; second lemma stipitate, 1-2 mm long hyaline base of the awn, awn 12-20 mm long, column 5-6 mm; stamens 3, anthers 1-1.5 mm long; ovary oblong, 0.25-0.5 mm, styles 0.5-1 mm long, stigmas 1-1.5 mm long. Pedicelled spikelets obovate, 3-4 mm long, unawned; pedicels 1-1.5 mm long; lower glume oblong or obovate, 3-4 x 1.5-2 mm, subcoriaceous or chartaceous, 13-15-nerved, minutely winged towards apex; upper glume ovate-lanceolate, 3-4 x 1.5 mm, delicate, 3-nerved, margins hyaline, ciliate; florets male or empty.

Occasional along dry open grasslands and other dry habitats. Rarely seen along the margins and bunds of fields and riversides.

Fl. & Fr. : July-February.

Notes : This species can be distinguished from others in the genus by its peculiar broader, obovate spikelets which are closely packed in, often solitary racemes. It can be separated from *D. oliganthum* (Hochst.) Cope by the stout perennial habit and glabrous rhachis.

CANNANORE : Begur R. F.

3. *Dichanthium foulkesii* (Hook. f.) Jain & Deshpande in Bull. Bot. Surv. Ind. 20: 134, 1978. *Andropogon foulkesii* Hook. f. Fl. Brit. Ind. 7: 174, 1896. *Bothriochloa foulkesii* (Hook. f.) Henr. in Blumea 3: 457, 1940; Bor, Grass. Bur. Cey. Ind. Pak, 107, 1960. *Amphilophis foulkesii* (Hook. f.) Fischer in Gamble, Fl. Pres. Madr. 1732, 1934 (Repr. ed. 3: 1200, 1957). PLATE No. 12

Tufted perennials. Culms 20-80 cm high, erect or geniculate; nodes glabrous. Leaves linear, acuminate, 10-25 x 0.2-0.5 cm, glaucous or green; hispid or glabrous, midrib prominent. Sheaths slightly keeled, mouth villous. Ligules membranous, fimbriate. Racemes 3-6, digitate or subdigitate, axils bearded, each one 3-8

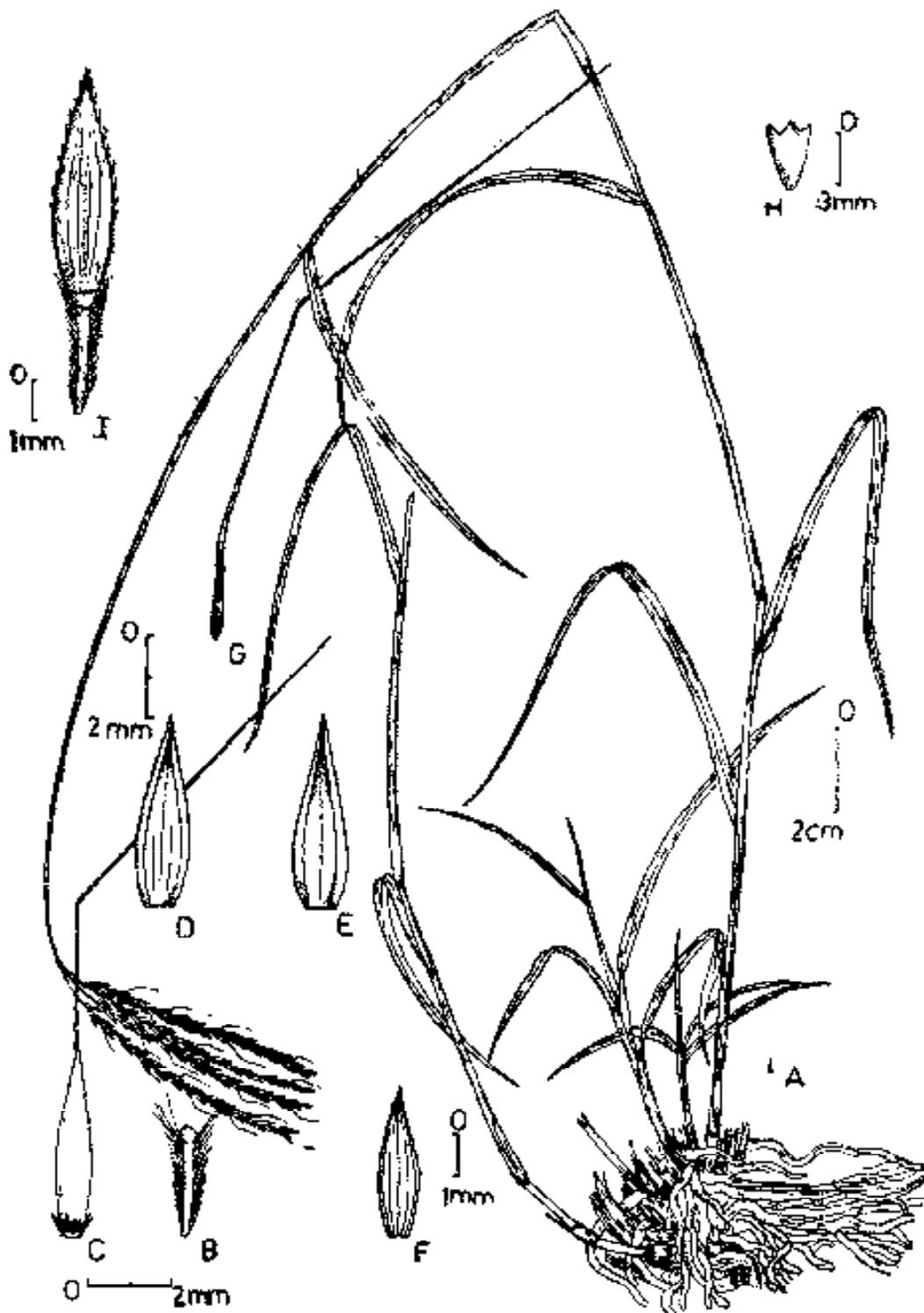


PLATE No. 12: *DICHANTHIUM FOULKESII* (Hook. f.) Jain & Deshpande

A. Habit; B. Joint of raceme; C. Sessile spikelet; D. Lower glume of sessile spikelet; E. Upper glume; F. First lemma; G. Second lemma; H. Lodicule; I. Pedicelled spikelet.

cm long, peduncled, purplish; joints linear, 2.5-3 mm long, flat, margins ciliate. Sessile spikelets oblong-lanceolate, 4-5 mm long; callus shortly bearded; lower glume lanceolate or oblong-lanceolate, 4.5 x 1.5 mm, chartaceous, faintly 7-9-nerved, flat or with a shallow depression towards base, margins infolded, keels pectinate towards apex; upper glume oblong-lanceolate, 4-5 x 1-1.5 mm, acuminate, chartaceous, 3-nerved, margins hyaline, ciliate in the upper half; lower floret empty; upper floret bisexual; first lemma oblong-lanceolate, 3.5-4 mm long, faintly 3-5-nerved, delicate, hyaline; second lemma stipitate, 2-3 mm long, hyaline base of the awn, awn 15-25 mm, column 6-8 mm long; lodicules obovate, c. 0.5 x 0.25 mm, 3-horned at apex; stamens 3, anthers 1-2 mm long; ovary oblong, 0.3-0.5 mm, styles 0.5-1 mm, stigmas 1-2 mm, feathery. Pedicelled spikelets elliptic-lanceolate, 5-6 mm long; pedicels linear, 2-3 mm, ciliate along the margins; lower glume elliptic-lanceolate, 5-5.5 x 1.5 mm; chartaceous, 7-9-nerved, margins infolded, ciliate towards apex, upper glume lanceolate, c. 5 x 1 mm, chartaceous, faintly 3-nerved, margins densely ciliate; lower floret similar to that of sessile spikelet; upper floret male; second lemma lanceolate, 3-4 x 1-1.25 mm, entire, delicate, hyaline; stamens 3, anthers 1-2 mm long.

Rare, along high altitude grasslands, usually growing as large clumps in moist damp habitats.

Fl. & Fr.: September-February.

Notes: Presence of pitted glumes and translucent joints and pedicels help to separate *Bothriochloa* O. Kuntze from the genus *Dichanthium* Willemet. In this species the glumes are without pits and the joints and pedicels are solid. According to Cope of Kew Herbarium (personal communication), *B. foulkesii* is not a straight forward species of *Bothriochloa* at all, but an inter-generic hybrid between *Dichanthium annulatum* and an as yet undetermined species of *Bothriochloa*. This species, which is somewhat intermediate in having a groove, that is not translucent along the upper surface of the pedicel, shows more affinity to the genus *Dichanthium* and hence it was thought better to be treated under it. Seems to be endemic to Southern India.

IDUKKI: Munnar, Devicolam; QUILON: Perundenaruvi.

4. *Dichanthium oliganthum* (Hochst. ex Steud.) Cope in Kew Bull. 35: 703, 1980. *Andropogon oliganthus* Hochst. ex Steud. Syn. Pl. Glum. 1: 368, 1854; Hook f. Fl. Brit. Ind. 7: 201.

1896, *Indochloa oligantha* (Hochst. ex Steud.) Bor in Kew Bull. 1954: 79. 1954 et Grass. Bur. Cey. Ind. Pak. 171, t. 9. 1960. *Heteropogon oliganthus* (Hochst. ex Steud.) Blatt. & Mc Cann in J. Bomb. Nat. Hist. Soc. 32: 623. 1928; Fischer in Gamble, Fl. Pres. Madr. 1744, 1934 (Repr. ed. 3: 1208. 1957).

Annuals. Culms 5-50 cm high, erect or decumbent; nodes glabrous. Leaves lanceolate, 2-10 x 0.2-0.5 cm, densely villous, undulate on one margin. Sheaths keeled. Ligule ovate, 1-3 mm, membranous. Racemes solitary, rarely 2, 2-5 cm long, hairy below the inflorescence; joints 2-2.5 mm long, densely silky villous along the margins. Sessile spikelets oblong-lanceolate, 3-5 x 1 mm; callus bearded; lower glume oblong, 3-4 x 1 mm, obtuse at apex, subcoriaceous, faintly 5-nerved; upper glume lanceolate, 3-4 x 1.5-2 mm, subcoriaceous, margins infolded, ciliate in the upper half; lower floret empty; upper floret bisexual; first lemma oblong-lanceolate, 2-3 x 1 mm, delicate, hyaline, faintly 3-nerved; second lemma stipitate, 1-2 mm long hyaline base of the awn, awn 25-45 mm long; stamens 2, anthers c. 1 mm long; ovary oblong, 0.25-0.5 mm, styles 1-1.5 mm long, stigmas 1-1.5 mm long. Pedicelled spikelets ovate-oblong, 5-6 x 2 mm, unawned; pedicels 2-2.5 mm, densely silky-villous along the margins; lower glume ovate-oblong, 5-6 x 2 mm, subcoriaceous, 11-13-nerved, ciliate at apex; upper glume oblong, obtuse, 3-4 x 1 mm, delicate, faintly 3-nerved, margins infolded, ciliate; florets often empty.

Frequent along high altitude grassland, usually in moist and shady places. Occasional in the crevices of moist rocks along with mosses and some terrestrial orchids.

Fl. & Fr. : August-December.

Notes : This grass is quite distinct by its aromatic, slender, wiry culms and leaves, usually solitary racemes with hairy peduncles below and the glumes with purple margins.

IDUKKI : Anamudi slopes, Eravikulam National park, Munnar, Peermade.

12. DIMERIA R. Br.

R. Br. Prodr. Fl. Nov. Holl. 204. 1810; Hook. f. Fl. Brit. Ind. 7: 103. 1896; Fischer in Gamble, Fl. Pres. Madr. 1711. 1934 (Repr. ed. 3: 1186. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 136. 1960.

A genus of about 45 species distributed in the tropics and subtropics, of which about 28 species occur in India and 15 species in Kerala.

This genus is most peculiar in the tribe Andropogoneae by its solitary, laterally compressed spikelets and flat or filiform rhachis without joints.

Out of 15 species described here 5, viz. *D. borii*, *D. copeana*, *D. jainii*, *D. keralae* and *D. raizadae* are new to science. The occurrence of *D. acutipes* and *D. avenacea* in the study area is yet to be confirmed.

Key to the species

- 1a. Awns 25-30 mm long, stout; racemes 2, unequal in length, intertwined; articulation of spikelets extremely oblique; upper floret with prominent palea *D. keralae* 10
- 1b. Awns up to 15 mm long, slender; racemes 1-15, almost equal in length, not intertwined; articulation straight; upper floret without palea or palea not distinct:
- 2a. Rhachis angular or trigonous:
- 3a. Spikelets 1-2 mm long; racemes 1-3 in number, up to 5 cm long; anthers 0.25-0.50 mm long *D. ornithopoda* 13
- 3b. Spikelets 2.5-5 mm long; racemes 2-15 in number, up to 10 cm long; anthers 1-2 mm long:
- 4a. Racemes 2; leaves 20-40 cm long; spikelets sessile, 3.5-4.5 mm long *D. copeana* 4
- 4b. Racemes 3-15; leaves 1-8 cm long; spikelets shortly pedicelled, 2.5-5 mm long *D. hohenackeri* 7
- 2b. Rhachis flat:
- 5a. Upper glume awned or at least acuminate:
- 5b. Upper glume winged:
- 7a. Keel of the upper glume winged towards apex only; rhachis 1-1.5 mm wide; nodes bearded; anthers 2-3 mm long *D. kurumthotticalana* 11

- 7b. Keel of the upper glume winged
all along; rachis up to 0.75 mm wide; nodes
glabrous; anthers up to 1 mm long *D. lawsonii* 12
- 8b. Upper glume not winged :
- 8a. Spikelets 3-3.5 mm long; rachis broader,
up to 1 mm wide; callus hairs 1-1.5 mm
long; racemes 2, rarely solitary; anthers
1-2 mm long *D. raizadae* 14
- 8b. Spikelets 4-5 mm long; rachis at the most
0.6 mm wide; callus hairs 0.6-1 mm long;
raceme usually solitary; anthers 0.6-1 mm
long *D. thwaitesii* 15
- 9b. Upper glume awnless, usually acute :
- 9a. Raceme solitary :
- 10a. Spikelets 2-3 mm long; callus hairs c. 0.5 mm
long; culms slender, filiform *D. fischeri* 6
- 10b. Spikelets 5-6 mm long; callus hairs 1-1.5
mm long; culms not as above *D. borii* 2
- 9b. Racemes 2-3 :
- 11a. Upper glume winged all along the keel :
- 12a. Spikelets 4-4.5 mm long; upper glume
narrowly winged all along the keel, wing
corky; callus hairs 0.5-1 mm long;
anthers 1.5-2 mm long *D. connivens* 3
- 12b. Spikelets 3-3.5 mm long; upper glume
broadly winged on the keel,
wing corky or papery; anthers
up to 1 mm long :
- 13a. Upper glume winged all along,
acute at apex, wing corky; callus
hairs up to 0.25 mm long; anthers
c. 1 mm long *D. bialets* 1
- 13b. Upper glume not winged at apex,
scuminete, wing papery; callus
hairs 0.5-1 mm long; anthers c.
0.5 mm long *D. jainii* 6
- 11b. Upper glume not winged or winged just
below the tip only :

- 14a. Spikelets 2.5-3 mm long; callus hairs up to 0.5 mm long; racemes 2, rarely solitary or 3, spreading; anthers 1-2 mm long *D. doccanensis* 5
- 14b. Spikelets 3.5-4 mm long; callus hairs 0.5-1 mm long; racemes usually 2, divaricate; anthers 0.5-1 mm long *D. kanjirapattilana* 9

1. *Dimeria bialata* C. E. C. Fischer in Kew Bull. 1933: 351. 1933
 et Fl. Pres. Madr. 1713. 1934 (Repr. ed. 3: 1188. 1957);
 Bor. Grass. Bur. Cey. Ind. Pak. 140. 1960. PLATE No. 13

Annuals. Culms erect, 20-50 cm high; nodes bearded. Leaves lanceolate, 2-8 x 0.2-0.5 cm, mostly basal, covered with tubercle-based hairs especially along the margins. Sheaths keeled, with tubercled hairs. Ligule membranous, truncate, fimbriate. Racemes 2, 5-8 cm long; rhachis flat, 0.75-1 mm wide. Spikelets oblong or elliptic-oblong, 3-3.5 x 1 mm; callus shortly bearded; lower glume lanceolate, c. 3 x 0.5 mm, keeled, narrowly winged and ciliate along the keels except towards tip, chartaceous; upper glume oblong-elliptic, 3-3.5 x 1 mm, acute, chartaceous, broadly winged, ciliate along the wing except towards apex; lower floret empty; upper floret bisexual; first lemma oblanceolate, 1-1.5 x 0.5 mm, hyaline, faintly 1-nerved, ciliate towards apex; second lemma notched, 1.5-2 x 0.5-1 mm, awned, hyaline, 1-nerved, awn 8-12 mm long, column c. 4 mm, brownish; stamens 2, anthers 1-1.5 mm; ovary oblong, c. 0.25 mm, styles c. 0.5 mm, stigmas c. 0.5 mm long.

Fairly common along open grasslands and dry rocky places along with other species of *Dimeria*.

Fl. & Fr.: September-December.

Notes: This species closely resembles a newly described species *D. jainii* P. V. Sreekumar *et al.*, but it can be separated from that species by its broader rhachis, truncate articulation of pedicels, short callus hairs, corky wing of the upper glume and longer anthers.

CANNANORE: Ezhimala, Paramba.

2. *Dimeria borli* P. V. Sreekumar, V. J. Nair & N. C. Nair in J. Econ. Tax. Bot. 3: 657. 1982. PLATE No. 14

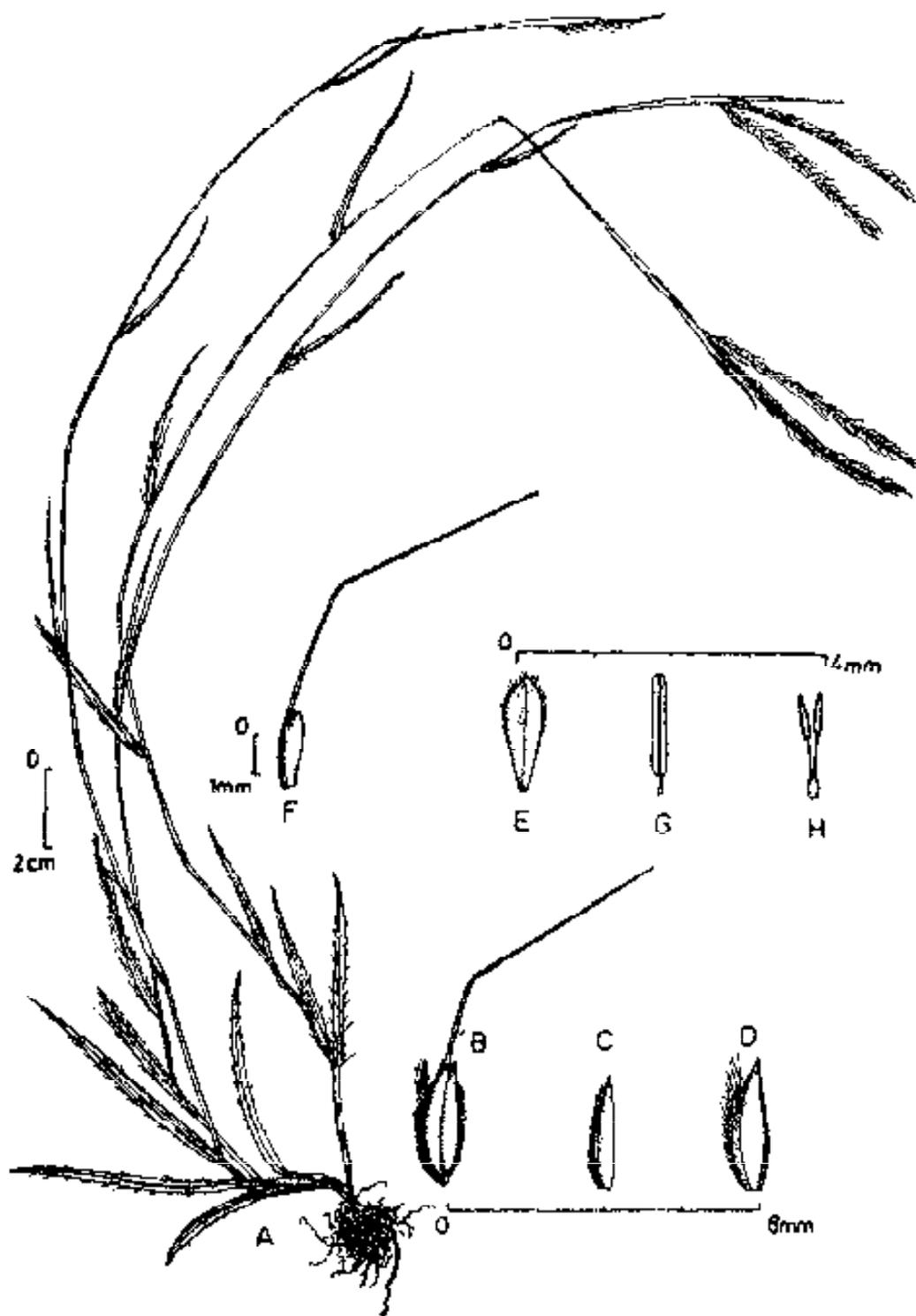


PLATE No. 13: *DIMERIA BIALATA* G. E. C. Fischer

A. Habit; B. Spikelet; C. Lower glume; D. Upper glume; E. First lemma;
 F. Second lemma; G. Stamen; H. Pistil.

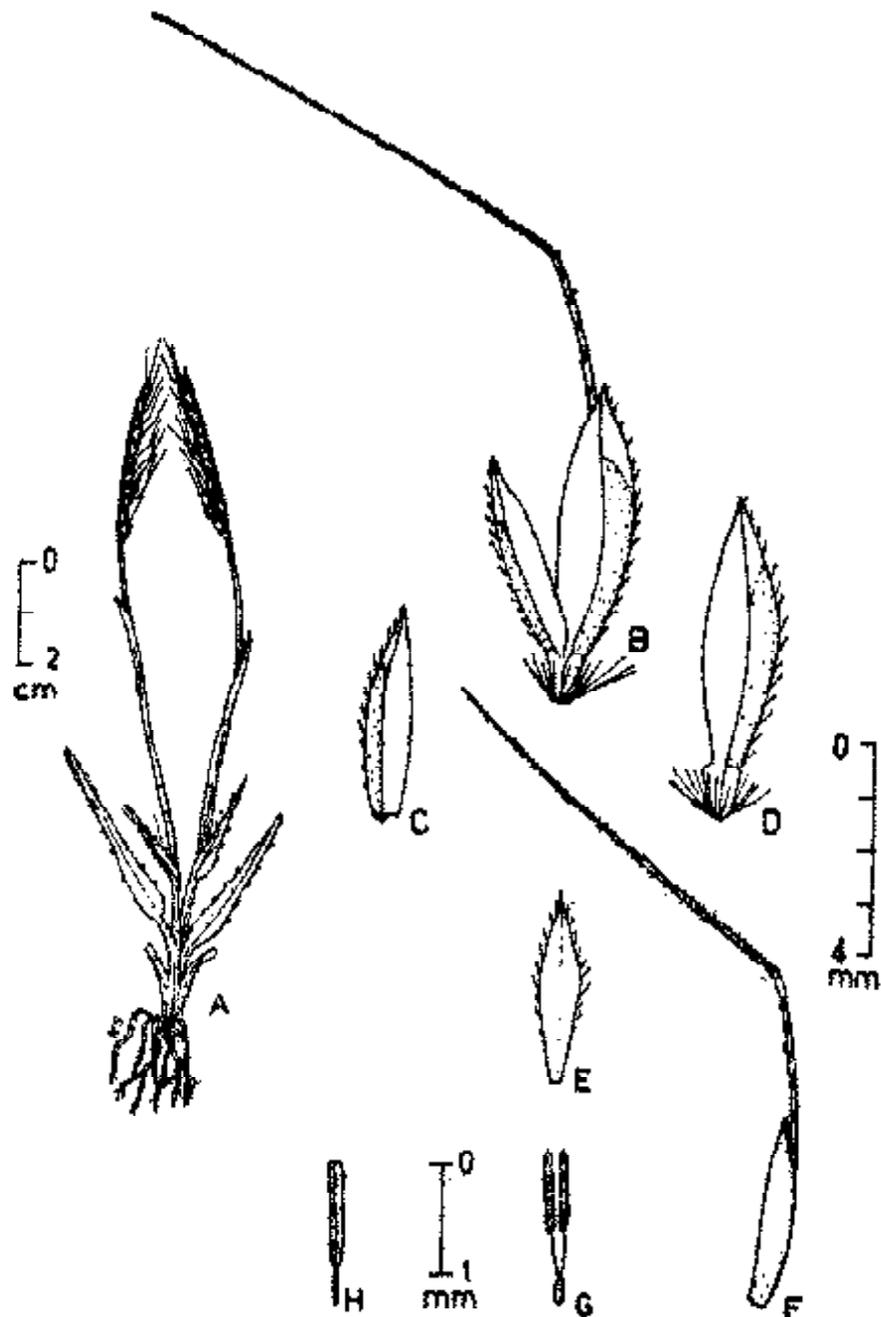


PLATE No. 14: *DIMERIA BORII* P. V. Sreekumar, V. J. Nair & N. C. Nair
 A. Plant; B. Spikelets; C. Lower glume; D. Upper glume with callus;
 E. Lower lemma; F. Upper lemma; G. Pistil; H. Stamen.

Annuals. Culms 5-15 cm tall, erect; nodes glabrous. Leaves 2-5 x 0.2-0.4 cm, lanceolate, base rounded, villous with tubercle-based hairs especially towards the mouth and along the margins, midrib prominent. Sheaths 1-4 cm, shorter than the internodes, slightly keeled, glabrous or sparsely villous towards upper half. Ligule a short ovate membrane. Racemes solitary, 2-4 cm long. Rhachis c. 1 mm wide, flattened, margins shortly ciliate. Spikelets 5-6 mm, obovate with a basal cuneate callus. Pedicels c. 0.5 mm long, joints concave. Callus c. 1 mm long, cuneate with golden yellow hairs 1-1.5 mm long. Lower glumes 3.5-4 x 0.75-1 mm, broadly lanceolate, shortly acuminate, coriaceous with broad corky wings which are shortly ciliate. Upper glumes 5-5.5 x 1-1.5 mm, elliptic-lanceolate, acuminate, coriaceous, broadly winged, wing c. 0.5 mm wide, corky in the lower 2/3, papery towards apex, shortly ciliate along the margins. Lower floret empty; lemma 3-3.5 x 0.5-0.75 mm, oblanceolate, acute, faintly 1-nerved, delicate, hyaline, margins ciliate in the upper half. Upper floret bisexual; lemma 3-3.5 x 0.75-1.25 mm, 2-lobed and awned, lobes acuminate, delicate, 1-nerved, glabrous, awn 12-15 mm long, geniculate, column c. 4 mm long, twisted, brown, bristle pale and scabrid; stamens 2, anthers c. 1 mm long, filaments short; ovary c. 0.2 mm long, elliptic, styles c. 0.5 mm long, slender, stigmas 0.75-1 mm long, plumose.

Very rare along the dry hill slopes, growing in the crevices of rocks.

Fl. & Fr. : November-December.

CALICUT: Kanjērakkadavu.

3. *Dimeria connivens* Hack. in DC. Monogr. Phan. 6: 689. 1889; Hook. f. Fl. Brit. Ind. 7: 104, 1896; Bor, Grass. Bur. Cey. Ind. Pak. 140, 1960.

Annuals. Culms erect or geniculate, 20-50 cm high; nodes sparsely bearded. Leaves linear-acuminate or lanceolate, mostly basal, 3-10 x 0.2-0.4 cm, with sparse tubercle-based hairs especially along the margins. Sheaths slightly keeled. Ligule ovate, membranous, fimbriate. Racemes 2, rarely one, 4-8 cm long, divergent; rhachis flat, c. 0.75 mm wide, narrowly winged and ciliate along the margins. Spikelets oblong or oblanceolate, greenish-yellow, 4-4.5 mm; callus bearded, hairs 0.5-1 mm; lower glume linear-lanceolate, c. 4 x 0.5 mm, chartaceous, keels ciliate; upper glume lanceolate or elliptic-acute, 4-4.5 x 1 mm, narrowly winged all along, wing corky,

ciliate, chartaceous, margins hyaline, ciliolate; lower floret empty; upper floret bisexual; first lemma oblanceolate or oblong, 2.5-3 x 0.5 mm, hyaline, faintly 1-nerved, ciliate towards apex; second lemma notched, awned, 2-2.5 x 1 mm, hyaline, faintly 1-nerved, awn 8-12 mm long, column 3-4 mm, brownish; stamens 2, anthers 1.5-2 mm, bright yellow; ovary oblong or elliptic, c. 0.4 mm long, styles c. 0.5 mm, cream coloured.

Rare, along the bunds of marshy and cultivated fields along with other species of *Dimeria* like *D. hohenackeri*.

Fl. & Fr.: September-December.

Notes: This species was known earlier only from Bihar and Orissa.

CANNANORE: Seethamgoli.

4. *Dimeria copeana* P. V. Sreekumar, V. J. Nair & N. C. Nair in J. Bombay Nat. Hist. Soc. 78(3): 577, 1981. PLATE No. 15

Tufted, stoloniferous, perennial. Culms 20-45 cm, capillary. Nodes bearded. Leaves 20-40 x 0.1-0.2 cm, linear, acuminate, sparsely villous on upper surface. Sheaths shorter than the internodes, glabrous or very sparsely villous at base. Ligule a small membrane, fimbriate at apex. Racemes 2, 8-10 cm long, slender. Rhachis 0.25-0.5 mm wide, trigonous, more or less zig-zag, obscurely winged, scabrid on the margins. Spikelets 3.5-4.5 mm long, 2-flowered, oblanceolate, firmly compressed, adpressed to the rachis, sparsely hairy. Callus 0.25-0.5 mm long, hairy. Lower glumes 3-4 mm long, oblong, acute, coriaceous, scabrid. Upper glumes 4-4.5 mm long, elliptic, acute, straight on the back and slightly curved towards the tip, scabrid, margins hyaline, villous. Lower floret empty, lemma c. 2.5 x 0.6 mm, oblanceolate, acute, one nerved, hyaline, ciliate on the margins above, epaleate. Upper floret bisexual, lemma 3-3.5 mm long, epaleate, oblong, acute, shortly bifid at apex, hyaline, awns 8-10 mm long, slender with a dark column and pale scabrid bristle. Stamens 2; anthers c. 2 mm long, narrow, linear; filaments short. Ovary c. 0.3 mm long, ovate. Styles 2, each c. 0.4 mm long, slender. Stigma c. 10 mm long, feathery. Grain c. 2.25 x 0.3 mm, oblong, acute towards tip, compressed.

Fl. & Fr.: December-march.

ALLEPPEY: Thrikkunnappuzha.

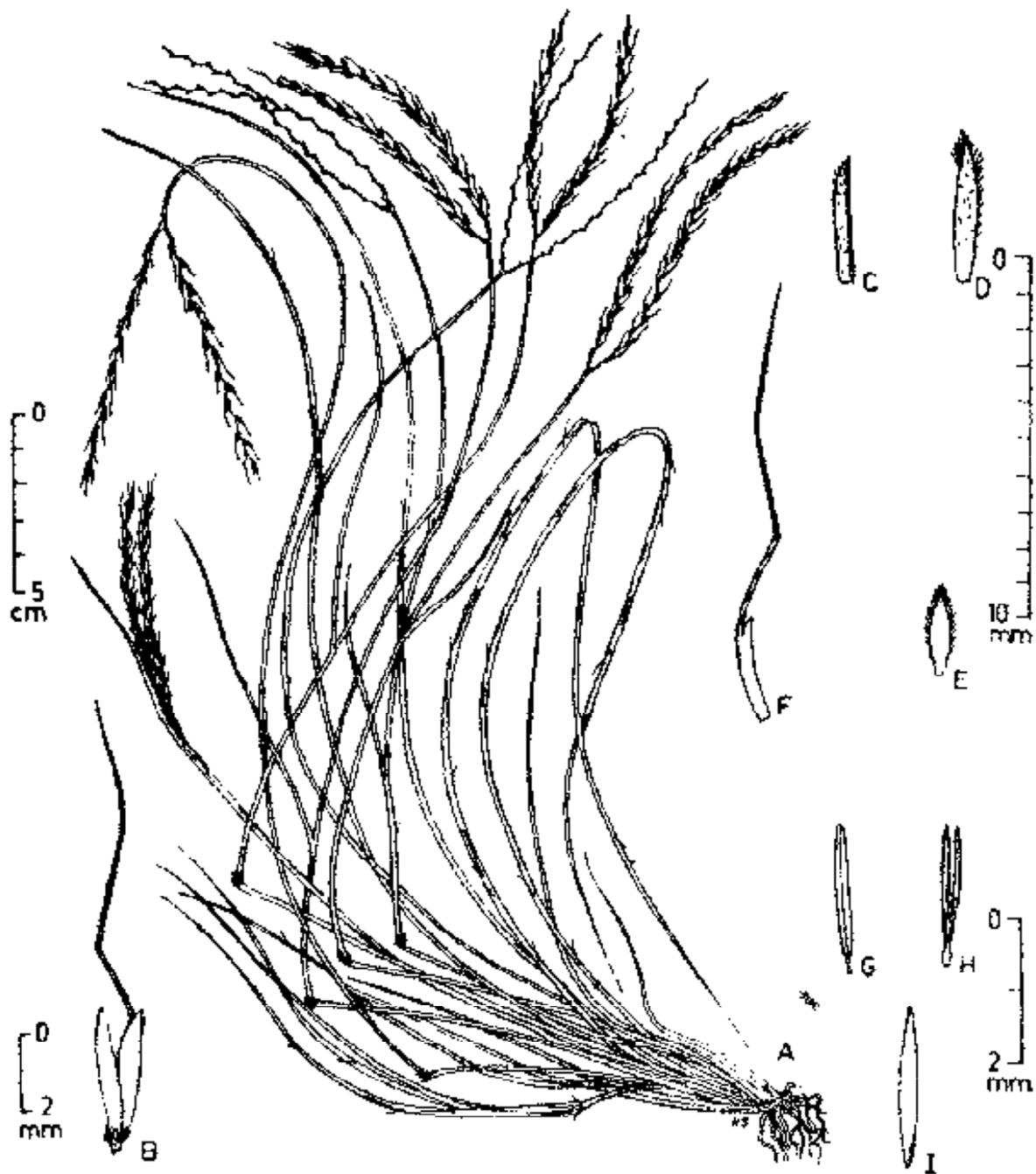


PLATE No. 15: *DIMERIA COPEANA* P. V. Sreekumar, V. J. Nair & N. C. Nair
 A. Habit; B. Spikelet; C. Lower glume; D. Upper glume; E. Lower lemma;
 F. Upper lemma; G. Stamen; H. Pistil; I. Grain.

5. *Dimeria deccanensis* Bor in Kew Bull. 1952: 578, 1953; Bor, Grass. Bur. Cey. Ind. Pak. 140. 1960

Annuals. Culms geniculate or erect, 15-60 cm high; nodes sparsely bearded or glabrous. Leaves linear-lanceolate, 2-6 x 0.2-0.4 cm, acuminate, covered with sparse tubercled hairs. Sheaths slightly keeled. Ligule membranous, truncate, fimbriate. Racemes 2, rarely one or 3, 2-6 cm long; rachis flat, 0.5-0.75 mm wide, narrowly winged. Spikelets oblanceolate, 2.5-3 mm long, shortly pedicelled, stalks c. 0.3 mm long; callus c. 0.5 mm; lower glume linear-lanceolate, 2.5-3 x 0.25 mm, chartaceous, ciliate along the keels; upper glume lanceolate, c. 3 x 0.5 mm, chartaceous, keel narrowly winged at apex, ciliate along the keels; lower floret empty; upper floret bisexual; first lemma oblanceolate, 1-1.5 x 0.25 mm, hyaline, faintly 1-nerved, ciliate towards apex; second lemma notched, awned, 1.5-2 x 1 mm, delicate, 1-nerved; awn 8-10 mm long, column 2-3 mm, chestnut brown; stamens 2, anthers 1-2 mm long, yellow; ovary oblong, c. 0.3 mm, styles c. 0.5 mm, stigmas c. 1 mm long, cream; grain elliptic, c. 1.5 x 0.5 mm.

Fairly common in open grasslands, dry rocky fields, along roadsides and wastelands in association with other grasses like *D. bialata*, *D. fischeri*, *Heteropogon contortus* etc.

Fl. & Fr.: October-December.

Notes: This species resembles *D. ceylanica* but can be distinguished from it by the smaller spikelets and straight tip of the upper glumes. It bears some resemblance to *D. kurzii* but has shorter awns and anthers than the other species.

CALICUT: Kanjeerakkadavu; CANNANORE: Mugu Road, Seethamgoli; PATHANAMTHITTA: Konni N. F.

6. *Dimeria fischeri* Bor in Kew Bull. 1952: 564, 1953 et Grass. Bur. Cey. Ind. Pak. 140. 1960.

Annuals. Culms slender, filiform, 10-40 cm high, geniculate; nodes sparsely bearded. Leaves lanceolate or linear-lanceolate, 0.5-3 x 0.05-0.1 cm, covered with sparse tubercled hairs. Sheaths slightly keeled. Ligules ovate, membranous. Racemes solitary, 0.5-4 cm long; rachis flat, 0.75-1 mm wide. Spikelets oblong-lanceolate, 2-3 mm long; callus c. 0.5 mm long, bearded; lower glume linear-lanceolate, 1.5-2 x 0.25 mm, chartaceous; upper glume oblong-lanceolate, c. 2 x 0.5 mm, winged, ciliate along the wing; lower floret

empty; upper floret bisexual; first lemma oblanceolate, 1-1.5 x 0.25 mm, hyaline, 1-nerved, ciliolate towards apex; second lemma notched, awned, 1.5-2 x 0.5 mm, delicate, hyaline, 1-nerved; awn 8-10 mm long, column 2-3 mm, chestnut brown; grain oblong, c. 1.5 x 0.3 mm.

Occasional along dry rocky places and open grasslands; growing in association with other species of the genus like *D. bialata*, *D. deccanensis*, *D. raizadae* etc.

Fl. & Fr. : October-December.

KASARAGOD : Kasaragod.

7. *Dimeria hohenackeri* Hochst. ex Miq. in Verh. Nederl. Inst. 3 : 35. 1851; Hook. f. Fl. Brit. Ind. 7 : 103. 1896; Fischer in Gamble, Fl. Pres. Madr. 1713. 1934 (Repr. ed. 3 : 1187. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 142. 1960; Maniatal & Sivarej. Fl. Calic. 338. 1982.

Annuals. Culms slender, 15-60 cm high, erect or geniculate; nodes sparsely bearded. Leaves lanceolate or linear-acuminate, mostly basal, 1-8 x 0.2-0.6 cm, tubercle-based hairy, ciliate along the margins. Sheaths keeled. Ligules membranous, truncate, lacerate. Racemes sub-digitate, 3-15 in number, slender, each 2-8 cm long; rhachis trigonous, c. 0.1 mm wide, scabrid, distantly noded. Spikelets linear-lanceolate, 2.5-5 mm long, pedicelled; pedicels 0.3-0.5 mm long; callus shortly bearded; lower glume linear-lanceolate, 2.5-4.5 x 0.75 mm, chartaceous; upper glume lanceolate, or oblong-acuminate 3-5 x 0.5 mm, chartaceous, scabrid; lower floret bisexual; first lemma oblanceolate, 1.5-3 mm, hyaline, 1-nerved, ciliate towards apex; second lemma oblong, notched, awned, 1.5-3.5 x 0.5 mm, hyaline, 1-nerved, awn 8-12 mm long, column 2-4 mm, chestnut brown; stamens 2, anthers 1-2 mm, bright yellow; ovary oblong, 0.3-0.5 mm, styles c. 0.5 mm long, stigmas c. 1 mm, cream.

Fairly common in marshy fields, wastelands, bunds of ricefields and other similar moist habitats.

Fl. & Fr. : October-December.

Notes : This species is quite distinct from all other species of the genus by its characteristic numerous slender racemes, capillary rhachis,

distantly placed, stalked spikelets and slender awns. This grass can be distinguished easily in the field by the basal leaves which turn red on drying.

CANNANORE: Bela, Seethamgoli.

8. *Dimeria jainii* P. V. Sreekumar, V. J. Nair & N. C. Nair in *Curr. Sci.* 52(6) : 259. 1983. PLATE No. 16

Annuals. Culms 10-20 cm tall, erect; nodes glabrous. Leaves 2-8 x 0.2-0.3 cm, linear-lanceolate, acuminate, rounded at base, covered with long or short tubercle-based hairs, midrib prominent. Sheaths 1-5 cm, shorter than the internodes, slightly keeled, villous with tubercle-based hairs. Ligule a short fimbriate membrane. Racemes usually 3, rarely 2, each 2-4 cm long. Rachis c. 0.5 mm wide, flattened, margins densely ciliate. Spikelets 3-3.5 mm long, ovate, acuminate, densely ciliate. Pedicels c. 0.5 mm, joints concave. Callus hairs 0.5-1 mm long. Lower glumes 2.25 x 0.5-0.75 mm, linear-lanceolate, densely ciliate along the dorsal margins, cilia 0.5-2 mm long. Upper glumes 3-3.5 x 1.5-2 mm, ovate, acuminate, broadly winged except at tip, wing papery, long ciliate along keel, cilia 1-2 mm long, margins shortly ciliate and hyaline. Lower floret empty; lemma 1.5-2 x 0.3-0.5 mm, elliptic, acute, delicate, hyaline, faintly 1-nerved, margins ciliate in the upper half. Upper floret bisexual; lemma 1.75-2 x 0.6-0.75 mm, delicate, notched at apex, awned, awns 10-12 mm long, geniculate, column c. 3 mm long, twisted, brownish, bristle pale, scabrid; lodicules 2, each c. 0.4-0.1 mm, oblanceolate, 2-lobed at apex; stamens 2, anthers c. 0.5 mm long, filaments short; ovary c. 0.25 mm long, elliptic, styles c. 0.5 mm long, slender, stigmas c. 0.35 mm long, feathery.

Rare, in open grasslands and dry grassy hill slopes along with other grasses like *Aristida setacea* Retz., *Ischaemum rangacharianum* C. E. C. Fischer and a few other *Dimeria* sp.

Fl. & Fr. : October-December.

CALICUT: Pokkunnamala.

9. *Dimeria kanjirapallilana* K. C. Jacob in *J. Bomb. Nat. Hist. Soc.* 47(1) : 48. 1947; Manilal & Sivaraj, *Fl. Calic.* 238. 1982.

Annuals. Culms 10-45 cm high, erect or geniculate; nodes sparsely bearded or glabrous. Leaves linear-lanceolate, acuminate, 3-8 x 0.2-0.4 cm, bulbous-based hairy especially along the margins,

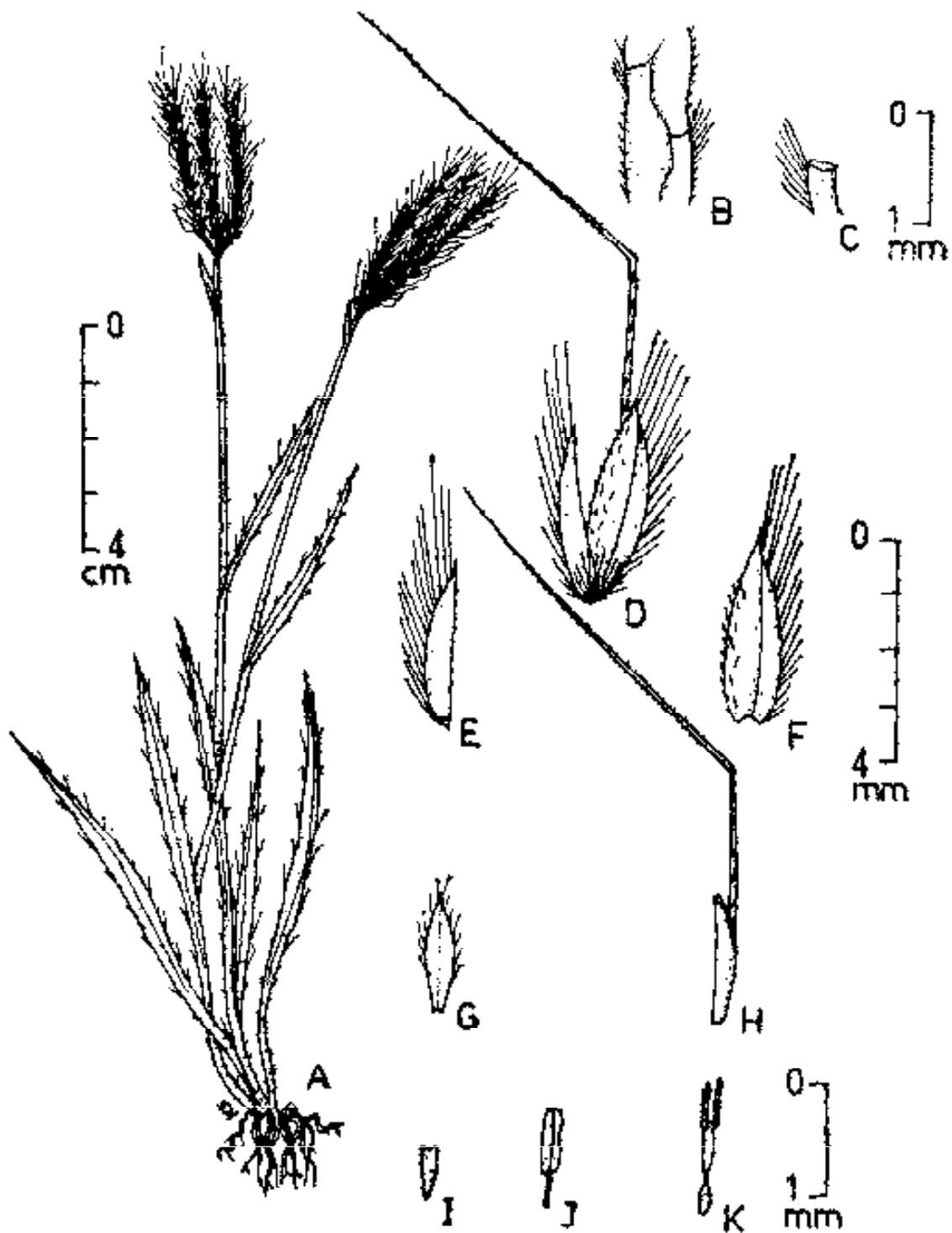


PLATE No. 16: *DIMERTIA JAINII* P. V. Sreekumar, V. J. Nair & N. C. Nair

A. Plant; B. A portion of rachis showing pedicels; C. Pedicel;
 D. Spikelet; E. Lower glume (Lateral view); F. Upper glume (Lateral view);
 G. Lower lemma (Dorsal view); H. Upper lemma (Lateral view); I. Lodicule;
 J. Stamen; K. Pistil.

Sheaths keeled. Ligules ovate, acute, membranous. Racemes 2, divaricate. 2-7 cm long; rhachis flat, 0.5-0.75 mm, zig-zag, margins sparsely ciliate, narrowly winged. Spikelets lanceolate or oblong-lanceolate, 3.5-4 mm; callus hairs 0.5-1 mm long; lower glume linear-lanceolate, 3-3.5 x 0.25 mm, shortly acuminate, chartaceous, scabrid; upper glume lanceolate, 3.5-4 x 0.5 mm, acuminate, narrowly winged at apex, chartaceous, margins hyaline, keels ciliate towards apex; lower floret empty; upper floret bisexual; first lemma oblong, 1.5-2 x 0.5 mm, hyaline, 1-nerved, ciliate towards apex; second lemma notched, awned, 2-2.5 x 0.5 mm, hyaline, 1-nerved; awn 8-12 mm long, column 3-4 mm, chestnut-brown; stamens 2, anthers 0.5-1 mm long; ovary oblong, c. 0.25 mm, styles c. 0.5 mm, stigmas 0.5-1 mm; grain oblong, or linear-oblong, 1.5-2 x 0.3 mm.

Rare, along the moist hill slopes and fringes of grasslands usually at higher elevations.

Fl. & Fr. : October-December.

Notes : This species is closely related to *D. ornithopoda* but can be distinguished by its divaricate racemes, flat, broader, winged rhachis, larger spikelets and shortly winged upper glumes.

It also shows close resemblance to *D. ornithopoda* var. *khasiana* but differs by its almost flat, broader rhachis and shortly winged upper glumes. Bor (1952) says that var. *khasiana* is confined to Bombay and its vicinity.

IDUKKI : Peermade; QUILON : Pampa Dam.

10. *Dimeria keralae* N. C. Nair, P. V. Sreekumar & V. J. Nair in J. Bomb. Nat. Hist. Soc. 80 (3) : 626. 1984. PLATE No. 17

Annuals. Culms 10-30 cm tall, erect, slender, purplish; nodes bearded. Leaves 2-5 x 0.1-0.2 cm broad, linear-lanceolate glabrous or covered with a few tubercle-based hairs along the margins; mid-rib prominent. Sheaths 2-6 cm, shorter than the internodes, keeled, loose, glabrous. Ligule a thin ovate membrane. Racemes 2, each 2-5 cm long, usually unequal and inter-twined. Rhachis c. 0.25 mm wide, flat on one side, angular on the outer side, glabrous. Spikelets 4-5 mm long, oblanceolate, cuneate at base, distant and pedicelled. Pedicels 1-1.5 mm, joints extremely oblique. Callus 1-2 mm long.

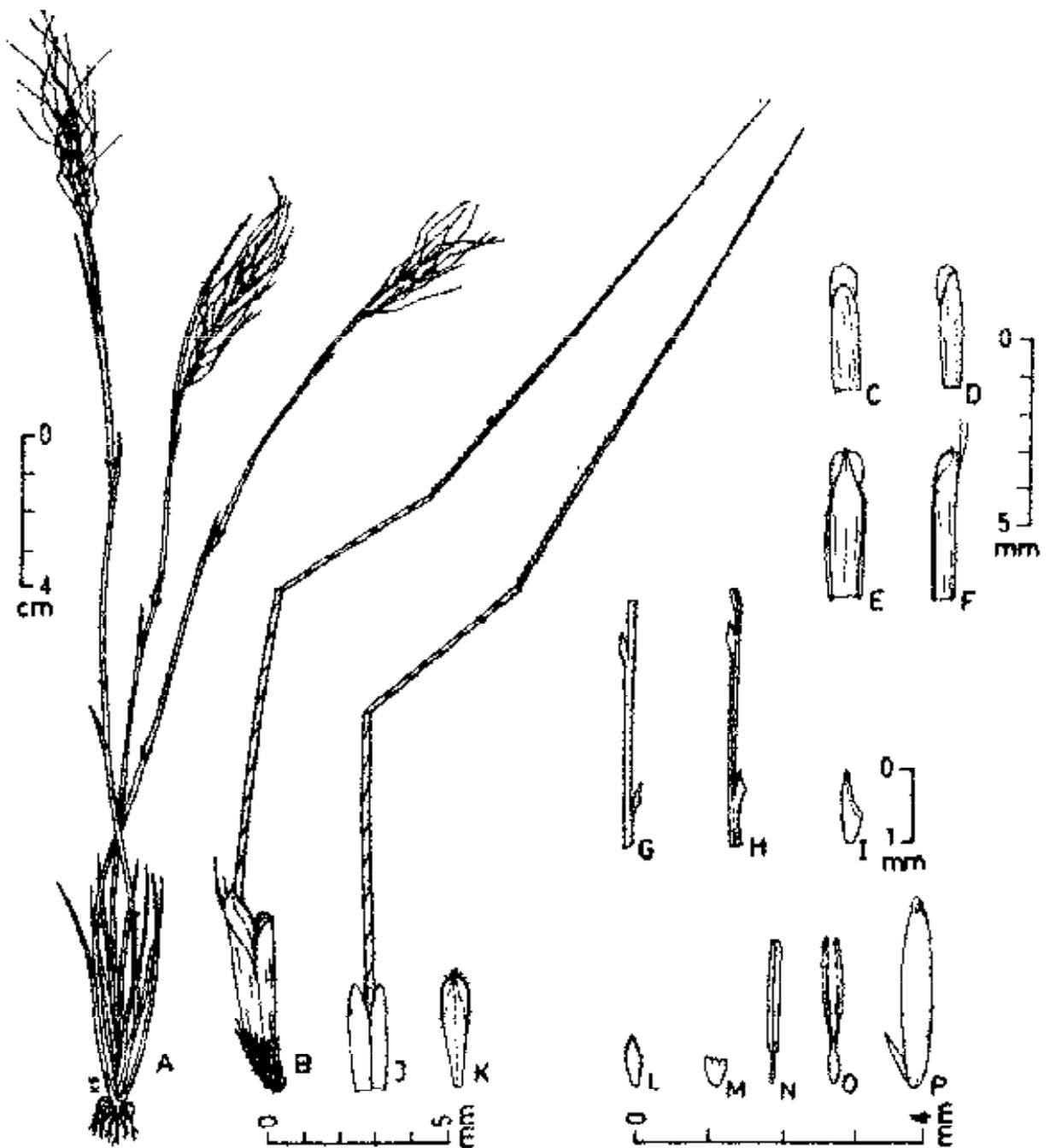


PLATE No. 37: *DIMERIA KERALAE* N. C. Nair, P. V. Sreekumar & V. J. Nair

A. Plant; B. Spikelet; C. Lower glume--inner view; D. Same--side view; E. Upper glume--inner view; F. Same--side view; G. Rhachis--outer view; H. Same--inner view; I. Pedicel; J. Upper lemma; K. Lower lemma; L. Upper palea; M. Lodicule; N. Stamen; O. Pistil; P. Grain with basally attached palea.

extremely acute at base, covered with golden-yellow hairs 1-1.5 mm long. Lower glumes 3.5-4 x 0.75-1 mm, oblong-linear, slightly emarginate and hyaline winged at apex, coriaceous, glabrous. Upper glumes 4-5 x 0.75-1 mm, oblong-lanceolate, minutely winged at apex, with hyaline wings along the margins which are hairy, and also with a few long hairs at the tip, coriaceous and glabrous elsewhere. Lower floret empty; lemma 3-4 x 0.3-0.5 mm, oblanceolate, 1-nerved, delicate, hyaline and ciliate along the upper margins; upper floret bisexual; lemma 3-4 x 0.75-1 mm, notched at apex, with a very long stout awn in between, delicate and 1-nerved in the lower half, subcoriaceous in the upper, glabrous; awn 20-30 mm long, stout, geniculate, column 10-15 mm long, twisted, chestnut brown, bristles pale and scabrid; palea very minute, 0.5-0.75 x 0.15-0.25 mm, ovate-lanceolate, nerveless, delicate, hyaline, shortly ciliate along the margins; lodicules 2, each c. 0.5 x 0.3 mm, obovate, 3-lobed at apex; stamens 2, anthers 1-1.5 mm long, pale-yellow with violet margins, filaments short; ovary c. 0.5 x 0.25 mm, elliptic, styles c. 0.5 mm long, slender, stigmas c. 1 mm long, narrow, pink, plumose; grain 2-2.5 x 0.4-0.5 mm, linear-oblong, with basally attached palea.

Fairly common in open, dry rocky grasslands along with other grasses like *Bhidea burnsiensis* Bor., *Danthonidium gammiei* (Bhida) C. E. Hubb., and *Dimeria bialata* C. E. C. Fischer.

Fl. & Fr. : October-December.

D. keralae is distinct from all other species of the genus previously described from India, in the following characters :

1. Racemes are unequal in length and intertwined with each other.
2. Both the lower and upper glumes possess hyaline wings at their tips.
3. Callus is sharply acute, long and with golden-yellow hairs.
4. Awns are long, stout and with a very long column.
5. Upper floret is paleate.
6. Grain is closely adpressed with the basal part of the palea, making it very difficult to separate them.

CANNANORE: Paramba.

11. *Dimeria kurumthotticalana* K. C. Jacob in J. Bomb. Nat. Hist. Soc. 47 (1): 49. 1947.

Annuals. Culms tufted, 20-40 cm high; nodes bearded. Leaves lanceolate or linear-lanceolate, 2-10 x 0.1-0.4 cm, bulbous based hairy. Ligules ovate, membranous. Racemes solitary, 2-5 cm long, slightly bent towards the base. Rhachis flat, 1-1.5 mm wide, ciliate along the margins. Spikelets elliptic, 5-6 mm long; callus hairs 0.5-1 mm; lower glume lanceolate or elliptic-lanceolate, 4-4.5 x 1 mm, acute, chartaceous or subcoriaceous, keels ciliate; upper glume elliptic, 4.5-5.5 x 1.5 mm, acuminate, subcoriaceous, margins hyaline, keel broadly winged in the upper 1/3, ciliate below the wing; lower floret empty; upper floret bisexual; first lemma oblanceolate, 2-3 x 0.75 mm, hyaline, 1-nerved, margins ciliate; second lemma notched-awned, 3-3.5 x 1 mm, hyaline, 1-nerved; awn 10-15 mm long, column 45 mm, chestnut-brown; stamens 2, anthers 2-3 mm long; ovary elliptic, c. 0.5 mm; styles 0.5-1 mm; stigmas 1-1.5 mm long.

Rare, along the grassy hill slopes in higher elevations.

Fl. & Fr.: October-December.

Notes: This species is similar to *D. lawsonii* but differs by the broader rhachis, bearded nodes, long anther lobes, wing of the upper glume confined towards apex only and cilia on the keels of the upper glume only below the wings.

D. kurumthotticalana is quite distinct from *D. ceylanica*. But, Bor (*f. c.*) has treated this species as a synonym of *D. ceylanica* with a question mark. The specimens of both these species were critically studied and were found to be distinct. They can be distinguished by the characters given below:

| <i>D. ceylanica</i> | <i>D. kurumthotticalana</i> |
|--|------------------------------------|
| 1. Racemes pubescent | Racemes glabrous |
| 2. Rhachis narrow, up to 0.75 mm wide | Rhachis broader, 1-1.5 mm wide |
| 3. Spikelets narrower, densely pubescent | Spikelets broader, almost glabrous |

- | | |
|--|----------------------------|
| 4. Callus hairs short, up to 0.5 mm long | Callus hairs 1-1.5 mm long |
| 5. Glumes acuminate at apex | Glumes acute at apex |
-

This endemic species is so far represented in MH only by the type material.

IDUKKI: Peermade.

12. *Dimeria lawsonii* (Hook. f.) Fischer in Gamble, Fl. Pres. Madr. 1713. 1934 (Repr. ed. 3: 1188. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 142. 1960. *D. pusilla* Thw. Enum. Pl. Zeyl. 369. 1864 var. *lawsonii* Hook. f. Fl. Brit. Ind. 7: 103. 1896.

Annuals. Culms tufted, 8-40 cm high, slender, erect or geniculate; nodes glabrous. Leaves lanceolate or linear-lanceolate, 1-10 x 0.1-0.3 cm, with a few bulbous based hairs. Sheaths keeled. Ligules ovate, membranous. Racemes solitary, 1-6 cm long. Rhachis flat, 0.5-0.75 mm wide, densely ciliate along the margins. Spikelets oblong-lanceolate, 5-7 mm (including the awn of 1-1.5 mm on the upper glume) long; callus hairs 0.5-1 mm long. Lower glumes linear-lanceolate, 4-5 x 0.3 mm, acuminate or shortly awned, chartaceous, keels densely ciliate. Upper glumes elliptic-lanceolate, 5-6 x 0.75 mm, acuminate, awned, awns 1-1.5 mm long, narrowly winged, chartaceous, densely ciliate along the wing, tip slightly recurved. Lower floret empty. Upper floret bisexual. First lemma oblanceolate, c. 1.5 x 0.5 mm, hyaline, 1-nerved, ciliate towards apex. Second lemma notched, awned, 2.5-3 x 1 mm, hyaline, 1-nerved. Awn 8-10 mm long, geniculate; column c. 3 mm, chestnut-brown coloured. Stamens 2, anthers c. 1 mm long. Ovary elliptic, c. 0.5 mm; styles c. 0.5 mm; stigmas 0.5-1 mm long.

Occasional along the banks of backwaters, streams and rivers, usually in coastal areas.

Fl. & Fr.: October-March.

Notes: This closely resembles *D. kurumthotticalana* by its solitary racemes, flat rhachis and awned upper glumes but can be distinguished from that species by the narrower rhachis, smaller anthers, glabrous nodes, and keel of the upper glume that is winged throughout and ciliate.

D. lawsonii superficially resembles *D. thwaitesii* in the field, but the former can be distinguished from the latter by its winged upper glumes, broader rhachis, larger spikelets and small slender culms.

This rare and endemic grass was earlier represented in MH only by a very old collection.

ALLEPPEY: Pallana.

13. *Dimeria ornithopoda* Trin. Fund. Agrost. 167. t. 14. 1820; Hook. f. Fl. Brit. Ind. 7: 104. 1896; Fischer in Gamble, Fl. Pres. Madr. 1713. 1934 (Repr. ed. 3: 1188. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 142. 1960.

Annuals. Culms slender, 10-50 cm high; nodes sparsely bearded or glabrous. Leaves lanceolate, 1-6 x 0.2-0.4 cm, sparsely hairy. Racemes 2, rarely 1 or 3, 1-5 cm long. Rhachis trigonous, c. 0.25 mm wide. Spikelets lanceolate, 1-2 mm, callus shortly bearded. Lower glume linear-lanceolate, 1-2 x 0.25 mm, chartaceous. Upper glume lanceolate, c. 2 x 0.5 mm, chartaceous, sparsely hairy. Lower floret empty. Upper floret bisexual. First lemma oblanceolate, 1-1.5 x 0.25 mm, delicate, hyaline, ciliate at apex. Upper lemma notched, awned, c. 2 x 0.5 mm, hyaline. Awn 5-12 mm long, column 2-3 mm, brown. Stamens 2; anthers 0.25-0.5 mm. Ovary oblong, c. 0.25 mm; stigmas c. 0.4 mm long.

Very common along the roadsides, hill-slopes, rocky places and also growing on broken compound walls, fences and bunds of cultivated fields; generally in drier situations.

Fl. & Fr.: August-March.

Notes: This species shows considerable infra-specific variation and several varieties have been established. But, in Kerala only one variety (*var. ornithopoda*) could be noted.

D. ornithopoda shows some similarity to *D. kanjirappallilana* but can be distinguished from the latter by its peculiar straight racemes, narrow, trigonous rhachis without wings, smaller spikelets and acute glumes without wings.

CALICUT: Chelannur, Peruvannamuzhi; CANNANORE: Angadimogaru; IDUKKI: Mannar, Paermade; TRICHUR: Peechi.

14. *Dimeria raizadae* V. J. Nair, P. V. Sreekumar & N. C. Nair in Indian J. For. 8(2): 163, 1983. PLATE No. 18

Annual or perennial. Culms 30-60 cm tall, erect; nodes glabrous. Leaves 4-10 x 0.2-0.4 cm, linear-lanceolate, base rounded, villous

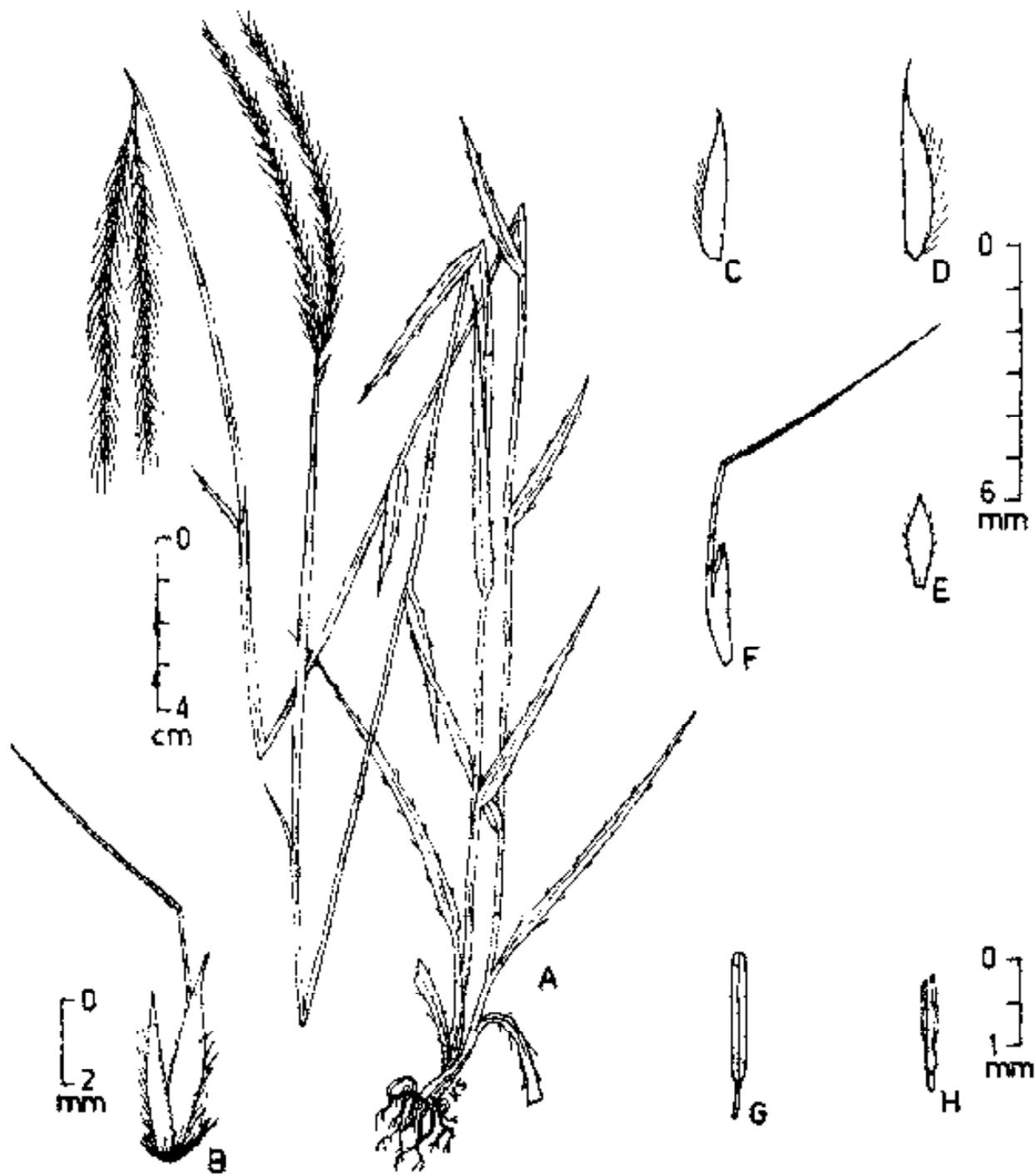


PLATE No. 18: *DIMERIA RAIZADAE* V. J. Nair, P. V. Sreekumar & N. C. Nair
 A. Plant; B. Spikelet; C. Lower glume; D. Upper glume; E. Lower lemma;
 F. Upper lemma; G. Stamen; H. Pistil.

with long or short, simple or tubercle-based hairs, especially on the lower surface and along the margins, midrib prominent. Sheaths 2-10 cm, shorter than the internodes, keeled, glabrous or covered with sparse tubercle-based hairs especially towards the upper half. Ligule c. 1 mm long, a thin ovate membrane, fimbriate at apex. Racemes 2, on a shortly exerted peduncle, each 6-10 cm long, or rarely one. Rhachis 0.75-1 mm wide, flattened, shortly ciliate along the margins. Spikelets 3-3.5 mm long (excluding the awn of the upper glume), ovate-lanceolate, sparsely hairy. Callus hairs 1-1.5 mm long. Lower glumes 3-3.5 x 0.75-1 mm, linear-lanceolate, acuminate or very shortly awned, ciliate in the lower half and also along the margins. Upper glumes 3-3.5 x 1-1.25 mm (excluding awn), ovate-lanceolate, acuminate, awned, awn 0.5-0.75 mm long, ciliate along dorsal lower half and shortly ciliate along the margins. Lower floret empty; lemma 1.75-2 x 0.5-0.75 mm, obovate, acute, delicate, hyaline, 1-nerved, ciliate along the margins except in the lower quarter. Upper floret bisexual; lemma 2-2.5 x 0.75-1 mm, 2-lobed at apex, awned in between lobes, acuminate, delicate, 1-nerved, glabrous; awn 6-10 mm long, geniculate, column c. 3 mm long, twisted, brownish; bristle pale and scabrid. Stamens 2, anthers 1-2 mm long, filaments short. Ovary c. 0.15 mm long, elliptic, styles c. 0.5 mm long, slender, stigmas 0.75-1 mm long, feathery.

In dry open grasslands and grassy hill slopes; locally common.

Fl. & Fr.: October-December.

CALICUT: Pookunnamala, Kanjeerakkadavu.

15. *Dimeria thwaitesii* Hack. in DC. Monogr. Phan. 6: 78. 1899; Fischer in Gamble, Fl. Pres. Madr. 1713. 1934 (Repr. ed. 3: 1188, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 144. 1960; *D. pusilla* var. *pallida* Thw. ex Hook. f. Fl. Brit. Ind. 7: 103. 1896.

Annuals. Culms slender, 15-40 cm high; nodes sparsely bearded or glabrous. Leaves lanceolate or linear-lanceolate, 2-12 x 0.1-0.3 cm, acuminate, covered with sparse tubercle-based hairs. Sheaths keeled. Ligules membranous, fimbriate. Racemes solitary or very rarely 2, 3-6 cm long. Rhachis flat, c. 0.5 mm wide, ciliate along the margins. Spikelets oblanceolate, 4-5 mm long, acuminate, densely hairy; callus hairs 0.5-2 mm long. Lower glume linear-lanceolate, 4-4.5 x 0.25 mm, acuminate, chartaceous, densely hairy. Upper glume lanceolate, 4-5 x 0.5 mm (including 1 mm long awn), acumi-

nate, chartaceous, densely hairy. Lower floret empty. Upper floret bisexual. First lemma oblanceolate, 1.5-2 x 0.5 mm, hyaline, 1-nerved, ciliate towards apex. Second lemma notched, awned, 2.5-3 x 1 mm, hyaline, 1-nerved. Awn 8-12 mm long, column 4-5 mm, brown. Stamens 2, anthers 0.5-1 mm. Ovary oblong, c. 0.25 mm; styles c. 0.5 mm long; stigmas 0.5-1 mm long. Grain linear-lanceolate, c. 2 x 0.25 mm.

Fairly common in dry rocky places and dry open grasslands of lower elevations, usually found growing along with other grasses like *Heteropogon contortus*, *Bhida burnsiiana*, *Danthonidium gammiei* and some *Dimeria* species.

Fl. & Fr.: November-March.

Notes: This species is closely related to *D. raizadae*, but differs by its slender culms, bearded nodes, shorter racemes, narrow thachis, larger spikelets, smaller anthers and short callus hairs.

In the field it may get confused with *D. fischeri* but is distinct by the presence of awned upper glumes and the wingless keels of the glumes.

CANNANDRE: Thaliparemba; IDUKKI: Muvattupuzha;
TRIVANDRUM: Nilamel.

13. EULALIA Kunth

Kunth, Rev. Gram. 1: 160. 1829; Fischer in Gamble, Fl. Pres. Madr. 1714. 1934 (Repr. ed. 3: 1188. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 145. 1960; Sur in J. Econ. Tax. Bot. 6(1): 177. 1985. *Pollinia* Trin. in Mem. Acad. Petersb. ser. 6. 2: 304. 1932; Hook. f. Fl. Brit. Ind. 7: 109. 1896. p. p.

A genus of about 30 species in the tropics and subtropics, about 13 species occur in India of which 6 are endemics and 3 species in Kerala.

This genus shows certain similarities with some species of *Ischaemum*. But, species of *Eulalia* can be distinguished by the flat joints and pedicels which are not swollen, absence of wrinkles or nodules on the lower glumes of the sessile spikelets and the numerous racemes.

Key to the species

- 1a. Basal sheaths clothed with chocolate brown wool *E. phaeothrix* 1
- 1b. Basal sheaths glabrous:
- 2a. Leaves collected at base, setaceous, up to 15 cm long; spikelets 5-6 mm long; lower glume of the sessile spikelets dark brown *E. thwaitesii* 2
- 2b. Leaves not collected at base, linear-lanceolate, up to 40 cm long; spikelets 2.5-3.5 mm long; lower glume pale brown *E. trispicata* 3

1. *Eulalia phaeothrix* (Hack.) O. Kuntze, Rev. Gen. Pl. 2: 775. 1891; Fischer in Gamble, Fl. Pres. Madr. 1715. 1834 (Repr. ed. 3: 1189. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 156. 1960; Sur in J. Econ. Tax. Bot. 6(1): 183. 1985. *Pollinia phaeothrix* Hack. in DC. Monogr. Phan. 6: 168. 1819; Hook. f. Fl. Brit. Ind. 7: 112. 1896.

Perennials. Culms 30-120 cm high, tufted; nodes glabrous, base with chocolate brown wool. Leaves linear-lanceolate, 5-40 x 0.3-0.8 cm, acuminate, densely hairy along the upper surface. Ligules dense tufts of white hairs. Inflorescence of 3-8 digitate or subdigitate racemes, culms pubescent below the inflorescence. Racemes 3-15 digitate racemes, culms pubescent below the inflorescence. Racemes 3-15 cm long, golden-yellow to brownish; joints turbinate, 2.5-3 mm long, densely ciliate. Sessile spikelets elliptic-lanceolate or oblong-lanceolate, 3.5-5 mm, awned, densely villous with golden-yellow or brownish hairs; lower glume oblong-lanceolate, 3.5-5 x 1 mm, chartaceous, 2-4-nerved, densely villous especially towards base, margins infolded; upper glume boat-shaped or lanceolate when spread, 4-4.5 x 1.5-2 mm, chartaceous, 1-3-nerved, keeled on dorsal side, margins hyaline, ciliate; lower floret empty; upper floret bisexual; first lemma oblong-lanceolate or lanceolate, 3.5-4 x 0.5-1 mm, hyaline, faintly 2-nerved, ciliate along the margins; second lemma deeply notched, awned, 2.5-3 x 1 mm, hyaline above, subcoriaceous below, faintly 1-3-nerved; awn 12-15 mm long; stamens 3, anthers 2-3 mm long; ovary elliptic, 0.5-1 mm, styles 1-2 mm long, stigmas 1.5-3 mm long. Pedicelled spikelets elliptic or oblong-lanceolate, 4-4.5 mm long, awned or not, densely villous; pedicels turbinate, 2-3 mm long, densely ciliate; lower glume elliptic, 4-4.5 x 1-1.5 mm, chartaceous, densely villous; upper glume and florets similar to that of sessile spikelets.

Fairly common along high altitude grasslands, grassy hill-slopes and mountain valleys, usually in drier areas.

Fl. & Fr. : August-December.

Notes : This species may sometimes be confused with *E. thwaitesii*, but can be separated from it by the peculiar chocolate-brown indumentum at the base, cauline leaves and golden-yellow or brownish hairs on the rachis and pedicels.

E. phaeathrix shows considerable variation in size of the culms and spikelets and also in indumentum. Generally racemes here are golden-yellow or brownish, but sometimes it may be pale also.

IDUKKI: Eravikulam, Munnar, Umayamala.

2. *Eulalia thwaitesii* (Hack.) O. Kuntze, *Rev. Gen. Pl.* 2: 775. 1891; *Bor. Grass. Bur. Cey. Ind. Pak.* 157. 1960; Shetty *et al.* in *Bull. Bot. Surv. Ind.* 15 (3 & 4): 276. 1973; *Sur in J. Econ. Tax. Bot.* 6(1): 187. 1985. *Pollinia thwaitesii* Hack. in DC. *Monogr. Phan.* 6: 163. 1889; Hook. f. *Fl. Brit. Ind.* 7: 111. 1896.

Perennials. Culms 25-50 cm high, tufted; nodes glabrous. Leaves lanceolate or linear-lanceolate, 3-15 x 0.2-0.5 cm, mostly collected at base, sparsely hairy or glabrous. Ligules membranous, thin, fimbriate with a row of hairs around. Racemes 1-4 in number, 2-8 cm long, villous, with white or brownish hairs; joints slightly turbinate, 2-4 mm, sparsely villous. Sessile spikelets elliptic-lanceolate, 5-6 mm long, awned; callus shortly bearded, hairs 0.5-1.5 mm long; lower glume elliptic-lanceolate, 5-6 x 1.5 mm, coriaceous, brown, 6-7-nerved, densely villous towards apex; upper glume boat-shaped, or elliptic-lanceolate, 5.5-6 x 1 mm, coriaceous, brown, densely villous towards apex; lower floret empty; upper floret bisexual; first lemma elliptic-lanceolate, c. 5 x 7 mm, hyaline, faintly 3-5-nerved, margins ciliate at apex; second lemma deeply notched, awned, c. 4 x 1 mm, hyaline, margins ciliate towards apex, awn 12-15 mm long; stamens 3, anthers 2-3 mm long; ovary ovate, c. 0.5 mm, styles 1.5-2 mm, stigmas 2-3 mm long. Pedicelled spikelets elliptic-lanceolate, awned or awnless, 5-6 mm long; pedicels slightly turbinate, 2-4 mm long, sparsely villous; glumes and florets similar to those of the sessile spikelet.

Rare, along the grasslands of higher elevations, grassy hill slopes and margins of sholas, usually in damp situations.

Fl. & Fr.: August-December.

Notes: This species was regarded earlier to be endemic to Sri Lanka. Shetty *et al.* (*l. c.*) reported this species for the first time in India based on a collection from the Anamudi slopes in Kerala.

This grass often grows along with *E. phaeothrix* in swampy grasslands and may get confused with it in the field. But *E. thwaitesii* can be easily distinguished from the other species by its radical, sub-distichous leaves, glabrous basal portion of the glumes and sheaths, white hairy rachis and pedicels and the dark brown lower glumes.

IDUKKI: Anamudi, Eravikulam.

3. *Eulalia trispicata* (Schult.) Henr. in *Blumea* 3: 453. 1940; *Bot. Grass. Bur. Cey. Ind. Pak.* 157. 1960; Manilal & Sivaraj. *Fl. Calic.* 334. 1982; Surin J. *Econ. Tax. Bot.* 6(1): 187. 1985, *Andropogon tristachyus* Roxb. *Hort. Beng.* 6. 1814, nom. nud. *A. trispicatus* Schult. *Syst. Veg.* 2: 452. 1824. *Eulalia tristachya* O. Kuntze, *Rev. Gen. Pl.* 2: 775. 1891; Fischer in *Gambie. Fl. Pres. Madr.* 1715. 1934 (Repr. ed. 3: 1189. 1957). *Pollinia argentea* Trin. in *Bull. Acad. Sci. Petersb.* 1: 71. 1836; Hook. f. *Fl. Brit. Ind.* 7: 11. 1856.

Leaves linear-lanceolate, 5-40 x 0.2-0.8 cm, acuminate. Ligules membranous, thin, with a tuft of long hairs around. Racemes 3-15, digitate or subdigitate, each 3-20 cm long; rachis 1.5-2 mm long, densely villous. Sessile spikelets elliptic-lanceolate, 3-3.5 mm long, awned; lower glume elliptic, c. 3 x 1 mm, chartaceous, 2-keeled, 2-nerved, densely villous; upper glume elliptic, c. 3 x 1 mm, chartaceous, 1-3-nerved, margins hyaline, ciliate; lower floret empty; upper floret bisexual; first lemma elliptic-lanceolate, 2.5-3 x 1 mm, hyaline, ciliate towards apex; second lemma deeply notched, 2-2.5 x 1 mm, hyaline, awned; awn 10-12 mm long, column 4-5 mm; stamens 3, anthers 1.5-2 mm long; ovary elliptic, c. 0.5 mm long, styles 0.5-1 mm long, stigmas 1-1.5 mm long. Pedicelled spikelets elliptic-lanceolate, 3-3.5 mm long, awned or not; pedicels 1.5-2 mm, or densely villous; glumes and florets similar to those of sessile spikelets.

Very common along the open grasslands, dry rocky places, wastelands and sometimes along the bunds of fields.

Fl. & Fr. : September-May.

Notes : This is one of the commonest species of *Eulalia*. It can easily be distinguished from the other species by its smaller spikelets, glabrous basal sheaths and white hairy joints and pedicels.

CALICUT : Pokkunnimala; CANNANORE : Bela; IDUKKI : Munnar, Paermade; TRIVANDRUM : Agastyarkudam, Boneccord, Nilamel; WYNAAD : Chandanathode.

14. GLYPHOCHLOA W. D. Clayton

W. D. Clayton in Kew Bull. 35(4) : 814. 1981. *Manisuris* Linn. Mant. Pl. 164. 1771, p.p.; Fischer in Gamble, Fl. Pres. Madr. 1769. 1934 (Repr. ed. 3 : 1219. 1957). p.p.; Bot. Grass. Bur. Cey. Ind. Pak. 190. 1960, p.p.

A genus of about 8 species and 3 varieties distributed in central and peninsular India, of which 3 species occur in Kerala.

Based on the structure of the racemes Clayton (*J. c.*) erected a new genus *Glyphochloa* by transferring most of the Indian species and varieties of *Manisuris* Linn. to it. He retained only one species *M. myuros* L. under the genus *Manisuris* Linn. where the raceme structure is unique, for the pedicelled spikelet is absciscent from its own pedicel against the normal manner of abscission in the other species. As *Mnesithea* Kunth and *Ratzeburgia* Kunth have been accorded separate generic status based on this character, it is better to treat *Glyphochloa* also as separate from *Manisuris* as suggested by Clayton.

Key to the species

- 1a. Lower glume with 4-5 conspicuous annular transverse ridges, ovate-lanceolate, acuminate, with one well developed awn; callus glabrous *G. acuminata* 1
- 1b. Lower glume without annular transverse ridges, tubercled or hooked, ovate or obovate, with 2 divergent awns; callus bearded :
- 2a. Glumes 4-8 mm long; marginal hooks of the lower glumes conspicuous, sometimes ciliate at tips; back of the glumes with tubercles and hooks *G. torficulata* 3

- 2b. Glumes 2-3 mm long; marginal hooks of the lower glumes not conspicuous; back of the glumes pitted *G. divergens* 2

1. *Glyphochloa acuminata* (Hack.) W.D. Clayton in Kew Bull. 35: 815. 1981. *Rottboellia acuminata* Hack. in DC. Monogr. Phan. 6: 291. 1889; Hook. f. Fl. Brit. Ind. 7: 155. 1896. *Manisuris acuminata* (Hack.) O. Kuntze, Rev. Gen. Pl. 2: 779. 1891; Fischer in Gamble, Fl. Pres. Madr. 1761. 1934 (Repr. ed. 3: 1220. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 101. 1960; Jain in Bull. Bot. Surv. Ind. 12: 9. 1970.

PLATE No. 19

Annuals. Culms 6-25 cm high, slender, erect or geniculate; nodes glabrous. Leaves lanceolate, 0.5-4 x 0.2-0.5 cm, filiform or acicular. Ligules truncate, membranous. Racemes spicate, 1-6 cm long; joints flat, clavate, 2-3 mm long. Sessile spikelets ovate-lanceolate or lanceolate, 3-5 mm long, acuminate; callus glabrous; lower glume ovate-lanceolate, 3-5 x 1 mm (excluding an awn of 4-5 mm), awn rarely bifid at apex, acuminate, coriaceous, 7-9-nerved, with 4-5 transverse ridges, rarely without ridges, winged along the margins in the upper half, wings broader on one side, ciliate; upper glume boat-shaped or oblong-lanceolate when spread, 2-3 x 1 mm, chartaceous, 3-nerved; lower floret empty or male; upper floret bisexual, first lemma ovate-lanceolate, 2-3 x 1 mm, delicate, hyaline, faintly 2-3-nerved; palea ovate-oblong, 1.5-2 x 1 mm, delicate, hyaline, 2-nerved; second lemma broadly ovate-lanceolate, 1.5-2 x 1-1.5 mm, delicate, hyaline, faintly 2-3-nerved; palea oblong-lanceolate, 1.5-2 x 0.5 mm, delicate, hyaline, 2-keeled, 2-nerved; stamens 3, anthers 0.5-1.5 mm long, violet; ovary oblong, c. 0.25 mm long, styles 0.25-0.5 mm long, stigmas c. 0.5 mm long, pink. Pedicelled spikelets oblong-lanceolate, 2-3 mm long (excl. awns of 1-3 mm); pedicels fused with joints; lower glume oblong-lanceolate, 3-4 x 1 mm (excl. awn of 3-4 mm), chartaceous, 3-7-nerved; upper glume boat-shaped or ovate-oblong when spread, 3-4 x 1 mm, keeled, winged along the keel; florets male or empty.

Fairly common in open grasslands, rocky hill slopes and wastelands or water-logged fields, usually in moist rocky places.

October-February.

Notes: This species shows some variations in the ornamentation and awns of the lower glumes. Normally, lower glumes are provided with 4-5 conspicuous, annular, transverse ridges. But, sometimes

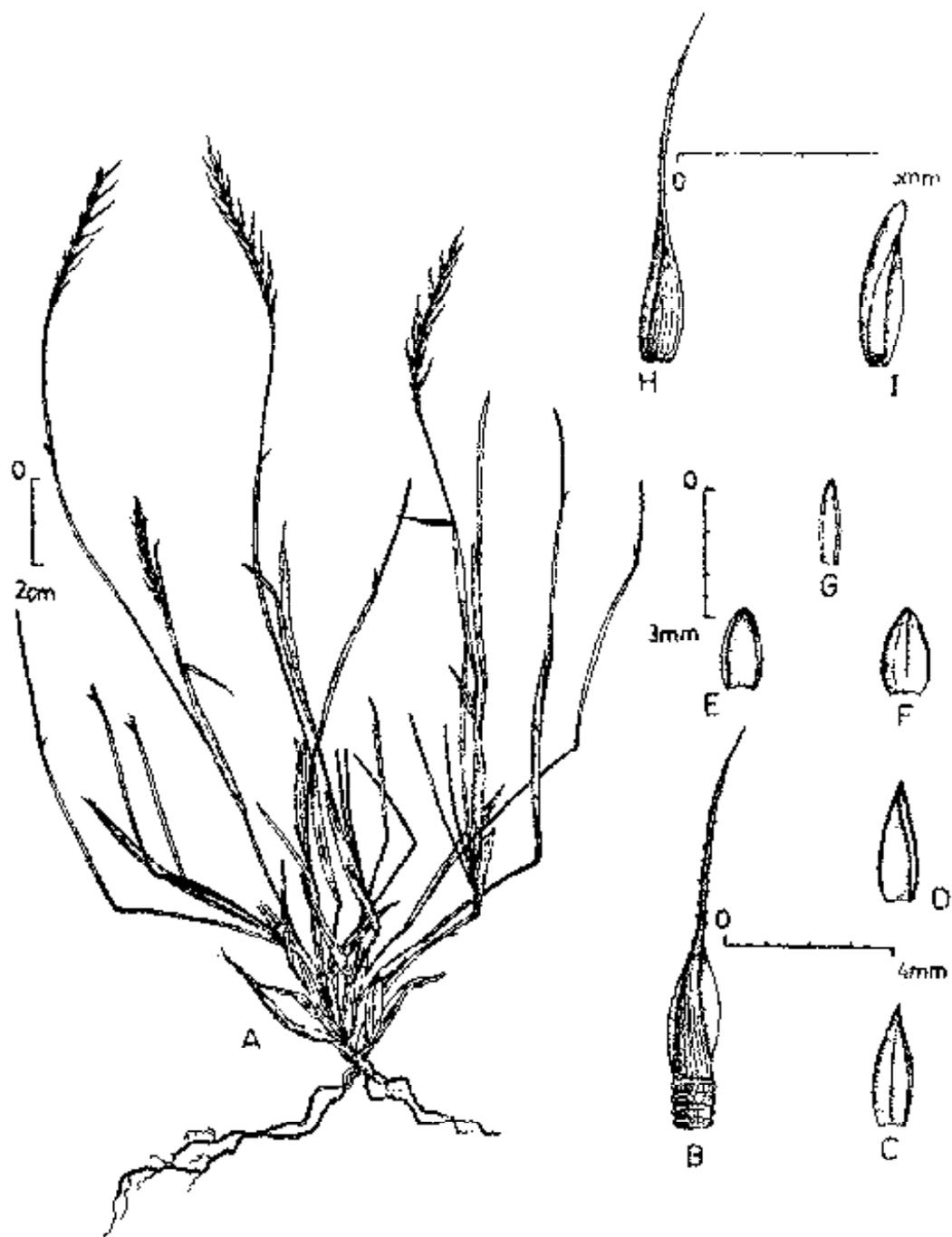


PLATE No. 18: *GLYPHOCHLOA ACUMINATA* (Hack.) W. D. Clayton

A. Habit; B. Lower glume of sessile spikelet; C. Upper glume; D. First lemma; E. Palea of the first lemma; F. Second lemma; G. Palea of the second lemma; H. Lower glume of pedicelled spikelet; I. Upper glume,

the glumes are smooth and entirely glabrous. Rarely within the same raceme both ridged as well as smooth glumes are found, where the awns are bifid also.

CANNANORE: Bela, Periya.

2. *Glyphochloa divergens* (Hack.) W. D. Clayton in Kew Bull. 35: 815. 1981. *Rottboellia divergens* Hack. in DC. Monogr. Phan. 6: 292. 1889. *Manisuris divergens* (Hack.) O. Kuntze, Rev. Gen. Pl. 2: 779. 1891; Bor, Grass. Bur. Cey. Ind. Pak. 701. 1960; Jain in Bull. Bot. Surv. Ind. 12: 10. 1970.

Annuals. Culms 10-30 cm high, slender, erect; nodes glabrous or sparsely bearded. Leaves lanceolate, 1-12 x 0.2-0.5 cm, base rounded. Leaves and sheath covered with sparse tubercle-based hairs. Ligules ovate, acute, membranous. Racemes 1-8 cm long, slender; joints obovate, 1.5-2 mm, flat. Sessile spikelets ovate, acuminate, 2-3 mm long (excluding awns); callus bearded; lower glume ovate, acuminate, 2-3 x 1 mm (excl. awns), cleft at apex into two divaricate awns 2-3 mm long, scabrid, coriaceous below, 7-9-nerved, muricate or pitted on back, winged in the upper half, wings ciliolate; upper glume ovate, 1.5-2 x 1 mm, acute or shortly acuminate, chartaceous, 3-nerved; lower floret empty; upper floret bisexual; first lemma ovate, 1.5-2 x 1 mm, acute or shortly acuminate, delicate, hyaline, faintly 2-3-nerved; second lemma ovate, 1-1.5 x 1 mm, delicate, hyaline; palea ovate, c. 1 x 0.5 mm, delicate, hyaline. Pedicelled spikelets lanceolate, 2-3 mm long (excl. awns) acuminate; pedicels fused with joints; lower glume ovate-lanceolate, 2-3 x 1 mm, acuminate, awned, awns 2-3 mm long, scabrid, chartaceous, 5-7-nerved, narrowly winged on one margin, wing ciliolate; upper glume lanceolate, 2-2.5 x 0.5 mm, shortly aristate, chartaceous, 3-nerved.

Rare; along the hill slopes and mountain valleys, in grasslands and wet places.

Fl. & Fr.: November-December.

Notes: This rare and endemic grass is so far represented in MH only by a single collection from the hill slopes of Peermade, Idukki district.

The grass species described under the name *Rottboellia divergens* by J.D. Hooker (1896) and subsequent workers is not at all *R. divergens*. Fischer (1933) discovered that the species referred to under this name in the Indian Floras is wrong and gave a new name

Manisuris forficulata thereby committing a new error. His description of *M. forficulata* was based on a mixture of two distinct species (Jain *l.c.*) The only earlier known specimens of *R. divergens* is its type material collected by Huegel and kept in the Vienna Herbarium. Jain (*l.c.*) in his revisionary work of the genus, gives an excellent discussion regarding its identity and nomenclature.

IDUKKI: Peermade.

3. *Glyphochloa forficulata* (Fischer) W.D. Clayton in Kew Bull. 35: 815. 1981. *Manisuris forficulata* Fischer in Kew Bull. 1933: 353. 1933, p.p. et in Gamble, Fl. Pres. Madr. 1761. 1934 (Repr. ed. 3: 1227. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 192. 1960; Jain in Bull. Bot. Surv. Ind. 12: 12. 1970.

Annuals. Culms 5-30 cm high, slender, erect, tufted; nodes glabrous or sparsely bearded. Leaves linear-lanceolate, 2-15 x 0.2-0.4 mm, glabrous or densely covered with tubercle-based hairs. Sheaths keeled, covered with tubercle-based hairs. Ligules ovate, acute, membranous. Racemes spicate, 1-5 cm long, stout; joints clavate, obovate, 1-2 mm long. Sessile spikelets ovate-oblong, 4-6 mm long (including the winged portion); callus sparsely bearded; lower glume ovate-oblong, 4-9 x 1-3 mm, broadly winged on both sides in the upper half, 2-cleft and 2-awned, lower half coriaceous with tubercles and marginal hooks, latter sometimes ciliate at tips; wings 2-4 mm wide, awns 3-5 mm long, straight or divaricate, scabrid; upper glume oblong, acute, 2-3 x 0.5-1 mm, chartaceous, 3-nerved; lower floret empty. Upper floret bisexual; first lemma oblong-lanceolate, 2-3 x 1-1.5 mm, delicate, hyaline, faintly 2-3-nerved; palea elliptic or oblong-lanceolate, 2-3 x 0.5 mm, delicate, faintly 2-nerved; second lemma elliptic-ovate, acute, 2-3 x 0.5-1 mm, delicate, hyaline, faintly 2-3-nerved; palea elliptic-lanceolate, 1-2 x 0.5 mm, delicate, hyaline; stamens 3, anthers 0.5-1 mm long; ovary elliptic-oblong, 0.25-0.5 mm long, styles 0.5-1 mm, stigmas 0.5-1 mm long. Pedicelled spikelets oblong-lanceolate, 4-6 mm long, awned; pedicels fused with rhachis; lower glume lanceolate or oblong-lanceolate, 4-6 x 1-2 mm, acuminate, awned, chartaceous, flat on the back, 5-7-nerved, winged on one side, wing 2-5 mm long, awn 2-4 mm long, scabrid; upper glume boat-shaped or lanceolate, 4-6 x 0.5-1 mm, acuminate, keeled, winged along the keel in the upper 3/4; florets male or empty.

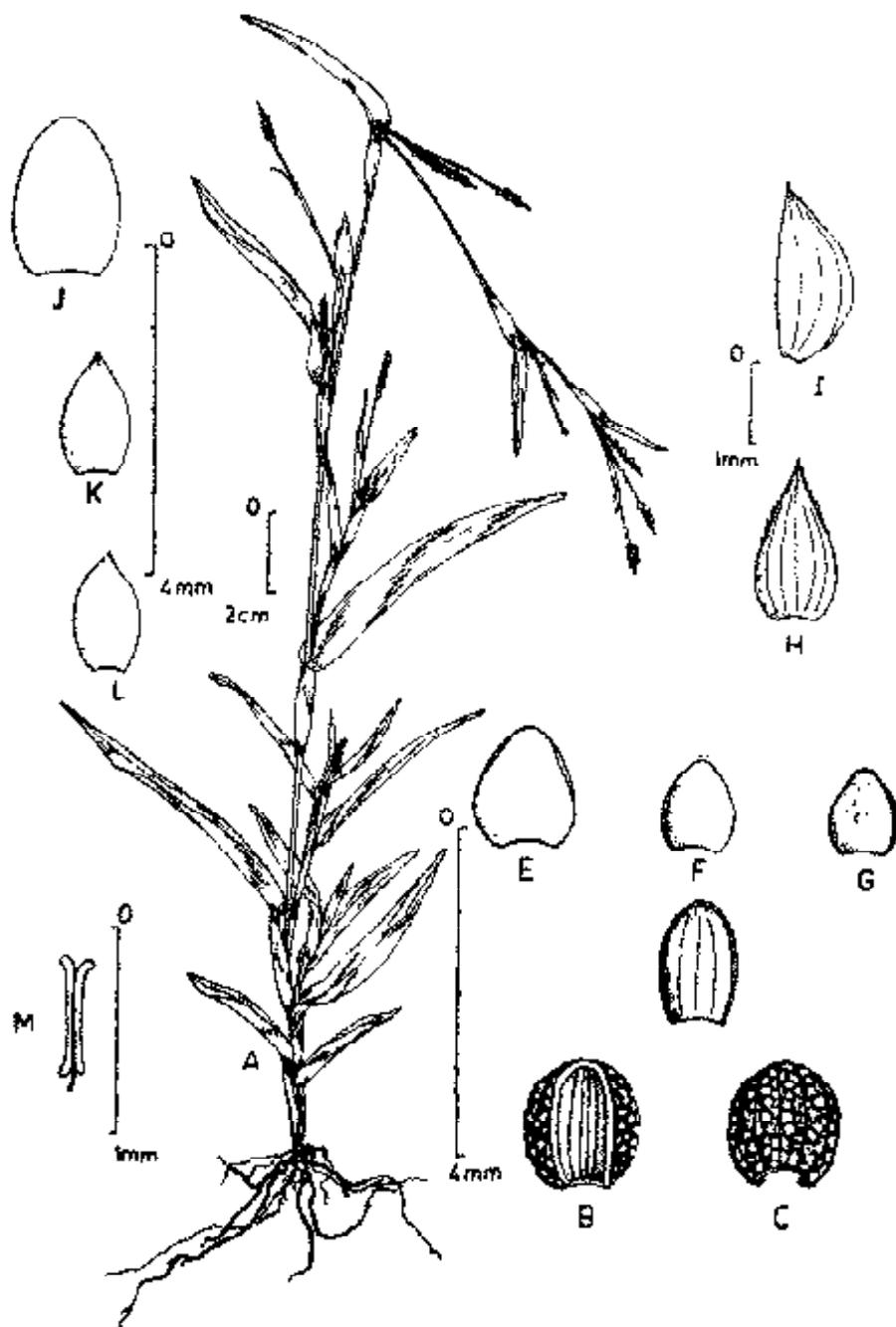


PLATE No. 20: *HACKELOCHLOA GRANULARIS* (Linn.) O. Kuntze

A. Habit; B. Lower glume of sessile spikelet (inner view); C. Lower glume (outer view); D. Upper glume; E. First lemma; F. Second lemma; G. Palea of the second lemma; H. Lower glume of pedicelled spikelet; I. Upper glume; J. First lemma; K. Second lemma; L. Palea of the second lemma; M. Stamen.

Rare; along the grassy slopes of hills and mountains, and road-cuttings; usually in moist, shady places.

Fl. & Fr. : September-December.

Notes : This grass endemic to south India, can easily be distinguished from the other species of the genus by its peculiar forficulate (scissors-shaped) structure of the lower glumes with prominent lateral hooks.

This species has had much nomenclatural confusions. While clarifying the confusion in the identity of *Rottboellia divergens*, Fischer (1934) had given a new name *Manisuris forficulata*, where he had unknowingly described a mixture of 2 distinct grass species; Jain (*l.c.*), while revising the Indian species of the genus, rectified all these mistakes and confusion and emended the description of this species.

IDUKKI : Peermade ; PALGHAT : Below Ayyappankovil.

15. HACKELOCHLOA O. Kuntze

O. Kuntze, *Rev. Gen. Pl.* 2: 776, 1891; Fischer in Gamble, *Fl. Pres. Madr.* 1758, 1934 (Repr. ed. 3: 1217, 1957); Bor, *Grass. Bur. Cey. Ind. Pak.* 159, 1960.

Species 2, distributed in tropics of the world including India, of which 1 species occurs in Kerala.

Hackelochloa granulata (Linn.) O. Kuntze, *Rev. Gen. Pl.* 2: 776, 1891; Fischer in Gamble, *Fl. Pres. Madr.* 1758, 1934 (Repr. ed. 3: 1217, 1957); Bor, *Grass. Bur. Cey. Ind. Pak.* 159, 1960. *Cenchrus granulata* Linn. *Mant. Pl.* 2: 575, 1771. *Manisuris granulata* (Linn.) Linn. f. *Nov. Gram. Gen.* 40, 1779; Hook. f. *Fl. Brit. Ind.* 150, 1896; Rang. & Tad. *Handb. S. Ind. Grass.* 180, t. 147, 1921.

PLATE No. 20

Annals: Culms 10-60 cm high, erect; nodes densely villous. Leaves oblong-lanceolate, lanceolate or linear-lanceolate, 2-20 x 0.2-1.3 cm, blunt at tip, rounded or shallowly cordate at base, coarsely hispid. Sheaths keeled, covered with tubercle-based hairs. Ligules ovate, membranous. Racemes 0.5-1.5 cm long, solitary or aggregated into a spatheate false panicle. Sessile spikelets globose, 1-2 mm long, awnless; lower glume hemispherical or cup-shaped, 1-2 x 1-1.5

mm, crustaceous, faintly 7-9-nerved, nerves visible only from innerside, pitted or tubercled; upper glume ovate-oblong, 1-1.5 x 1 mm, subcoriaceous or chartaceous, adhering below the cavity of the joint, faintly 3-nerved; lower floret empty; upper floret bisexual; first lemma broadly ovate, delicate, hyaline; second lemma ovate, hyaline; palea similar to lemma; stamens 3, anthers c. 0.25 mm, lobes divaricate; ovary oblong, c. 0.2 mm, styles c. 0.5 mm, stigmas c. 0.5 mm. Pedicelled spikelets broadly ovate-acute, 1.5-2.5 mm long, pedicels 1-1.5 mm long, fused with the rachis; lower glume broadly ovate or ovate-lanceolate, 1.5-2.5 x 1 mm, chartaceous, 5-7-nerved, 2-keeled, winged on one side, keels ciliolate; upper glume boat-shaped, 2-2.5 mm long, chartaceous, 5-7-nerved, strongly keeled, keel winged, ciliolate; lower floret empty; upper ones male or empty; first lemma broadly ovate, 1.5-2 x 1 mm, delicate, hyaline; second lemma ovate-lanceolate, 1-1.5 x 1 mm, delicate, hyaline; palea similar to the lemma; stamens 3, anthers 0.5-1 mm long.

Frequent along open grasslands, moist rocky places, gravelly hill slopes and bunds of cultivated fields. A moisture and shade loving species.

Fl. & Fr. : July-February.

Notes : This grass turns bluish-yellow when dried, probably due to the accumulation of aluminium salts. It is considered one of the best fodder grasses.

IDUKKI : Mangaladevi temple, Rajamudi, Thannikkudi;
PALGHAT : Chindaki forest; TRIVANDRUM : Kottur R. F.

16. HETEROPOGON Pers.

Pers. Syn. Pl. 2: 553, 1807; Fischer in Gamble, Fl. Pres. Madr. 1741, 1934 (Repr. ed. 3: 1207, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 162, 1960.

Species about 12, distributed in the tropics and sub-tropics of the world, of which 7 occur in India and one in Kerala.

Heteropogon contortus (Linn.) P. Beauv. ex Roem. & Schult. Syst. Veg. 2: 836, 1817; Fischer in Gamble, Fl. Pres. Madr. 1743, 1934 (Repr. ed. 3: 1207, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 163, t. 6, 1960; Manilal & Sivaraj. Fl.

Calic. 332. 1982. *Andropogon contortus* Linn. Sp. Pl. 1045. 1753; Hook. f. Fl. Brit. Ind. 7: 199. 1896; Rang. & Tad. Handb. S. Ind. Grass. 207. t. 162-163. 1921.

Perennials. Culms densely tufted, erect or geniculate, 20-100 cm high; nodes glabrous. Leaves lanceolate or linear-lanceolate, 2-25 x 0.2-0.6 cm, acute or blunt at apex, rounded at base, mid-rib prominent. Sheathe keeled, basal ones laterally compressed, with a few long hairs towards collar. Ligules truncate, membranous, fimbriate. Racemes 2-6 cm long (excluding long, twisted awns), with lower homogamous spikelet pairs and upper heterogamous ones. Homogamous sessile spikelets linear-lanceolate, 5-8 cm long; lower glume lanceolate or linear-lanceolate, 5-8 mm, chartaceous, several nerved, glabrous or with long tubercle-based hairs on dorsal side; upper glume elliptic-lanceolate or lanceolate, 5-7 x 1 mm, chartaceous, 3-nerved, margins hyaline, ciliate; lower floret empty; upper floret male; first lemma lanceolate, 4-8 x 1-1.5 mm, delicate, 3-nerved, margins ciliate; second lemma linear-lanceolate, 4-6 x 1 mm, delicate, 1-3-nerved, margins ciliate towards apex; stamens 3, anthers 2-3 mm long. Homogamous pedicelled spikelets elliptic-lanceolate, 5-8 mm long; pedicels 1-2 mm long, glabrous; lower glume oblong-lanceolate, 5-8 x 1.5-2 mm, chartaceous, several nerved, broadly winged on one margin, usually covered with long tubercle-based hairs on dorsal side, sometimes entirely glabrous; upper glume elliptic-lanceolate when spread, 5-7 x 1 mm, chartaceous, 3-nerved, margins hyaline, ciliate; florets and lemmas similar to those of sessile spikelets. Heterogamous sessile spikelets linear or linear-lanceolate, awned, 5-8 mm long; callus sharply acute, 2-4 mm long with chocolate-brown hairs of 1-5 mm; lower glume oblong, 5-8 x 1-1.5 mm, rounded at apex, coriaceous, 9-11-nerved, pubescent above, chestnut-brown when mature; upper glume linear, blunt or shortly acute, keeled, coriaceous, 3-nerved, sparsely pubescent; lower floret empty; upper floret bisexual; first lemma oblong, 1-3 x 0.5-1 mm, acute, paleaceous, hyaline, faintly 1-nerved, ciliate towards apex; second lemma oblanceolate hyaline base of the awn, 2-3 mm long, 1-nerved, awn 30-100 mm long, densely hairy, tip contorted; ovary oblong, 0.5-2 mm long; styles 2-3 mm long; stigmas 1-6 mm long, feathery. Heterogamous pedicelled spikelets linear, 6-8 mm long; pedicels 2-3 mm long; glumes not broadly winged; florets similar to those of homogamous pedicelled spikelets.

Very common and one of the dominant species in the open grasslands, in dry rocky places, wastelands, railway tracks and roadsides, usually in drier situations.

Fl. & Fr. : Throughout the year.

Notes : This species shows extreme variation in size as well as indumentum of the glumes. Usually the lower glumes of the homogamous spikelets and the leaves are densely clothed with tubercle-based hairs. But sometimes plants as well as the glumes are entirely glabrous. Some of the specimens with glabrous spikelets were sent to Cope of the Royal Botanic Gardens, Kew. According to him (personal communication) "it is not worth naming varieties of this widespread and extremely variable species unless we feel absolutely sure that what we see is incipient speciation"

In open grasslands the glabrous and hairy forms grow together.

According to the local people roots of the plant are very good for the treatment of snake-bite; the roots are either chewed by the victim or pounded in water and given orally. A very small quantity of the oil distilled from the awns of this grass, taken along with betel leaf is supposed to cure asthma.

ALLEPPEY : Ambalapuzha, Punnappa; CALICUT : Calicut; CANNANORE : Nilaswar; Taliparamba, Tellicherry; ERNAKULAM : Cochin; IDUKKI : Mangaladevi temple; PALGHAT : Agali, Walar; QUILON : Kodumon; TRICHUR : Chalakudi, Peechi; TRIVANDRUM : Kariavattom, Nadayara, Pulimath; WYNAAD : Brahmagiri, Chandanathode.

17. IMPERATA Cyr.

Cyr. Pl. Rar. Neap. 2: 26, t. 11, 1792; Hook. f. Fl. Brit. Ind. 7: 106, 1896; Fischer in Gamble, Fl. Pres. Madr. 1707. 1934 (Repr. ed. 3: 1183, 1957); Bor. Grass. Bur. Cey. Ind. Pak. 169, 1960.

A genus of about 10 species in warm temperate countries of the World, of which 2 occur in India, one in Kerala.

Imperata cylindrica (Linn.) Ræusch, Nom. Bot. ed. 3: 10, 1797; Cope in Nasir & Ali, Fl. Pak. 143: 252, 1982. *Lagurus cylindricus* Linn. Syst. Nat. ed. 10, 878, 1759. *Imperata cylindrica* (Linn.) P. Beauv. var. *major* (Nees) C. E. Hubb. ex Hubb. et Vaughan, Grass. Maur. 96, 1940; Bor. Grass. Bur. Cey. Ind. Pak. 170, 1960. *I. koenigii* (Retz.) P. Beauv. var. *major* Nees, Fl. Afr. Austr. 90, 1841.

I. cylindrica (Linn.) P. Beauv. var. *koenigii* Dur. et Schinz. Consp. Flor. Afr. 5: 694, 1894; Fischer in Gamble, Fl. Pres. Madr. 1707. 1934 (Repr. ed. 3: 1184, 1957); *I. arundinacea* Cyr. Pl. Rar. Neap. 2: 26. 1792; Hook. f. Fl. Brit. Ind. 7: 106. 1896, p.p.; Rang. & Tad. Handb. S. Ind. Grass. 147. t. 128. 1921.

Perennials. Culms 20-150 cm high, rhizomatous, densely tufted from scaly rhizomes; nodes densely villous. Leaves lanceolate or linear-lanceolate, 5-60 x 0.4-1.4 cm, mostly collected at base, narrowed at base, glaucous, midrib prominent, broad. Basal sheaths disintegrating into fibres, mouth villous. Ligules ovate, thin, membranous. Panicles spiciform, cylindrical, 5-20 cm long, white silky hairy. Spikelets similar, pedicelled, lanceolate or elliptic-lanceolate, 2.5-4.5 mm long, awnless, enveloped in long silky hairs from callus and glumes; pedicels 1-3 mm long; lower glume lanceolate, 2.5-3 x 1 mm, chartaceous, 5-nerved, with a few long silky hairs in the lower half; upper glume similar, but slightly bigger; lower floret empty, upper floret bisexual; first lemma oblong-lanceolate, 1.5-2 x 1 mm; slightly 3-lobed at apex, hyaline, ciliate at apex; second lemma elliptic-lanceolate, 1-1.5 x 1 mm, slightly 3-lobed, hyaline, margins ciliate at apex; palea obovate, 0.5-1 mm long, hyaline. Stamens 2, anthers 2.5-3.5 mm long, orange-yellow; ovary oblong, 0.25-0.5 mm, styles 2-3 mm long, stigmas 2-3 mm long.

Frequent along the banks of backwaters, riversides, abandoned fields, low-level grasslands where it flourishes just before annual fires and as a weed in cultivated fields, usually on black cotton soil.

Fl. & Fr. : Throughout the year.

Notes : The varietal classification here is quite unreliable. According to Cope (*f.c.*) 'although the differences between the varieties can be demonstrated statistically, the varieties intergrade so much that individual specimens are often unidentifiable' The hairiness of nodes, loose or dense nature of panicles and flat or rolled leaves etc. are extremely overlapping and unreliable as means of identification. Hence it seems best to ignore the varietal treatments, as suggested by Cope.

It is a fast-spreading species in the lower altitude grasslands. The rhizomes here are extremely aggressive, making the grass very

difficult to be uprooted and eradicated. This grass is excellent for thatching and paper industry.

ALLEPPEY: R. Block; CALICUT: Sultan Battery; CANNANORE: Theerthundamala; ERNAKULAM: Cochin Airport; IOUKKI: Thekkadi; PALGHAT: Kanjirampuzha, Silent Valley; QUILON: Thanmala; TRICHUR: Peechi Dam; TRIVANDRUM: Chinikkala, Boneccord; WYNAAD: Mepadi.

18. ISCHAEMUM Linn.

Linn. Sp. Pl. 1049. 1753 et Gen. Pl. ed. 5. 469. 1754; Hook. f. Fl. Brit. Ind. 126. 1896; Fischer in Gamble, Fl. Pres. Madr. 1717. 1934 (Repr. ed. 3: 1191. 1957); Bor. Grass. Bur. Cey. Ind. Pak. 171. 1960.

A genus of about 70 species in the tropical regions of the world, mainly in Asia, of which about 45 species occur in India and 28 species, 3 varieties and 2 sub-varieties in Kerala.

Ischaemum is one of the most difficult genera, much in need of a revision, reaching its greatest complexity in south east Asia including India where some detailed biosystematic study is badly needed. Out of the 28 species described here from Kerala, 11 are new to science.

Key to the species

- 1a. Racemes 3-10, paniculate *I. nilagiricum* 17
- 1b. Racemes usually paired, rarely solitary or 3, digitate or sub-digitate :
 - 2a. Spikelets awnless or the awn rudimentary, concealed :
 - 3a. Racemes hardly exserted from the spathe, 0.5-3.5 cm long; lower leaves rounded or shallowly cordate at base; pedicels of the pedicelled spikelets 3-5 mm long *I. muticum* 15
 - 3b. Racemes long-exserted from the spathe, 4-8 cm long; lower leaves narrowed and tapering at base; pedicels c. 1 mm long *I. jayachandranii* 10
 - 2b. Spikelets prominently awned, awns well exserted:
 - 4a. Margins of the lower glume of the sessile spikelet expanded in the lower half :

- 6a. Lower glume of the sessile spikelet broadly or narrowly winged on both sides towards apex, wing often auriculate *I. indicum* 9
- 6b. Lower glume of the sessile spikelet not winged towards apex, oblong-lanceolate, acuminate:
- 6a. Joints of racemes with a tooth-like projection on inner side, 3-5 mm long; glumes glabrous:
- 7a. Lower leaves petiolate, petioles 1-5 cm long; upper glume of the sessile spikelet not winged at apex *I. zeylanicum* 28
- 7b. Lower leaves sessile; upper glume of the sessile spikelet with an obscure wing at the apex *I. thomsonianum* 23
- 6b. Joints of racemes without a tooth-like projection, up to 3 mm long; glumes more or less pilose:
- 8a. Spikelets 3-4 mm long; lower glume of the spikelet bicuspidate *I. timorensis* 24
- 8b. Spikelets 6-8 mm long; lower glume of the spikelets usually 3-lobed at apex, rarely bicuspidate *I. agastymalayicum* 1
- 4b. Margins of the lower glume of the sessile spikelet narrowly and evenly inflexed from base to apex:
- 9a. Bases of the lower leaves usually acute, narrow and tapering, rarely rounded or shallowly cordate, but then without a petiole:
- 10a. Pedicels of the pedicelled spikelets more than one-third the length of the sessile spikelets:
- 11a. Lower glume of the sessile spikelets ovate-lanceolate, acuminate, chartaceous throughout, flat, without nodules; racemes 2 or 3; pedicelled spikelets usually reduced *I. tadulingamii* 22
- 11b. Lower glume ovate-oblong, obtuse or acute, never acuminate, crustaceous below, coriaceous above, usually with a few nodules and wrinkles; racemes paired; pedicelled spikelets developed:
- 12a. Leaf blades up to 20 cm long, 10 mm wide; culms not robust:
- 13a. Lower leaves rounded or shallowly cordate at base, never petioled; sessile spikelets 3.5-5 mm long; upper glume of the sessile spikelet keeled on dorsal side *I. kannanorensis* 4

- 13b. Lower leaves narrowed and tapering towards base, with or without a distinct petiole; sessile spikelets 5-6.5 mm long; upper glume rounded on dorsal side:
- 14a. Lower glume of the sessile spikelet perfectly smooth and glabrous or rarely with a few side nodules, but then never interconnected; lower leaves usually petiolate; nodes glabrous *I. commutatum* 5
- 14b. Lower glume of the sessile spikelet deeply and irregularly wrinkled, side nodules interconnected, sparsely villous or glabrous; lower leaves sessile; nodes bearded *I. himalayana* 8
- 12b. Leaf blades 10-60 cm long, 10-20 mm wide; culms robust, up to 20 cm high; racemes 5-12 cm long; spikelets 5-6 mm long, elliptic or ovate, acute; lower glume deeply and irregularly wrinkled with 8-10 ridges and furrows *I. nairii* 16
- 10b. Pedicels of the pedicelled spikelets less than one-third the length of the sessile spikelets:
- 15a. Lower glumes densely villous with white silky hairs, flat, without ridges or furrows:
- 16a. Culms robust, up to 150 cm high; leaves 10-30 cm long, linear-lanceolate, lower ones tapering towards base; tall, erect perennials *I. mollis* 14
- 16b. Culms slender, up to 30 cm high; leaves up to 3 cm long, ovate-lanceolate or triangular, cordate at base; prostrate, creeping or geniculate annuals *I. raii* 19
- 15b. Lower glumes glabrous, usually with side nodules joined by sharp ridges and furrows, rarely flat but then winged on one side towards apex:
- 17a. Tip of the lower glume of the sessile spikelet broadly or narrowly winged on one side; glumes flat, with or without a few side nodules, nodules never interconnected:
- 18a. Wing on the lower glume broad, auriculate; spikelets 4-6 mm long; callus bearded; leaves 3-20 cm long *I. mangaluricum* 13
- 18b. Wing on the glume narrow, not auriculate; spikelets 6-7 mm long; callus glabrous; leaves 10-40 cm long *I. barbatum* 2
- 17b. Tip of the lower glume of the sessile spikelet not winged; glumes with prominent side nodules interconnected by usually sharp ridges and furrows:
- 19a. Lower leaves narrowed and tapering at base; lower glumes crustaceous below with deep furrows and

- ridges across the back; pedicelled spikelets reduced or empty; sessile spikelets 4-6 mm long *I. rugosum* 20
- 19b. Lower leaves rounded or shallowly cordate at base; lower glumes coriaceous below with obscure ridges and furrows; pedicelled spikelets well-developed:
- 20a. Racemes 8-15 cm long; lower glume of the pedicelled spikelet broadly winged on one margin; leaves up to 30 cm long; sessile spikelets usually awnless *I. travancorensis* 25
- 20b. Racemes 5-8 cm long; lower glume of the pedicelled spikelet narrowly winged on one margin; leaves up to 15 cm long; sessile spikelets usually awned *I. vembanadense* 27
- 9b. Base of the lower leaves usually sagittate or deeply cordate and with distinct petioles, rarely shallowly cordate or rounded and without petioles:
- 21a. Lower leaves petiolate:
- 22a. Pedicels of the pedicelled spikelets more than one-third the length of the sessile spikelets:
- 23a. Sessile spikelets 3.5-4.5 mm long; glumes thin, chartaceous; racemes slender; leaves triangular, ovate-lanceolate or rarely lanceolate, deeply cordate or sagittate at base *I. malabaricum* 12
- 23b. Sessile spikelets 5-6.5 mm long; glumes thick; crustaceous or coriaceous; racemes stouter; leaves elliptic-lanceolate or lanceolate, narrowed, tapering, rounded or shallowly cordate at base *I. commutatum* 5
- 22b. Pedicels of the pedicelled spikelets less than one-third the length of the sessile spikelets:
- 24a. Lowest group of spikelets in threes, one awned and two awnless; inflorescence in fascicles of 5-8 long peduncles from a sheath *I. keralensis* 11
- 24b. Lowest group of spikelets in pairs; inflorescence not as above:
- 25a. Lower glume of the pedicelled spikelet broadly winged on one margin, wing purplish; lower glume of the sessile spikelet with 4-5 distinct side nodules *I. rangacharianum* 18
- 25b. Lower glume of the pedicelled spikelet not winged or wing narrow; lower glume of the sessile spikelet deeply and irregularly wrinkled:

- 26a. Joints of racemes linear-clavate; lower glume crustaceous or coriaceous with 3-4 side nodules, sometimes deeply and irregularly wrinkled; leaves up to 15 cm long *I. dolzellii* 7
- 26b. Joints of racemes distinctly turbinate; lower glume chartaceous, with or without side nodules, sometimes nodules are interconnected; leaves up to 10 cm long *I. semisagittatum* 21
- 21b. Lower leaves sessile:
- 27a. Pedicels of the pedicelled spikelets more than one-third the length of the sessile spikelets:
- 28a. Glumes crustaceous or coriaceous, smooth or wrinkled with nodules and ridges, villous or glabrous:
- 29a. Sessile spikelets 3.5-5 mm long; upper glume of the sessile spikelet keeled on dorsal side; joints and pedicels clavate *I. cannanorensis* 4
- 29b. Sessile spikelets 5-6.6 mm long; upper glume rounded on dorsal side; joints and pedicels linear-turbinate *I. commutatum* 5
- 28b. Glumes chartaceous or coriaceous, usually smooth and not wrinkled or rarely with a few obscure nodules, densely villous:
- 30a. Sessile spikelets 3.5-4.6 mm long; racemes sparsely villous; glumes thin, chartaceous; joints of racemes 2.5-3 mm long; linear-clavate, slender, sparsely villous; pedicelled spikelets awnless *I. malabaricum* 12
- 30b. Sessile spikelets 5-6 mm long; racemes densely villous; glumes thick, coriaceous; joints of racemes 3-4 mm long, turbinate, stouter, densely villous; pedicelled spikelets awned *I. calicutensis* 3
- 27b. Pedicels of the pedicelled spikelets less than one-third the length of the sessile-spikelets:
- 31a. Lowest group of spikelets in threes; one awned and two awnless *I. copcanum* 6
- 31b. Lowest group of spikelets in pairs:
- 32a. Leaves 1-4 cm long, ovate-lanceolate or triangular, shallowly cordate or sagittate at base; pedicelled spikelets awnless:

- 33a. Joints of racemes 2.5-3 mm long, linear-clavate or slightly turbinate, not swollen; sessile spikelets 3.5-4 mm long *I. raii* 19
- 33b. Joints of racemes 3-4 mm long, clavate, swollen, shining; sessile spikelets 5-6 mm long *I. tumidum* 26
- 32b. Leaves up to 10 cm long, lanceolate, deeply cordate or sagittate at base; pedicelled spikelets awned; sessile spikelets 5-6 mm long *I. calicutensis* 3

1. *Ischaemum agastyamalayanum* P. V. Sreekumar, M. K. Janarthanam & A.N. Henry in J. Bomb. Nat. Hist. Soc. 84 (3) : 643-646, 1987.

PLATE No. 21

Perennials. Culms 20-80 cm long, stoloniferous, trailing or geniculate, rarely erect; nodes bearded or glabrous. Leaves elliptic-lanceolate, lanceolate or linear-lanceolate, 3-10 x 0.5-1 cm., acuminate, rounded or shallowly cordate at base, covered with dense or sparse tubercle-based hairs. Sheaths keeled. Ligules ovate, acute, membranous, 2-4 mm long. Racemes 2, rarely 3, 3-5 cm long, densely hairy; joints 2.5-3 mm, turbinate, furrowed, densely hairy, hairs 0.5-3 mm long. Sessile spikelets oblong-lanceolate, 7-8 mm long (excl. arista), awned, densely villous; callus cuneate, densely bearded, hairs 1-2 mm long; lower glume broadly ovate-lanceolate, 5-6 x 2-3 mm, 3-lobed at apex or very rarely bicuspidate, but then the lobes divaricate, chartaceous, 11-13-nerved, densely hairy, hairs 1-3 mm long; upper glume boat-shaped or ovate-lanceolate when spread, 6-8 x 1-2 mm, acuminate, tip recurved, shortly bifid and aristate, chartaceous, faintly 3-5-nerved, keeled on dorsal side, keel minutely winged and sparsely ciliate at the middle or towards apex, margins infolded, hyaline towards apex, arista 2-3 mm long; lower floret male; upper floret bisexual; first lemma ovate-oblong, 4.5-5 x 2 mm, acute, delicate, faintly 3-5-nerved, margins hyaline, ciliate towards apex, palea elliptic-lanceolate, 4-4.5 x 1 mm, chartaceous, 2-keeled, 2-nerved, margins infolded, delicate, hyaline; stamens 3, anthers 1-2 mm long; second lemma notched, 4-5 x 1.5-2 mm, delicate, hyaline, 3-nerved, awned, lobes acuminate, ciliate towards apex; awn 12-15 mm long, column 5-6 mm, brownish; palea oblong-lanceolate, delicate, hyaline, 2-nerved; stamens 3, anthers 2-3 mm long; ovary oblong, c. 0.5 mm, styles 1-1.5 mm long, stigmas c. 2 mm. Pedicelled spikelets lanceolate or oblong-lanceolate, 6-7 mm long, awned, sometimes reduced; pedicels 2-2.5 mm long, densely villous; lower glume oblong-lanceolate or ovate-lanceolate, 5-6 x 1.5-2 mm, slightly bifid, acuminate, aristate, chartaceous, 9-11-nerved, keeled and densely villous on dorsal side; upper glume and florets similar to those of the sessile spikelets

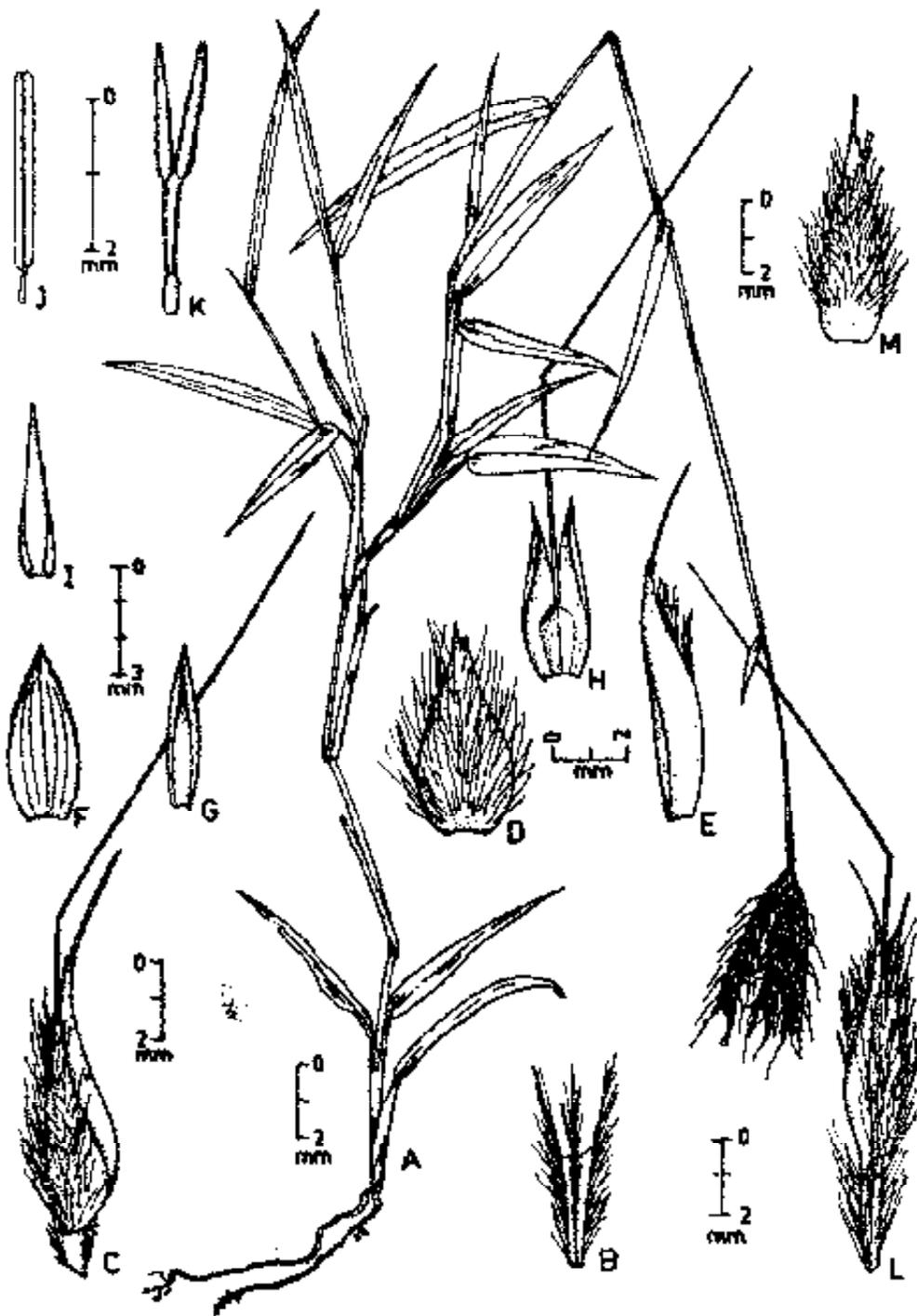


PLATE No. 21: *ISCHAEMUM AGASTYAMALAYANUM* P. V. Sreekumar,
M. K. Janarth. & A. N. Henry

A. Habit; B. Joint of raceme; C. Sessile spikelet; D. Lower glume of sessile spikelet; E. Upper glume; F. First lemma; G. Palea of the first lemma; H. Second lemma; I. Palea of the second lemma; J. Stamen; K. Pistil; L. Pedicelled spikelet; M. Lower glume of pedicelled spikelet.

Rare, along the grassy hill slopes and in higher altitude grasslands.

Fl. & Fr.: October - December.

IDUKKI: Lockhart gap; TRIVANDRUM: Western slopes of Agasthyamala.

2. *Ischaemum barbatum* Retz. Obs. Bot. 6: 35. 1791; Bor in Kew Bull. 15: 411. 1961. *I. goebelii* Hack. in Ost. Bot. 2. 51: 149. 1901; Bor, Grass. Bur. Cey. Ind. Pak. 179. 1960. *I. aristatum* sensu Hack. subsp. *imberbe* Hack. var. *imbricatum* Hack. in DC. Monogr. Phan. 6: 203. 1889; Hook. f. Fl. Brit. Ind. 7: 127. 1896.

PLATE No. 22

Annuals or perennials. Culms 80-120 cm high, erect, tufted, nodes glabrous. Leaves linear-lanceolate, 10-40 x 0.4-1 cm, narrowed at base. Sheaths slightly keeled. Ligules ovate, 3-5 mm long, acute, membranous. Racemes 2, appressed to each other and appear solitary, 6-15 cm long; joints clavate-turbinate, 5-6 mm long, crustaceous or coriaceous. Sessile spikelets oblong-lanceolate, 6-7 mm long, awned; callus glabrous; lower glume ovate-oblong, 6-7 x 2.5-3 mm, acute, coriaceous, 13-15-nerved, with or without 4-6 side nodules, tip winged on one side, wing scabrid; upper glume boat-shaped or ovate-lanceolate when spread, 6-7 x 2 mm, coriaceous, keeled on dorsal side, minutely winged at apex, margins infolded, hyaline; lower floret male; upper floret bisexual; first lemma elliptic-lanceolate, c. 6 x 1.5 mm, shortly acuminate, delicate, 3-5-nerved, margins infolded, hyaline; palea elliptic-lanceolate, c. 6 x 1.5 mm, delicate, hyaline, 2-keeled, 2-nerved; stamens 3, anthers c. 2 mm long, cream-coloured; second lemma notched, c. 6 x 2.5 mm, awned, lobes acuminate, hyaline, faintly 5-7-nerved, awn 8-10 mm long; palea oblong, 4-4.5 x 1-1.5 mm, delicate, hyaline, 2-keeled, 2-nerved, sprinkled with wart like dots; stamens 3, anthers c. 3 mm long, cream-yellow; ovary linear-oblong, c. 1 mm long, styles c. 2 mm long, stigmas 1.5-2 mm, brownish. Pedicelled spikelets ovate-oblong, 5-6 mm long, awnless; pedicels obovate or clavate, c. 2 mm long; lower glume ovate-oblong, 5-6 x 2-3 mm, acute, coriaceous, 9-11-nerved, broadly winged on one margin, wing scabrid; upper glume boat-shaped, or ovate-lanceolate when spread, acute, c. 5 x 2 mm, coriaceous, 5-7-nerved, margins infolded, hyaline; florets male; lemmas and paleas similar to those of the sessile spikelet, but smaller; second lemma entire, awnless; stamens 3, anthers c. 2 mm long.

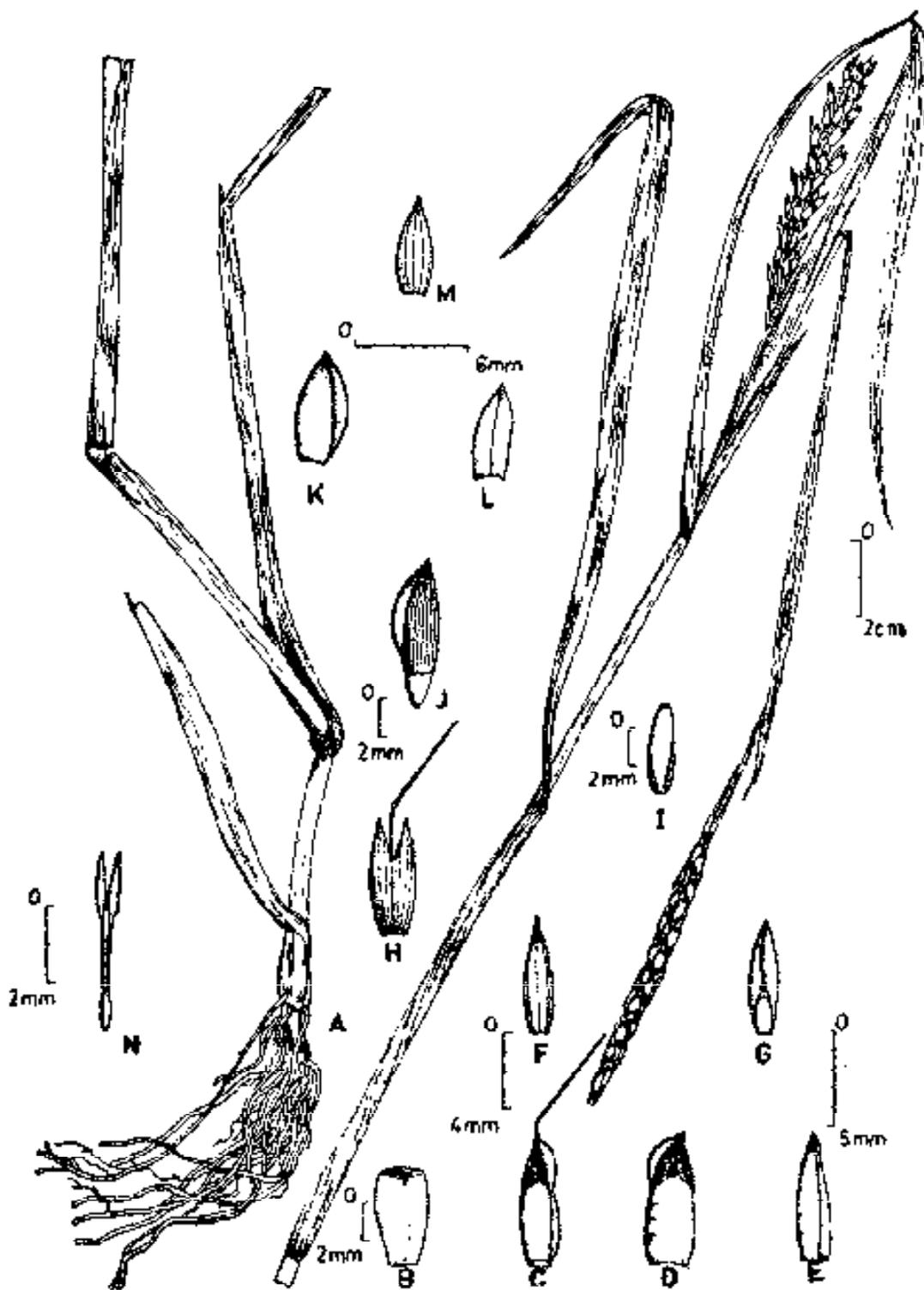


PLATE No. 22: *ISCHAEMUM BARBATUM* Retz.

A. Habit; B. Joint of raceme; C. Sessile spikelet; D. Lower glume; E. Upper glume; F. First lemma; G. Palea of the first lemma; H. Second lemma; I. Palea of the second lemma; J. Pedicelled spikelet; K. Lower glume of pedicelled spikelet; L. Upper glume; M. Second lemma; N. Pistil.

Rare, along the banks of rivers, streams and canals, growing in the crevices of rocks.

Fl. & Fr. : October - December.

Notes : This rare grass was known earlier only from Assam in India. Singh *et al.* (1976) reported its occurrence in Hassan District of Karnataka. There is no earlier collection of this species in BSI and MH.

CANNANORE : Koippadi.

3. *Ischaemum calicutensis* P. V. Sreekumar, V. J. Nair & N. C. Nair in J. Econ. Tax. Bot. 4(3) : 1007, 1983.

PLATE No. 23

Perennials. Culms 30-80 cm long, creeping and stoloniferous; upper nodes sparsely villous, lower ones glabrous. Leaves 2-10 x 0.8-0.12 cm, lanceolate long acuminate, base deeply cordate or sagittate, glabrous. Sheaths 1-8 cm long, shorter than the internodes, keeled, striate, glabrous except one margin which is villous towards mouth. Ligule 1-2 mm long, an ovate acute membrane. Inflorescence of 2 racemes, 4-6 cm long, densely villous, stout, enclosed in a spathe 3-10 cm long. Joints of racemes 3-4 mm long, slightly turbinate, densely villous. Sessile spikelets 5-6 mm long, ovate-lanceolate, awned, callus bearded; lower glume 5-5.5 x 1-1.5 mm, ovate-lanceolate, coriaceous, faintly 7-9-nerved, densely villous except in the upper quarter, hairs 0.5-2.5 mm long, silky, smooth or rarely with a few obscure nodules, margins narrowly and evenly inturred from base to apex; upper glume 5.5-6 x 1-1.5 mm, boat-shaped or lanceolate when spread, keel rounded except towards apex which is minutely winged, coriaceous, faintly 5-nerved, covered with short adpressed hairs, margins hyaline, shortly ciliate; lower floret male or bisexual with a rudimentary pistil; lemma 4.5-5 x 0.75-1 mm, lanceolate, delicate, hyaline, faintly 5-7-nerved, margins infolded and ciliate; palea 4-4.5 x 0.75-1 mm, oblong-lanceolate, delicate, hyaline, 2-keeled, 2-nerved, glabrous; stamens 3, anthers 1.25-1.6 mm long, filaments c. 0.5 mm long; upper floret bisexual; lemma 3-3.5 x 1-1.25 mm, notched, lobes acute, delicate, hyaline, faintly 3-nerved, awn 20-25 mm long, column 5-10 mm long, brownish, bristle pale, scabrid; palea 2.5-3 x 0.5-0.75 mm, oblong, rounded or slightly emarginate at apex, delicate, hyaline, 2-keeled, 2-nerved, glabrous; lodicules 2, each c. 0.5 x 0.3 mm, obovate, oblique and wavy at apex; stamens 3, anthers 1.5-2 mm long, filament c. 0.5 mm long; ovary c. 0.5 x 0.1 mm, oblong, styles

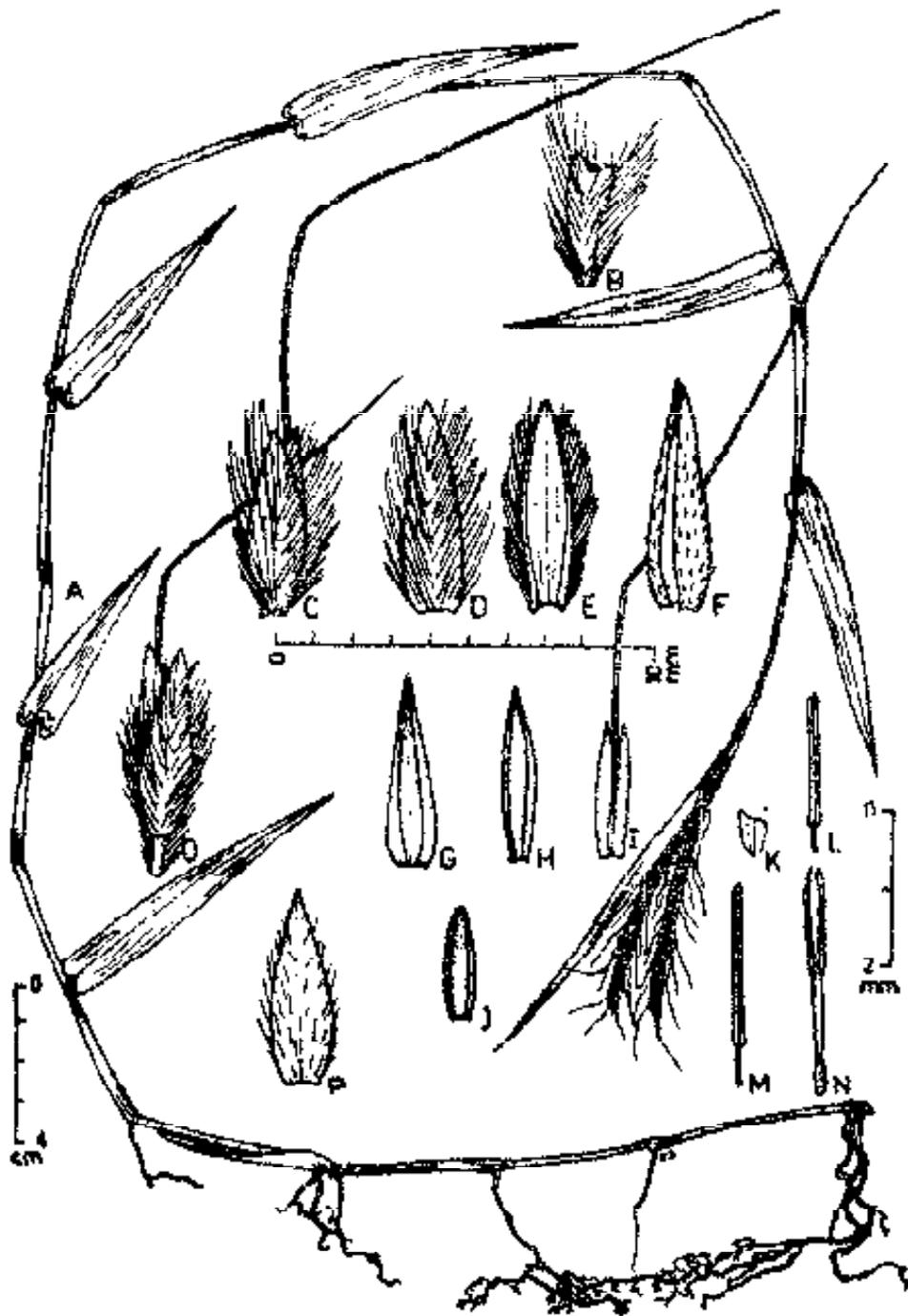


PLATE No. 23: *ISCHAEMUM CALICUTENSIS* P. V. Breekumar, V. J. Nair & N. C. Nair

A. Plant; B. Joint (rachis); C. Sessile spikelet; D. Lower glume of the sessile spikelet-dorsal view; E. Lower glume-ventral view; F. Upper glume-lateral view; G. Lower lemma-ventral view; H. Palea-dorsal view; I. Upper lemma-dorsal view; J. Upper palea spread open-dorsal view; K. Lodicule; L. Stamen of the lower floret; M. Stamen of the upper floret; N. Pistil; O. Pedicelled spikelet; P. Upper glume of the pedicelled spikelet.

c. 1 mm long, slender, stigmas *c.* 1.5 mm long, feathery, flesh-coloured. Pedicelled spikelet 4.5-5 mm long (excluding pedicels), oblong, acute, awned, callus bearded; pedicels 1-1.5 mm long, densely villous, hairs 1-2 mm long; lower glume 4.5-5 x 1-1.5 mm, oblong-lanceolate, coriaceous, faintly 5-7-nerved, densely villous except in the upper quarter, hairs 0.5-2.5 mm long, silky; upper glume 4.5-5 x 1-1.25 mm, boat-shaped or ovate lanceolate when spread, coriaceous, faintly 5-nerved, densely villous, keel rounded; lower floret male or bisexual with a rudimentary pistil; lemma 4-4.5 x 0.75-1 mm, lanceolate, delicate, hyaline, faintly 3-5-nerved, margins infolded and ciliate, palea 3-3.5 x 0.5-0.75 mm, oblong-lanceolate, delicate, hyaline, 2-keeled, 2-nerved, glabrous; stamens 3, anthers 1-1.5 mm long, filaments short; upper floret bisexual; lemma 3-3.5 x 1-1.25 mm, notched, lobes acute, delicate, hyaline, glabrous, awn 12-15 mm long, column *c.* 5 mm long, brownish, bristle pale, scabrid; palea 2-2.5 x 0.5-0.75 mm, oblong, rounded at apex, delicate, hyaline, 2-keeled, 2-nerved, glabrous; stamens and pistils are similar to that of sessile spikelets.

Fl. & Fr. : October December.

CALICUT : Pokkunnamala.

4. *Ischaemum kannanorensis* P. V. Sreekumar, V. J. Nair & N.C. Nair in J. Econ. Tax. Bot. 4(3) : 1009. 1983.

PLATE No. 24.

Tufted perennials. Culms 15-60 cm high, erect or geniculate; upper nodes usually bearded, lower ones either villous or glabrous. Leaves 2-10 x 0.3-0.6 cm, lanceolate, long acuminate, base rounded or shallowly or even deeply cordate, villous with sparse tubercle-based hairs or glabrous. Sheaths 2-6 cm long, shorter than the internodes, striate, keeled, glabrous. Ligule 2-3 mm long, an oblong acute membrane. Inflorescence of 2 racemes, 2-5 cm long, stout, enclosed in a spathe 3-6 cm long, glabrous. Joints of racemes 2.5-3 mm long, clavate or linear-clavate, crustaceous, densely villous on dorsal side, sparsely villous or glabrous along the margins, hairs 0.5-1.5 mm long. Sessile spikelets 3.5-5 mm long, ovate-oblong or oblong-acute, densely hairy or glabrous, awned, callus *c.* 1 mm long, densely hairy, hairs 0.5-2 mm long; lower glume 3.5-5 x 1.25-1.5 mm, ovate-oblong, or oblong-acute, crustaceous below, coriaceous above, smooth or wrinkled with a few shallow nodules and ridges, densely villous or entirely glabrous, faintly 11-13 nerved, marg-

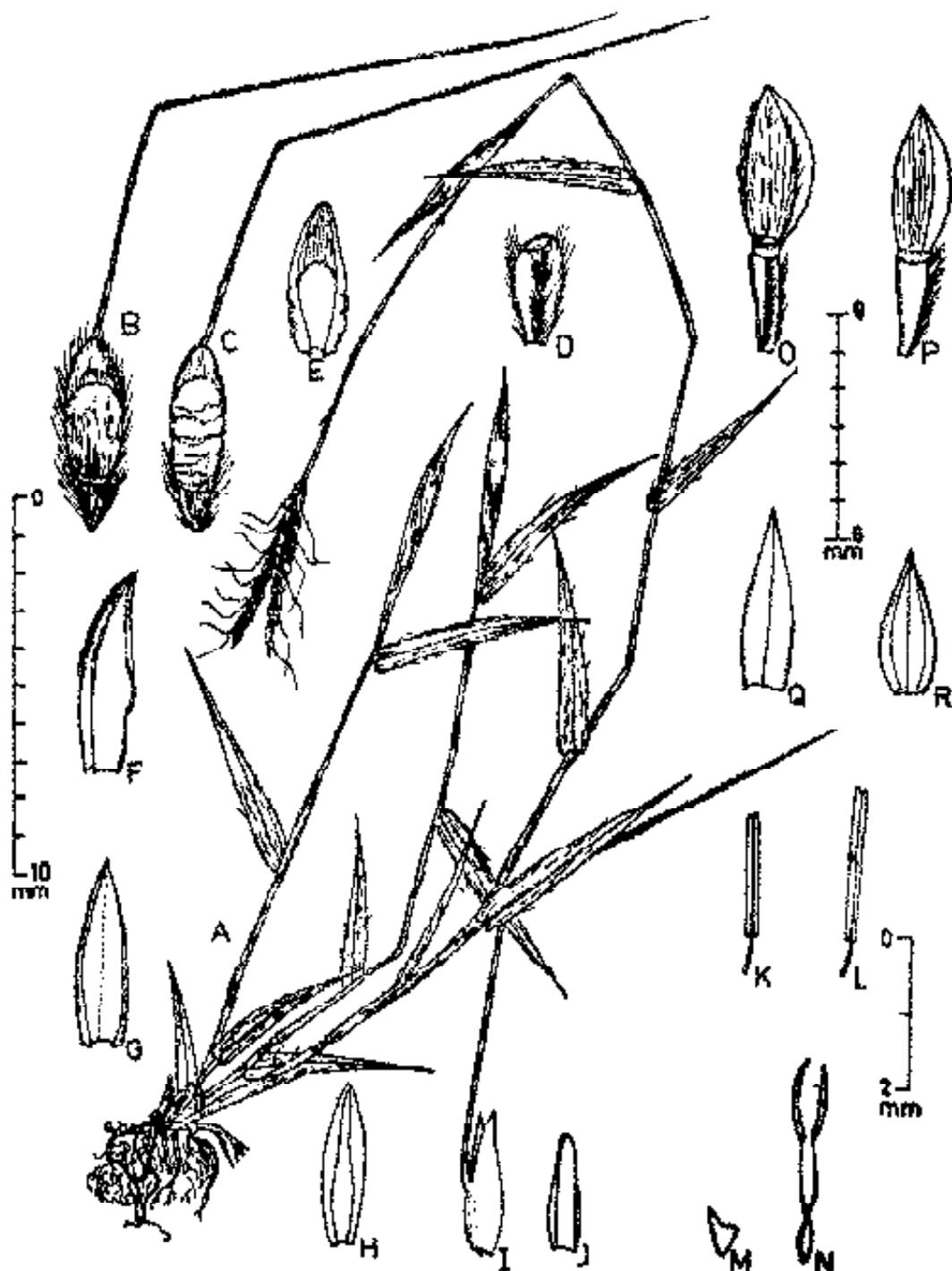


PLATE NO. 24: *ISCHAEMUM KANNANORENSIS* P. V. Sreekumar, V. J. Nair, B. N. C. Nair

A. Plant; B-C. Sessile spikelet - hairy & glabrous types; D. Joint (rachis); E. Lower glume of the sessile spikelet - ventral view; F. Upper glume - lateral view; G. Lower lemma - ventral view; H. Palea - ventral view; I. Upper lemma - lateral view; J. Palea spread open - dorsal view; K. Stamen of the lower floret; L. Stamen of the upper floret; M. Lodicule; N. Platis; O-P. Pedicelled spikelet - glabrous & hairy types; Q. Upper glume of the pedicelled spikelet - dorsal view; R. Upper lemma of the pedicelled spikelet - ventral view.

ins narrowly delicate, hyaline, 2-keeled, 2-nerved, glabrous; stamens 3, anthers 1-1.5 mm long, light pink or yellow, filaments 0.3-0.5 mm long; upper floret bisexual; lemma 3-3.5 x 1.25-1.5 mm, notched, lobes acute, delicate, hyaline, faintly 3-5-nerved, glabrous, awn 15-20 mm long, geniculate, column 8-10 mm long, brown, bristle pale, scabrid; palea 2.5-3 x 0.5-0.75 mm, oblong, rounded at apex, delicate, hyaline, 2-keeled, 2-nerved, glabrous; lodicules 2, each c. 0.5-0.4 mm, obovate, oblique, and 2-horned at apex; stamens 3, anthers 1.5-2 mm long, light pink or yellow, filaments c. 0.5 mm long; ovary c. 0.5 x 0.2 mm, oblong, styles c. 1 mm long, slender, stigmas c. 1 mm long, cream-coloured, feathery. Pedicelled spikelet 3.5-5 mm, ovate or oblong, usually unawned, very rarely awned; pedicels 2-2.5 mm long, linear-clavate, densely villous on dorsal side or sometimes along the margins also; lower glume 4-5 x 1.5-1.75 mm, ovate or oblong, acute, winged on one side, wing scabrid, coriaceous, faintly 11-13 nerved, densely villous or glabrous; upper glume 3.5-4.5 x 1-1.25 mm, lanceolate, keel angled, winged and scabrid towards apex, glabrous elsewhere; lower floret male, lemma, palea and stamens similar to that of sessile spikelet; upper floret bisexual; lemma 3-3.5 x 1.5-1.75 mm, ovate-lanceolate, faintly 3-5-nerved, delicate, hyaline, glabrous; palea, stamens, lodicules and pistil similar to that of sessile spikelet.

Fl. & Fr. : October - December.

CANNANORE : Paramba, Chattamchal.

5. *Ischaemum commutatum* Hack, in DC. Monogr. Phan. 6: 209, 1889; Hook. f. Fl. Brit. Ind. 7: 131, 1896; Fischer in Gamble, Fl. Pres. Madr. 1722, 1934 (Repr. ed. 3: 1194, 1957); Bor, Grass. Bur. Cay, Ind. Pak. 178, 1960.

Perennials. Culms 30-100 cm long, stoloniferous, trailing or erect; nodes glabrous. Leaves oblong or elliptic-lanceolate or lanceolate, 4-15 x 0.8-1.5 cm, acuminate, upper ones rounded or shallowly cordate at base, lower ones narrowed and distinctly petioled, petioles 0.5-6 cm long, densely villous to glabrous. Sheaths slightly keeled. Ligules ovate, 1-5 mm long, acute, membranous. Racemes 2, rarely 3, 3-6 cm long; joints linear-turbinate, 3-4 mm long, crustaceous, densely ciliate on one angle. Sessile spikelets oblong, 5-6.5 mm long, acute, awned; callus sparsely bearded or glabrous; lower glume oblong, 5-6 x 1.5-2 mm, acute, crustaceous below with or without 2-5 shallow side nodules, coriaceous or chartaceous above, faintly 11-13-nerved, margins narrowly infolded; upper glume boat-

shaped or ovate-lanceolate when spread, 5-6.5 x 1.5-2 mm, acuminate, coriaceous, faintly 3-nerved, margins infolded, hyaline, ciliate towards apex; lower floret male; upper floret bisexual; first lemma oblong-lanceolate, 5-5.6 x 1-1.5 mm, shortly acuminate, delicate, hyaline, faintly 3-5-nerved, margins infolded, ciliate towards apex; palea oblong-lanceolate, 4.5-5 x 1 mm, delicate, hyaline, 2-keeled, 2-nerved; stamens 3, anthers 1-1.5 mm long; second lemma notched, 4.5-5 x 1.5-2 mm, lobes acute, delicate, hyaline, ciliolate along the upper margins, awned; awn 10-15 mm long; palea oblong, c. 4 x 1 mm, delicate, hyaline, 2-keeled, 2-nerved; lodicules 2, linear-oblong or cuneate, c. 1 mm long, 2-horned at apex; stamens 3, anthers 2.5-3 mm long; ovary oblong, c. 1 mm, styles 1-2 mm, stigmas 2-3 mm long. Pedicelled spikelets ovate, c. 5 mm long, acute, awnless; pedicels linear-clavate, 3-4 mm long, crustaceous, densely ciliate on one angle; lower glume ovate, 4-4.5 x 2 mm, acute, chartaceous, 11-13-nerved, broadly winged on one margin, wing scabrid; upper glume ovate-lanceolate, 4-4.5 x 1-1.5 mm, acuminate, chartaceous, 3-nerved, keeled on dorsal side; florets male; lemmas and paleas similar to those of the sessile spikelets, but smaller; upper lemma entire, awnless.

Frequent, along the fringes of forests, banks of rivers, streams and canals; usually in moist, shady habitats.

Fl. & Fr. : June - September.

Notes : This species can easily be distinguished from the allied species of the genus by its peculiar flat lower glumes of the sessile spikelets, longer pedicels and joints, broadly winged lower glumes of the sessile spikelets and distinctly petioled leaves. *I. commutatum* shows considerable variation in the indumentum on leaves and sheaths and in the presence or absence of the lateral nodules on the lower glumes of the sessile spikelets. Normally, the glumes are flat and with a few side nodules, but sometimes they are devoid of nodules.

IDUKKI : Way to Eravikulam National Park; PALGHAT : Below Ayyapan kovil; QUILON : Moozhiyar.

6. *Ischaemum copeanum* P. V. Sreekumar, V. J. Nair & N. C. Nair in J. Bomb. Nat. Hist. Soc. 82 (2) : 390, 1985. PLATE No. 25

Creeping annuals. Culms 20-40 cm high, creeping or geniculate; upper nodes villous, lower ones sparsely villous or glabrous. Leaves 2-5 cm long, 4-10 mm wide, ovate-lanceolate, acuminate, rounded or shallowly cordate at base, sparsely covered with tubercle based hairs. Sheaths 1-5 cm long, shorter than the internodes, striate, gla-

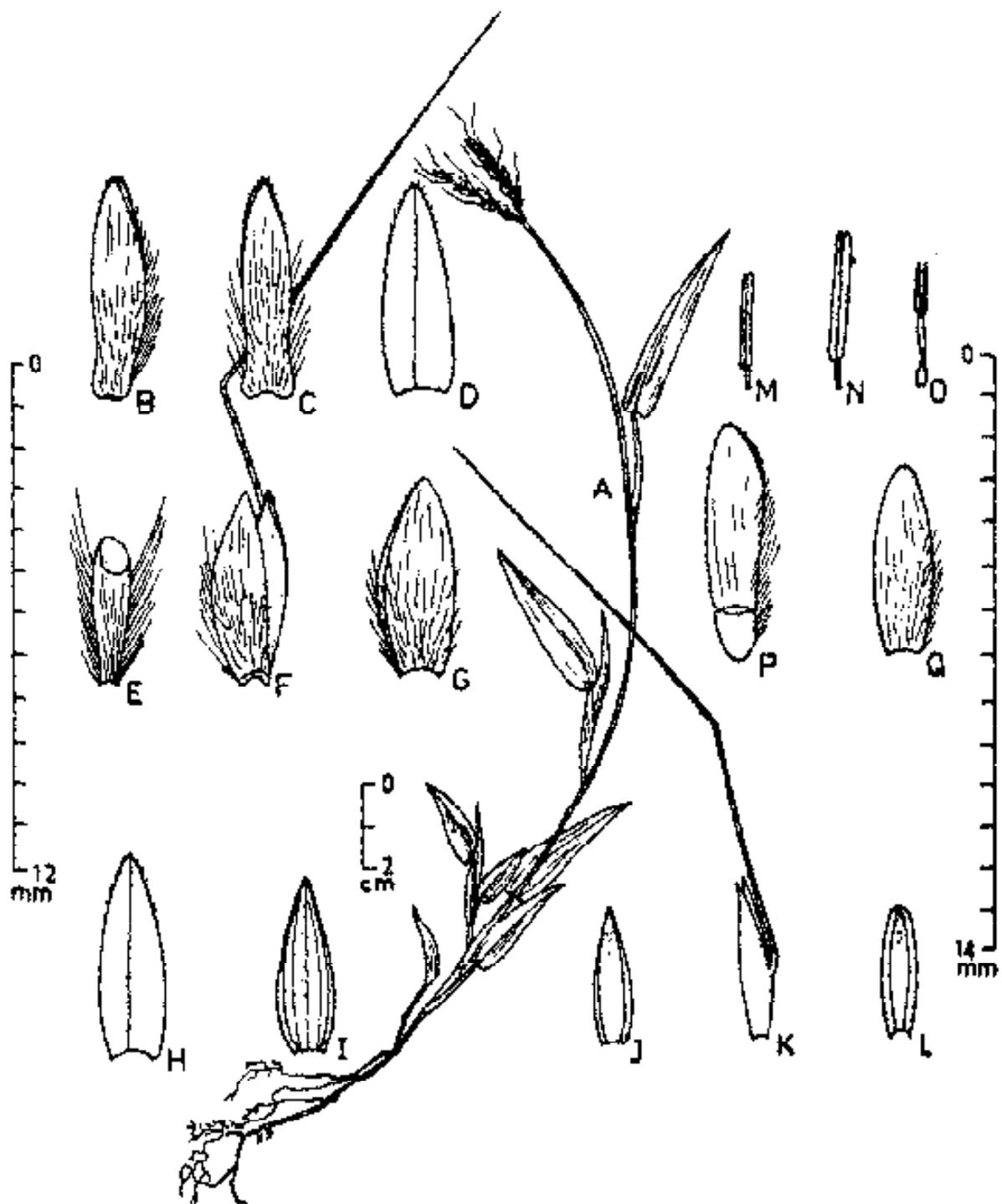


PLATE No. 25: *ISCHAEMUM COPEANUM* P. V. Sreekumar, V. J. Neir & N. C. Neir

A. Plant; B. Awned sessile spikelet (Dorsal view); C. Lower glume (Dorsal view); D. Upper glume (Dorsal view); E. Joint (Rhachia); F. Awned sessile spikelet (Dorsal view); G. Lower glume (Dorsal view); H. Upper glume (Dorsal view); I. Lower lemma (Ventral view); J. Palea (Dorsal view); K. Upper lemma (Lateral view); L. Upper palea (Dorsal view); M. Stamen of the lower floret; N. Stamen of the upper floret; O. Pistil; P. Pedicelled spikelet (Dorsal view); Q. Lower glume of the pedicelled spikelet (Dorsal view).

brous. Ligule 1-2 mm, an ovate acute membrane. Inflorescence with 1-2 peduncles from a spathe, peduncles long exserted. Racemes two on each peduncle, 2-3 cm long, slender, sparsely villous. Joints of racemes 3-3.5 mm long, linear-clavate, coriaceous or chartaceous, densely villous along the margins and dorsal side. Lowest group of sessile spikelets in three, two of them are unawned. Unawned sessile spikelets 4.5-5 mm long, linear or oblong-lanceolate, single flowered, floret male; lower glume 4.5-5 x 1-1.5 mm, lanceolate when spread, chartaceous, silky villous in the lower half, hairs 0.5-2.5 mm long, margins infolded, scabrid towards apex. Awned sessile spikelet 4-4.5 mm long, ovate-acute, callus bearded; lower glume 4-4.5 x 1.5-1.75 mm, ovate-oblong, chartaceous, faintly 11-13-nerved, silky villous in the lower half, margins inturned, narrowly winged on one side, scabrid towards apex; upper glume 4-4.5 x 1-1.5 mm, boat-shaped, lanceolate when spread, chartaceous, sharply keeled, faintly or strongly 3-nerved, margins hyaline, ciliolate in the upper half; lower floret male; lemma 3.5-4 x 1-1.5 mm, oblong-lanceolate, delicate, hyaline, faintly 3-5-nerved, margins infolded, ciliolate in the upper half; palea 3-3.5 x 0.75-1 mm, oblong-lanceolate, delicate, hyaline, 2-keeled, 2-nerved, glabrous; stamens 3, anthers 1.5-2 mm long; upper floret bisexual; lemma 3-3.5 x 1-1.5 mm, notched, lobes acute, delicate, hyaline, faintly 3-nerved, awn 10-15 mm long, geniculate, column 4-6 mm long, brown, bristle pale, scabrid; palea 2.5-3 x 0.5-0.75 mm, oblong, delicate, hyaline, 2-keeled, 2-nerved, glabrous, with a few wart like dots towards apex; stamens 3, anthers 2-3 mm long, filaments short; ovary 0.4-0.5 mm long, oblong, styles c. 1 mm long, stigmas 1-1.5 mm long, feathery. Pedicelled spikelet 4-4.5 mm long, oblong-lanceolate or linear-oblong, unawned; pedicels 0.5-1 mm long, linear-clavate, densely villous; lower glume 4-4.5 x 1-1.25 mm, linear-oblong, chartaceous, densely villous in the lower half, margins narrowly inturned, scabrid towards apex; upper glume and florets similar in shape and structure to that of the sessile spikelet.

Rare, in moist rocky places near waterfalls, a shade-loving grass.

Fl. & Fr. : November-December.

CANNANORE : Cherkala.

7. *Ischaemum dalzellii* Stapf ex Bor in Kew Bull. 1951: 448, 1952: Bor. Grass. Bur. Cey. Ind. Pak. 178, 1960.

Annuals or perennials. Culms 30-100 cm long, creeping or trailing, rarely erect; nodes glabrous or sparsely bearded. Leaves lanceo-

late or linear-lanceolate, 4-15 x 0.8-1.5 cm, long acuminate, deeply cordate or hastate at base, lower ones distinctly petiolate, petioles 0.5-5 cm long. Ligules ovate, acute, membranous. Racemes 2, slender, 3-6 cm long; joints linear-clavate, 3-4 mm long, crustaceous, shining, densely ciliate along the margins. Sessile spikelets linear-oblong, 5-7 mm long, awned; callus densely bearded; lower glume linear-oblong, 5-6 x 1 mm, crustaceous or coriaceous below with 3-4 side nodules, chartaceous above, 7-9-nerved, densely villous in the upper half especially along the margins; upper glume boat-shaped or oblong-lanceolate when spread, 5-6 x 1-2 mm, acuminate, chartaceous, faintly 3-5 nerved, dorsal side softly hairy in the upper half, keeled in the lower half; lower floret male or bisexual with a rudimentary pistil, Upper floret bisexual; first lemma oblong-lanceolate, 5.5-6 x 1-1.5 mm, delicate, hyaline, faintly 3-nerved; palea elliptic-lanceolate, 4.5-5 x 1 mm, delicate, hyaline, 2-keeled, 2-nerved; stamens 3, anthers c. 2 mm long; second lemma deeply notched, awned, c. 4 x 1 mm, faintly 3-nerved, delicate, hyaline; awn 15-25 mm long. Palea oblong, 3-3.5 x 0.5-1 mm, delicate, hyaline, 2-nerved; lodicules 2, obovate, c. 0.5-0.25 mm, oblique and 2-horned at apex; stamens 3, anthers c. 3 mm long; ovary linear-oblong, c. 0.5-1 mm, styles, 1-2 mm long, stigmas 2-3 mm long. Pedicelled spikelets oblong-lanceolate, c. 6 mm long, awned or awnless; pedicels linear-clavate, 1-2 mm long, densely ciliate; glumes and floret similar to those of sessile spikelets, but smaller; awns shorter.

Rare, along the rocky hill-slopes, in the crevices of rocks and in shades.

Fl. & Fr. : October - December.

Notes : This extremely rare grass was not represented in MH, till the present collection. This species endemic to Southern India, was known earlier only from Belgaum, North Kanara and Chickmagalur of Karnataka State.

The lower glumes are variable in this species. Sometimes they are deeply and irregularly wrinkled with prominent side-nodules. But, in certain cases glumes are not at all wrinkled or only the side nodules are visible.

1. dalzellii can easily be separated from other species of the genus, by the long-petiolate lower leaves with hastate bases, linear-clavate or clavate, shining joints and pedicels and narrowly oblong-lanceolate spikelets.

8. *Ischaemum elimalayanum* P. V. Sreekumar, V. J. Nair & N. C. Nair in J. Bomb. Nat. Hist. Soc. (in ed.)

PLATE No. 26

Tufted perennials. Culms 30-120 cm high, erect; nodes densely or sparsely villous. Leaves lanceolate or linear-lanceolate, 5-20 x 0.4-1 cm, acuminate, lower ones narrowed towards base, upper ones rounded or shallowly cordate, covered with sparse tubercle-based hairs. Sheaths 5-15 cm long, shorter than the internodes, keeled, striate, covered with dense, tubercle-based hairs except towards base. Ligules ovate, 3-6 mm, acute, membranous. Inflorescence of 2 racemes, 4-8 cm long, stout, sparsely villous; peduncles shortly exerted. Joints of racemes linear-clavate, 2.5-3 mm long, crustaceous, long villous along the margins and dorsal angles. Sessile spikelets elliptic, 5-5.5 mm long, awned, callus bearded; lower glume ovate or oblong, 4.5-5 x 1.75-2 mm, acute, crustaceous below with 4-5 shallow side nodules, deeply and irregularly wrinkled, coriaceous above, faintly 9-11-nerved, margins narrowly inturned, scabrid above; upper glume boat-shaped or ovate-lanceolate when spread, 4.5-5 x 1.5-2 mm, keel rounded, humped in the middle, tip minutely winged and scabrid, smooth, coriaceous, shortly hairy; lower floret male; lemma oblong-lanceolate, 4-4.5 x 1-1.5 mm, delicate, hyaline, faintly 3-nerved, margins inturned, ciliate in the upper half; oblong-lanceolate, palea 4-4.5 x 1-1.5 mm, delicate, hyaline, 2-keeled, 2-nerved, glabrous; lodicules 2, obovate, each c. 0.5 x 0.3 mm, oblique and concave at apex; stamens 3; anthers 1-1.5 mm long, filaments short; upper floret bisexual; lemma 3-3.5 x 1-1.25 mm, notched, lobes acute, delicate, hyaline, faintly 3-nerved, margins ciliolate in the upper half; awn 12-15 mm long, geniculate, column 5-7 mm long, brown, bristle pale, scabrid; palea oblong-acute, 2.5-3 x 0.5-0.75 mm, delicate, hyaline, 2-keeled, 2-nerved, glabrous; lodicules similar to those of the lower floret; stamens 3, anthers 1.5-2 mm long, filaments short; ovary oblong, c. 0.5 x 0.25 mm, styles c. 1 mm long, slender, stigmas c. 1 mm long, feathery. Pedicelled spikelets oblong, 4-4.5 mm long, unawned; pedicels 2.5-3 mm long, linear-clavate, densely villous, hairs 0.5-2 mm long; lower glume oblong, 4-4.5 x 1.5-1.75 mm, broadly winged on one margin, wing auriformis, scabrid, coriaceous, faintly 7-9-nerved, sparsely villous in the lower half, margins inturned, scabrid towards apex; upper glume lanceolate, 3.5-4 x 1-1.25 mm, keel rounded, minutely winged and scabrid towards apex, coriaceous, faintly 3-5-nerved, margins infolded, hyaline; lower floret male; lemma oblong, 3.5-4 x 1-1.5 mm, acute, delicate, hyaline, faintly 3-nerved, margins infolded, ciliate; palea lanceolate, 3.5-4 x 0.75-1 mm, similar in texture to that of sessile spikelet; upper floret bisexual; lemma ovate-lanceolate,

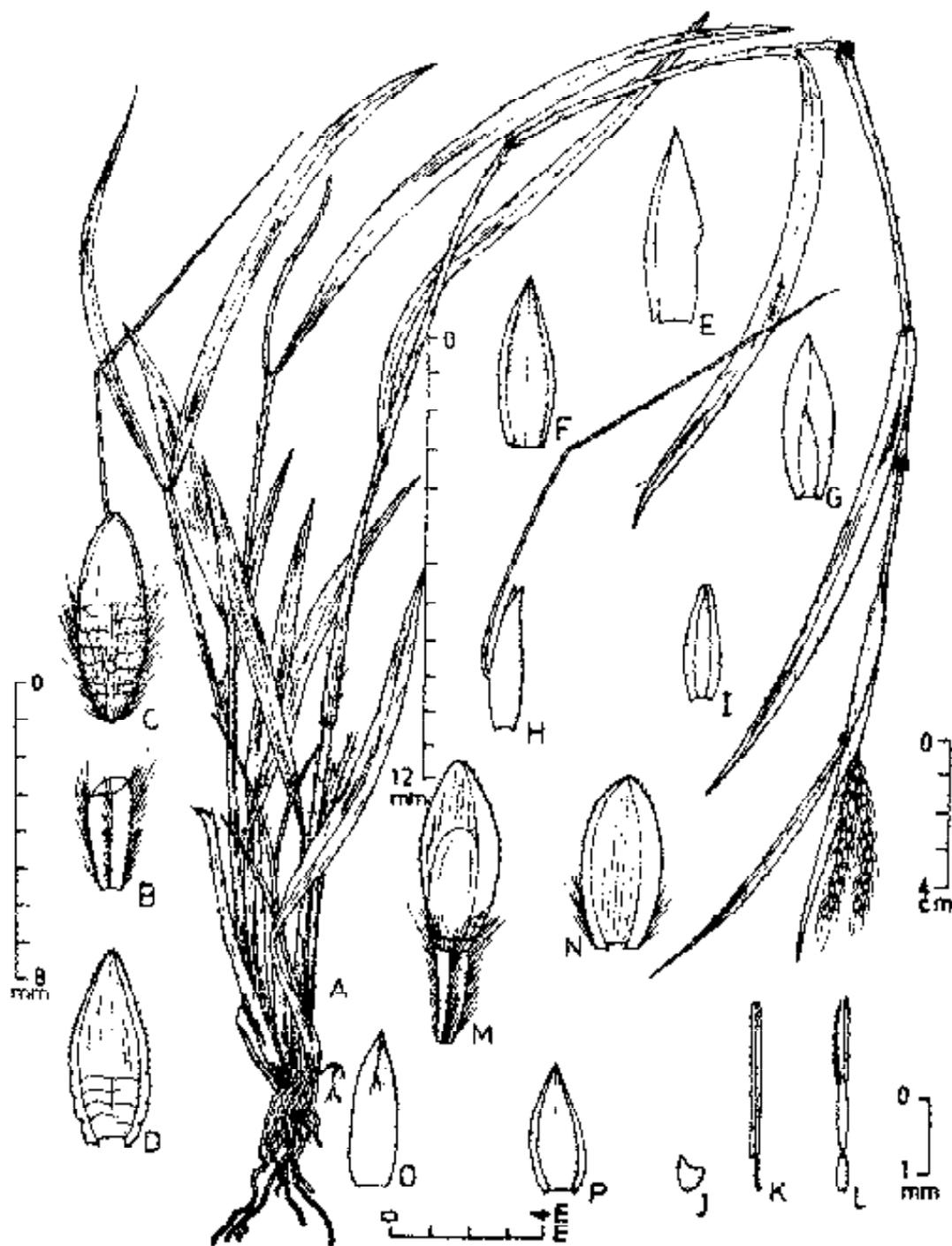


PLATE No. 26: *ISCHAEMUM ELIMALAYANUM* P. V. Sreekumar, V.J. Neel & H. G. Neel

A. Habit; B. Joint of raceme; C. Sessile spikelet; D. Lower glume of sessile spikelet; E. Upper glume; F. First lemma; G. Palea of the first lemma; H. Second lemma; I. Palea of the second lemma; J. Lodicule; K. Stamen; L. Pistil; M. Pedicelled spikelet; N. Lower glume of pedicelled spikelet.

3-3.5 x 1-1.5 mm, delicate, hyaline, faintly 3-5-nerved, glabrous; palea 2.5-3 x 0.5-0.75 mm, similar in shape and structure to that of sessile spikelet; stamens 3; anthers 1.5-2 mm long; filaments short; pistil similar to those of sessile spikelet.

Tall perennial grass growing along grassy hill slopes; locally rare.

CANNANORE : Elimala.

9. *Ischaemum indicum* (Houtt.) Merrill in J. Arn. Arb. 19: 320, 1938; Bor. Grass, Bur. Cey. Ind. Pak. 180, 1960. *Phileum indicum* Houtt, Nat. Hist, II, 13: 198, t. 90, f. 2, 1782. *Ischaemum aristatum* auct. non Linn.: Fischer in Gamble, Fl. Prae. Madr. 1721, 1934 (Repr. ed. 3: 1194, 1957). *I. ciliare* Retz. Obs. Bot. 6: 36, 1791; Hook. f. Fl. Brit. Ind. 133, 1896; Rang. & Tad. Handb. S. Ind. Grass. 159, t. 135-136, 1921.

A species of about 3 varieties and 3 sub-varieties distributed in India, Ceylon, Burma and South-east Asia of which 3 varieties and 2 sub-varieties occur in Kerala.

This species is badly in need of a thorough biosystematic investigation. Most of these infraspecific taxa are not always distinct, and sometimes it is very difficult to demarcate the barriers between the varieties or subvarieties. Several intermediate forms are also not uncommon. Still, at the sametime it is too difficult to accommodate them within one or two taxa. The varieties and subvarieties of this species available in Kerala are treated here separately and they can be identified as given below :

Key to the varieties and subvarieties

- 1a. Pores distinct on the ventral surface of the racemes; spikelets 4.5-5 mm long:
- 2a. Culms slender, creeping; leaves glabrous or pubescent:
- 3a. Lower glume of the sessile spikelet smooth towards apex, acuminate var. *indicum* sub-var. *indicum*
- 3b. Lower glume of the sessile spikelet scrobiculate towards apex, acute var. *indicum* sub-var. *scrobiculatum*
- 2b. Culms stouter, erect or willowy; leaves densely villous with erect hairs var. *indicum* sub-var. *villosum*
- 1b. Pores indistinct on the ventral surface of the racemes; spikelets 5.5-6.5 mm long :

- 4a. Lower glume of the sessile spikelet densely pilose; leaves glabrous or hairy var. *waltlichii*
- 4b. Lower glume of the sessile spikelet glabrous except for callus; leaves very hairy var. *longipilum*

Ischaemum indicum (Houtt.) Merrill var. *indicum* sub-var. *indicum*. *Phleum indicum* Houtt. Nat. Hist. It. 13: 198, t. 90, f. 2. 1782. *Ischaemum ciliare* Retz. var. *prorepens* Hack. in DC. Monogr. Phan. 6: 226, 1889; Hook. f. Fl. Brit. Ind. 7: 134, 1896.

Annuals. Culms 10-80 cm long, creeping and rooting at the nodes, slender; nodes glabrous or sparsely villous. Leaves lanceolate or linear, 0.5-8 x 0.2-0.6 cm, acute, rounded at base, glabrous or sparsely hairy with tubercled hairs, entire or undulate along the margins. Sheaths keeled. Ligules ovate, acute, membranous. Racemes usually 2, rarely 1 or 3, 1-5 cm long; joints turbinate, 1.5-2 mm, densely villous. Sessile spikelets ovate-oblong, 4-5 x 1.5-2 mm, awned; callus shortly bearded; lower glume oblong or ovate-oblong, 4-5 x 1-1.5 mm, notched and acuminate at apex, subcoriaceous below, chartaceous above, faintly 7-9-nerved, broadly winged on either side in the upper half, wings ear shaped, margins long-ciliate below the wings; upper glume boat-shaped, 4-5 x 1.5-2 mm; aristate, arista 1-3 mm long, chartaceous, 3-5-nerved, dorsally keeled, minutely winged and ciliate along the keels; lower floret male; upper floret bisexual; first lemma ovate-lanceolate, 3.5-4 x 1-1.5 mm, chartaceous, faintly 3-nerved, margins delicate, hyaline; palea elliptic-lanceolate, 3-3.5 x 0.5-1 mm, chartaceous, 2-keeled, 2-nerved, margins infolded, hyaline; stamens 3, anthers 1.5-2 mm long; second lemma notched, awned, 3.5-4 x 1.5-2 mm, delicate, faintly 3-nerved, awn 8-15 mm long, column 3-6 mm; palea oblong, 3-3.5 x 1 mm, delicate, hyaline, 2-keeled, 2-nerved; stamens 3, anthers c. 2 mm long; ovary oblong, c. 0.5 mm, styles 1-1.5 mm long, stigmas 1-1.5 mm long, pedicelled spikelets ovate, 4-5 mm long, acute, awned; pedicels 1.5-2 mm long, densely villous; lower glume ovate-lanceolate, 3.5-4 x 1-1.5 mm, acuminate, chartaceous, 9-11-nerved, winged on one margin, densely villous in the upper half; upper glume and the florets similar to those of the sessile spikelets.

Very common along the bunds of paddy fields, roadsides, wastelands, margins of forests, open grasslands and hill slopes; usually in moist places.

Fl. & Fr. : January-September.

Notes : This taxon can easily be distinguished from allied species and varieties by its slender, creeping culms, broad, auriculate wings of the lower glumes with distinctly nerved upper portion. This grass shows variation to a certain extent in the hairiness of leaves and sheaths and the width of the wings of the glumes.

ALLEPPEY : Alleppey town, Mancombu, Punnamada; CANNANORE : Kumbala, Taliparamba; TRIVANDRUM : Pulimath.

Ischaemum indicum (Houtt.) Merrill var. *indicum* sub-var. *scrobiculatum* (Nees ex Steud.) Bor, Grass. Bur. Cey. Ind. Pak. 180. 1960. *Spodiopogon scrobiculatus* Nees ex Steud. Syn. Pl. Glum. 1 : 373. 1854. *I. ciliare* Retz. var. *scrobiculatum* (Nees ex Steud.) Hack. in DC. Monogr. Phan. 6 : 226. 1889; Hook. f. Fl. Brit. Ind. 7 : 134. 1896.

This is exactly similar to sub-var. *indicum* in appearance, but the lower glumes of the sessile spikelets are only acute at apex, not acuminate and the wings are rather narrower and the joints and pedicels are sparsely hairy, against the densely ciliate ones in sub-var. *indicum*. Moreover, in this grass the upper nerved portion of the lower glumes of the sessile spikelets are distinctly or vaguely scrobiculate, a character which distinguishes it from the allied varieties and sub-varieties.

Frequent along the roadsides, sea-shores, hill-slopes and wastelands.

Fl. & Fr. : October December.

Notes : This sub-variety was previously known only from Sri Lanka.

ALLEPPEY : Tiruvalla; CALICUT : Calicut Town; QUILON : Konni R. F.

Ischaemum indicum (Houtt.) Merrill var. *indicum* sub-var. *villosum* (Nees) Bor, Grass. Bur. Cey. Ind. Pak. 180. 1960. *Spodiopogon villosus* Nees in Hook. et Arn. Bot. Beech. Voy. 242. 1838. *Ischaemum ciliare* Retz. var. *villosum* Hack. in DC. Monogr. Phan. 6 : 227. 1889; Hook. f. Fl. Brit. Ind. 7 : 134. 1896.

Perennials. Culms 30-100 cm long, erect or willowy, tufted or stoloniferous; nodes densely villous. Leaves linear-lanceolate or elli-

ptic-lanceolate, 5-25 x 0.5-1.5 cm, acuminate, narrowed at base, rarely petiolate, densely villous with erect hairs. Sheaths keeled, densely villous. Ligule ovate, acute, membranous, 2-5 mm long. Racemes 2, 2-8 cm long. Spikelets slightly bigger than that of sub-var. *indicum*.

Fairly common in open grasslands, hill-slopes and along rocky places, usually in drier situations,

Fl. & Fr. : August - December.

Notes : Unlike the other sub-varieties, here the culms are robust, tufted or stoloniferous which gives a perennial appearance. The leaves and sheaths are considerably longer and densely villous; hence in appearance one may feel it as a distinct variety or even a separate species. But, the floral characters are not much varying from the other sub-varieties.

This shows some variations in the habit, sometimes they are erect and tufted or creeping and stoloniferous. Leaves are also variable.

Previously known only from Sri Lanka and Madhya Pradesh.

CALICUT : Kanjeerakkadavu; IDUKKI : Eravikulam National Park, Munnar, on way to Mangaladevi temple.

Ischaemum indicum (Houtt.) Merritt var. *wallichii* (Hack.) Bor, Grass. Bur. Cey. Ind. Pak. 180, 1960, *I. ciliare* Retz. var. *wallichii* Hack. in DC. Monogr. Phan. 6: 227. 1889.

Perennials. Culms 20-100 cm high, tufted; nodes densely villous. Leaves linear-lanceolate, 4-20 x 0.3-1 cm, acuminate, narrowed and sometimes petiolate at bases, glabrous or densely villous. Sheaths keeled. Racemes 2, 3-8 cm long; joints turbinate, 2-2.5 mm long, densely ciliate. Sessile spikelets oblong or obovate, 5-6 mm long, awned; lower glume oblong or obovate, slightly notched at apex, winged on either side, 4.5-5.5 x 1-1.5 mm, chartaceous, 7-9-nerved, densely long pilose; upper glume, florets, lemmas and paleas similar to those of the var. *indicum*, but larger.

Occasional along the open grasslands and other grassy hill-slopes.

Fl. & Fr. : July - December.

Notes : This variety can be identified from the other allied ones by its densely pilose, obovate-obtuse lower glumes of the sessile spi-

kelets. It is similar in appearance to sub-var. *villosum*, but can be distinguished by its larger spikelets and densely pilose glumes.

This grass was earlier known only from Assam.

IDUKKI : Devicolam, Munnar.

Ischaemum indicum (Houtt.) Merrill var. *longipilum* (Hack.) Bor, Grass. Bur. Cey. Ind. Pak. 181. 1960. *I. ciliare* Retz. var. *longipilum* Hack. in DC. Monogr. Phan. 6: 227. 1889.

Perennials. Culms 25-100 cm long, erect or stoloniferous, creeping; nodes glabrous or sparsely bearded. Leaves linear-lanceolate or lanceolate, 3-25 x 0.3-1 cm, acute or acuminate, upper ones rounded at base, lower ones tapering or narrowed and petiolate at base. densely covered with tubercle-based hairs. Sheaths strongly keeled, glabrous or sparsely hairy. Ligules ovate, obtuse or truncate, membranous. Racemes 2, 4-8 cm long; joints turbinate, 2.5-3 mm long. Spikelets 4-5.5 mm long; lower glume obovate, 4.5-5.5 mm long, coriaceous, wings very broad, auriculate; upper glumes and florets similar to those of var. *wallichii*.

Rare, along the hill-slopes and open grasslands.

Fl. & Fr. : November-December.

Notes : Nearer to var. *wallichii*, but differs by having entirely glabrous glumes with broad, auriculate wings. Leaves here are densely covered with tubercle-based hairs.

This very rare grass was so far reported only from Sri Lanka.

WYNAD : Chandanathode.

10. *Ischaemum Jayachandranii* R. Ansari, V. S. Ramachandran & P. V. Sreekumar in Curr. Sci. 53 (3): 151. 1984.

PLATE No. 27

Stoloniferous perennials. Culms 30-50 cm high, slender, creeping or erect; nodes glabrous. Leaves 4-12 x 0.3-0.6 cm, lanceolate or elliptic-lanceolate, lower ones narrowed and tapering towards base, upper ones rounded or shallowly cordate, glabrous, margins minutely serrulate. Sheaths 4-10 cm long, longer than the internodes, striate, glabrous. Ligule 2-4 mm long, an ovate acute membrane. Inflorescence of 2 racemes, 4-8 cm long, slender, glabrous. Joints

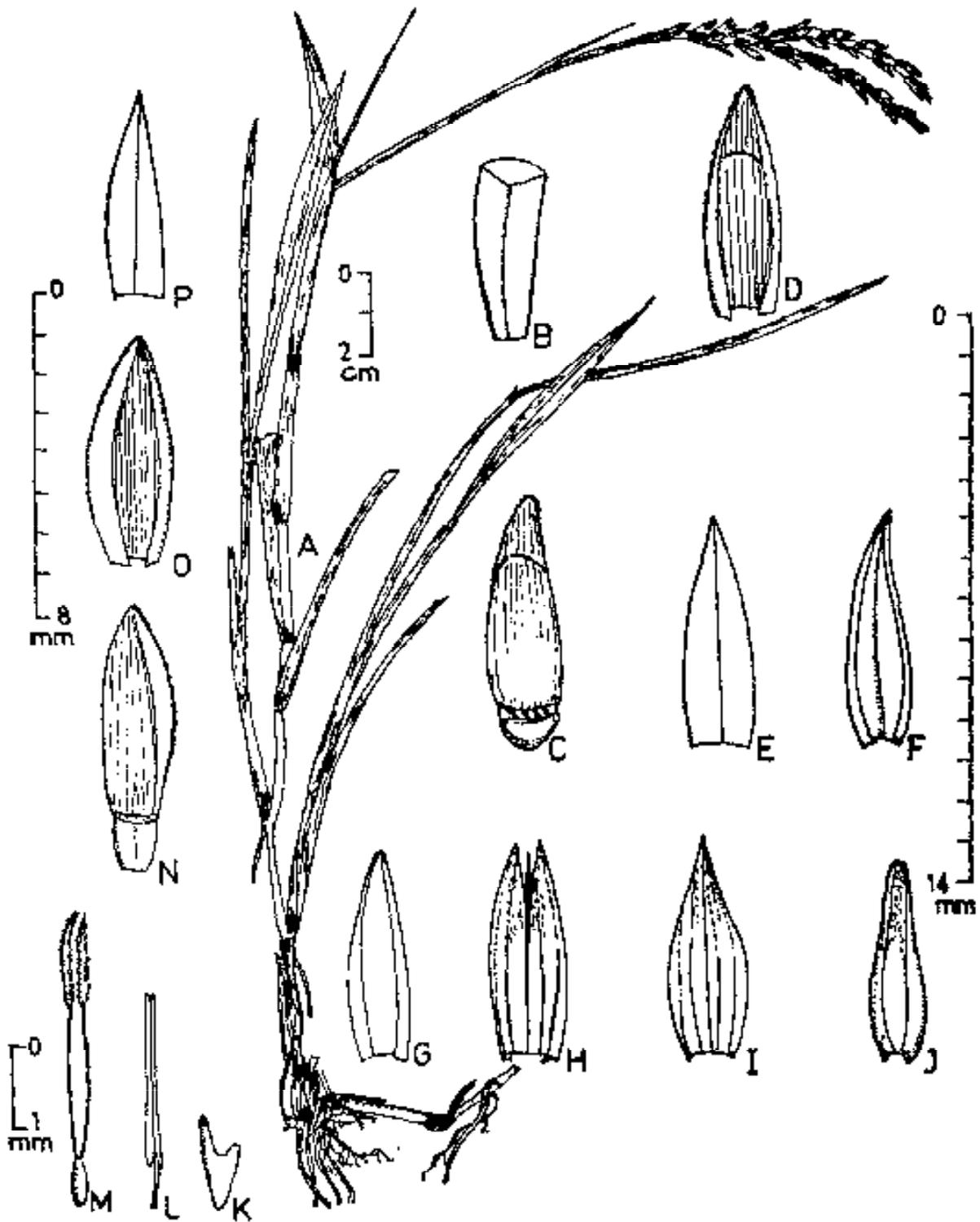


PLATE No. 27 : *ISCHAEMUM JAYACHANDRANII* R. Anseri, V. S. Ramachandren & P. V. Sreekumar

A. Plant; B. Joint (rachis); C. Sessile spikelet; D. Lower glume of the sessile spikelet (ventral view); E. Upper glume (dorsal view); F. Lower lemma (ventral view); G. Palea spread open (dorsal view); H. Upper lemma (notched with rudimentary awn--dorsal view); I. Same (entire and without awn--dorsal view); J. Palea (ventral view); K. Lodicule; L. Stamen; M. Pistil; N. Pedicelled spikelet; O. Lower glume of the pedicelled spikelet (ventral view); P. Upper glume (dorsal view).

of racemes 4-4.5 x 1.75-2 mm, turbinate, coriaceous, smooth, glabrous. Sessile spikelets 5.5-6 x 1.75-2 mm, oblong-lanceolate, unawned, callus glabrous; lower glume 5-5.5 x 1.75-2 mm, oblong-lanceolate, coriaceous below, subcoriaceous above, faintly 11-13-nerved, margins narrowly intumed, scabrid towards apex, glabrous elsewhere; upper glume 5-5.5 x 1.5-2 mm, boat-shaped, lanceolate when spread, sharply keeled, minutely winged at apex, coriaceous, faintly 3-5-nerved; lower floret male; lemma 5-6 x 1-1.5 mm, lanceolate, shortly acuminate, delicate, hyaline, faintly 3-5-nerved, margins intumed, glabrous; palea 4.5-5 x 1-1.5 mm, lanceolate, delicate, hyaline, 2-keeled, 2-nerved, glabrous; lodicules 2, each 0.75-1 x 0.3-0.4 mm, oblong or obovate, 2-horned at apex; stamens 3, anthers 1.5-2 mm, long, filaments short; upper floret bisexual; lemma 4.5-5 x 1.5-2 mm, entire or very rarely notched, ovate-lanceolate, faintly 5-nerved, median nerve prominent and prolonged into a rudimentary awn when it is notched, lobes acuminate, longer than the rudimentary awn, delicate, hyaline, sprinkled with wart-like outgrowths in the upper half, smooth and glabrous elsewhere; lodicules and stamens more or less similar to that of the lower floret; ovary c. 0.5 x 0.25 mm, oblong, styles 1.5-2 mm long, slender, stigmas 0.75-1 mm, long, feathery; pedicelled spikelet 5-5.5 mm long, oblong-acute, unawned; pedicels c. 1 mm long, clavate, glabrous; lower glume 5-5.5 x 1.75-2 mm, ovate-acute, narrowly winged on one margin, wing scaberulous, coriaceous, smooth and glabrous, faintly 11-13-nerved, margins intumed; upper glume 4.5-5 x 1-1.5 mm, lanceolate, keel rounded, coriaceous, smooth and glabrous; florets similar to that of sessile spikelets.

Growing in marshy places and paddy fields, usually in water-logged areas. Locally common.

Fl. & Fr. : December - January.

CANNANORE: Niteswar.

11. *Ischaemum keralensis* P.V. Sreekumar, V.J. Nair & N.C. Nair
in *Adansonia* 2 : 135, 1985. PLATE No. 28

Creeping annuals. Culms 20-60 cm high, creeping or geniculate; upper nodes villous. Leaves 3-10 x 0.6-1.6 cm, lanceolate, acuminate, deeply cordate or sagittate at base, covered with sparse tubercle-based hairs, lower leaves petioled, petiole 0.5-1.5 cm long. Sheaths 2-6 cm long, shorter than the internodes, striate, glabrous. Ligule 1-2 mm, an ovate acute membrane. Inflorescence of solitary racemes, 1-4 cm long, stout, in fascicles of 5-8 long peduncles from a spathe

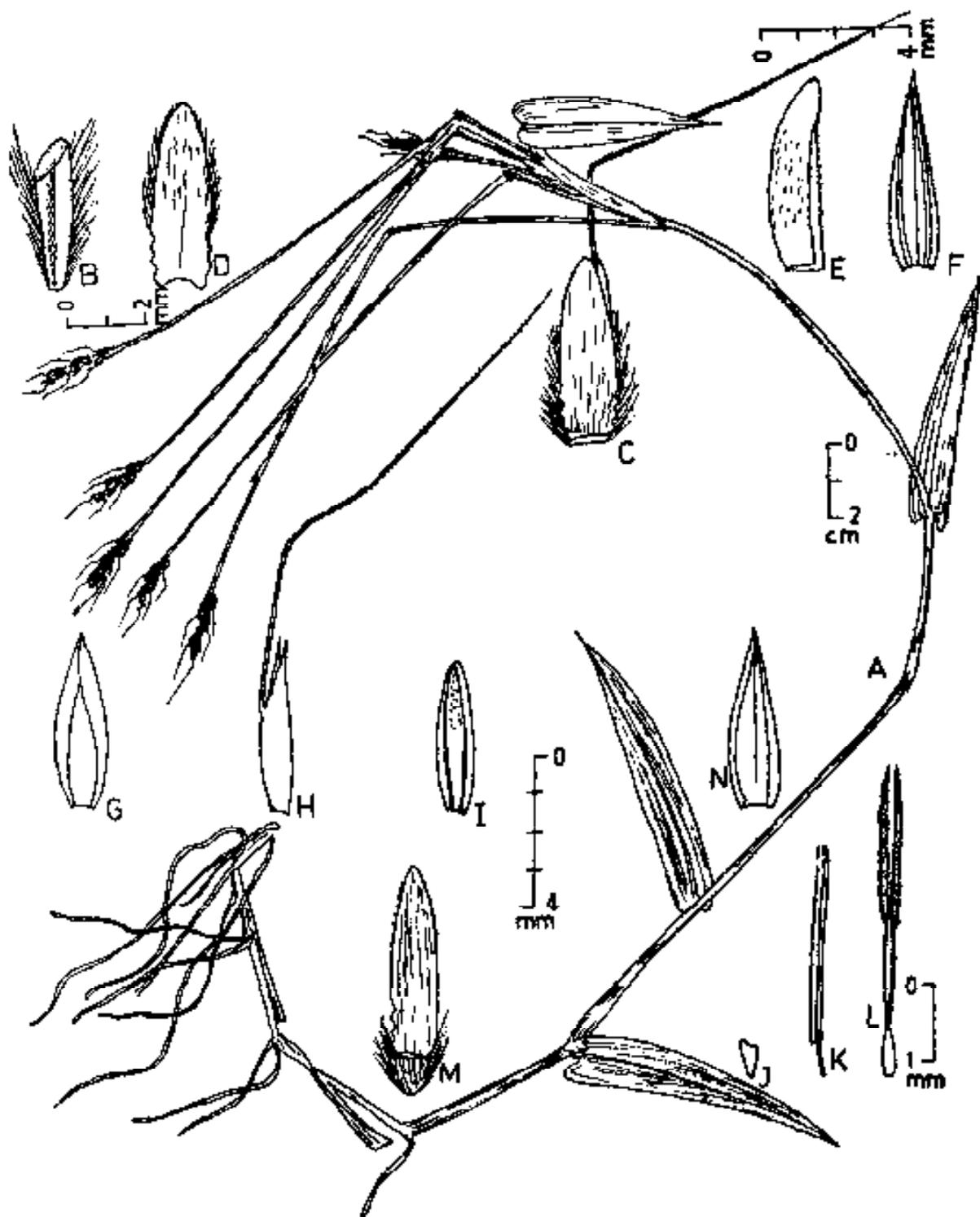


PLATE No. 28: *ISCHAEMUM KERALENSIS* P. V. Sreekumar, V. J. Nair & N. C. Nair

A. Entire plant; B. Joint (rhachis); C. Sessile spikelet (dorsal view); D. Lower glume of the sessile spikelet (dorsal view); E. Upper glume (lateral view); F. Lower lemma (ventral view); G. Palea (ventral view); H. Upper lemma (lateral view); I. Upper palea (dorsal view); J. Lodicule; K. Stamen; L. Pistil; M. Pedicelled spikelet; N. Upper lemma of the pedicelled spikelet (ventral view).

2-5 cm long. Joints of racemes 3.5-4 mm long, linear-clavate, coriaceous, densely villous along the margins and dorsal side, hairs 0.5-2.5 mm long. Lowest group of spikelets in threes, two of them are pedicelled and unawned. Unawned pedicelled spikelets 4.5-5 mm long, linear or oblong-lanceolate, single flowered; floret male. Awned sessile spikelet 4.5-5 mm long, oblong-lanceolate, callus bearded; lower glume 4.5-5 x 1-1.25 mm, oblong-acute, coriaceous, faintly 9-11-nerved, sparsely villous in the lower half and also along the margins, with a few side nodules, margins inturned, scabrid towards apex; upper glume 4.5-5 x 1.5-1.75 mm, boat-shaped or ovate-lanceolate when spread, coriaceous, sharply keeled, keel minutely winged and scabrid towards apex, strongly 3-nerved, margins hyaline, ciliate in the upper half, softly hairy on dorsal side; lower floret male; lemma 4.5-5 x 1-1.5 mm, ovate-lanceolate, delicate, hyaline, faintly 3-5-nerved, margins infolded, ciliate in the upper half; palea 4-5 x 1-1.5 mm, elliptic-lanceolate, delicate, hyaline, 2-keeled, 2-nerved, glabrous; stamens 3, anthers 1-1.5 mm long; upper floret bisexual; lemma 4-4.5 x 0.75-1 mm, notched, lobes acuminate, delicate, hyaline, faintly 3-nerved; awn 12-16 mm long, geniculate, column 4-6 mm long, brown, bristle pale, scabrid; palea 3.5-4 x 0.5-0.75 mm, linear or oblong, delicate, hyaline, 2-keeled, 2-nerved, glabrous with a few wart-like dots towards apex, lodicules 2, each c. 0.5 x 0.25 mm, oblanceolate, retuse at apex; stamens 3, anthers 2-3 mm long, filaments short; ovary c. 0.5 mm long, oblong, styles c. 1.5 mm long, slender, stigma c. 2 mm long, feathery. Pedicelled spikelets 4.5-5 mm long, oblong-lanceolate, unawned; pedicels c. 1 mm long, clavate, sparsely villous; lower glume 4.5-5 x 1-1.25 mm, oblong-lanceolate, coriaceous, sparsely villous or glabrous, margins inflexed, scabrid towards apex; upper glume 4.5-5 x 1-1.5 mm, ovate-lanceolate, coriaceous, faintly 3-5-nerved, glabrous; florets more or less similar to those of the sessile spikelet; upper lemma 4-4.5 x 1-1.25 mm, oblong-lanceolate, entire, delicate, hyaline, faintly 3-nerved, glabrous.

Growing in moist rocky places; usually in shady places; locally very rare.

Fl. & Fr. : October-December.

CANNANORE : Cherukala.

Ischaemum malabaricum P. V. Sreekumar, V.J. Nair & N.C. Nair in Kew Bull. 39(4) : 743, 1984. PLATE No. 29

Annuals. Culms weak, creeping and geniculate; upper nodes

villous, lower ones either villous or glabrous. Leaves 1-10 x 0.5-1.5 mm, triangular, ovate-lanceolate, or lanceolate, acute or long-acuminate, base deeply cordate or sagittate, glabrous or sparsely villous. Sheaths 1-6 cm long, shorter than the internodes, striate, glabrous. Ligule 2-3 mm long, an ovate membrane. Inflorescence of 2 racemes, 2-6 cm long, slender, enclosed in a spathe 2-8 cm long and villous towards base. Joint of raceme 2.5-3 mm long, linear-clavate, slender, rounded on dorsal side, ventrally flat, margins long villous. Sessile spikelets 3.5-4.5 mm long, ovate-oblong, awned, callus bearded; lower glume 3-4 x 1-1.25 mm, ovate-oblong or elliptic, acute, smooth, thin, chartaceous, faintly 9-11-nerved, dorsally covered with long white hairs 1-2 mm long, and also with short hairs except on the upper quarter, margins narrowly and evenly inturned from base to apex; upper glume 3-3.5 x 1.25-1.5 mm, boat-shaped, dorsally rounded, chartaceous, faintly 3-5-veined, covered with short adpressed hairs, margins hyaline, shortly ciliate; lower floret male; lemma 3.5-4 x 0.75-1 mm, linear-oblong or elliptic-lanceolate, acute, delicate, hyaline, 2-keeled, faintly 3-5-nerved, shortly hairy along the margins; palea 3-3.5 x 0.75-1 mm, linear-oblong, acute, delicate, hyaline, 2-keeled, 2-nerved, glabrous, margins inturned; lodicules 2, each c. 0.35 x 0.2 mm, obovate, retuse at apex; stamens 3, anthers c. 1 mm long, filaments short; upper floret bisexual; lemma 2.5-3 x 0.75-1 mm, notched, lobes acute, delicate, hyaline, faintly 3-nerved, shortly ciliate, awn 12-15 mm long, column c. 5 mm long, brown, bristle pale, scabrid; palea 2-2.5 x 0.5-0.75 mm, oblong or oblanceolate, obtuse, rounded at apex, delicate, hyaline, 2-nerved, 2-keeled, glabrous; lodicules 2, each c. 0.5 x 0.25 mm, obovate, oblique and wavy at apex; stamens 3, anthers 1.5-2 mm long, dirty yellow, filaments short; pistil 2.5-3 mm long, ovary 0.4-0.5 x 0.1-0.15 mm elliptic, styles c. 1.5 mm long, slender, stigmas c. 1 mm long, pink, feathery. Pedicelled spikelet 3.5-4 mm long (excluding pedicels), elliptic-acute, without awns, callus densely villous; pedicels c. 2 mm long, linear, dilated at apex, dorsally rounded, ventrally flat, long-villous along the margins; lower glume 3.5-4 x 0.75-1 mm, elliptic or oblong, acute, thin, chartaceous, faintly 9-11-nerved, 2-keeled, scabrid along the keels, glabrous or sparsely villous towards base, margins narrowly inturned; upper glume 3.5-4 x 1-1.25 mm, elliptic-lanceolate, acute or shortly acuminate, chartaceous, faintly 3-nerved, shortly keeled, minutely hairy, margins hyaline and shortly ciliate; lower floret male; lemma 3-3.5 x 0.75-1 mm, elliptic-lanceolate, delicate, hyaline, faintly 3-4-nerved, 2-keeled, glabrous except margins which are shortly ciliate; palea 3-3.5 x 0.5-0.75 mm, lanceolate, acute, delicate, hyaline, 2-keeled, 2-ner-

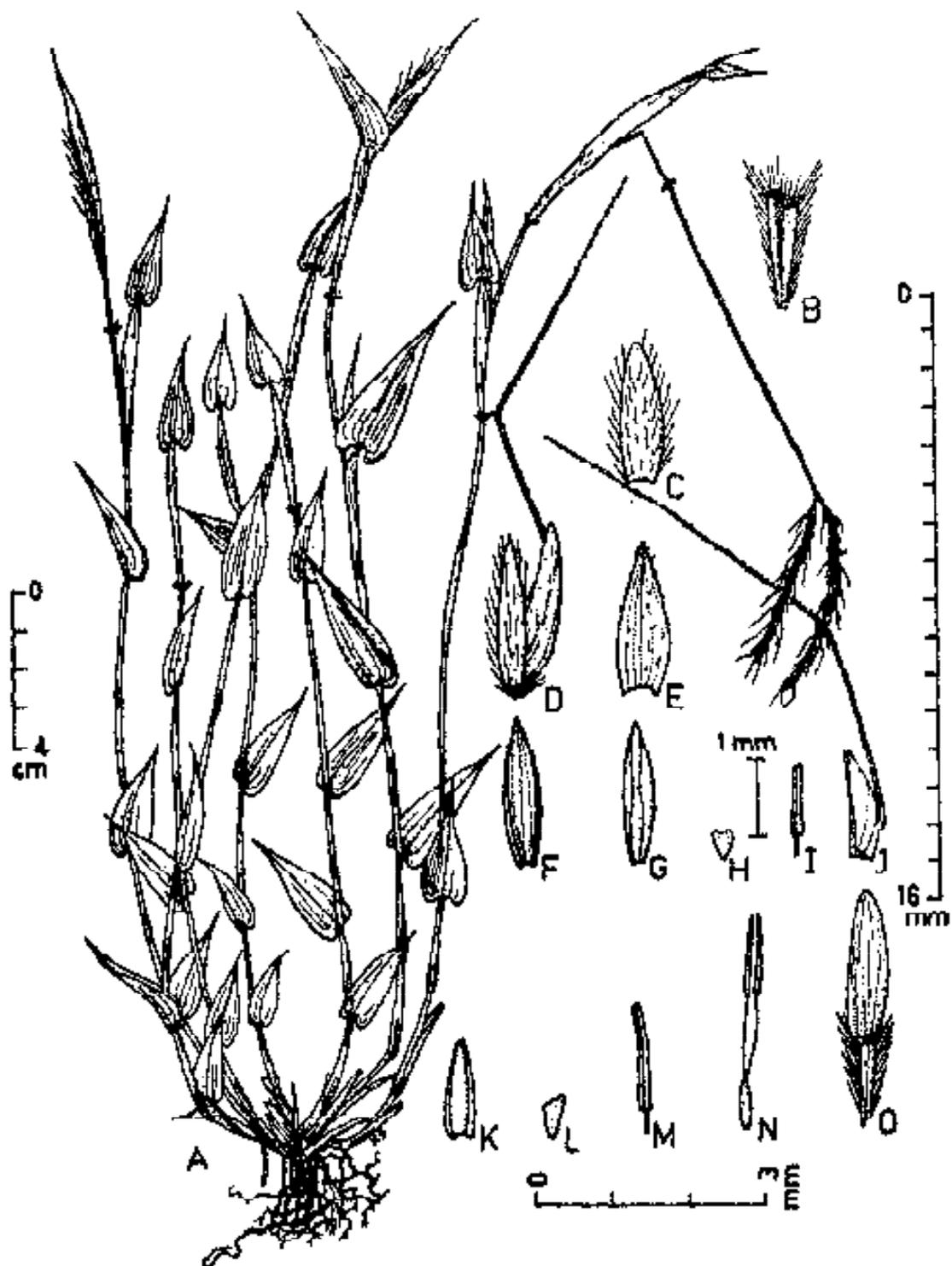


PLATE No. 2B: *ISCHAEMUM MALABARICUM* P. V. Sreekumar, V. J. Neir
 & N. C. Neir

A. Habit; B. Joint of the rachis; C. Lower glume of the sessile spikelet-dorsal view; D. Sessile spikelet; E. Upper glume-dorsal view; F. Lower lemma-ventral view; G. Palea-ventral view; H. Lodicule; I. Stamen; J. Upper lemma-lateral view; K. Upper palea spread open-dorsal view; L. Lodicule of the upper floret; M. Stamen; N. Pistil; O. Pedicelled spikelet.

ved, glabrous; lodicules of the same size and shape as in the sessile spikelet; stamens 3, anthers c. 1 mm long, filaments short; upper floret male; lemma 2.5-3 x 0.75-1 mm, elliptic, acute, delicate, hyaline, faintly 3-nerved, shortly keeled, glabrous, margins inturned at apex; palea 2-2.5 x 0.5-0.75 mm, linear-oblong, delicate, hyaline, 2-keeled, 2-nerved, glabrous; lodicules 2, similar to those of the sessile spikelet; stamens 3, anthers 1.5-2 mm long, filaments short.

In dry localities, usually trailing over old compound walls; locally very common.

Fl. & Fr. : October - December.

CALICUT : Kalarimala, Pokkunnamala; CANNANORE : Paramba, Elimata, Kumbia.

13. *Ischaemum mangaluricum* (Hack.) Stapf ex C. E. C. Fischer in Gamble, Fl. Pres. Madr. 1723. 1934 (Repr. ed. 3: 1194. 1957); Bor, Grass, Bur. Cey. Ind. Pak. 182, 1960; Maniál & Sivaraj. Fl. Calic. 333, 1982. *I. aristatum* sensu Hack. subsp. *imberbe* var. *mangaluricum* Hack. in DC. Monogr. Phan. 6: 204. 1889; Hook. f. Fl. Brit. Ind. 7: 127. 1896.

Perennials. Culms 30-80 cm high, densely tufted, erect or geniculate, rarely rooting at the lower nodes; nodes glabrous. Leaves lanceolate or linear-lanceolate, 3-20 x 0.3-0.8 cm, tapering and narrowed at bases. Ligules ovate, acute, membranous, 1-6 mm long. Racemes 2, 3-10 cm long; joints clavate-turbinate, 4-5 mm long, crustaceous, ciliate on one angle. Sessile spikelets oblong, 4-8 mm long, awned; callus bearded; lower glume oblong, 4-6 x 1.5-2 mm, crustaceous or coriaceous below, with or without 4-5 side nodules, chartaceous above, 11-15-nerved, tip winged on one side, wing auriculate, scabrid; upper glume boat-shaped or oblong-lanceolate, 4-6 x 1-2 mm, chartaceous, keeled on dorsal side, keel narrowly winged at apex, appressed hairy or glabrous; lower floret male; upper floret bisexual; first lemma oblong-lanceolate, 4-5.5 x 1-2 mm, delicate, hyaline, faintly 3-5-nerved; palea elliptic-lanceolate, 3-5 x 1 mm, delicate, hyaline, 2-keeled, 2-nerved; stamens 3, anthers 1-1.5 mm long, cream yellow or cream turning to pink; second lemma notched, awned, 4-4.5 x 1.5-2 mm, delicate, awn 10-15 mm long, column 5-6 mm; palea oblong, 3-4 x 1 mm, delicate, hyaline, 2-nerved, sprinkled with wart-like dots in the upper half; stamens 3, anthers c. 2 mm long; ovary ovate-oblong, c. 0.5 mm, styles 1-1.5 mm long, stigmas c. 1 mm long, reddish-brown or cream turning to pink. Pedicelled spi-

kelets ovate-oblong, 4-5 mm long, awnless; pedicels clavate, 1-1.5 mm long, densely ciliate; lower glume ovate-oblong or oblong-lanceolate, 4-5 x 2-3 mm, broadly winged on one margin, chartaceous, faintly 11-15-nerved; upper glume, lemmas and paleas more or less similar to those of the sessile spikelets, but smaller; florets male; second lemma entire, awnless.

Very common, along marshy places, fallow fields, wetlands, bunds of paddy fields and other damp places, usually in semiaquatic habitats.

Fl. & Fr. : September-December.

Notes : This species shows considerable variation in hairiness and ornamentation of the glumes. Sometimes the lower glumes possess prominent side nodules; while at times the nodules are very faint. Lower glumes with nodules on both sides were seen in some materials; while in some other specimens the nodules were confined only to one margin. Similarly upper glumes are either minutely winged and appressed hairy or without wings and glabrous.

I. mangaluricum is nearer to *I. barbatum* but it can be identified from the latter by the smaller culms, terminal and axillary racemes, and auriculate wings on the lower glumes.

This grass grows abundantly along the wetlands and fallow fields and is very difficult to be uprooted and eradicated. Patil & D'cruz (1972) have also emphasized its abundance and quick spreading nature along the low-lying paddy fields of Maharashtra. It is a troublesome weed in paddy fields.

CALICUT : Vengeri ; CANNANORE : Elimala; Periya.

14. *Ischaemum molle* Hook. f. Fl. Brit. Ind. 7: 128, 1896. Fischer in Gamble, Fl. Pres. Madr. 1722. 1934 (Repr. ed. 3: 1194, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 183, 1960.

Perennials. Culms 50-150 cm high, densely tufted, erect; nodes bearded. Leaves lanceolate or linear-lanceolate, 5-25 x 0.5-1 cm, acuminate, upper ones rounded or shallowly cordate at base with short hairy petioles, lower ones narrowed at bases, glabrous or covered with sparse tubercle-based hairs. Sheaths covered with tubercle-based bristles or hairs, lower ones rarely glabrous. Ligules ovate, acute, membranous. Racemes 2, 4-6 cm long; joints linear-turbinate, 3-4 mm long, densely villous. Sessile spikelets oblong-lanceolate, 5-6 mm long, awned, densely villous; lower glume oblong-lanceolate, 5-6 x

1-1.5 mm, chartaceous or subcoriaceous, faintly 9-11-nerved, densely covered with long white hairs, with or without a few obscure ridges and nodules; upper glume boat-shaped or oblong-lanceolate, chartaceous, keeled on dorsal side, humped in the middle, densely ciliate towards apex; lower floret male; upper floret bisexual; first lemma oblong-lanceolate, 4.5-5.5 x 1-1.5 mm, delicate, faintly 3-5-nerved, margins infolded, hyaline, ciliate in the upper half; palea lanceolate or elliptic-lanceolate, 4.5-5 x 1 mm, delicate, keeled, 2-nerved, stamens 3, anthers c. 2 mm long; second lemma notched, awned, 4-5 x 1-1.5 mm, lobes acute, delicate, faintly 3-nerved, awns 20-25 mm long, column 6-8 mm, brown; palea oblong lanceolate, 3-3.5 x 0.5-1 mm delicate, hyaline, 2-nerved; stamens 3, anthers 2-3 mm long; ovary oblong, c. 0.5 mm long, styles c. 1 mm long, stigmas 1-1.5 mm. Pedicelled spikelets oblong-lanceolate, 5-6 mm long, awnless or rarely awned. Pedicels 1-2 mm long, densely villous; lower glume similar in size and shape but winged on one margin; upper glume similar to those of the sessile spikelets, but smaller, not humped; florets, lemmas and paleas similar to those of the sessile spikelets.

Occasional along wet lands, fallow fields, ditches and marshes, growing in dense clumps. A typical grass of marshy places.

Fl. & Fr. : October-December.

Notes : This species is closely related to and often confused with *I. rugosum* from which it differs by the taller, robust culms, shortly petiolate upper leaves and smooth or faintly rugose and densely villous lower glumes of the sessile spikelets. This grass grows abundantly in marshy places, often deeply rooted and hence very difficult to be uprooted.

CANNANORE: Mukkarikandam.

15. *Ischaemum muticum* Linn, Sp. Pl. 1049. 1753; Hook, f Fl. Brit. Ind. 7: 132. 1896; Fischer in Gamble, Fl. Pres. Madr. 1723. 1934 (Repr. ed. 3: 1194. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 183. 1960.

Perennials. Culms 5-80 cm long, creeping or trailing, stoloniferous, sometimes rooting at the nodes; nodes glabrous. Leaves lanceolate or ovate-lanceolate. 0.5-10 x 0.2-1 cm, acuminate, rounded or shallowly cordate at bases. Sheaths slightly keeled, ciliate along one margin, sparsely hairy with tubercle based hairs especially towards upper half. Ligules truncate, thin, membra-

nous, fimbriate. Racemes 2, concealed or hardly exerted from the spathe, 0.5-3.5 cm long; joints turbinate, 3-5 mm long, strongly keeled and triangular; keels ciliolate or glabrous. Sessile spikelets oblong-acute, 5-7 mm long, awnless; callus glabrous; lower glume oblong, 5-6.5 x 1.5-3 mm, acute, coriaceous, faintly 7-11-nerved, 2-keeled, minutely winged towards apex, wing scabrid; upper glume boat-shaped or ovate-lanceolate when spread, 5-7 x 2-3 mm, subcoriaceous or chartaceous, faintly 3-7-nerved, dorsally keeled, keel minutely winged in the upper half; lower floret male; upper floret bisexual; first lemma ovate-lanceolate, 5-6.5 x 1.5-2.5 mm, chartaceous, faintly 3-nerved, margins infolded, delicate, hyaline, ciliolate towards apex; palea oblong-lanceolate or lanceolate, 5-6 x 1-1.5 mm, chartaceous, 2-keeled, 2-nerved, keels scabrid; stamens 3, anthers 1.5-2 mm long; second lemma oblong-lanceolate, 5-7 x 1-2 mm, acuminate, delicate, hyaline, faintly 3-nerved; palea elliptic-lanceolate or oblong-lanceolate, 5-6 x 1-2 mm, acute, delicate, hyaline, 2-keeled, 2-nerved, margins infolded, hyaline, ciliolate towards apex; lodicules 2, obovate, retuse at apex, c. 1 x 0.5 mm, faintly 3-nerved; stamens 3, anthers 1.5-2 mm long; ovary ovate-oblong, 0.5-1 x 0.5 mm, styles 1-1.5 mm long, stigmas c. 2 mm, feathery; grains c. 2 x 1 mm, ovate. Pedicelled spikelets elliptic or oblong-lanceolate, 4-6 mm long, awnless, sometimes reduced into small rudimentary structure; pedicel turbinate, 3-5 mm long.

Common along the banks of backwaters, coastal sands, estuaries and salt marshes, sometimes in water.

Fl. & Fr. : July - March.

Notes : This species can easily be identified from all other species of the genus, by its peculiar racemes usually concealed or hardly exerted from the spathe and awnless sessile spikelets. This grass has a thick rootstock, which creeps extensively in sand, and can be used against tidal erosion.

ALLEPPEY : Kumarakam, Thanneermukkam, Thykkuttam;
 QUILON : Residency ward; TRIVANDRUM : Veli.

16. *Ischaemum nairii* V.J. Nair & P.V. Sreekumar in J. Econ. Tax. Bot. 5(5) : 1205. 1984. PLATE No. 30

Tufted perennials. Culms 100-200 cm high, erect; nodes densely villous. Leaves 10-60 cm long, 10-20 mm wide, linear lanceolate, acuminate, lower ones narrowed and tapering towards

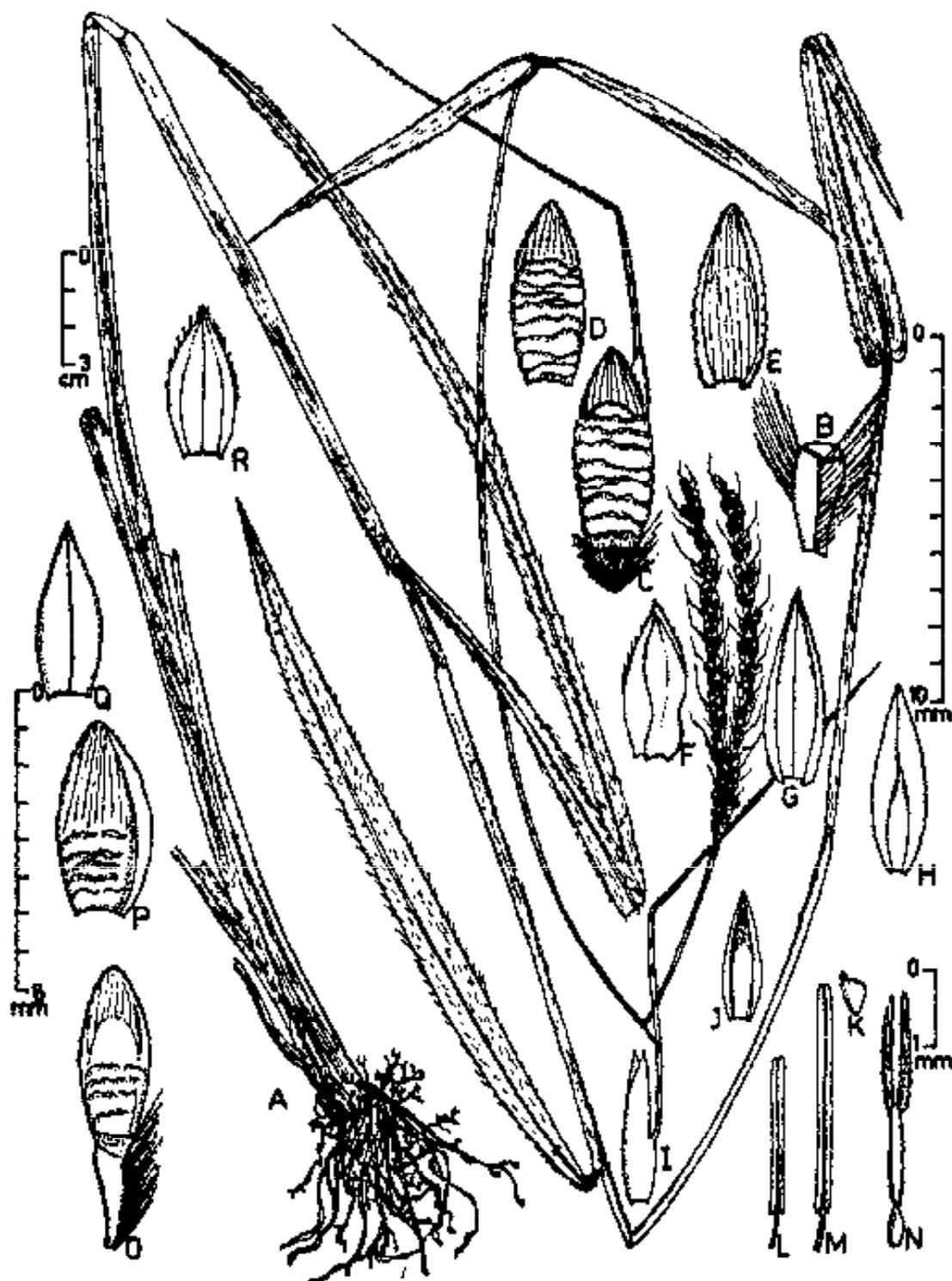


PLATE No. 30; *ISCHAEMUM NAIRII* V. J. Nair & P. V. Sreekumar

A. Plant; B. Joint (Rhachis); C. Sessile spikelet; D. Lower glume of the sessile spikelet (Dorsal view); E. Same (Ventral view); F. Upper glume (Lateral view); G. Lower lemma (Ventral view); H. Palea (Ventral); I. Upper lemma (Lateral view); J. Upper palea spread open (Dorsal view); K. Lodicule; L. Stamen of the lower floret; M. Stamen of the upper floret; N. Pistil; O. Pedicelled spikelet; P. Lower glume of the pedicelled spikelet (Dorsal view); Q. Upper glume (Dorsal view); R. Upper lemma (Dorsal view).

base, upper ones rounded or shallowly cordate, densely villous with tubercle based hairs, margins serrulate. Sheaths 10-80 cm long, shorter than the internodes, striate, villous with tubercle based hairs especially in the upper half. Ligule 2-6 mm, ovate acute membrane, mouth sparsely villous. Inflorescence of 2 racemes, 5-12 cm long, stout, glabrous to sparsely villous; peduncles long exserted. Joints of racemes 2.5-3 mm long, linear-clavate, crustaceous, long villous along the margins and dorsal angles. Sessile spikelets 5.5-6 mm long, elliptic, awned, callus densely bearded, hairs 0.5-2 mm long; lower glume 4.5-5.5 x 1.75-2 mm, ovate-acute, crustaceous below with several side nodules joined by sharp ridges, coriaceous above, faintly 9-11-nerved, margins narrowly and evenly inturned, scabrid above; upper glume 5-5.5 x 1.5-2 mm, boat-shaped, dorsally keeled, tip minutely winged and scabrid, smooth, coriaceous, faintly 7-9-nerved, margins hyaline and ciliate in the upper half; lower floret male; lemma 4.5-5 x 1.25-1.5 mm, oblong-lanceolate, delicate, hyaline, faintly 3-nerved, median nerve prominent, margins infolded, shortly ciliate in the upper half; lower glabrous elsewhere; palea 4.5-5.4 x 1-1.25 mm, elliptic-lanceolate, delicate, hyaline, 2-keeled, 2-nerved, margins infolded, ciliate in the upper half; lodicules 2, each c. 0.5 x 0.3 mm, obovate, oblique at apex; stamens 3, anthers c. 2 x 0.25 mm, filaments c. 0.5 mm long; upper floret bisexual; lemma 3.5-4 x 1-1.5 mm, notched, lobes sharply acute, delicate, hyaline, faintly 3-nerved, margins ciliolate in the upper half; awn 14-16 mm long, geniculate, column 6-7 mm long, brown, bristle pale, scabrid; palea 3-3.5 x 0.75-1 mm, lanceolate, delicate, hyaline, 2-keeled, 2-nerved, glabrous, with a few wart-like dots towards apex; lodicules similar to that of the lower floret; stamens 3, anther filaments c. 0.5 mm long; ovary 0.5 x 0.25 mm, oblong, styles 1-1.25 mm long, slender, stigmas 1.25-1.5 mm long, feathery. Pedicelled spikelet 5-5.5 mm long, ovate-acute, unawned, pedicels 2-2.5 mm long, linear-clavate, ventrally flat, dorsally angled, densely villous on dorsal angle, hairs 0.5-2 mm long; lower glume 4.5-5 x 2-2.5 mm, ovate, narrowly winged on one margin, wing scabrid, smooth or irregularly wrinkled with a few shallow depressions, side nodules indistinct, coriaceous, faintly 7-9-nerved, glabrous, margins inturned, scabrid towards apex; upper glume 4-4.5 x 1.5-2 mm, ovate-lanceolate, keel rounded, coriaceous, faintly 5-nerved, margins infolded, minutely ciliate in the upper half, smooth and glabrous elsewhere; lower floret male; lemma 4-4.5 x 1.25-1.5 mm, oblong-lanceolate, delicate, hyaline, faintly 3-nerved, margins infolded, ciliate in the upper half; glabrous elsewhere. Palea 4-4.5 x 1-1.25 mm, oblong-lanceolate, similar in texture to that of sessile spikelet; stamens

3, anthers c. 2 mm long, filaments short; upper floret bisexual; lemma 3.5-4 x 1.75-2 mm, ovate-lanceolate, delicate, hyaline, faintly 3-5-nerved, margins ciliate in the upper half; palea 3-3.5 x 0.75-1 mm, similar in shape and texture to that of sessile spikelet; stamens 3, anthers c. 3 mm long, filaments short; pistil similar to that of the sessile spikelet.

Tall perennial grasses growing in clumps along shallow streams and rivulets in the forests, usually in marshy places; locally rare.

Fl. & Fr. : November-December.

CALICUT : Kanjeerakkadavu.

17. *Ischaemum nilagiricum* Hack. in Ost. Bot. 51: 150, 1901; Fischer in Gamble, Fl. Pres. Madr. 1722, 1934 (Repr. ed. 3: 1194, 1957); Bor, Grass, Bur. Cey. Ind. Pak. 183, 1960, *I. hirtum* sensu Hook. f. Fl. Brit. Ind. 7: 135, 1896 non Hack. 1889.

PLATE No. 31

Perennials. Culms 30-120 cm high, tufted, erect; nodes glabrous. Leaves lanceolate, elliptic-lanceolate or linear-lanceolate, 5-20 x 0.5-1.5 cm, acuminate, upper ones rounded at base, lower ones narrowed at base, softly hairy with small tubercled hairs. Sheaths slightly keeled, softly hairy, ciliate along the margin. Ligules ovate-acute or truncate, narrow, fimbriate-membranous. Racemes 3-10, paniculate, each 2-10 cm long; joints linear-turbinate, 3-5 mm long, apex with teeth-like projections, angles densely ciliate. Sessile spikelets elliptic-lanceolate, 5-6 mm long, awned, densely villous; lower glume elliptic or ovate-lanceolate, 4-5 x 1.5-2 mm, notched at apex, chartaceous or subcoriaceous, densely villous, 11-13-nerved; upper glume boat-shaped or ovate-lanceolate when spread, 5-6 x 1.5-2 mm, acuminate-eristate and recurved at apex, chartaceous, 5-7-nerved, keels ciliate towards apex, margins infolded, hyaline, ciliate; lower floret male; upper floret bisexual; first lemma elliptic-lanceolate, 5-5.5 x 1 mm, shortly acuminate, delicate or chartaceous, 3-nerved, margins ciliate towards apex; palea elliptic-lanceolate, 4.5-5 x 1 mm, chartaceous, 2-keeled, 2-nerved, margins infolded, delicate, hyaline; stamens 3, anthers c. 2 mm long, yellow; second lemma entire or slightly notched, awned, delicate, hyaline, 5-7-nerved, margins ciliate, awn 6-12 mm long, column 3-4 mm long, brown; palea lanceolate, or elliptic-lanceolate, 4-5 x 0.5-1 mm, hyaline, 2-keeled, 2-nerved, sprinkled with wart-like dots towards apex; stamens 3, anthers c. 3 mm long, yellow; ovary oblong, 0.5-1 mm long, styles 1-2 mm long, stigmas 2-3 mm long, yellow to brownish. Pedicelled spikelets ellip-

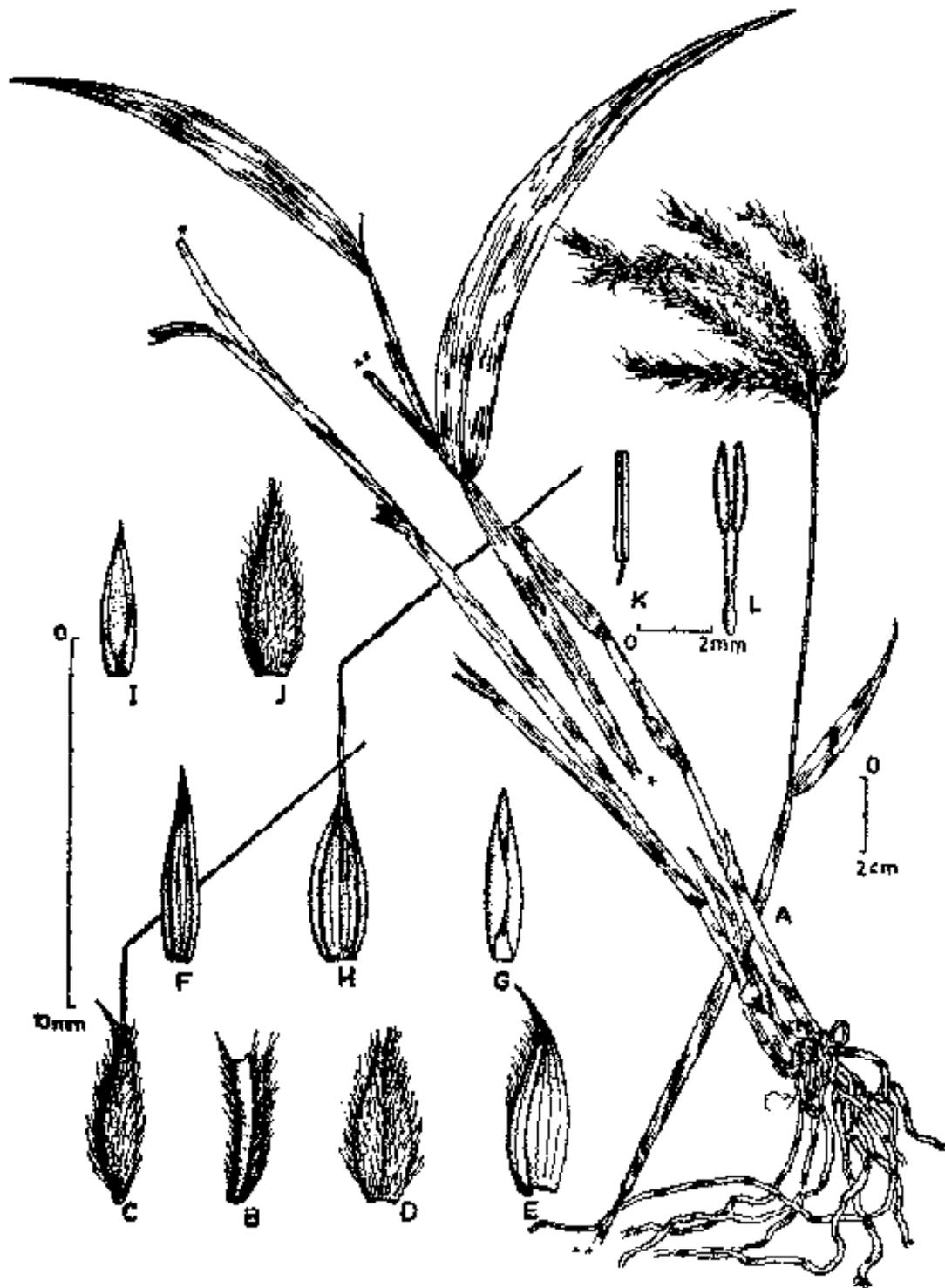


PLATE No. 31 : *ISCHAEMUM NILAGIRICUM* Hack.

A. Habit; B. Joint of raceme; C. Sessile spikelet; D. Lower glume of sessile spikelet; E. Upper glume; F. First lemma; G. Palea of the first lemma; H. Second lemma; I. Palea of the second lemma; J. Lower glume of pedicelled spikelet; K. Stamen; L. Pistil.

tic-lanceolate, 5-6 mm long, awned; pedicels turbinate, 2-3 mm long, densely ciliate; lower glume ovate-lanceolate, 5-6 x 1.5-2 mm, acuminate, densely villous, chartaceous, 13-15-nerved; upper glumes and florets similar to those of the sessile spikelets.

Frequent along the margins of the lakes, pools, ponds and canals, in crevices of rocks along running water; a semi-aquatic grass.

Fl. & Fr. : November - April.

Notes : This species can easily be distinguished from all other species of the genus by the numerous racemes which are paniculate rather than digitate or subdigitate. Leaves here are broader, flat, hairy or glabrous.

I. nitagiticum grows abundantly along the margins of lakes, streams, pools and canals, sometimes floating and trailing above water.

ERNAKULAM : Kuttampuzha ; IDUKKI : Munnar ; PALGHAT : Below Anavei, Silent Valley ; TRICHUR : Chalakudi ; WYNAD : Mappadi, Vayitri.

18. *Ischaemum rangacharianum* Fischer in Kew Bull, 1933 : 352, 1933 et in Gamble, Fl. Pres. Madr. 1722, 1934 (Repr. ed. 3: 1194, 1957) ; Bor, Grass. Bur. Cey. Ind. Pak, 184, 1960. *I. aristatum* auct. non Linn, 1753 ; Rang. & Tad. Handb. S. Ind. Grass, 151, t. 130-131, 1921. PLATE No. 32.

Annuals. Culms 20-80cm long, creeping and rooting at the nodes, geniculate or rarely erect, pinkish; nodes glabrous. Leaves lanceolate or elliptic-lanceolate, 1-12 x 0.4-1.2 cm, acuminate, upper ones rounded or shallowly cordate at base, lower ones narrowed and shortly petioled at base, covered with tubercle-based hairs, undulate atleast on one margin. Sheaths slightly keeled, glabrous or with tubercle-based hairs in the upper part. Ligules ovate, acute, membranous, 2-5 mm long. Racemes 2, adpressed together and appears as solitary, 2-6 cm long; joints clavate-turbinate, 3-4 mm long, chartaceous, densely ciliate in two rows along one angle. Sessile spikelets lanceolate, 5-6 mm long, awned, purplish; lower glume lanceolate or oblong-lanceolate, 5-6 x 1-1.5 mm, coriaceous below with 4-5 conspicuous side nodules, chartaceous and distinctly nerved above, with 9-11 faint nerves, keeled, glabrous or sparsely ciliate in the upper half, keel scabrid; upper glume lanceolate or elliptic-lanceolate, 5-6 x 1 mm, acuminate, chartaceous, faintly 3-nerved, keeled on dorsal side, sprinkled with wart-like.

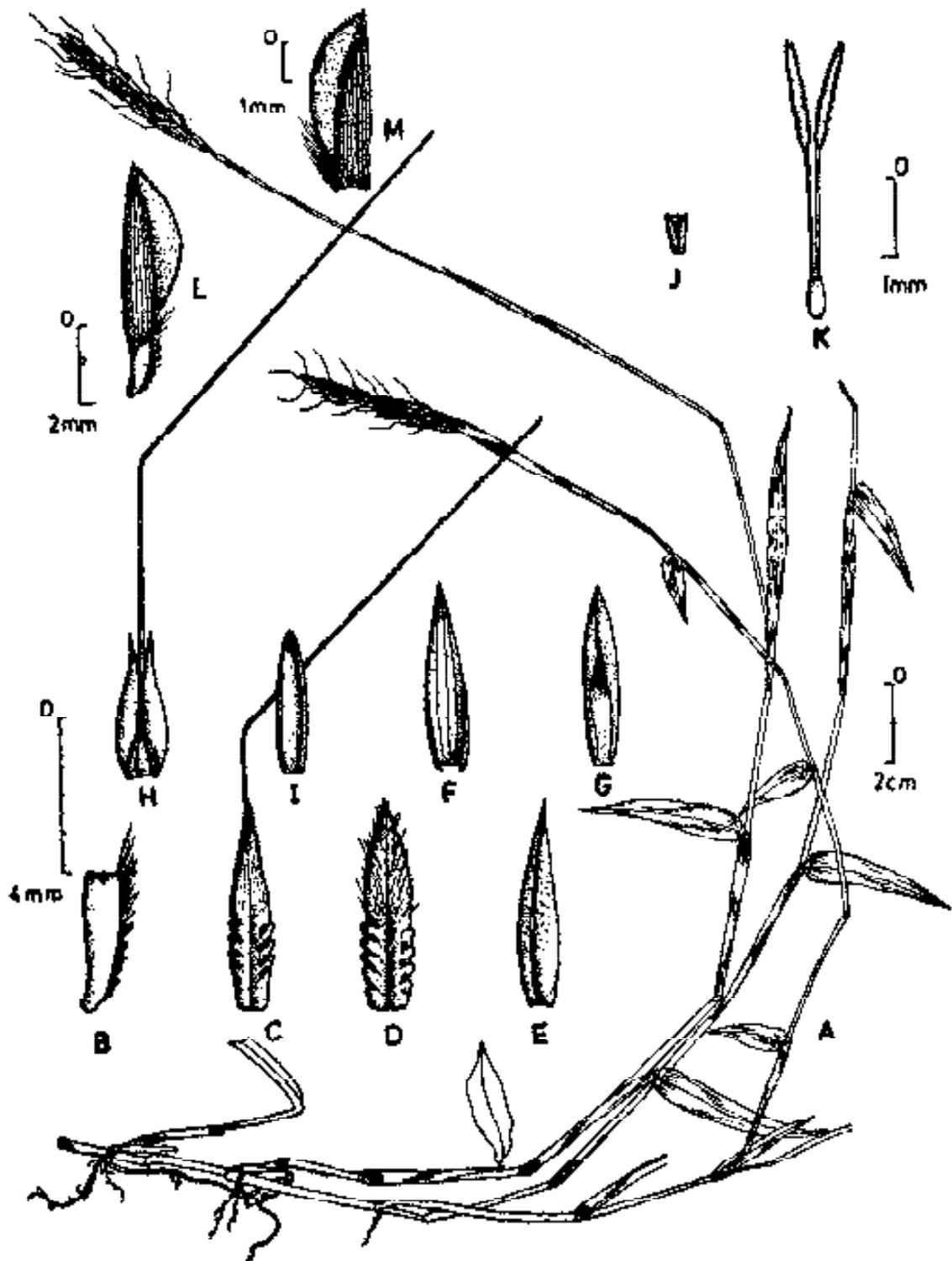


PLATE No. 32 ; *ISCHAEMUM RANGACHARIANUM* C. E. C. Fischer

A, Habit; B, Joint of raceme; C, Sessile spikelet; D, Lower glume of sessile spikelet; E, Upper glume; F, First lemma; G, Palea of the first lemma; H, Second lemma; I, Palea of the second lemma; J, Lodicule; K, Pistil; L, Pedicelled spikelet; M, Lower glume of pedicelled spikelet.

growths on dorsal side; lower floret male; upper floret bisexual; first lemma oblong-lanceolate, 4.5-5 x 1 mm, delicate, hyaline-faintly 3-5-nerved; palea elliptic-lanceolate, 4.5-5 x 1 mm, 2-keeled, 2-nerved, delicate, hyaline; stamens 3, anthers 1.5-2 mm long, dirty yellow; second lemma notched, awned, 3-4 x 1-1.5 mm, delicate, hyaline with a coriaceous base, faintly 3-nerved, awns 12-18 mm long; culm 6-8 mm long; palea linear-oblong or oblong-lanceolate, 3-4 x 0.5-1 mm, delicate, hyaline, 2-keeled, 2-nerved; lodicules 2, obovate-oblique and wavy at apex, c. 0.5 x 0.25 mm, faintly nerved; stamens 3, anthers 1.5-2 mm long, dirty yellow; ovary elliptic-oblong, c. 0.5 x 0.2 mm, styles 1.5-2 mm long, stigmas 1.5-2 mm, purple-red. Pedicelled spikelets lanceolate (excluding the broad auriculate wing), 4-5 mm long, awnless; pedicels clavate, turbinate, 1-2 mm long, densely ciliate along one angle; lower glume oblong or obovate, 4-5 x 1.5-2 mm, acute, broadly winged on one margin, chartaceous, faintly 11-13-nerved, villous towards base, with or without a few shallow side-nodules on one margin, wing auriculate, pink, scabrid along the margin; upper glume and florets similar to those of the sessile spikelets, but upper lemma entire and awnless.

Common along open dry grasslands, hill slopes, on rocky bunds and fences and also along roadsides and waste places.

Fl. & Fr. : September - March.

Notes : This species is distinct from all other Indian species of the genus *Ischaemum* by its broadly winged lower glumes of the pedicelled spikelets and narrowly lanceolate lower glumes of the sessile spikelets with several distinct side nodules. The wings on the lower glumes of the pedicelled spikelets are often purplish-red.

CALICUT: Chelannur, Pokkunnamala; PALGHAT: Shoranur, Thiruvizhamkunnu; TRIVANDRUM: Kazhakkuttam, Nedumangad, Nilamel.

19. *Ischaemum ravi* P. V. Sreekumar, V. J. Nair & N. C. Nair in J. Bomb. Nat. Hist. Soc. (in ed.). PLATE No. 33

Creeping annuals. Culms 10-30 cm high, erect or geniculate; nodes villous. Leaves ovate-lanceolate or triangular, 1-3 x 0.4-0.8 cm, sharply acute, rounded or shallowly cordate at base, glabrous. Sheaths 1-4 cm long, shorter than the internodes, striate, glabrous. Ligule ovate, 0.5-1 mm, acute, membranous. Inflorescence of 1-2 racemes, 1-3 cm long, stout, densely villous, peduncles long exserted.

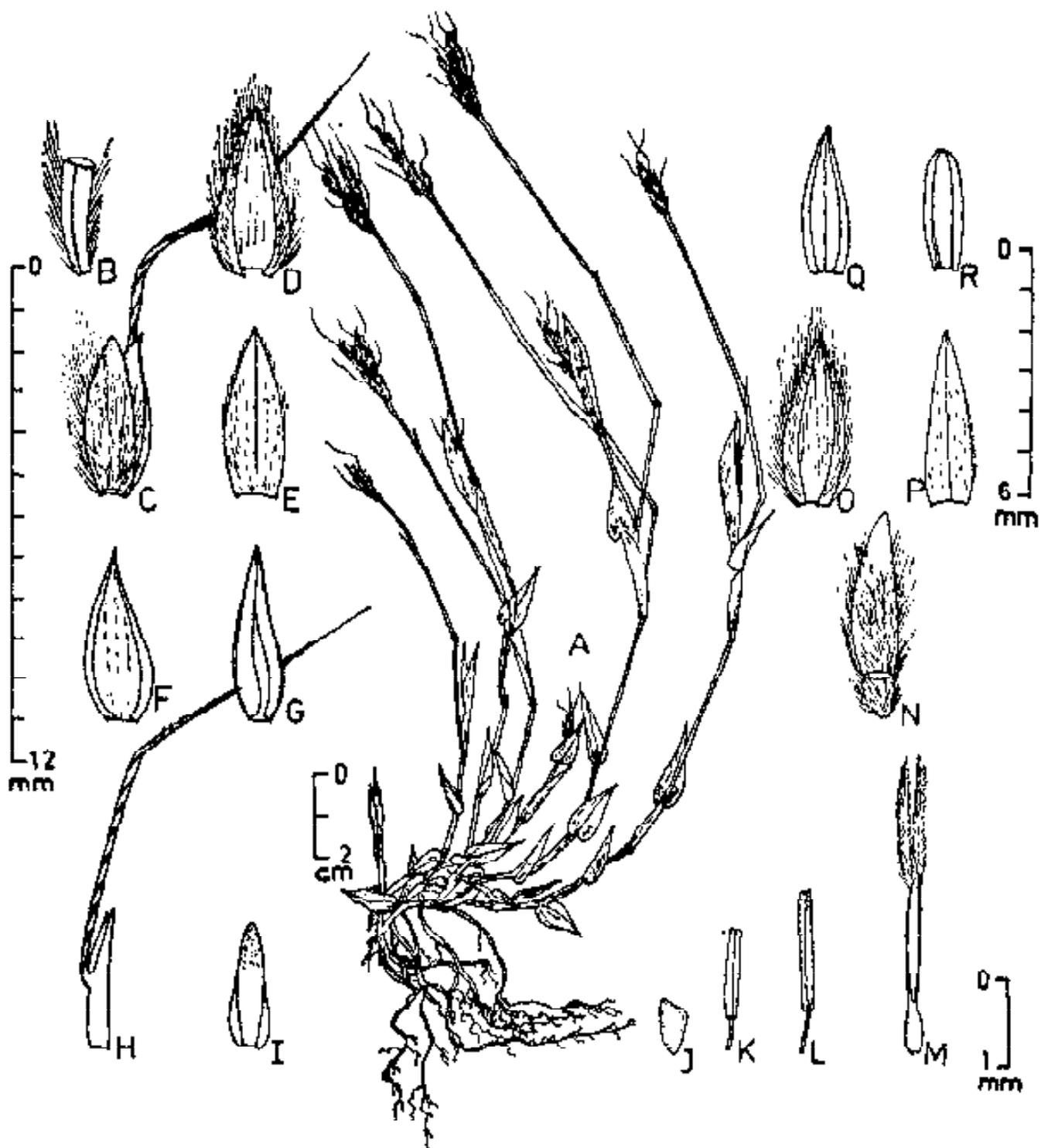


PLATE No. 33: *ISCHAEMUM RAUI* P. V. Sreekumar, V. J. Nair & N.C.Nair

A. Habit; B. Joint of raceme; C. Sessile spikelet; D. Lower glume of sessile spikelet; E. Upper glume; F. First lemma; G. Palea of the first lemma; H. Second lemma; I. Palea of the second lemma; J. Lodicule; K. Stamen of the lower floret; L. Stamen of the upper floret; M. Pistil; N. Pedicelled spikelet; O. Lower glume of pedicelled spikelet; P. Upper glume; Q. Second lemma; R. Palea of the second lemma.

Joints of racemes linear-clavate or slightly turbinate, 2.5-3 mm long, densely villous. Sessile spikelets ovate, 3.5-4 mm long, acute, awned, densely silky villous, hairs 0.5-3 mm long, lower glume ovate, 3.5-4 x 1.5-2 mm, acute, coriaceous, faintly 9-11-nerved, densely silky villous, margins intumed, scabrid above; upper glume boat-shaped or ovate-lanceolate when spread, 3.5-4 x 1-1.5 mm, keel rounded except towards tip which is minutely winged and scabrid, coriaceous, softly hairy, margins hyaline, ciliate in the upper half; lower floret male; lemma ovate-lanceolate, 3.5-4 x 1-1.5 mm, delicate, hyaline, faintly 3-5-nerved, margins infolded, ciliate in the upper half; palea lanceolate, 3.5-4 x 1-1.25 mm, delicate, hyaline, faintly 3-5-nerved, margins infolded, delicate in the upper half; palea lanceolate, 3.5-4 x 1-1.25 mm, delicate, hyaline, 2-keeled, 2-nerved, glabrous; stamens 3; anthers 1-1.5 mm long, filaments short; upper floret bisexual; lemma notched; 3-3.5 x 1-1.25 mm, lobes acute, delicate, hyaline, faintly 3-nerved, margins ciliolate in the upper half; awn 10-12 mm long, geniculate, column 6-7 mm long, brown, bristles pale, scabrid; palea oblong or oblanceolate, 3-3.5 x 0.5-0.75 mm, delicate, hyaline, 2-keeled, 2-nerved, glabrous with a few wart-like dots towards apex; lodicules obovate, c. 0.6 x 0.3 mm, oblique at apex; stamens 3; anthers 1.5-2 mm long, filaments short; ovary ovate, c. 0.5 x 0.25 mm, styles c. 1, 5 mm, slender, stigmas c. 1.5 mm long, feathery. Pedicelled spikelets lanceolate, 3.5-4 mm long, unawned, densely villous; pedicels 0.5-1 mm long, villous; glumes and florets more or less similar to those of sessile spikelets.

CANNANORE : Mugu Road.

20. *Ischaemum rugosum* Salisb. Icon. Stirp. Rar. 1, t. 1, 1791; Hook. f. Fl. Brit. Ind. 7: 127, 1896; Rang. & Tad. Handb. S. Ind. Grass. 153, t. 132, 1921; Fischer in Gamble, Fl. Pres. Madr. 1722, 1934 (Repr. ed. 3: 1194, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 184, 1960.

Annuals or perennials. Culms 20-80 cm long, tufted or stoloniferous, erect or geniculate; upper nodes villous, lower ones glabrous. Leaves lanceolate or linear-lanceolate, 4-15 x 0.3-0.6 cm, acuminate, narrowed and tapering towards base. Ligule ovate, acute, membranous. Racemes 2, 3-8 cm long; joints turbinate or clavate, 3-4 mm long, coriaceous, densely ciliate along one angle. Sessile spikelets oblong or oblong-lanceolate, 4-6 mm long, awned; callus sparsely bearded; lower glume oblong-lanceolate, 4.5-5 x 1.5-2 mm, crustaceous, or coriaceous below with prominent side nodules connected by deeper shallow ridges and furrows, coriaceous above, 13-15-nerved, scab-

rid towards apex; upper glume boat-shaped or oblong-lanceolate when spread, 4-6 x 1-1.5 mm, subcoriaceous, keeled and slightly humped on dorsal side, keel minutely winged and scabrid; lower floret male; upper floret bisexual; first lemma oblong-lanceolate, 4-5 x 1-1.5 mm, delicate, faintly 3-nerved; palea oblong-lanceolate or elliptic-lanceolate, 4-5 x 1 mm, delicate, 2-keeled, 2-nerved, margins infolded, hyaline; stamens 3, anthers 1.5-2 mm long, yellow; second lemma notched, 3-4 x 1-1.5 mm, awned, delicate, hyaline, faintly 3-nerved; awns 8-12 mm long, column 5-6 mm long, brown; palea oblong-lanceolate, 3-3.5 x 0.5-1 mm, delicate, hyaline, 2-keeled, 2-nerved, with a few wart-like growths towards apex; lodicules obovate, concave at apex, c. 0.5 x 0.4 mm; stamens 3, anthers 2.5-3 mm long, yellow; ovary oblong, c. 0.5 x 0.2 mm, styles 1-1.5 mm, stigmas c. 2 mm long. Pedicelled spikelets oblong, awnless; pedicels c. 1 mm long, ciliate on one angle; lower glume oblong, 4.5-5 mm long, coriaceous, 11-15-nerved, broadly or narrowly winged on one margin, wing scabrid; upper glume is similar to those of the sessile spikelets, but not humped on dorsal side in the middle. Florets similar to those of the sessile spikelets.

Frequent along the margins of backwaters, ponds, in marshes, wet-lands, paddy fields and also in shallow stagnant waters.

Fl. & Fr. : December - March.

Notes : This species can easily be identified by its sharply ridged, yellowish lower glumes, distinct side nodules across the back in the lower part and usually reduced or rudimentary pedicelled spikelets.

It is a highly variable species in which the glumes are either crustaceous and sharply ridged or coriaceous and faintly ridged and furrowed. Sometimes the pedicelled spikelets are large and on a short pedicel, or reduced on a long pedicel.

ALLEPPEY : Thrikkunnapuzha.

21. *Ischaemum semisagittatum* Roxb. Fl. Ind, 1: 322, 1820; Hook. f. Fl. Brit. Ind. 7: 130, 1896; Fischer in Gamble, Fl. Pres. Madr. 1722, 1934 (Repr. ed. 3: 1194, 1957); Bor. Grass. Bur. Cey. Ind. Pak. 185, 1960; Manilal & Sivaraj. Fl. Calic. 333, 1982.

This species is reported from Mangalore a place in Karnataka very close to the northern border of Kerala. So, there is every possibility that this may occur in Kerala also.

22. *Ischaemum tadulingamii* N. C. Nair & P. V. Sreekumar in
Blumea 30: 385-387, 1985. PLATE No. 34

Tufted annuals or perennials. Culms 10-30 cm high, erect; nodes glabrous. Leaves linear-lanceolate, 2-10 x 0.4-0.6 cm, shortly acuminate, narrowed and tapering at the base, sparsely villous with tubercle-based hairs. Sheaths 2-8 cm long, equal to or shorter than the internodes, striate, villous with sparse tubercled hairs, throat sparsely villous. Ligule 2-3 mm long, ovate, acute, membranous. Racemes 2 or 3, 2-6 cm long, stout; spathe 2-10 cm long, glabrous. Joints of racemes linear, turbinate, 3.5-4 mm long, coriaceous, long villous along the margins and dorsal angle. Sessile spikelets ovate-lanceolate, 6-7 mm long; callus densely bearded, hairs 1-2 mm long. Lower glume ovate-lanceolate, 6-6.5x1.75-2 mm, acuminate, without nodules, chartaceous, distinctly 7-13-nerved, with a few long hairs on dorsal side towards base, margin narrowly and evenly inturned, not winged, scabrid in the upper half; upper glume 5.5-6x1.25-1.5 mm, boat-shaped or ovate-lanceolate when spread, acuminate, keels rounded except towards the minutely winged and scabrid apex, chartaceous, 3-5-nerved, covered with very short adpressed hairs, especially towards the base, margins infolded and ciliate in the upper half. Lower floret empty. Upper floret bisexual. First lemma lanceolate, 4.5-5x1-1.5 mm, delicate, hyaline, faintly 3-nerved, margins infolded and ciliate in the upper half, glabrous elsewhere. Second lemma lanceolate, 4-4.5x1-1.5 mm, delicate, hyaline, faintly 3-nerved, margins ciliate in the upper half, apex notched, lobes acute. Awn 10-12 mm long, geniculate, column 5-6 mm long, chestnut brown, arista pale, scabrid. First palea elliptic-lanceolate, 4-4.5x1-1.25 mm, delicate, hyaline, 2-keeled, margins infolded and ciliate in the upper half. Second palea oblong, 3-4x0.75-1 mm, delicate, hyaline, 2-keeled, glabrous, apex rounded. Lodicules of upper floret obovate, 0.6-0.75x0.4-0.5 mm, retuse at apex, faintly 5-7-nerved, median nerve prominent. Lodicules of lower floret obovate, oblique, c. 1x0.5 mm, faintly 3-5-nerved, apex wavy and 2-horned. Stamens 3, anthers 1.5-2 mm long. Caryopsis obovate with 2 horns at apex, c. 2x0.75 mm. Pedicelled spikelet ovate-lanceolate, 4-6 mm long, unawned, usually reduced, sterile. Pedicels linear, turbinate, 3-4 mm long, villous along the margins and dorsal angle, hairs 0.5-2 mm long. Lower glume ovate-lanceolate, 4.5-6x1.25-1.5 mm, winged on one margin, wing scabrid, smooth, chartaceous, faintly 9-11-nerved, glabrous, margins inturned, scabrid towards apex; upper glume ovate-lanceolate, 3-5 mm long, keel rounded, glabrous, apex acute. Florets empty.

Tufted perennial grasses growing in clumps near edges of streams

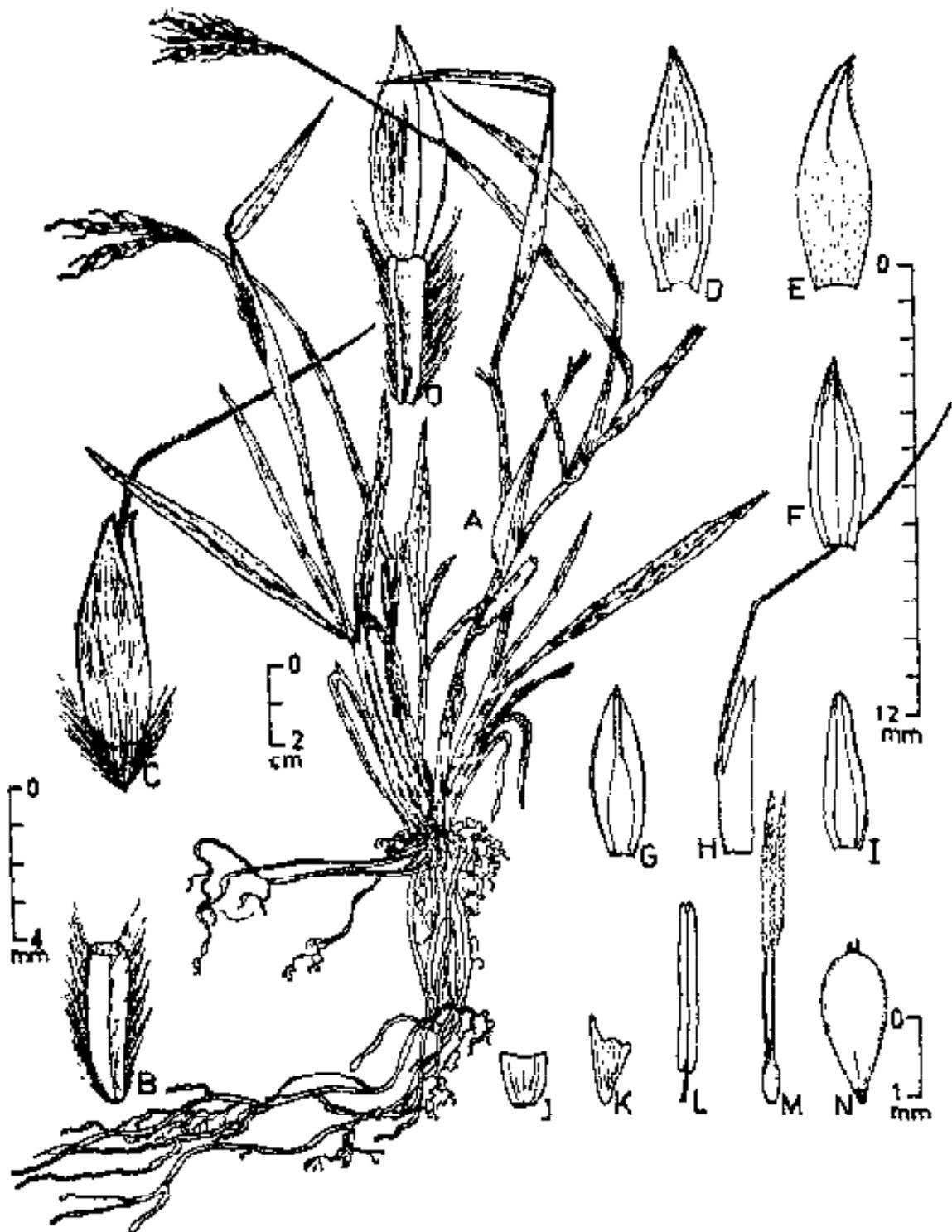


PLATE No. 34: *ISCHAEMUM TADULINGAMII* N. C. Nair & P. V. Sree-
kumar

A. Plant; B. Joint (rhachis); C. Sessile spikelet (dorsal view); D. Lower glume of the sessile spikelet (ventral view); E. Upper glume (dorsal view); F. Lower lemma (ventral view); G. Palea (ventral view); H. Upper lemma (lateral view); I. Upper palea (ventral view); J. Lodicule of the lower floret; K. Lodicule of the upper floret; L. Stamen; M. Pistil; N. Caryopsis; O. Pedicelled spikelet (dorsal view).

and along rocky areas in grasslands, locally rare.

Fl. & Fr. : March-April.

IDUKKI : Eravikulam National Park.

23. *Ischaemum thomsonianum* Stapf ex Fischer in Gamble, Fl. Pres. Madr, 1722. 1934 (Repr. ed. 3; 1193, 1957); Bor, Grass. Bur. Cey. Ind. Pak, 186, 1960, *I. murinum* auct. non Forst. 1786; Hook.f. Fl. Brit. Ind. 7: 135, 1896.

Annuals. Culms 20-100 cm long, creeping and rooting at the nodes, rarely stoloniferous; nodes sparsely bearded. Leaves lanceolate or linear-lanceolate, 2-15x0.4-1 cm, acuminate, rounded or narrowed at base, densely or sparsely hairy. Sheaths keeled. Ligules thin, fimbriate, membranous. Racemes 2, rarely 3, 3-10 cm long, slender; joints turbinate, 3-4 mm long, densely long ciliate on one angle, shortly ciliate on other two angles, with a tooth-like projection on inner side, apex toothed. Sessile spikelets elliptic-lanceolate, 5-6 mm long (excluding awns), awned; callus cuneate, 1-2 mm long, villous towards base; lower glume broadly ovate-lanceolate, bicuspidate, 5-6x1.5-2 mm, coriaceous, 11-15-nerved, narrowly winged at apex; upper glume boat-shaped or ovate-lanceolate when spread, 5-6x1.5-2 mm, acuminate, shortly bifid and aristate in between, awns 1-2 mm long, chartaceous, 5-nerved, dorsal side keeled and narrowly winged in the upper half, margins infolded, ciliate towards apex; lower floret male; upper floret bisexual; first lemma elliptic, acute or shortly acuminate, 4-5x1-1.5 mm, chartaceous, 3-nerved, margins infolded, hyaline, ciliate towards apex; palea oblong-lanceolate, 4-4.5x1 mm, chartaceous, 2-keeled, 2-nerved; stamens 3, anthers 2-3 mm long; second lemma notched, awned, 4-4.5x1-1.5 mm, delicate, hyaline, 3-nerved, awns 10-15 mm long, column 4-5 mm, chestnut-brown; palea oblong-lanceolate, 4-4.5x1 mm, delicate, hyaline, 2-keeled; lodicules 2, obovate, oblique and 2-horned at apex, c. 0.5x0.4 mm; stamens 3, anthers 2-3 mm long; ovary oblong, c. 0.5 mm, styles 1-1.5 mm long, stigmas c. 2 mm long. Pedicelled spikelets oblong-lanceolate, 5-6 mm long, awned; pedicels turbinate, 3-3.5 mm long, ciliate along the angles; lower glume ovate-lanceolate, 5-6x1.5-2 mm, acuminate aristate, coriaceous, 11-15-nerved, dorsally keeled, keel narrowly winged in the upper half; upper glume and florets similar to those of the sessile spikelets.

Rare, along the bunds of paddy fields, roadsides and wastelands, banks of backwaters and rivers.

Fl. & Fr. : December-March.

Notes : This species is nearer to *Ischaemum timorense* but differs by the longer joints of racemes with a tooth-like projection, larger spikelets and glabrous glumes. It is also related to *I. zeylanicum*, but can be distinguished by the sessile lower leaves and obscurely winged upper glume of the sessile spikelets.

ALLEPPEY : Champakkulam, way to Kumerakam.

24. *Ischaemum timorense* Kunth, Rev. Gram. 1: 369. t. 98. 1830; Hook. f. Fl. Brit. Ind. 7: 136. 1896, p.p.; Fischer in Gamble, Fl. Pres. Madr. 1722. 1934 (Repr. ed. 3: 1193. 1957); Bor, Grass, Bur, Cey. Ind, Pak, 185. 1960.

Perennials. Culms 10-120 cm long, creeping, stoloniferous, rooting at the nodes, nodes bearded. Leaves lanceolate or linear-lanceolate, 1-12 x 0.1-0.8 cm, acuminate, rounded or shallowly cordate at base. Ligules ovate, acute, membranous. Racemes solitary or paired, 1-4 cm long, hairy; joints turbinate, 2-3 mm long, long-ciliate along one angle. Sessile spikelets ovate-lanceolate, 3-4 mm long, awned; callus cuneate, c. 1 mm long, bearded towards base: lower glume ovate-lanceolate, 3-4 x 1.5-2 mm, shortly bicuspidate, chartaceous, 7-9-nerved, long pilose in the upper half; upper glume lanceolate or ovate-lanceolate, 3-4 x 1 mm, shortly bifid at apex, aristate in between, arista 2-3 mm long, chartaceous, 3-nerved, hairy on the upper half; lower floret male. Upper floret bisexual; first lemma oblong-lanceolate, c. 3 x 1 mm, delicate, 3-nerved; palea lanceolate, 2.5-3 x 0.5-1 mm, delicate, hyaline, 2-keeled, 2-nerved; stamens 3, anthers 1-1.5 mm long; second lemma notched, awned, 2.5-3 x 1 mm, delicate, hyaline, 3-nerved; awn geniculate, 10-15 mm long, column 4-5 mm long, brownish; palea oblong-lanceolate, 2-2.5 x 0.5-1 mm, delicate, hyaline, 2-keeled, 2-nerved; stamens 3, anthers 1-1.5 mm long; ovary oblong, c. 0.5 mm long, styles c. 1 mm long, stigmas c. 1 mm long. Pedicelled spikelets oblong-lanceolate, 3-4 mm long, awned; pedicels turbinate, c. 2 mm long, long ciliate on one angle; lower glume ovate-lanceolate, 3-4 x 1-1.5 mm, acuminate, shortly aristate, chartaceous, 5-7-nerved, pilose in the upper half; upper glume and florets similar to those of the sessile spikelets.

Fairly common, along the road-cuttings, canal sides and margins of backwaters, usually creeping and trailing on sandy soil and in damp places.

Fl. & Fr. : September-December.

Notes : This species is peculiar for its long, runner-like creeping and stoloniferous culms with rosette-like nodal clusters of short, lanceolate leaves; and can be easily distinguished from all other species of the genus by the above mentioned habit.

QUILON : Kottarakkara; TRIVANDRUM : Kariavattom, Nodumengad, Nilamel.

25. *Ischaemum travancorense* Stapf ex Fischer in Kew Bull. 1933: 353. 1933; Fischer in Gamble, Fl. Pres. Madr. 1723. 1934 (Repr. ed. 3: 1194. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 186. 1960. *I. aristatum* sensu Hook. f. subsp. *rottleri* Hook. f. Fl. Brit. Ind. 7: 127. 1896. PLATE No. 35

Perennials. Culms 30-200 cm long, trailing or geniculate, rooting at the lower nodes; nodes glabrous. Leaves lanceolate, elliptic-lanceolate or linear-lanceolate, 5-30 x 0.5-1.5 cm, acuminate, rounded or cordate at base, with short hairy petioles. Sheaths slightly keeled. Ligules ovate, acute, membranous, 3-8 mm long. Racemes 2, adpressed together and appear solitary, 8-16 cm long, glabrous; joints clavate-turbinate, 4-5 mm long, crustaceous, glabrous. Sessile spikelets oblong-lanceolate, 6-8 mm long, awnless or very rarely awned; callus glabrous; lower glume oblong or ovate-oblong, 6-7 x 2 mm, crustaceous below with a few side nodules connected by deep or shallow ridges, chartaceous above, faintly 13-15-nerved, very minutely winged at apex, glabrous; upper glume boat-shaped or ovate-lanceolate when spread, 6-8 x 1.5-2 mm, chartaceous or subcoriaceous, faintly 5-7-nerved, dorsally keeled and minutely winged at apex, appressed hairy above, margins infolded, hyaline, ciliolate towards apex; lower floret male; upper floret bisexual; first lemma oblong-lanceolate, 5-6 x 1.5-2 mm, delicate, 3-nerved, margins infolded, hyaline; palea oblong-lanceolate, 5-6 x 1-1.5 mm, delicate, 2-keeled, 2-nerved; stamens 3, anthers c. 2 mm long, orange-yellow; second lemma oblong-lanceolate, 5-5.5 x 1.5-2 mm, notched with a rudimentary awn in between or rarely awn developed; palea oblong or oblong-lanceolate, 4-4.5 x 1 mm, delicate, hyaline, 2-nerved, sprinkled with wart-like dots; lodicules obovate, oblique and 2-horned at apex, c. 1 x 0.5 mm, faintly 3-5-nerved; stamens 3, anthers c. 3 mm long; ovary oblong, c. 0.5 x 0.2 mm, styles c. 2 mm long, stigmas c. 2 mm, golden-yellow. Pedicelled spikelets ovate-oblong or obovate, 5-6 mm long, awnless; pedicels clavate-turbinate, 2-3 mm long, glabrous; lower glume ovate-oblong, broadly winged on one margin, 5-6 x 2.5-4 mm, coriaceous, 13-15-nerved, wing scabrid along the margin; upper glume and florets similar to those of the sessile spikelets, but smaller; second lemma entire and awnless.

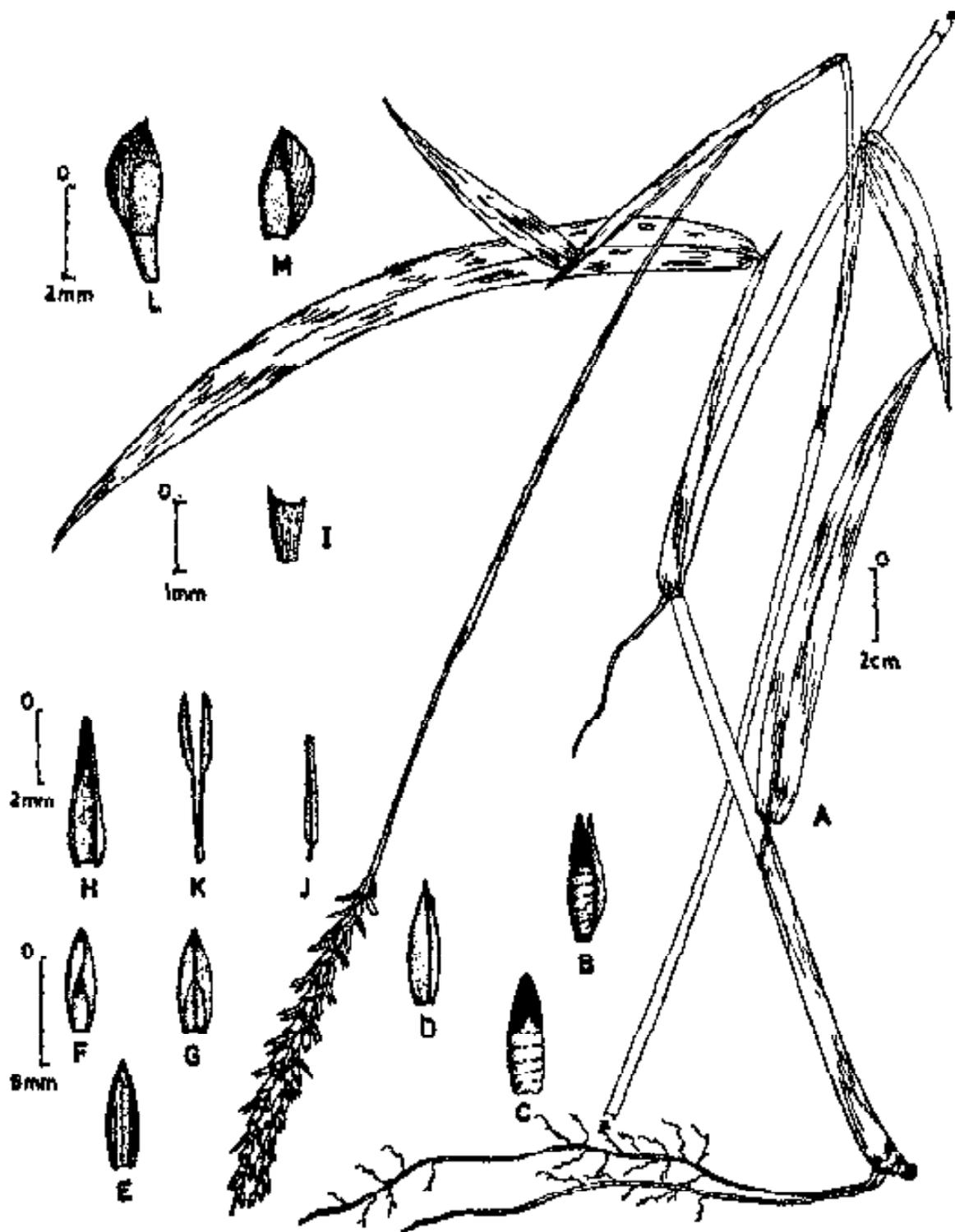


PLATE No. 35: *ISCHAEMUM TRAVANCORENSE* Stapf. ex C.E.C. Fischer

A. Habit; B. Sessile spikelet; C. Lower glume of sessile spikelet; D. Upper glume; E. First lemma; F. Palea of the first lemma; G. Second lemma; H. Palea of the second lemma; I. Lodicule; J. Stamen; K. Pistil; L. Pedicelled spikelet; M. Lower glume of pedicelled spikelet.

Occasional along the shallow streams, banks of backwaters, in muddy fields and canals.

Fl. & Fr. : September-March.

Notes : It is very closely related to *Ischaemum vembanadense*, but differs by the longer leaves, awnless sessile spikelets and broadly winged lower glume of the pedicelled spikelets.

I. travancorensis seems to be endemic to Kerala.

ALLEPPEY : Alleppey backwaters, Nedumudi, Pallana, R. Block, Thottappally.

26. *Ischaemum tumidum* Stapf ex Bor in Kew Bull. 1951: 450. 1952; Bor, Grass, Bur. Cey. Ind. Pak. 186. 1960; Manilal & Sivaraj. Fl. Calic. 333. 1982.

Annuals. Culms 10-30 cm long, creeping or geniculate; upper nodes bearded, lower ones glabrous. Leaves ovate-lanceolate, 1-4 x 0.5-1 mm, cordate or shortly sagittate at base. Sheaths slightly keeled. Ligules thin, truncate, fimbriate, membranous. Racemes 2, 1-4 cm long; joints clavate, swollen, 3-4 mm long, crustaceous or coriaceous shining, densely ciliate along the margins and tips. Sessile, spikelets oblong, 5-6 mm long, acute, awned; lower glume ovate-oblong, 4.5-5 x 1.5-2 x 1.5-2 mm, crustaceous and shining below, coriaceous above, 7-9-nerved, densely villous along the margins and apex, upper glume oblong-lanceolate, 5-6 x 1.5-2 mm, chartaceous, 3-nerved, softly hairy on dorsal side; lower floret male. Upper floret bisexual; first lemma oblong-lanceolate, 4.5-5 x 1 mm, delicate, hyaline, 3-nerved, margins infolded, ciliate in the upper half; palea elliptic-lanceolate, 4-5 x 1 mm, delicate, hyaline, 2-keeled, 2-nerved; lodicules 2, oblanceolate, c. 0.5 x 0.2 mm, dentate at apex; stamens 3, anthers 1-2 mm long; second lemma deeply notched, 3-4 x 1 mm, awned, lobes acute, delicate, hyaline, ciliate towards apex; palea oblong-lanceolate, 3.5-4 x 1 mm, delicate, hyaline, 2-nerved. Pedicelled spikelets lanceolate, 5-6 mm long, awnless, hairy; pedicels clavate, c. 1 mm, hairy; lower glume oblong-lanceolate, 4.5-5 x 1 mm, crustaceous or coriaceous, 9-11-nerved, densely hairy; upper glume and florets similar to those of the sessile spikelets; second lemma entire, awnless.

Rare, along dry, open grasslands, grassy hill slopes and rocky places.

Fl. & Fr. : October-December.

Notes : Several differences were noticed from the typical plant such as shorter truncate and fimbriate ligules, bearded upper nodes, smaller lower glume which are acute at apex, glumes smooth and without nodules, longer lemmas and paleas and longer awns.

This species is distinct from other species of the genus by its characteristic swollen raceme joints and smaller leaves.

CANNANORE : Paramba.

27. *Ischaemum vembanadense* Patil & D'Cruz in J. Bomb. Nat. Hist. Soc. 70 : 324. 1973.

Perennials. Culms 20-150 cm long, trailing and rooting at the lower nodes, geniculate or rarely erect; nodes glabrous. Leaves lanceolate, 5-12 x 0.5-1 cm, acuminate, rounded or shallowly cordate at base. Sheaths slightly keeled, ciliate along one margin. Ligules ovate, 2-5 mm long, acute, membranous. Racemes 2, adpressed together and appear solitary, 5-8 cm long; joints clavate-turbinate, 4-5 mm long, crustaceous. Sessile spikelets oblong-lanceolate, 5-6 mm long, awned or very rarely awnless; callus glabrous; lower glume oblong-lanceolate, 5-6 x 2 mm, crustaceous below with 4-6 side nodules, sometimes nodules inter-connected with ridges and furrows, coriaceous above, faintly 13-15-nerved; upper glume boat-shaped or ovate-lanceolate when spread, 5-6 x 1.5 mm, dorsally keeled, chartaceous, faintly 5-nerved; lower floret male; upper floret bisexual; first lemma ovate-lanceolate, 5-6 x 1.5-2 mm, delicate, 3-nerved, palea oblong-lanceolate, 5-6 x 1 mm, chartaceous, 2-keeled, 2-nerved; stamens 3, anthers c. 2 mm long, yellow; second lemma deeply notched, 4.5-5 x 1-1.5 mm, awned or rarely awnless, lobes acute, delicate, hyaline, 3-nerved, awn 10-15 mm long, column 5-6 mm, chestnut-brown; palea oblong-lanceolate, 4-5 x 1 mm, delicate, hyaline, 2-nerved; stamens 3, anthers c. 3 mm long, yellow; ovary oblong, c. 0.5 mm, styles 1.5-2 mm long, stigmas c. 2 mm long, violet or cream when young. Pedicelled spikelets oblong, 5-6 mm long, awnless; pedicels 1-2 mm long, glabrous; lower glume oblong, 5-6 x 1.5-2 mm, acute, subcoriaceous or chartaceous, faintly 13-15-nerved, narrowly winged on one margin; upper glume and florets similar to those of the sessile spikelets; second lemma entire, awnless.

Rare, along the banks of rivers and backwaters, sometimes trailing and floating over the weeds growing in canals and backwaters.

Fl. & Fr. : October-January.

Notes : Very closely related to *Ischaemum travancorense*. The distinguishing features of *I. vembanadense* from the former are its shorter leaves and racemes, usually awned sessile spikelets and narrowly winged lower glumes of the pedicelled spikelets.

Here, the diagnostic features with reference to those of its allied species are very feeble and seems to be quite unreliable. Most of the characters tally with each other and often overlap. So it is felt that *I. vembanadense* could well be accommodated in *I. travancorense* when more populations of both the species are critically studied.

ALLEPPEY : Thottappalli.

28. *Ischaemum zeylanicum* Bor. Grass. Bur. Cey. Ind. Pak. 186. 1960; V.J. Nair & Ramach. in Bull. Bot. Surv. Ind. 22(1-4): 193. 1980. *I. timorense* Kunth var. *zeylanicum* Hack. in DC. Monogr. Phan. 6: 230. 1886. *I. timorense* sensu Hook. f. Fl. Brit. Ind. 7: 136. 1896. p.p.

PLATE No. 36

Annuals or perennials. Culms 30-100 cm long, willowy, geniculate or trailing; nodes glabrous. Leaves elliptic or elliptic-lanceolate, 3-15 x 0.4-1.2 cm, shortly acuminate, tapering, narrowed and petiolate at base, petioles 0-(upper ones sessile) 5 cm long. Sheaths keeled, villous towards collar. Ligules ovate, membranous. Racemes 2, 2-8 cm long, slender, hairy; joints turbinate, 3-4 mm long, 3-angled, densely long ciliate on dorsal angle, shortly ciliate on inner angles, with a tooth like projection on inner side towards base. Sessile spikelets ovate-lanceolate or oblong-lanceolate, 4-5 mm long, awned; callus c. 1 mm long, sparsely bearded; lower glume ovate-lanceolate, 4-4.5 x 2-2.5 mm, bicuspidate, chartaceous or coriaceous, 9-11-nerved; upper glume boat-shaped or ovate-lanceolate, 4-5 x 1.5-2 mm, acuminate, aristate (arista 1-2 mm), chartaceous, 5-nerved, margins delicate, hyaline, and ciliate at the middle; lower floret male; upper floret bisexual; first lemma oblanceolate, 3.5-4 x 1-1.5 mm, chartaceous, 3-nerved, margins hyaline, ciliate towards apex; palea elliptic-lanceolate, 3-4 x 0.5-1 mm, chartaceous, 2-keeled, 2-nerved, margins infolded, delicate, hyaline; stamens 3, anthers 1.5-2 mm long, yellow; second lemma notched, 3-4 x 1 mm, awned, delicate, 3-nerved; awn 10-15 mm long, column 4-5 mm long, brownish; palea oblong-lanceolate, 3.5-4 x 0.5-1 mm, delicate, hyaline, 2-nerved; stamens 3, anthers 2-3 mm long, yellow; ovary oblong,

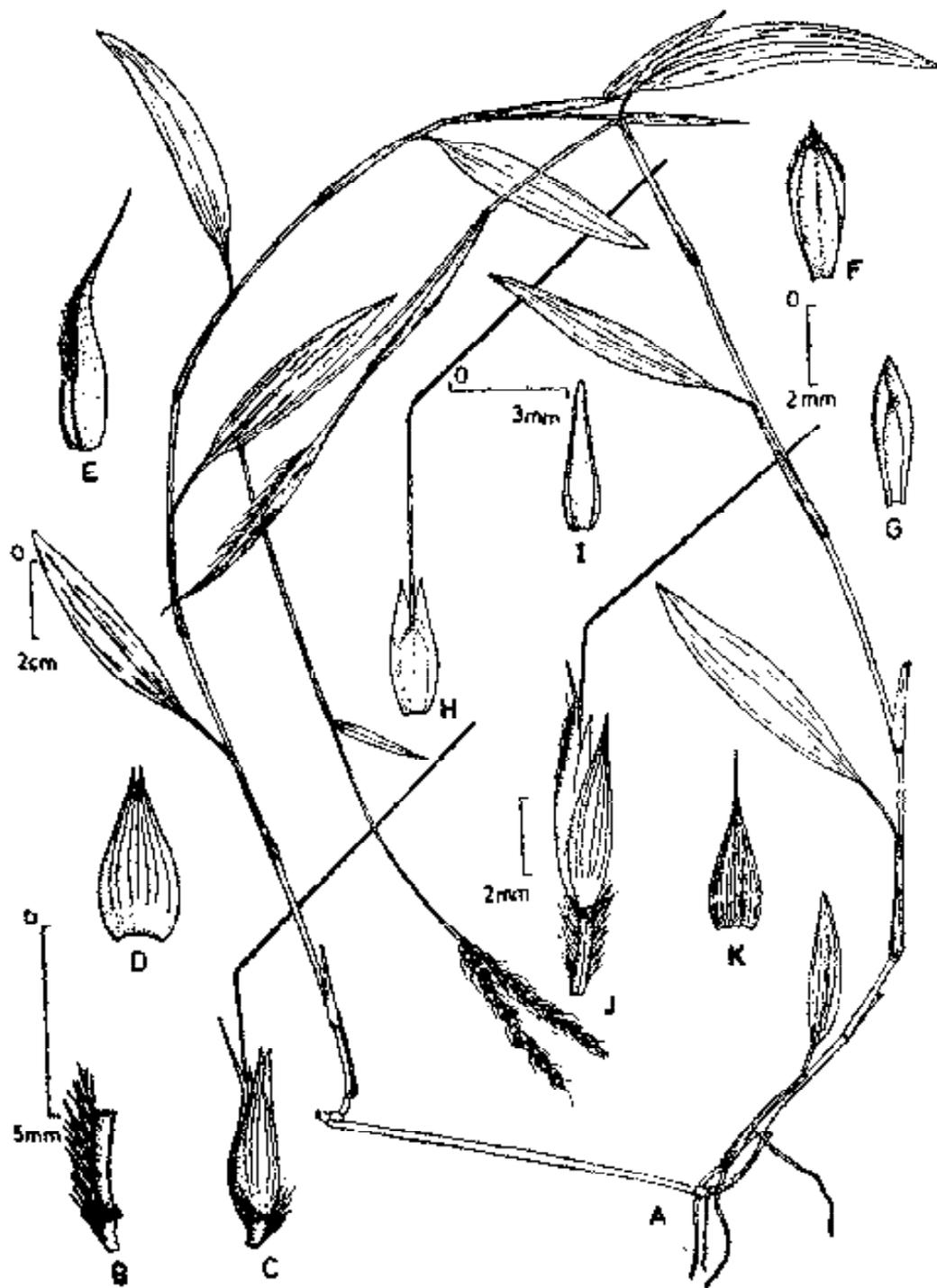


PLATE No. 36 : *ISCHAEMUM ZEYLANICOLUM* Bor

A. Habit; B. Joint of culm; C. Sessile spikelet; D. Lower glume of sessile spikelet; E. Upper glume; F. First lemma; G. Palea of the first lemma; H. Second lemma; I. Palea of the second lemma; J. Pedicelled spikelet; K. Lower glume of pedicelled spikelet.

c. 0.5 mm long; styles 1-1.5 mm long; stigmas 1.5-2 mm long, violet. Pedicelled spikelets oblong-lanceolate or elliptic-lanceolate, 4-5 mm long, awned; pedicels turbinate, 2-3 mm long, densely hairy; lower glume ovate-lanceolate, 3-4 x 1-1.5 mm (excl. an arista of c. 1 mm long), acuminate, aristate, chartaceous, 11-13-nerved; upper glume and florets similar to those of the sessile spikelets.

Common along the margins of forests, scrub jungles and groves, usually in shades.

Fl. & Fr. : October-March.

Notes : This species was so far reported only from Bombay and Ceylon. Recently, after a critical examination of the sheets in MH, V.J. Nair & Ramachandran (*l. c.*) segregated the wrongly identified specimens and reported its occurrence in Kerala. This report extends its known distribution to southern regions of India.

I. zeylanicum is nearer to *I. timorense*, but can be identified easily by the distinctly petiolate lower leaves, longer joints of racemes with a tooth like projection on inner side and glabrous glumes. It is also related to *I. thomsonianum*, but differs by the petiolate lower leaves and winged upper glume of the sessile spikelet.

CANNANORE : Cherkafa, Taliparamba; IDUKKI : Korthode, Peermade, Sabarimala; MALAPPURAM : Mancheri; QUILON : on way to Sabarimala; WYNAD : Vayitri.

19. MICROSTEGIUM Nees

Nees in Lindley, *Nat. Syst.* ed. 2, 447, 1836; Fischer in Gamble, *Fl. Pres. Madr.* 1716, 1934 (Repr. ed. 3: 1190, 1957); Bor, *Grass. Bur. Cey. Ind. Pak.* 192, 1960; Sur in *J. Econ. Tax. Bot.* 6(1): 167, 1985. *Pollinia* Trin. in *Mem. Acad. Sci. Petersb.* ser. 6, 2(3): 306, 1832; Hook. f. *Fl. Brit. Ind.* 7: 109, 1896, pp.

A new genus of about 30 species mainly in tropical Asia, of which 5 species are found in India and 2 in Kerala.

This genus shows considerable variation in lower florets. In some species florets are well-developed and male, or reduced. Sometimes the lower lemma is present while palea is suppressed and vice versa.

Key to the species

- 1a. Joints of racemes linear-clavate, ciliate; upper glume strongly keeled, awned; stamens 3; awns slender; perennials *M. ciliatum* 1
- 1b. Joints of racemes filiform, glabrous; upper glumes rounded or weakly keeled, acute or acuminate; stamens 2; awns capillary; annuals *M. nudum* 2

1. *Microstegium ciliatum* (Trin.) A. Camus in Ann. Soc. Linn. Lyon, n.s. 68: 201. 1921; Fischer in Gamble, Fl. Pres. Madr. 1716. 1934 (Repr. ed. 3: 1190. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 193. 1960; Sur in J. Econ. Tax. Bot. 6(1): 169. 1985. *Pollinia ciliata* Trin. in Mem. Acad. Sci. Petersb. ser 6, 2(3): 306. 1832; Hook. f. Fl. Brit. Ind. 7: 116. 1896.

PLATE No. 37

Perennials. Culms 20-120 cm long, rambling, rooting at the lower nodes, nodes glabrous. Leaves elliptic-lanceolate or lanceolate, 2-15 x 0.2-1.2 cm, acuminate, narrowed and shortly petioled. Ligules obscure. Inflorescence of 3-15 subdigitate racemes. Racemes 2-12 cm long, flexuous; joints linear-clavate, 2-4 mm long, densely ciliate in 2 rows. Sessile spikelets oblong-lanceolate, 4-5 mm long, awned; callus sparsely villous; lower glume oblong-lanceolate or lanceolate, 4-5 x 0.5-1 mm, notched at apex, chartaceous, 5-nerved, dorsally grooved, margins infolded, keels ciliate towards apex; upper glume lanceolate, 3-4 x 0.5 mm, acuminate shortly awned, strongly keeled on dorsal side, chartaceous, 3-nerved, awn 1-2 mm long, margins infolded, hyaline, ciliate; lower floret absent; upper floret bisexual; lemma ovate-lanceolate, 0.5-1 x 0.5 mm, awned, chartaceous; awn 6-15 mm long, slender; column 2-3 mm long, brownish; palea ovate, acute, c. 0.5 x 0.25 mm, hyaline or chartaceous; lodicules 2, obovate, c. 0.5 x 0.25 mm, faintly 2-3-nerved; stamens 3, anthers c. 1 mm long, yellow; ovary oblong, c. 0.5 mm long, styles 1-2 mm long, stigmas 1-1.5 mm long, cream. Pedicelled spikelets lanceolate, 4-5 mm long, pedicels 2-3 mm long, densely ciliate; callus densely villous; lower glume similar to that of sessile spikelet, but flat; upper glume and florets similar.

Fairly common along the banks of streams and rivulets in scrub jungles and fringes of forests, usually in shades.

Fl. & Fr. : July-December.

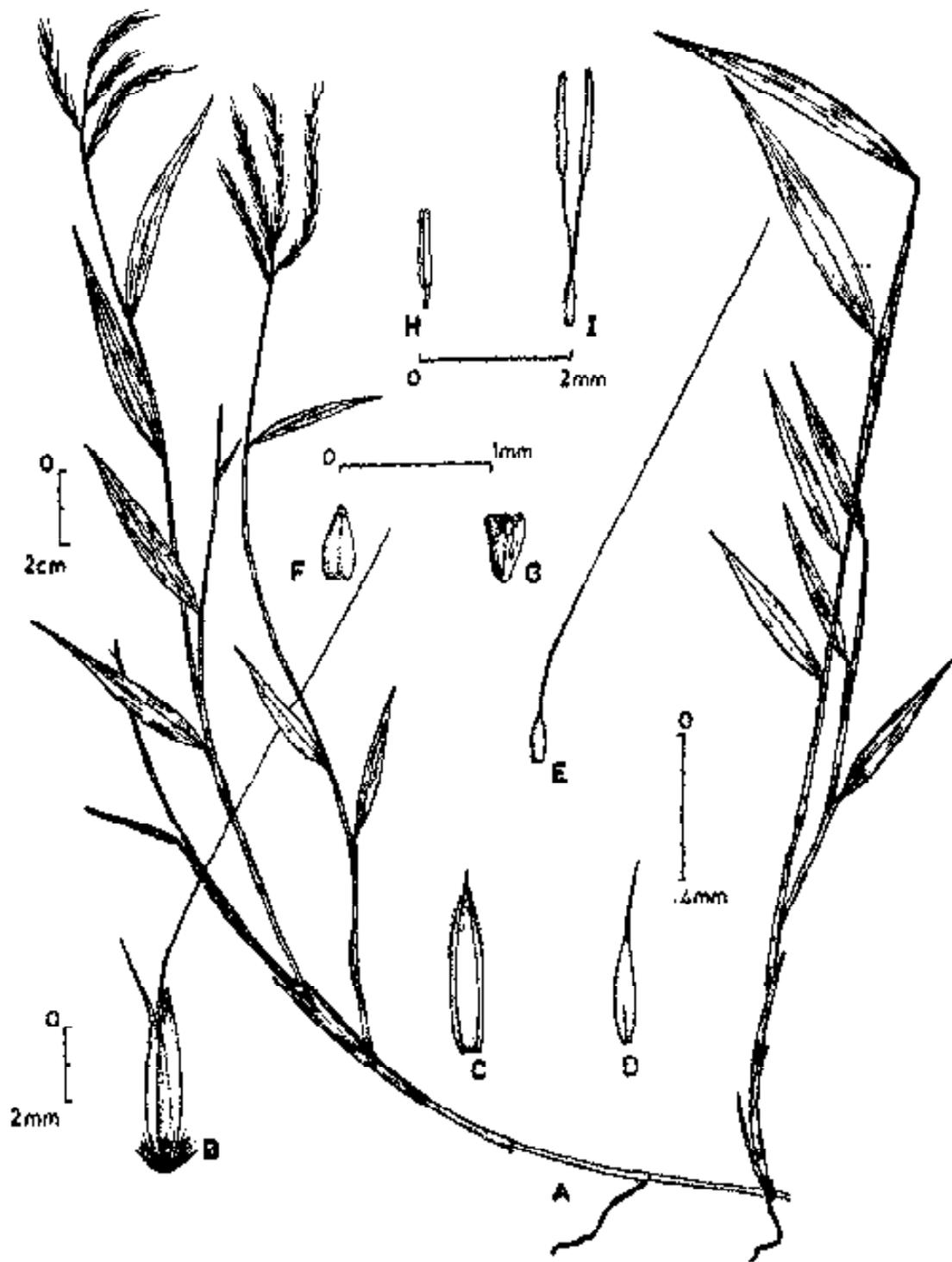


PLATE No. 37 : *MICROBRYEGIUM CILIATUM* (Trin.) A. Camus

A. Habit; B. Sessile spikelet; C. Lower glume; D. Upper glume;
 E. Lemma; F. Palea; G. Lodicula; H. Stamen; I. Pistil.

Notes : It is a highly variable species. The size and shape of leaves vary considerably. The number of racemes and the hairiness of the joints and pedicels also show certain variations.

DUKKI : Azhutha, Mukkuzhi, Sabarimala; QUILON : Aranamudi, Meenar water-falls.

2. *Microstegium nudum* (Trin.) A. Camus in Ann. Soc. Linn. Lyon, n. s. 68: 201, 1921; Fischer in Gamble, Fl. Pres. Madr. 1716. 1934 (Repr. ed. 3: 1190. 1957); Bor. Grass. Bur. Cey. Ind. Pak. 194. 1960; Sur in J. Econ. Tax. Bot. 6(1) : 172. 1985. *Pollinia nuda* Trin. in Mem. Acad. Sci. Petersb. ser. 6, 2: 307. 1832; Hook. f. Fl. Brit. Ind. 7: 117. 1896.

Annuals. Culms 10-40 cm long, slender, creeping, rooting at nodes; nodes glabrous or softly villous. Leaves elliptic-lanceolate or ovate-lanceolate, 1-8 x 0.3-1 cm, narrowed at base, undulate on one margin especially towards base. Sheaths ciliate along one margin. Ligules ovate, membranous; inflorescence of 3-12 subdigitate racemes which are usually perpendicular to the axis. Racemes 2-10 cm long, slender, filiform; joints linear, 4-5 mm long, slender, glabrous. Sessile spikelets lanceolate, 3-4 mm long, awned; callus sparsely bearded; lower glume ovate-lanceolate, 3-4 x 1 mm, acuminate, chartaceous, 5-7-nerved, dorsally grooved, shortly bifid at apex; upper glume lanceolate, 3-3.5 x 1 mm, acuminate, chartaceous, 3-nerved; lower floret empty; upper floret bisexual; first lemma ovate-lanceolate, 2-3 x 1 mm, delicate, hyaline, glabrous; second lemma notched, 1.5-3 mm, awned, delicate, awn 6-20 mm long, very slender, capillary, sometimes curly; stamens 2, anthers c. 0.5 mm long, cream or yellow; ovary oblong, c. 0.5 mm long, styles 1-2 mm long, stigmas 1-2 mm long, white. Pedicelled spikelets similar in size and structure of sessile ones; pedicels 2-3 mm long, glabrous.

Occasional along moist hill slopes and shady places.

Fl. & Fr. : July - December.

Notes : This species can be distinguished from *M. ciliatum*, by its slender habit, glabrous joints and pedicels and long capillary awns. Here lower floret is represented by a hyaline lemma while in *M. ciliatum* it is absent. This grass often grows in moist shady situations.

IDUKKI : Munnar.

20 MNESITHEA Kunth

Kunth, Rev. Gram. 1: 153. 1829; Bor, Grass. Bur. Cey. Ind. Pak. 196. 1960.

A genus of 6 species in Southeast Asia, of which 1 occurs in India and Kerala.

Mnesithea laevis (Retz.) Kunth, Rev. Gram. 1: 154. 1829; Fischer in Gamble, Fl. Pres. Madr. 1761. 1934 (Repr. ed. 3: 1220. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 344. 1960. *Rottboellia laevis* Retz. Obs. Bot. 3: 11. 1783. *R. perforata* Roxb. Pl. Corom. 2: 43, t. 182. 1798; Hook. f. Fl. Brit. Ind. 7: 158. 1896.

Perennials. Culms 20-150 cm high, erect, rhizomatous; nodes glabrous. Leaves oblong-lanceolate, lanceolate or linear, 2-50 x 0.2-0.8 cm, flat, blunt or shortly acute at apex. Ligules membranous, thin, truncate. Spikes terminal and axillary, 3-20 cm long, ending with narrow tails of almost barren spikelets. Joints 4-8 mm long, hollow, with a pair of sessile spikelets at each node. Spikelets all sessile, pedicelled ones reduced, oblong, 3-5 mm, awnless, sunken in cavities of rachis. Lower glume oblong, 3-5 x 1-1.5 mm, coriaceous, 5-7-nerved, nerves visible only on inner side. Upper glume oblong, 3.5-5 x 1.5-2 mm, delicate, hyaline, faintly 3-nerved. Lower floret empty. Upper floret bisexual. First lemma oblong, 3-4.5 x 1-1.5 mm, acute, delicate, hyaline, faintly 2-3-nerved. Second lemma oblong, 3-4 x 1-1.5 mm, delicate, hyaline, faintly 3-nerved. Palea oblong, 2.5-3.5 x 1 mm, delicate, hyaline. Stamens 3, anthers 2-3 mm long. Ovary oblanceolate, 0.3-0.5 mm long; styles c. 0.5 mm; stigmas 1-1.5 mm long.

Occasional along the coastal zones, usually in dry sandy soil, sometimes occur along hill slopes of higher elevations also.

Fl. & Fr. : August-January.

TRIVANDRUM : Nagercoil border.

21. POGONATHERUM P. Beauv.

P. Beauv. Ess. Agrost. 56, 176, t. 11/7. 1812; Bor, Grass. Bur. Cey. Ind. Pak. 200. 1960; Sur in J. Econ. Tax. Bot. 6(3) : 663. 1985.

A genus of about 4 species in Southern Asia and Australia, all of which occur in India and 2 in Kerala.

Key to the species

- 1a. Spikelets 2.5-3 mm long; callus hairs of the pedicelled spikelets up to 2 mm long; lower floret male; upper floret with 2 stamens; awns 10-15 mm long
P. paniceum 2
- 1b. Spikelets up to 2 mm long; callus hairs of the pedicelled spikelets 2-4 mm long; lower floret empty; upper floret with 1 stamen; awns 20-30 mm long
P. crinitum 1

1. ***Pogonatherum crinitum*** (Thunb.) Kunth, Enum. Pl. 1: 478, 1833; Hook. f. Fl. Brit. Ind. 7: 141, 1896; Bor. Grass. Bur. Cey. Ind. Pak. 200, 1960; Sur in J. Econ. Tax. Bot. 6(3): 665, 1985. *Andropogon crinitus* Thunb. Fl. Jap. 40, t. 7, 1784. *Pogonatherum paniceum* auct. non (Lam.) Hack. 1906: Alst. Suppl. Fl. Cey. 330, 1931; Fischer in Gamble, Fl. Pres. Madr. 1713, 1934 (Repr. ed. 3: 1188, 1957). PLATE No. 38

Perennials. Culms densely tufted with thick woody root-stock, 10-40 cm high, erect; nodes sparsely villous or glabrous. Leaves elliptic-lanceolate or lanceolate, 1-8 x 0.1-0.4 cm, narrowed at base. Sheaths slightly keeled, villous towards mouth along one margin. Ligules membranous, thin, fimbriate. Raceme solitary, 0.5-3.5 cm long, slender; joint turbinate, 0.5-1 mm, densely ciliate along the angles. Sessile spikelets lanceolate, 1.5-2 mm long, awned, cream-yellow; lower glume oblong, 1-1.5 x 0.5 mm, truncate and ciliate at apex, chartaceous, slightly 2-keeled, 2-nerved; upper glume boat-shaped or ovate-lanceolate, 1.5-2 x 0.5-1 mm, awned, chartaceous, 3-nerved, awns 15-25 mm long; lower floret empty; upper floret bisexual; first lemma ovate-oblong, c. 1 x 0.5 mm, obtuse at apex, hyaline, 1-nerved; palea absent; second lemma notched, 1-1.5 x 0.5 mm, awned, delicate, 1-nerved; awn 20-30 mm long, slender; palea ovate-oblong, c. 1 x 0.5 mm, rounded or truncate at apex, hyaline, 2-keeled, 2-nerved; stamen 1, anthers c. 1 mm long, pale yellow; ovary elliptic, 0.1-0.2 mm long, styles 0.5-1 mm, stigmas c. 1 mm long, cream coloured. Pedicelled spikelets similar; callus hairs 2-4 mm long.

Very common on broken compound walls, hill slopes, rocky places and crevices of moist rocks; usually in shade.

Fl. & Fr. : Throughout the year.

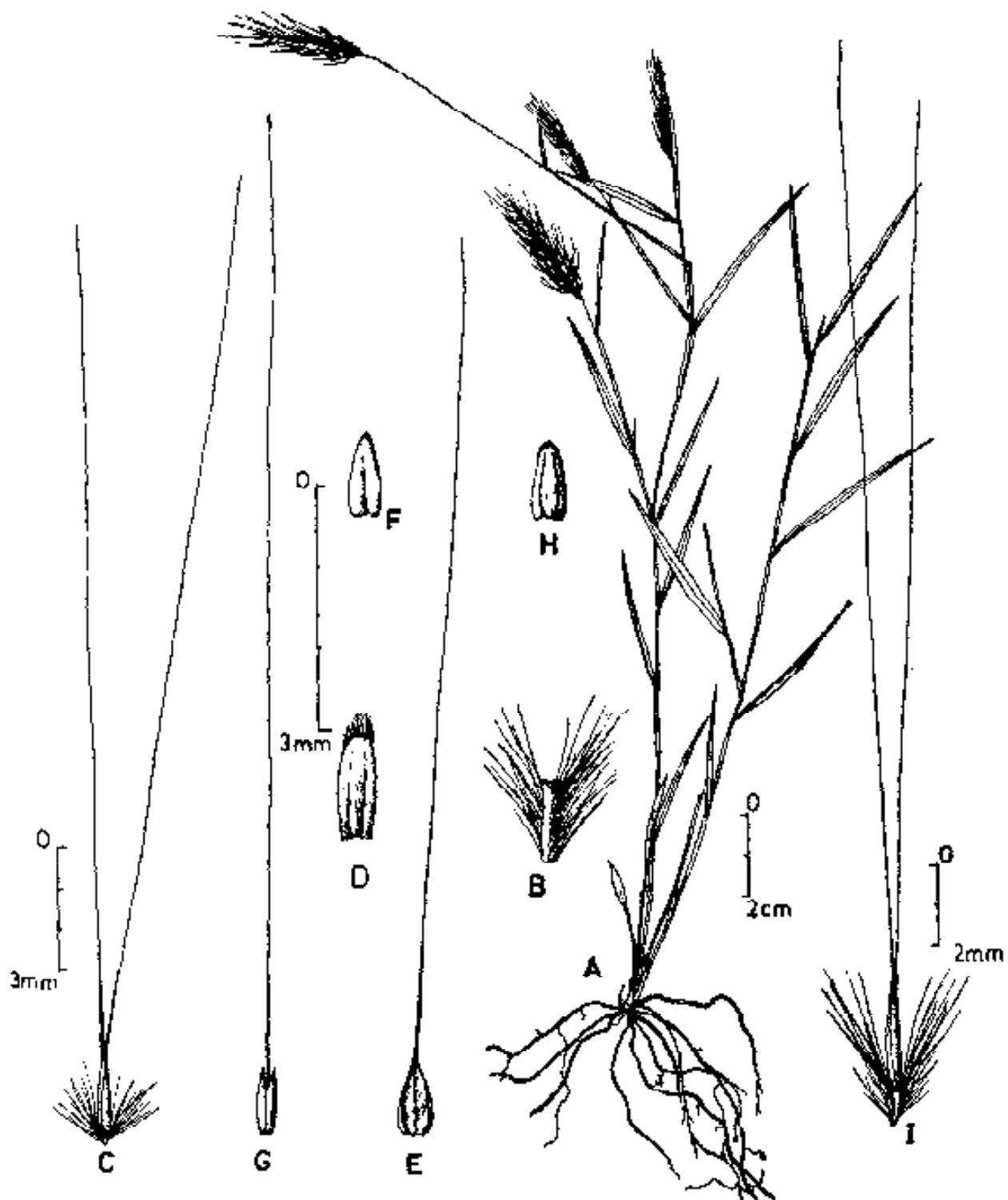


PLATE No. 38: *POGONATHERUM CRINITUM* (Thunb.) Kunth

A. Habit; B. Joint of raceme; C. Sessile spikelet; D. Lower glume of sessile spikelet; E. Upper glume; F. First lemma; G. Second lemma; H. Palea of the second lemma; I. Pedicelled spikelet.

Notes : This species is closely related to and often confused with *Pogonatherum paniceum*, but differs by the smaller spikelets, empty lower florets, solitary stamen of the upper floret and longer callus hairs and awns.

It is very difficult to distinguish these two species in the field. Several specimens in MH were wrongly identified and kept under *P. paniceum*, a rare plant and a probable introduction. *P. crinitum* is rather common and less robust.

IDUKKI : Munnar, Vafanchakkanum; MALAPPURAM : Mancheri; PALGHAT : Silent-Valley; QUILON : Perumthenaruvu; TRIVANDRUM : Bonecord; WYNAD : Chandanathode, Tambracherri, Vayitiri.

2. *Pogonatherum paniceum* (Lam.) Hack, in Allg. Bot. z. 12, 178, 1906; Bor. Grass. Bur. Cey. Ind. Pak. 202, 1960; Cope in Nasir & Ali, Fl. Pak. 143, 271, 272, t. 29(1-2), 1982; Sur in J. Econ. Tax. Bot. 6(3): 686, 1985. *Saccharum paniceum* Lam. Encycl. Meth. Bot. 1: 595, 1785 et Tab. Encycl. 1: t. 40/3, 1791, *Pogonatherum saccharoideum* P. Beauv. Ess. Agrost. 176, 177, 1812; Hook. f. Fl. Brit. Ind. 7: 141, 1850.

Perennials. Culms 15-50 cm high, erect, tufted with a woody rootstock; nodes glabrous or sparsely bearded. Leaves lanceolate or linear-lanceolate, 2-8 x 0.1-0.3 cm. Sheaths keeled, villous towards mouth. Ligules obscure. Raceme solitary, 1-4 cm long, yellowish or cream. Joints turbinate, 1-1.5 mm long, densely ciliate along angles. Sesale spikelets lanceolate or oblong-lanceolate, 2.5-3 mm, awned; callus hairs 0.5-2 mm long; lower glume oblong, 2-2.5 x 0.6-1 mm, 2-3-lobed, or denticulate and densely ciliate at apex, chartaceous, slightly 2-keeled, 2-nerved, upper glume boat-shaped or ovate-lanceolate when spread, 2-3 x 1 mm, awned, keeled on dorsal side, chartaceous, margins hyaline; awn 10-15 mm long, slender; lower floret male; upper floret bisexual; first lemma oblong, c. 2 x 0.5 mm, truncate and ciliate at apex, hyaline, slightly keeled, 2-nerved; palea linear-oblong, 1.5-2 x 0.5 mm, delicate, hyaline; stamens 2, anthers c. 1 mm long; second lemma notched, awned, 1.5-2 x 0.5 mm, hyaline; awn 10-15 mm long slender; palea ovate-oblong, c. 2 x 1 mm, truncate, fimbriate at apex, hyaline, slightly 2-keeled, 2-nerved; stamens 2, anthers 1-1.5 mm long; ovary linear-oblong, c. 0.2 mm, styles 0.5-1 mm, stigmas 1-2 mm long. Pedicelled spikelets lanceolate, 2-2.5 mm, awned; pedicels linear-turbinate, 1-2 mm long; ciliate along angles; glumes and florets more or less similar to those of the sesale spikelets.

Rare, in dry rocky places and hill slopes.

Fl. & Fr. : May June.

Notes : This grass is extensively cultivated as an ornamental in gardens, due to its peculiar tillering and foliage. The densely tufted culms and small dark green leaves give a 'mini bamboo' like appearance.

ALLEPPEY : Champakkulam.

22. PSEUDANTHISTIRIA (Hack.) Hook. f.

Hook. f. *Fl. Brit. Ind.* 7: 219. 1896; *Bor. Grass. Bur. Cey. Ind. Pak.* 203. 1960.

A genus of about 5 species distributed in the tropics and subtropics of the World, of which about 4 species occur in India and 3 in Kerala. This genus is allied to *Themeda* Forssk. and may often get confused with it.

Key to the species

- 1a. Culms creeping below and rooting at the lower nodes, weak, slender; leaves elliptic or elliptic-lanceolate or rarely lanceolate; pedicelled spikelets 4-6 mm long *P. umbellata* 3
- 2b. Culms erect, robust, stouter; leaves linear, linear-lanceolate or lanceolate; pedicelled spikelets 2-4 mm long:
 - 2a. Leaves up to 8 cm long, 3 mm wide; spathes setose with stiff hairs from minute tubercles; lower glume of the sessile spikelets shortly hinged *P. heteroclita* 1
 - 2b. Leaves up to 20 cm long, 8 mm wide; spathes densely setose with stiff hairs from rather large, often dark-coloured tubercles; lower glume of the sessile spikelet more or less glabrous *P. hispida* 2

- 1. ***Pseudanthistiria heteroclita* (Roxb.) Hook. f.** *Fl. Brit. Ind.* 7: 219. 1896; Fischer in Gamble, *Fl. Pres. Madr.* 1749. 1934 (Repr. ed. 3: 1212. 1957); *Bor. Grass. Bur. Cey. Ind. Pak.* 203. 1960. *Anthistiria heteroclita* Roxb. *Fl. Ind.* 1: 253. 1820.

Perennials. Culms 15-50 cm high, erect or geniculate, tufted; nodes glabrous. Leaves lanceolate or linear-lanceolate, 2-6 x 0.1-0.3 cm, acuminate, rounded at base or shallowly cordate, midrib

prominent, sparsely hairy. Sheaths keeled. Ligules truncate, fimbriate, membranous. Panicles 5-15 cm long, with loose clusters of spikelets. Sessile spikelets 2-3 in a raceme, linear-oblong, awned, 2-3 mm long; callus bearded with soft, shaggy hairs; lower glume oblong, 2-3 x 1 mm, truncate, subcoriaceous, shortly hispid; upper glume linear-oblong, 2-3 x 0.5 mm, acute, keeled, subcoriaceous, 3-nerved; lower floret wanting; upper floret bisexual; second lemma stipitate 1-2 mm long hyaline base of the awn, awns 15-20 mm long, slender; stamens 3, anthers 1-1.5 mm long; pistil very short. Pedicelled spikelets 1-3 in a raceme, elliptic, 2-3 mm long, awnless; pedicels 0.5-1 mm long; lower glume elliptic, 2-3 x 1 mm, chartaceous, 11-nerved, sparsely hairy; upper glume elliptic, 2-3 x 1 mm, shortly acuminate, chartaceous, 3-nerved, margins hyaline; upper floret empty or male; stamens 3, anthers 1-1.5 mm long.

Occasional, along open grasslands, hill slopes, in shades of bushes often found growing gregariously on recently exposed soil.

Fl. & Fr. : November - December.

Notes : This species is very close to *Pseudanthistiria hispida* and may often be confused with it in the field, but can be differentiated from the other by the slender habit, hispid lower glumes of the sessile spikelets and minutely tubercled hairs of the spathes. This grass is said to be used for thatching.

CANNANORE : Pilicoda.

2. *Pseudanthistiria hispida* Hook. f. *Fl. Brit. Ind.* 7: 219, 1896; Fischer in Gamble, *Fl. Pres. Madr.* 1749, 1934 (Repr. ed. 3: 1212, 1957); Bor, *Grass, Bur. Cey. Ind. Pak.* 203, 1960.

Annuals or perennials. Culms 30-100 cm high, tufted, erect or geniculate; nodes glabrous. Leaves lanceolate or linear-lanceolate, 5-20 x 0.2-0.8 cm, acuminate, rounded at base, midrib prominent, hirsute. Sheaths keeled. Ligules truncate, membranous. Panicles 10-25 cm long, narrow, congested, leafy. Sessile spikelets 1-2 in a raceme, linear-oblong, 2-3 mm long, awned, callus softly hairy; lower glume oblong or elliptic-oblong, 2-3 mm long, subcoriaceous, glabrous; upper glume linear-oblong, 2-3 mm long, acute, chartaceous, 3-nerved, keeled; lower floret wanting; upper floret bisexual; second lemma stipitate 1-2 mm long hyaline base of the awn, 1-nerved, awned, awn 20-25 mm long, slender; stamens 3, anthers c. 1 mm long. Pedicelled spikelets 2-3 in a raceme, elliptic, 3-4 mm long, awnless, softly hairy; pedicels 1-1.5 mm long, hairy; lower glume elliptic, 3-4 x 1 mm, chartaceous, up to

11-nerved, sparsely hairy with tubercled hairs; upper glume elliptic-lanceolate, 3-3.5 x 1 mm, chartaceous, 3-nerved, margins hyaline; upper floret male; stamens 3, anthers 1-1.5 mm long.

Frequent, along open grasslands, grassy hill slopes, forming pure strands in waste places after the first rain.

Fl. & Fr. : November-January.

CANNANORE : Pilicode.

3. *Pseudanthistiria umbellata* (Hack.) Hook. f. *Fl. Brit. Ind.* 7: 220. 1896; Fischer in Gamble, *Fl. Pres. Madr.* 1749. 1934 (Repr. ed. 3: 1212. 1957); Bor, *Grass. Bur. Cey. Ind. Pak.* 204. 1960; Manilal & Sivaraj, *Fl. Calic.* 336. 1982. *Andropogon umbellatus* Hack. in DC. *Monogr. Phan.* 6: 401. 1889.

Annuals. Culms 20-150 cm long, creeping or decumbent, rooting at the lower nodes, violet or purplish; nodes glabrous. Leaves elliptic, elliptic-lanceolate or lanceolate, 1-10 x 0.2-0.8 cm, acuminate, rounded at base. Sheaths slightly keeled. Ligules truncate, membranous. Panicles 10-40 cm long, loose. Sessile spikelets 2 in a raceme, oblong or linear-oblong, awned, 3-4 mm long; callus bearded with white shaggy hairs; lower glume elliptic-oblong, 3-4 x 1 mm, truncate, subcoriaceous, faintly 5-7-nerved, glabrous; upper glume elliptic-lanceolate, 3-4 x 0.5 mm, chartaceous, dorsally keeled, 3-nerved; lower floret wanting; upper floret bisexual; second lemma oblanceolate or stipitate 2-3 mm long hyaline base of the awn, 1-nerved; awn 15-30 mm long, slender; stamens 3, anthers 1-2 mm long; ovary oblong, *c.* 0.5 mm, styles 1-1.5 mm long, stigmas 1.5-2 mm long. Pedicelled spikelets 3 in a raceme, narrowly elliptic-lanceolate, 4-6 mm long, awnless; pedicels 1-2 mm long, hairy; lower glume elliptic-lanceolate, 4-6 x 1 mm, chartaceous, 11-nerved, softly hairy or glabrous; upper glume elliptic or elliptic-lanceolate, 4-5 x 1 mm, chartaceous, 3-nerved; upper floret male; lodicules 2, obovate, 2-horned, *c.* 0.5 x 0.3 mm; stamens 3, anthers 2-3 mm long.

Very common, along the hill slopes, scrub jungles, margins of the forests, dry open grasslands, preferably in shades.

Fl. & Fr. : November-March.

Notes : This very common species can be distinguished from all other species of the genus by its slender, creeping habit and short

elliptic or elliptic-lanceolate leaves. Seems to be endemic to southern India.

CANNANORE : Taliparamba; IDUKKI : Munnar, Peermade, Sabarimala; QUILON : Konni R.F.; TRIVANDRUM : Kottur R.F., Nedumangad, Nilamel; WYNAD : Chandanathode, Veyitiri.

23. PSEUDOSORGHUM A. Camus

A. Camus in Bull. Mus. Hist. Nat. Paris 26: 662. 1920; Bor, Grass. Bur. Cey. Ind. Pak. 205, 1960.

A monotypic genus of tropical Asia.

Pseudosorghum fasciculare (Roxb.) A. Camus in Bull. Mus. Hist. Nat. Paris 26: 662. 1920; Fischer in Gamble, Fl. Pres. Madr. 1734. 1934 (Repr. ed. 3: 1202. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 205. 1960. *Andropogon fascicularis* Roxb. Fl. Ind. 1: 269. 1920; Hook. f. Fl. Brit. Ind. 7: 117. 1896.

Perennials. Culms 50-150 cm high, erect, stout; nodes glabrous or softly hairy. Leaves linear-lanceolate, 15-40 x 0.4-0.8 cm, acuminate, midrib prominent. Sheaths covered with tubercled hairs towards the upper half, margins densely villous. Ligules ovate, 2-5 mm, acute, membranous. Panicles 5-15 cm long, open. Joints c. 3 mm, dorsally rounded, ventrally flat, densely bristly. Sessile spikelets lanceolate, 5-6 x 1 mm; callus densely villous; lower glume elliptic-lanceolate, c. 5 x 2 mm, truncate or slightly notched at apex, subcoriaceous, keels pectinate towards apex; upper glume lanceolate, c. 5 x 1.5 mm, subcoriaceous, faintly 7-nerved, dorsal side slightly keeled towards apex, glabrous; lower floret empty; upper floret bisexual; first lemma lanceolate or elliptic-lanceolate, 4-5 x 1 mm, delicate, 3-5-nerved, margins ciliate; second lemma notched, 3-4 x 1 mm, delicate; awn 15-25 mm long, column 8-12 mm long, brownish; stamens 3, anthers c. 1 mm long; ovary ovate, c. 0.5 mm, styles c. 1 mm long, stigmas c. 1 mm long. Pedicelled spikelets linear-lanceolate, 4-5 mm long, unawned; pedicels 3-4 mm long; lower glume linear-oblong, or elliptic-oblong, 4-5 x 1-1.5 mm, subcoriaceous, 11-13-nerved, keels pectinate towards apex; upper glume lanceolate, 4-5 x 1 mm, subcoriaceous, faintly 7-9-nerved, margins minutely ciliate; lower floret empty; upper floret male or empty.

Rare, along the fringes of forests, usually near streams and rivulets.

Fl. & Fr. : September - December.

TRICHUR : Parambikulam.

24. ROTTBOELLIA Linn. f.

Linn. f. Gram. Gen. 23. 1779; Hook. f. Fl. Brit. Ind. 7: 151. 1896; Bor, Grass. Bur. Cey. Ind. Pak. 206. 1960.

A genus of about 4 species in the Old World tropics, of which 2 occur in India and 1 in Kerala.

Rottboellia cochinchinensis (Lour.) W.D. Clayton in Kew Bull. 35(4): 817-818. 1981. *Stegosia cochinchinensis* Lour. Fl. Cochin. 1: 51. 1790. *R. exaltata* Linn. f. Suppl. Pl. 114. 1781, non (Linn.) Linn. f. Nov. Gram. Gen. 23. 37. 1779; Hook. f. Fl. Brit. Ind. 7: 156. 1896; Rang. & Tad. Handb. S. Ind. Grass. 176. t. 145. 1921; Fischer in Gamble, Fl. Pres. Madr. 1758. 1934 (Repr. ed. 3: 1219. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 206. t. 13. 1960; Manilal & Sivaraj. Fl. Calic. 332. 1982.

Annuals. Culms 30-150 cm high, supported below by stilt roots; nodes glabrous. Leaves linear-lanceolate, 3-60 x 0.3-2 cm, acuminate, narrowed or rounded at base, midrib prominent, basal sheaths covered with stiff tubercle-based bristles. Ligules ovate, membranous. Spikes terete, 3-15 cm long terminating in a tail of reduced spikelets. Joints hollow, 4-6 mm long, crustaceous, abscission oblique. sessile spikelets ovate, 3-4 mm long, sunken in cavities of joints, callus annular, glabrous; lower glume broadly ovate or ovate-oblong, 3-5 x 2-3 mm, coriaceous or crustaceous, faintly 13-15-nerved, nerves visible on innerside, pale yellow; upper glume boat-shaped, keeled, 3-5 x 2-4 mm, coriaceous, 11-13-nerved, mucous and narrowly winged at apex; lower floret male or rarely empty; upper floret bisexual; first lemma elliptic or ovate-lanceolate, 3-5 x 1-1.5 mm, mucous at apex, subcoriaceous; palea ovate-lanceolate, 3-4 x 1.5-2 mm, hyaline; lodicules 2, oblanceolate, 0.5-1.0 x 0.25-0.5 mm, oblique at apex; stamens 3, anthers 2-3 mm long; second lemma boat-shaped, 3-4 x 2-3 mm, delicate, hyaline; palea ovate-lanceolate, 3-4 x 1.5-2 mm, delicate, hyaline; stamens and lodicules similar to those of lower florets; ovary oblong, 0.25-0.5 mm long, styles 1-1.5 mm long, slender, stigmas 1-1.5 mm. Pedicelled spikelets ovate-lanceolate, oblong or elliptic, 3-5 mm long; pedicels clavate, 4-5 x 2 mm, flat, crustaceous or coriaceous, glabrous; lower glume elliptic-oblong, 3-5 x 1-1.5 mm, acute, chartaceous, 13-15-

nerved, dark-green; upper glume boat-shaped, 3-4 x 1 mm, chartaceous, 7-nerved.

Very common along the banks of backwaters, rivers, streams and canals, frequent along the margins of secondary forests where it grows in moist shady situations.

Fl. & Fr. : August-March.

Notes : This grass usually have a stilt root system, by which it survives in semi-aquatic habitats, usually in moist or water-logged fields. The basal sheaths here are densely clothed with sharp bristles, hence cows and buffaloes give little or no preference to this grass.

This species is considered one of the most troublesome weeds, Holm *et al.* (1977) say "many research reports express alarm over this weed. It seems to be a recent adventive in many crops and areas and is causing concern because of its destructiveness and rapid spread". It is regarded a serious weed in 8 countries.

CANNANORE: Elimala, Taliparamba; ERNAKULAM: Bhuthathanthottu; IDUKKI: Thannikkudi; MALAPPURAM: Mancheri; PALGHAT: Ayyappankovil, Panthanthode, Silent Valley; QUILON: Chalakkayam; TRICHUR: Mannuthi, Thunakkedavu; TRIVANDRUM: Kariavattom, Veli.

25. SACCHARUM Linn.

Linn. Sp. Pl. 1: 54, 1753; Gen. Pl. ed. 5: 28, 1754; Hook. f. Fl. Brit. Ind. 7: 118, 1896; Fischer in Gamble, Fl. Pres. Madr. 1708, 1934 (Repr. ed. 3: 1185, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 208, 1960.

A genus of about 40 species distributed in the tropics of the world, of which about 13 species occur in India and 2 in Kerala.

Key to the species

- 1a. Panicles 15-50 cm long; peduncles hairy below the panicles; wild grass
S. spontaneum 2
- 1b. Panicles very large, often over 50 cm long; peduncles glabrous below the panicles; cultivated grass
S. officinarum 1

1. *Saccharum officinarum* Linn. Sp. Pl. 54. 1753; Hook. f. Fl. Brit. Ind. 7: 118. 1896; Fischer in Gamble, Fl. Pres. Madr. 1709. 1934 (Repr. ed. 3: 1185. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 212. 1960.

The cultivated 'sugar cane', extensively grown in the hilly tracts and midlands of Kerala, especially in Quilon, Trivandrum, Pathanamthitta and Alleppey districts.

This tall grass can be recognised by its wider leaves, large inflorescence, awnless spikelets and glabrous glumes. The dried inflorescence can be dyed and used for decoration.

2. *Saccharum spontaneum* Linn. Mant. Pl. 2: 183. 1771; Hook. f. Fl. Brit. Ind. 7: 118. 1896; Rang. & Tad. Handb. S. Ind. Grass. 149. t. 129. 1921; Fischer in Gamble, Fl. Pres. Madr. 1709. 1934 (Repr. ed. 3: 1185. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 214. 1960; Manilal & Sivarej. Fl. Calic. 345. 1982.

Perennials. Culms 100-300 cm or more high, erect, rhizomatous, densely tufted; nodes glabrous or sparsely hairy. Leaves linear-lanceolate, 30-150 x 0.5-1.5 cm, acuminate, rounded at base, gradually tapering into a narrow wing on either side of the petiole, glaucous, serrulate along the margins. Sheaths densely silky villous at the collar around ligule. Ligules ovate, 3-6 mm long, acute, membranous. Panicles 15-30 cm long, densely silky villous; peduncles softly silky hairy below. Joints turbinate, 1.5-3 mm long, dilated at apex, densely long villous. Spikelets paired, one sessile and the other pedicelled, similar, lanceolate or oblanceolate, 3-4 mm long, reddish-brown, awnless; callus densely long villous. Lower glume ovate-lanceolate, 3-4 x 1 mm, acuminate, subcoriaceous below, chartaceous or delicate above, slightly 2-keeled, 2-3-nerved, margins delicate, hyaline, ciliate. Upper glume ovate-lanceolate, 3-4 x 1-1.5 mm, acuminate, chartaceous, dorsally keeled, 1-nerved, margins delicate, hyaline, ciliate. Lower floret empty. Upper floret bisexual. First lemma ovate-acute or elliptic, 2-2.5 x 1 mm, hyaline, 2-3-nerved, ciliate along the margins. Second lemma narrowly linear-lanceolate, 2-2.5 x 0.1 mm, hyaline. Lodicules 2, obovate, 2-horned at apex, ciliate, 0.3-0.5 mm long. Stamens 3, anthers 1-2 mm long, yellow or reddish. Ovary oblong-elliptic, c. 0.25 mm long; styles 0.5-1.5 mm long; stigmas 0.5-1 mm, white. Pedicelled spikelets similar to sessile ones. Pedicels turbinate, 0.5-1 mm long, dilated at apex, densely villous.

Fairly common, along the banks of backwaters; rivers, pools and ponds, rarely along the fringes of forests.

Fl. & Fr. : Throughout the year, at the end of rains.

Notes : This grass is very difficult to be uprooted due to its thick, rhizomatous root-stock and acts as an effective soil binder.

ERNAKULAM : Cochin; IDUKKI : Mundakkayam; PALGHAT : Waiyay; QUILON : Moozhiyar, Perumthenaruvi; TRICHUR : Kanjany.

26. SCHIZACHYRIUM Nees

Nees, *Agrost. Brass.* 331, 1829; *Bor. Grass. Bur. Cey. Ind. Pak.* 214, 1960.

A genus of about 50 species distributed in the tropics of the World, of which 6 species occur in India and 2 in Kerala.

Key to the species

- 1a. Leaves rounded at apex; joints of racemes 2-toothed at apex, 1-3 mm long, glabrous; spikelets more or less glabrous; glumes chartaceous, more or less glabrous *S. brevifolium* 1
- 1b. Leaves acuminate at apex; joints of racemes irregularly denticulate at apex, 4-6 mm long, densely villous; spikelets hairy; glumes coriaceous, villous *S. exile* 2

1. *Schizachyrium brevifolium* (Sw.) Nees ex Bueso in *Miq. Plant. Junghn.* 359, 1854; Fischer in *Gamble, Fl. Pres. Madr.* 1752, 1934 (Repr. ed. 3: 1214, 1957); *Bor. Grass. Bur. Cey. Ind. Pak.* 215, 1960. *Andropogon brevifolius* Sw. *Prodr. Veg. Ind. Occ.* 26, 1788; Hook. f. *Fl. Brit. Ind.* 7: 165, 1896. PLATE No. 39.

Annuals. Culms 15-50 cm high, erect or geniculate, nodes glabrous. Leaves oblong or oblong-lanceolate, obtuse and rounded at apex, rounded at base. Sheaths sharply keeled. Ligules membranous, thin, fimbriate. Racemes 1-4 cm long, slender, hardly exserted. Joints linear-clavate, 1-3 mm long, chartaceous, 2-toothed at apex. Sessile spikelets lanceolate, 2-4 mm long, awned; callus sparsely bearded; lower glume lanceolate, 2-3.5x0.5 mm, shortly bifid at apex, chartaceous, faintly 3-5-nerved; upper glume boat-shaped or lanceolate, 2-4 x 0.5-1 mm, keeled on dorsal side, chartac-

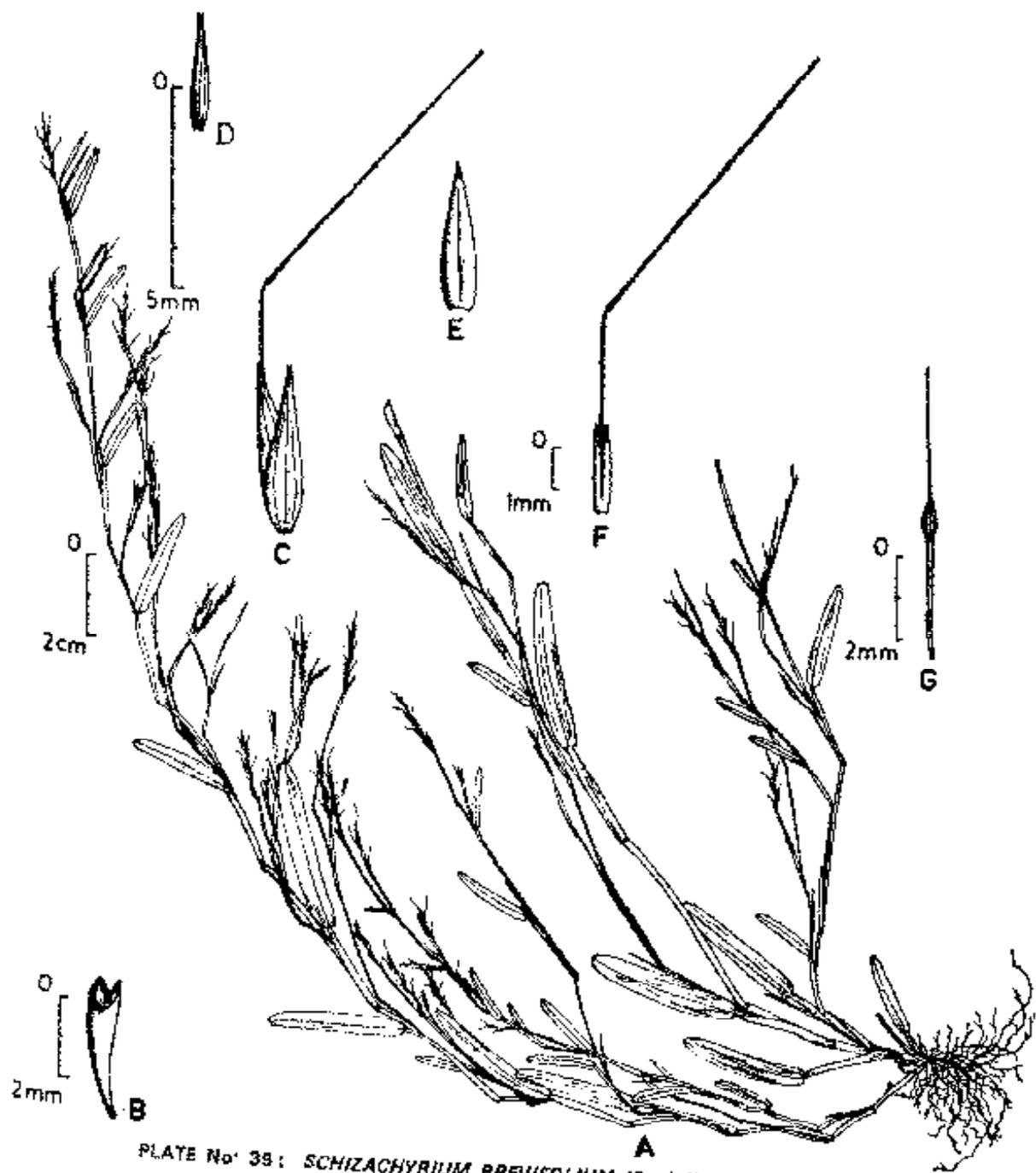


PLATE No. 39: *SCHIZACHYRIUM BREVIFOLIUM* (Sw.) Nees ex Buss

A. Habit; B. Joint of raceme C. Sessile spikelet; D. Lower glume of sessile spikelet; E. Upper glume; F. Lemma; G. Pedicelled spikelet.

eous, 1-nerved, margins hyaline; lower floret empty; upper floret bisexual; first lemma oblong-lanceolate, 1.5-2 x 0.5 mm, hyaline, 2-keeled, 2-nerved; palea absent; second lemma deeply notched, awned, 1.5-2.5 x 0.5 mm, lobes acuminate, hyaline; awn 6-12 mm long, column c. 4 mm long, brownish; palea absent or obscure; stamens 3, anthers 0.25-1 mm long; ovary oblong, c. 0.25 mm, styles 0.25-0.5 mm, stigmas c. 0.5 mm long. Pedicelled spikelets reduced to aristate glumes, ovate-lanceolate or lanceolate, 0.5-1 mm, arista 2-3 mm long; pedicels linear, 1.5-3 mm, glabrous.

Rare, along the bunds of cultivated lands, hill-slopes and open grasslands.

Fl. & Fr. : November-December.

QUILON : Near Kufathupuzha.

2. *Schizachyrium exile* (Hochst.) Stapf in Prain, Fl. Trop. Afr. 9: 191, 1917; Fischer in Gamble, Fl. Pres. Madr. 1752. 1934 (Repr. ed. 3: 1214, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 216, 1960. *Andropogon exilis* Hochst. in Flora 27: 241, 1844; Hook. f. Fl. Brit. Ind. 7: 166, 1896.

Annuals. Culms 10-80 cm high, densely tufted, erect or geniculate, turning red when dried; nodes glabrous. Leaves lanceolate or linear-lanceolate, 1-10 x 0.1-0.4 cm, acuminate, rounded or shallowly cordate at base. Sheaths sharply keeled. Ligules truncate, thin, membranous. Racemes 1-3 cm long, in fascicles of peduncles from the spathe, concealed or hardly exerted from it. Joints clavate or terete, 4-5 mm long, oblique and denticulate, densely villous. Sessile spikelets lanceolate or linear-lanceolate, 4-5 mm long, awned, densely villous; callus shortly bearded; lower glume lanceolate or oblong-lanceolate, 4-5 x 0.5-1 mm, acuminate, shortly bifid at apex, coriaceous, faintly 3-5-nerved, slightly 2-keeled, villous; upper glume boat-shaped, lanceolate when spread, 4-5 x 0.5-1 mm, acuminate or shortly aristate, subcoriaceous or chartaceous, keeled, 1-3-nerved, margins hyaline; lower floret empty; upper floret bisexual; first lemma lanceolate, 3.5-4.5 x 1 mm, hyaline, 3-nerved, ciliolate; palea absent; second lemma deeply notched, awned, 3-4 x 1 mm, lobes acuminate, hyaline; awn 10-15 mm long, column 4-5 mm, chestnut brown; stamens 3 or 2, 1-1.5 mm long; ovary oblong, c. 0.5 mm, styles 0.5-1 mm, stigmas 0.5-1 mm long. Pedicelled spikelets reduced, glume lanceolate, c. 1 mm long, aristate, arista 3-5 mm long, pedicels linear-oblong, 3-4 mm long, flat, densely villous.

Rare, along the roadsides and grassy hill slopes, usually as undergrowth among shrubs and tall grasses. A shade loving species.

Fl. & Fr. : September - December.

TRIVANDRUM : Kariavattom, Nadayara.

27. SEHIMA Forssk.

Forssk. *Fl. Aegypt. -Arab.* 178, 1775; *Bor. Grass. Bur. Cey. Ind. Pak.* 217, 1960.

A genus of about 7 species distributed in the tropics of the Old World, of which 4 occur in India and one in Kerala.

It is one of the most difficult genera to key out at the generic as well as specific level, but can be recognised by the peculiar lyriform venation of the lower glume and easily disarticulating groups of spikelets.

Sehima nervosum (Rottl.) Stapf in Prain, *Fl. Trop. Afr.* 9: 36, 1917; Fischer in Gamble, *Fl. Pres. Madr.* 1724, 1934 (Repr. ed. 3: 1195, 1957); *Bor. Grass. Bur. Cey. Ind. Pak.* 218, 1960. *Andropogon nervosus* Rottl. in Vehr. *Ges. Naturf. Freunde Berl. neue Schr.* 4: 218, 1803. *Ischaemum laxum* R. Br. *Prodr.* 205, 1810; Hook. f. *Fl. Brit. Ind.* 7: 136, 1896; Shukla & Jain in *Bull. Bot. Surv. Ind.* 20: 68, 1978.

Perennials. Culms 30-120 cm high, tufted, erect, wiry; nodes glabrous. Leaves linear-lanceolate, 10-30 x 0.3-0.6 cm, acuminate, rounded at base, midrib prominent, glaucous. Ligules membranous, thin, fimbriate. Raceme 5-10 cm long, slightly curved or straight. Joints linear-clavate, 3-4.5 mm long, coriaceous, densely ciliate along 2 angles, hairs 0.5-4 mm long. Sessile spikelets oblong or oblong-lanceolate, 8-10 mm long, awned; callus bearded; lower glume linear-oblong or lanceolate, 7-8 x 1 mm, winged on one side towards apex, deeply grooved, with 2-4 depressions above the groove, chartaceous, 7-9-nerved, wing scabrid along the margins; upper glume boat-shaped or lanceolate, 7-8 x 1-1.5 mm, shortly notched, awned and recurved at apex, keel winged towards apex just below the awn, ciliate, margins ciliate in the upper half; awn 5-10 mm long; lower floret male; upper floret bisexual; first lemma linear-lanceolate, 6-7 x 1 mm, hyaline, 2-keeled, 2-nerved, margins ciliate in the upper half; palea lanceolate, 5-6 x 1 mm, hyaline, 2-keeled; stamens 3, anthers

c. 3 mm long, yellow with pink margins; second lemma oblong, notched, awned, 5-8 x 1 mm, lobes acuminate, hyaline, 3-nerved; awn 25-35 mm long, geniculate, column 10-15 mm long, chestnut brown, ciliate along the spirals; palea oblong-lanceolate, 4.5-5 x 0.5 mm, hyaline, 2-keeled, 2-nerved; stamens 3, anthers c. 3 mm long, yellow with violet margins; ovary oblong, c. 0.5 mm long, styles 1-2 mm long, stigmas 2-3 mm long, cream-yellow. Pedicelled spikelets lanceolate or elliptic-lanceolate, 8-10 mm long, awnless, pedicels linear-clavate, 4-5 mm long, densely ciliolate along 2 angles; lower glume ovate-lanceolate, 8-10 x 1.5-2 mm, acuminate, coriaceous, 7-9-nerved, 2-keeled, villous in the upper half on ventral side, margins delicate; upper glume elliptic-lanceolate, 7-8 x 1-1.5 mm, acuminate, chartaceous, 3-nerved, margins villous in the upper half; lower floret neuter or male with rudimentary stamens; upper floret male; stamens 3, similar to that of the sessile spikelets; lemmas and paleas similar to those of the sessile spikelets; second lemma entire, awnless.

Occasional, in open grasslands and dry grassy hill slopes.

Fl. & Fr. : October - December.

Notes : This can be distinguished from the other species of the genus by the deeply grooved lower glume of the sessile spikelets with membranous tips confined to upper quarter, perennial habit and purplish pedicelled spikelets. It is a very good fodder grass.

CANNANORE : Mugu Road.

28. SORGHUM Moench

Moench, *Meth. Bot.* 207. 1784; *Bor. Grass. Bur. Cey. Ind. Pak.* 220. 1960; Snowden in *J. Linn. Soc. Bot.* 55: 191, 1955.

A genus of about 25 species distributed in the tropics and subtropics of the World, of which about 12 species occur in India and 3 in Kerala.

The taxonomic problems in *Sorghum* are enormous and Snowden (*f. c.*) has solved them to a considerable extent especially for cultivars.

Key to the species

- 1a. Cultivated grasses; grains exposed by the gaping glumes; spikelets obovate, sub-globose, or elliptic-lanceolate, 4-6 mm long; glumes reddish-brown or black when mature *S. bicolor* 1

1b. Wild grasses; grains not exposed:

- 2a. Nodes densely bearded; spikelets 3-4 mm long; black, rufous-brown *S. nitidum* 3
- 2b. Nodes entirely glabrous; spikelets 4-6 mm long, cream to reddish-brown, glabrous or white hairy *S. halepense* 2

1. *Sorghum bicolor* (Linn.) Moench, Meth. Bot. 207. 1794; Bor. Grass. Bur. Cey. Ind. Pak. 227. 1960. *Holcus bicolor* Linn. Mant. Pl. 2: 301. 1771. *Sorghum vulgare* Pers. Syn. Pl. 1: 101. 1805. *S. margaritifera* Stapf in Prain, Fl. Trop. Afr. 9: 125. 1917.

The common 'Sudan Grass' is extensively cultivated almost throughout India, as 'Jowar'. This species is characterised by the broadly obovate or subglobose sessile spikelets, large grains exposed by the gaping glumes and persistent spikelets.

According to Thomas A. Cope (pers. comm.), *S. margaritifera* should be included under *S. bicolor*.

2. *Sorghum halepense* (Linn.) Pers. Syn. Pl. 1: 101. 1805; Fischer in Gamble, Fl. Pres. Madr. 1735. 1934 (Repr. ed. 3: 1203. 1957); Bor. Grass. Bur. Cey. Ind. Pak. 222. 1960; Cope in Nasir & Ali, Fl. Pak. 143. 296. t. 32. 1982. *Holcus halepensis* Linn. Sp. Pl. 1047. 1753. *Andropogon halepensis* (Linn.) Brot. Fl. Lusit. 1: 89. 1804; Hook. f. Fl. Brit. Ind. 7: 182. 1896. *Sorghum miliaceum* (Roxb.) Snowden in J. Linn. Soc. Bot. 55: 207. 1955; Bor. Grass. Bur. Cey. Ind. Pak. 223. 1960. *Andropogon miliaceus* Roxb. Fl. Ind. 1: 276. 1820. *Sorghum miliaceum* (Roxb.) Snowden var. *parvispiculum* Snowden, l. c. 209; Bor. l. c.

Perennials. Culms 50-250 cm high or more, stout, rhizomatous; nodes glabrous. Leaves lanceolate or linear-lanceolate, 25-60 x 0.8-3.5 cm, acuminate, rounded or shallowly cordate at base, margins serrulate. Ligules fimbriate, membranous. Panicles pyramidal, 15-50 cm long, 5-20 cm wide, lax. Sessile spikelets elliptic or subelliptic, 4-5 mm long, awned or not, densely hairy or glabrous, cream yellow or purplish or even brown when mature; callus densely hairy; lower glume elliptic or ovate, 4-5 x 1.5-2 mm, scute, 3-toothed at apex, coriaceous or crustaceous, faintly 5-7-nerved, densely hairy or rarely glabrous; upper glume elliptic-lanceolate, 4-5 x 1.5-2 mm, chartaceous

or crustaceous, faintly 3-5-nerved, slightly keeled on dorsal side towards apex, sparsely hairy; lower floret empty, epaleate; upper floret bisexual, epaleate or palea minute; first lemma ovate or elliptic, 3.5-4 x 1-1.5 mm, hyaline, faintly 3-nerved, margins ciliate; second lemma ovate, notched, awned, 2-3 mm long, hyaline, faintly 3-nerved, margins ciliate; awn 8-15 mm long, column 5-6 mm, brown; lodicules 2, obovate, 0.5-1 x 0.5 mm, 2-horned, densely ciliate along the margins and apex; stamens 3, anthers c, 3 mm long; ovary oblong or elliptic, 0.5-1 mm long, styles 1-1.5 mm, stigmas 1.5-2 mm long. **Pedicelled spikelets lanceolate or elliptic-lanceolate, 5-6 mm long, awnless, more or less glabrous, purplish; pedicels 3-4 mm long, slender, densely villous; lower glume elliptic-lanceolate, 5-6 x 1.5-2 mm, chartaceous, prominently 7-9-nerved; upper glume elliptic-lanceolate, 4.5-5 x 1-1.5 mm, chartaceous, 5-nerved, margins hyaline; ciliate; florets male; first lemma similar to that of the sessile spikelets; second lemma elliptic or oblong, 3.5-4 x 1-1.5 mm, obtuse, hyaline, palea linear-lanceolate, 2-2.5 x 0.5 mm, hyaline, ciliate.**

Frequent along the fringes of forests and along the banks of streams and rivulets, rarely as a weed in cultivated lands.

Fl. & Fr. : October-February.

Notes : This introduced 'Johnson grass' is now running wild and rapidly spreading all over India including Kerala. Snowden (l.c.) believed that *S. halepense* is not indigenous to India and treated the Indian materials under *S. miliaceum*. But, later on Cope (l.c.) has merged the latter with *S. halepense*.

CANNANORE : Tolpetty; PALGHAT : Aruvampara R. F.

3. *Sorghum nitidum* (Vahl) Pers. Syn. Pl. 1: 101. 1805; Fischer in Gamble, Fl. Pres. Madr. 1735. 1934 (Repr. ed. 3: 1203. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 245. 1960. *Holcus nitidus* Vahl, Symb. Bot. 2: 102. 1791. *Andropogon serratus* Thunb. Fl. Jap. 41. 1784; Hook. f. Fl. Brit. Ind. 185. 1896. *Sorghum serratum* (Thunb.) O. Kuntze, Rev. Gen. Pl. 2: 792. 1891, non Roem. & Schult. 1817.

Perennials. Culms 80-200 cm high, erect, wiry; nodes densely bearded. Leaves linear-lanceolate, 10-60 x 0.4-1.5 cm, acuminate, rounded or narrowed at base. Sheaths villous at mouth. Ligules membranous, scarious. Panicles pyramidal or lanceolate, 15-30 cm

long, 8-15 cm wide, lax, branches filiform, whorled. Sessile spikelets elliptic or narrowly ovate, 3-4 mm long, acute, awned or awnless, dark brown to black when mature; callus rufous brown hairy; lower glume ovate, 3-3.5 x 1-1.5 mm, acute, crustaceous or coriaceous, faintly 5-7-nerved, densely hairy; upper glume ovate-lanceolate, 3-3.5 x 1-1.5 mm, coriaceous, 5-7-nerved, hairy towards apex, lower floret empty, upper floret bisexual; first lemma ovate-lanceolate, 2.5-3 x 1 mm, chartaceous, faintly 3-nerved, margins hyaline, ciliate; second lemma ovate-lanceolate, 2.5-3 x 1 mm, mucicous or awned, hyaline, 1-nerved, margins ciliate in the upper half; awn 5-12 mm long; lodicules 2, obovate, c. 0.5 x 0.25 mm, 2-horned and long ciliate at apex; stamens 3, anthers 1.5-2 mm long; ovary oblong or elliptic, c. 0.6 x 0.2 mm, styles 1-1.5 mm long, stigmas 1.5-2 mm. Pedicelled spikelets lanceolate or elliptic-lanceolate, 3-4 mm long, awnless, softly hairy; pedicels slender, 2.5-3 mm long, rufous-brown hairy; glumes similar to those of the sessile spikelets, but chartaceous; floret mate.

Frequent along the hill-slopes and forest margins.

Fl. & Fr.: September-December.

Notes: This species can easily be distinguished from the other allied species of the genus by its densely bearded nodes, almost similar spikelets which are black when mature, narrower leaves and loose pyramidal panicles. The awned and awnless forms are seen in this species or sometimes both the types of spikelets are present even on the same panicle.

IDUKKI: Thekkadi; WYNAD.

29. SPODIOPOGON Trin.

Trin. Fund. Agrost. 192, t. 17. 1820; Bor. Grass. Bur. Cey. Ind. Pak. 246. 1960; Fischer in Gamble, Fl. Pres. Madr. 1710. 1934 (Repr. ed. 3: 1186. 1957); Hook. f. Fl. Brit. Ind. 7: 108. 1896.

A genus of about 10 species distributed in the subtropics of the world, of which 3 species occur in India and 1 in Kerala.

Spodiopogon rhizophorus (Steud.) Pilger in Engler & Prantl, Naturl. Pflanzenf. Aufl. 2, 14C: 119. 1940; Bor. Grass. Bur. Cey. Ind. Pak. 246. 1960; Manilal & Sivaraj. Fl. Calic. 344. 1982. *Andropogon rhizophorus* Steud.

Syn. Pl. Glum. 1: 381, 1854. *Spodiopogon albidus* Benth. in J. Linn. Soc. Bot. 19: 66, 1831; Hook. f. Fl. Brit. Ind. 7: 108, 1896; Fischer in Gamble, Fl. Pres. Madr. 1710, 1934 (Repr. ed. 3: 1186, 1957). PLATE No. 40

Annuals or perennials. Culms 30-150 cm high, erect or willowy, with stilt root at the basal nodes, sometimes geniculate, or trailing, internodes purplish; nodes glabrous. Leaves elliptic or elliptic-lanceolate, 5-25 x 0.5-4 cm, acuminate, narrowed or tapering at base, with a petiole of 0 (upper ones sessile) - 6 cm long, thin, flaccid, softly hairy. Sheaths ciliate along the margins especially towards mouth. Ligules ovate, membranous, acute. Panicles elliptic, pyramidal or lanceolate, 4-15 cm long, lax or congested, densely silky villous. Joints flat, c. 3 mm long, densely ciliate along margins. Sessile spikelets oblong-lanceolate or elliptic-lanceolate, 5-8 mm long, awned; lower glume ovate-lanceolate, 5-7 x 1-2 mm, truncate and toothed at apex, chartaceous, 7-9-nerved, densely or sparsely villous; upper glume boat-shaped or ovate-lanceolate, 5-6 x 1.5-2 mm, acuminate, aristate, chartaceous, 7-11-nerved, keeled; lower floret male or rarely bisexual; upper floret bisexual; first lemma lanceolate, 5-7 x 1 mm, delicate, hyaline, 3-nerved; palea oblong-lanceolate, 4-6 x 1 mm, 2-keeled, 2-nerved; stamens 3, anthers c. 3 mm long, flesh-coloured; second lemma oblong, notched, awned, 4-5 x 0.5-1 mm, lobes acuminate, delicate, keeled, 1-nerved; awn 10-15 mm long; palea ovate, 2.5-3 x 1.5-2 mm, acute, chartaceous, faintly toothed at apex, stamens 3, anthers c. 3 mm long, flesh-coloured; ovary elliptic-lanceolate, 0.5-0.7 mm, styles 2-3 mm long, stigmas 2-3 mm long, flesh-coloured. Pedicelled spikelets lanceolate or linear-lanceolate, 5-6 mm long, awned; pedicels flat, 3-4 mm long, densely ciliate along margins; glumes and florets similar to those of the sessile spikelets.

Frequent along the hill-slopes, margins of forests and road-sides, usually in shades.

Fl. & Fr. : October-March.

Notes : This grass is distinct by its broadly-elliptic, flaccid leaves and silky-woolly panicles. This leafy species is often found in the openings of thick forests where it grows gregariously.

CANNANORE : Elimala, Taliparamba; ERNAKULAM : Cochin; IDUKKI : Peermade; PALGHAT : Kaikatty, Panthanhode; QUILON : Anathode.

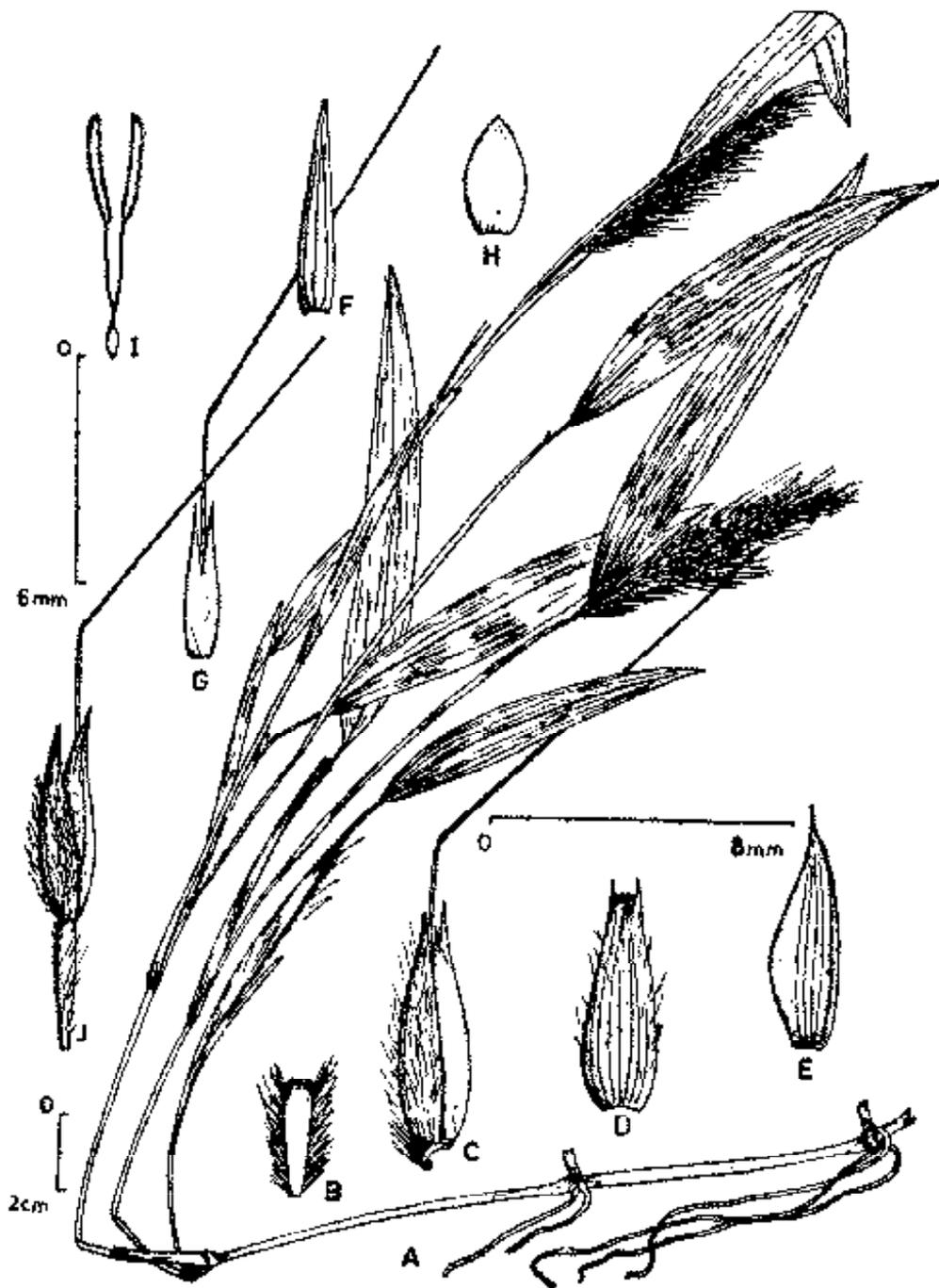


PLATE No. 40 ; *SPODIOPOGON RHIZOPHORUS* (Stued.) Pilger

A. Habit; B. Joint of culm; C. Sessile spikelet; D. Lower glume of sessile spikelet; E. Upper glume; F. First lemma; G. Second lemma; H. Palea of the second lemma; I. Peltate ligule; J. Panicle base.

30. THEMEDA Forssk.

Forssk. Fl. Aegypt.-Arab. 178. 1775; Bor, Grass. Bur. Cey. Ind. Pak. 248. 1960.

A genus of about 20 species distributed in the tropical and subtropical regions of the World, of which about 19 species occur in India and 4 in Kerala.

This genus may often be confused with *Pseudanthistiria* (Hack.) Hook. f., but can be distinguished by having 2 pairs of sessile, involucrel spikelets in each raceme and densely hairy awns of the hermaphrodite spikelets.

Key to the species

- 1a. Lower glume of the sessile awned spikelet with a longitudinal slit-like groove on the dorsal side; sessile spikelets 2 in a raceme, 3-4 mm long *T. tremula* 3
- 1b. Lower glume of the sessile spikelet without a longitudinal groove; sessile spikelets solitary in a raceme:
- 2a. Pairs of involucrel spikelets inserted at the same level:
- 3a. Sessile spikelets 5-8 mm long; panicles decomposed, congested; involucrel spikelets 4-6 mm long; keels of the lower glume of the involucrel spikelets not winged; awns shorter, up to 3 cm long
T. saberimalayana 2
- 3b. Sessile spikelets 8-10 mm long; panicles simple, lax; involucrel spikelets 6-12 mm long; keels of the lower glume of the involucrel spikelets broadly winged; awns longer, up to 6 cm long
T. triandra 4
- 2b. Pairs of involucrel spikelets inserted at different levels:
- 4a. Sessile spikelets 4-5 mm long, callus hairs up to 3 mm long, white; involucrel spikelets 5-6 mm long, glabrous; awns slender, up to 2 cm long
T. cymbaria 1
- 4b. Sessile spikelets 6-10 mm long; callus hairs up to 8 mm long, brown; involucrel spikelets 6-12 mm long, tubercled hairy; awns stouter, up to 6 cm long
T. triandra 4
1. *Themeda cymbaria* (Roxb.) Hack. in DC. Monogr. Phan. 6: 668. 1889; Fischer in Gamble, Fl. Pres. Madr. 1746. 1934 (Repr. ed. 3: 1210. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 251. 1960. *Anthistiria cymbaria* Roxb. Fl. Ind. 1: 255. 1820; Hook. f. Fl. Brit. Ind. 7: 215. 1896.

Perennials. Culms 60-250 cm high, densely tufted, rhizomatous, laterally compressed at base; nodes glabrous. Leaves linear-lanceolate, 20-100 x 0.4-1 cm, acuminate, narrowed and tapering at base. Sheaths sharply keeled, villous in the upper half especially towards collar. Ligules ovate, acute, membranous, fimbriate. Panicles lax, drooping, 15-80 cm long, densely spiculate with loose clusters of spikelets. Involucral spikelets 2 pairs in a raceme, inserted at different levels, lanceolate or elliptic-lanceolate, 5-6 mm long, glabrous; lower glume elliptic-lanceolate, 5-6 x 1 mm, chartaceous, 7-9-nerved, glabrous; upper glume elliptic-lanceolate, 4-5 x 1 mm, chartaceous, 3-nerved, margins hyaline, ciliate in the upper half; lower floret empty; upper floret male; first lemma elliptic or oblong, 3-4 x 1 mm, hyaline, faintly 3-5-nerved, glabrous; epaleate; second lemma linear-lanceolate, or oblanceolate, c. 3x0.2mm, hyaline, glabrous; stamens 3, anthers 1-2 mm long. Sessile spikelet solitary in a raceme, oblong-lanceolate, 4-5mm, awned; callus hairs 1-3 mm long, white; lower glume oblong-lanceolate, 4-4.5 x 1 mm, 2-toothed, coriaceous or subcoriaceous, faintly 5-7-nerved, sparsely hairy or glabrous; upper glume oblong-lanceolate, or lanceolate, 4-5 x 1 mm, mucronate, subcoriaceous, 3-5-nerved, 2-keeled, keels rounded; lower floret empty; upper floret bisexual; first lemma oblong, 3-3.5 x 1 mm, hyaline, faintly 2-nerved; epaleate; second lemma stipitate, c. 2 mm long hyaline base of the awn, 1-nerved, awn 15-20 mm long; palea elliptic-lanceolate, c. 1 x 0.3 mm, hyaline; lodicules 2, obovate or oblanceolate, 0.5-1 mm, 2-horned; stamens 3, anthers 1-2 mm long; ovary oblong, c. 0.3 mm, styles 0.5-1 mm, stigmas 0.5-1 mm long. Pedicelled spikelets 2-3 in a raceme, elliptic-lanceolate or lanceolate, 4-5 mm, acuminate; pedicels 2-3 mm long; glumes and florets more or less similar to those of the involucral spikelets.

Very common, along the hill slopes, margins of the forests or sometimes inside the forests, in grasslands and banks of streams, often associated with *Pennisetum polystachyon* and *Cymbopogon flexuosus*.

Fl. & Fr. : April-December.

This is an excellent fodder grass. The dried culms and leaves can be used for thatching and as a mulch in 'Cardamom' nurseries. The leaves are said to have very good capacity to retain moisture. Locally known as "Elephant Grass" or "Potha pullu"

IDUKKI : Peermade, Periyar, Ponnambalamedu, Thekkadi; PALGHAT; QUILON: Mannarapara; TRIVANDRUM: Boneccord, Kottur R. F.

2. *Themeda sabarimalayana* P.V. Sreekumar & V.J. Nair in Bull. Bot. Surv. Ind. 29(1-4): 127-128. 1987(1989). PLATE No. 41

Perennials. Culms 50-200 cm high, erect, tufted; nodas glabrous. Leaves linear-lanceolate, 15-40x0.5-1 cm, acuminate, rounded at base, midrib prominent, margins serrulate. Sheaths keeled. Ligules ovate, acute, membranous. Panicles 30-60 cm long, lax, drooping. Involucral spikelets 2 pairs, inserted at same level in a raceme, lanceolate or narrowly elliptic-lanceolate, 4-6 mm long, sparsely hairy or glabrous; lower glume elliptic-lanceolate, 4-6 x 1 mm, acuminate, chartaceous, 9-13-nerved, sparsely hairy towards apex; upper glume lanceolate, 4-6 x 1 mm, chartaceous, 3-5-nerved, margins hyaline, ciliate in the upper half; lower floret empty; upper floret male; first lemma elliptic-lanceolate, 3-5 x 0.5-1 mm, hyaline, faintly 3-5-nerved, margins ciliolate in the upper half, epaleate; second lemma linear-lanceolate, c. 2 x 0.2 mm, hyaline, glabrous; stamens 3, anthers 2-3 mm long. Sessile spikelet solitary, oblong-lanceolate, awned, 5-6 mm long, brownish; callus rufous-brown hairy, hairs 1-3 mm long; lower glume oblong-lanceolate, 5-6 x 1 mm, truncate and dentate at apex, coriaceous, 9-11-nerved, softly hairy; upper glume oblong-lanceolate, 5-5.5 x 1 mm, acute, chartaceous, 3-5-nerved, 2-keeled; first lemma elliptic-lanceolate, 3-4 x 0.5-1 mm, hyaline, faintly 3-5-nerved; epaleate; second lemma stipitate hyaline base of the awn, 1-2 mm long, 1-nerved; awn 15-30 mm long; palea ovate-acute, c. 0.5 x 0.3 mm, chartaceous; stamens 3, anthers 2-3 mm long; ovary c. 0.5 mm, styles 1-1.5 mm long, stigmas 1-2 mm long. Pedicelled spikelets 3 or 4 in a raceme, lanceolate or narrowly elliptic-lanceolate, 4-6 mm long, acuminate. Pedicels 1-2 mm long; glumes and florets more or less similar to those of the sessile spikelets.

Rare, along the forest margins and hill slopes.

Fl. & Fr.: November-December.

PATHANAMTHITTA: On way to Sabarimala.

3. *Themeda tremula* (Nees ex Steud.) Hack. in DC. Monogr. Phan. 6: 667. 1889; Fischer in Gamble, Fl. Pres. Madr. 1746. 1934 (Repr. ed. 3: 1210. 1957); Bor. Grass. Bur. Cey. Ind. Pak. 254. 1960. *Anthistiria tremula* Nees ex Steud. Syn. Pl. Glum. 1: 401. 1855; Hook. f. Fl. Brit. Ind. 7: 214. 1896; Rang. & Tad. Handb. S. Ind. Grass. 212. t. 165. 1921. PLATE No. 42

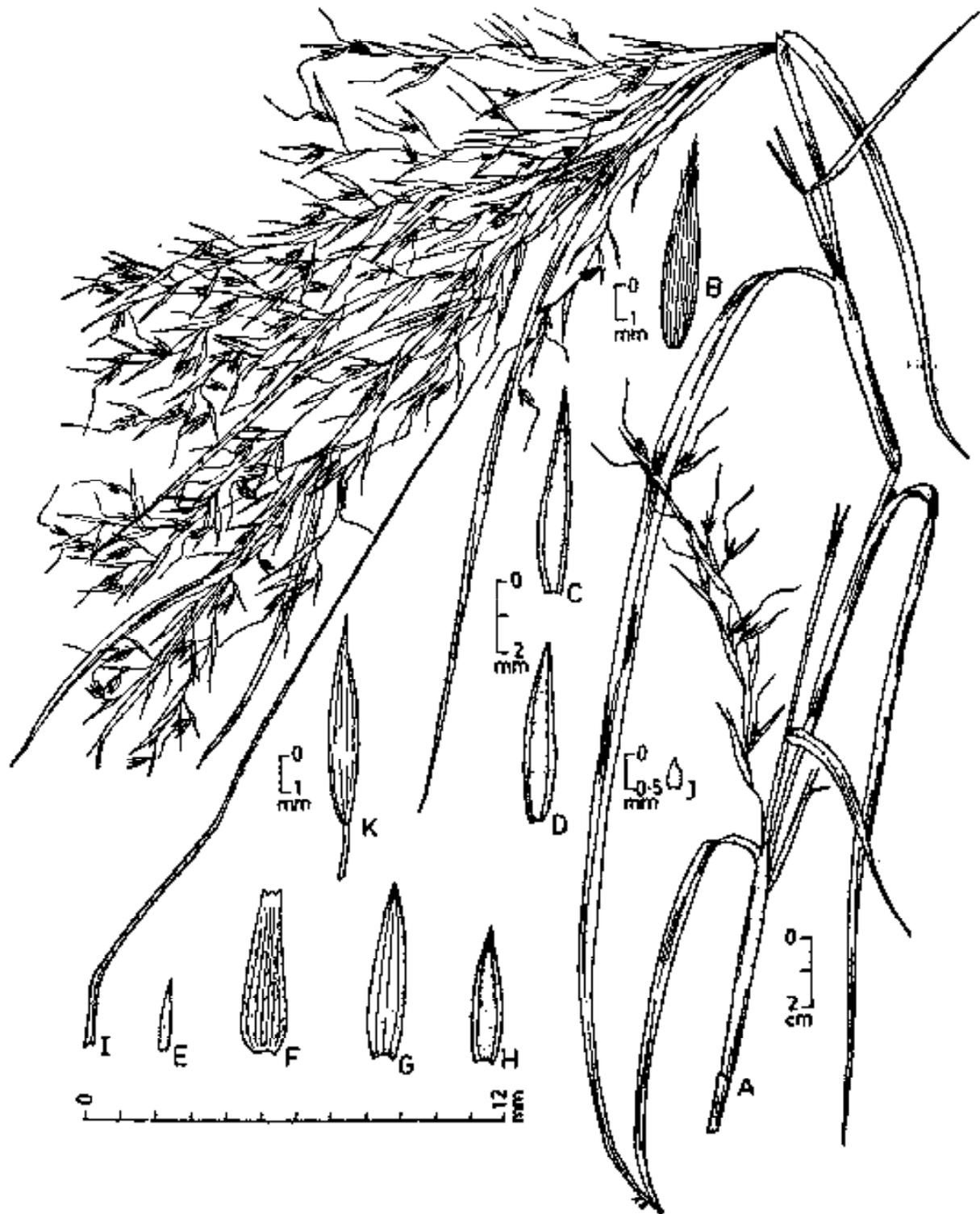


PLATE No. 41 : *THEMEDA SABARIMALAYANA* P. V. Gopakumar & V.J. Neir
 A. Habit; B. Lower glume of involucre spikelet; C. Upper glume; D. First lemma; E. Second lemma; F. Lower glume of sessile spikelet; G. Upper glume; H. First lemma; I. Second lemma; J. Palea of the second lemma; K. Pedicel of sessile spikelet.

Annuals or perennials. Culms 20-120 cm high, tufted, erect or geniculate; nodes glabrous. Leaves lanceolate or linear-lanceolate 2-40 x 0.2-1 cm, acute or shortly acuminate, rounded at base, midrib prominent, sparsely tubercled hairy. Sheaths sharply keeled. Ligules fimbriate, membranous. Panicles 5-50 cm long, with loose or rarely congested clusters or racemes. Involucral spikelets 2 pairs, at different levels, sessile, elliptic-lanceolate or lanceolate or rarely ovate-lanceolate, 6-8 mm long, tubercled hairy especially towards apex; lower glume elliptic-lanceolate or ovate-lanceolate, 6-8 x 1.5-2 mm, chartaceous, 15 to several nerved, 2-keeled, covered with long tubercle-based hairs; upper glume lanceolate or narrowly elliptic-lanceolate, 6-7 x 1-1.5 mm, chartaceous, 3-nerved, margins ciliate in the upper half; lower floret empty; upper floret male; first lemma elliptic-lanceolate, 4-7 x 1 mm, hyaline, 3-nerved, margins ciliate in the upper half; epaleate; second lemma linear-lanceolate, 3-4.5 x 0.25 mm, hyaline, shortly bifid at apex, 1-nerved; palea elliptic, c. 1 x 0.5 mm, hyaline; lodicules 2, obovate, 2-horned, 0.5-1 mm; stamens 3, anthers 2-4 mm long. Sessile spikelets 2 in a raceme, awned oblong-lanceolate, 3-4 mm long; callus 1-2 mm long, rufous-brown hairy; lower glume oblong or ovate-lanceolate, 3-4 x 1-2 mm, truncate, coriaceous, densely hairy with a deep slit like groove in the middle; upper glume oblong, 3-4 x 1 mm, coriaceous, margins 2-keeled, keels rounded, softly hairy; lower floret empty; upper floret bisexual; first lemma ovate-lanceolate or elliptic-lanceolate, 2-3 x 1 mm, hyaline, 1-nerved; epaleate; second lemma stipitate 2-3 mm long hyaline base of awn; awns 15-25 mm long, hairy; palea elliptic-lanceolate, c. 1 x 0.3 mm, hyaline; stamens 3, anthers 1-2 mm long, ovary oblong, c. 0.5 mm, styles c. 0.5 mm long, stigmas 1-2 mm long. Pedicelled spikelets usually 3 in a raceme, elliptic-lanceolate or lanceolate, 5-8 mm long, awnless; pedicels 1-2 mm, brown-hairy below; lower glume elliptic-lanceolate, 5-6 x 1 mm, chartaceous, 9-11-nerved, sparsely tubercled hairy; upper glume and florets more or less similar to those of the involucral spikelets.

Very common in open grasslands, hill-slopes, road-cuttings, rarely in marshy fields and the openings of the forests, where it is robust.

Fl. & Fr. : Throughout the year.

Notes : This species shows considerable variation in its habit, habitat and hairiness. Slender annual forms with creeping or geniculate culms as well as tall, robust perennial forms with tufted and erect culms were noticed. The plants growing in forest margins are usually robust and leafy.

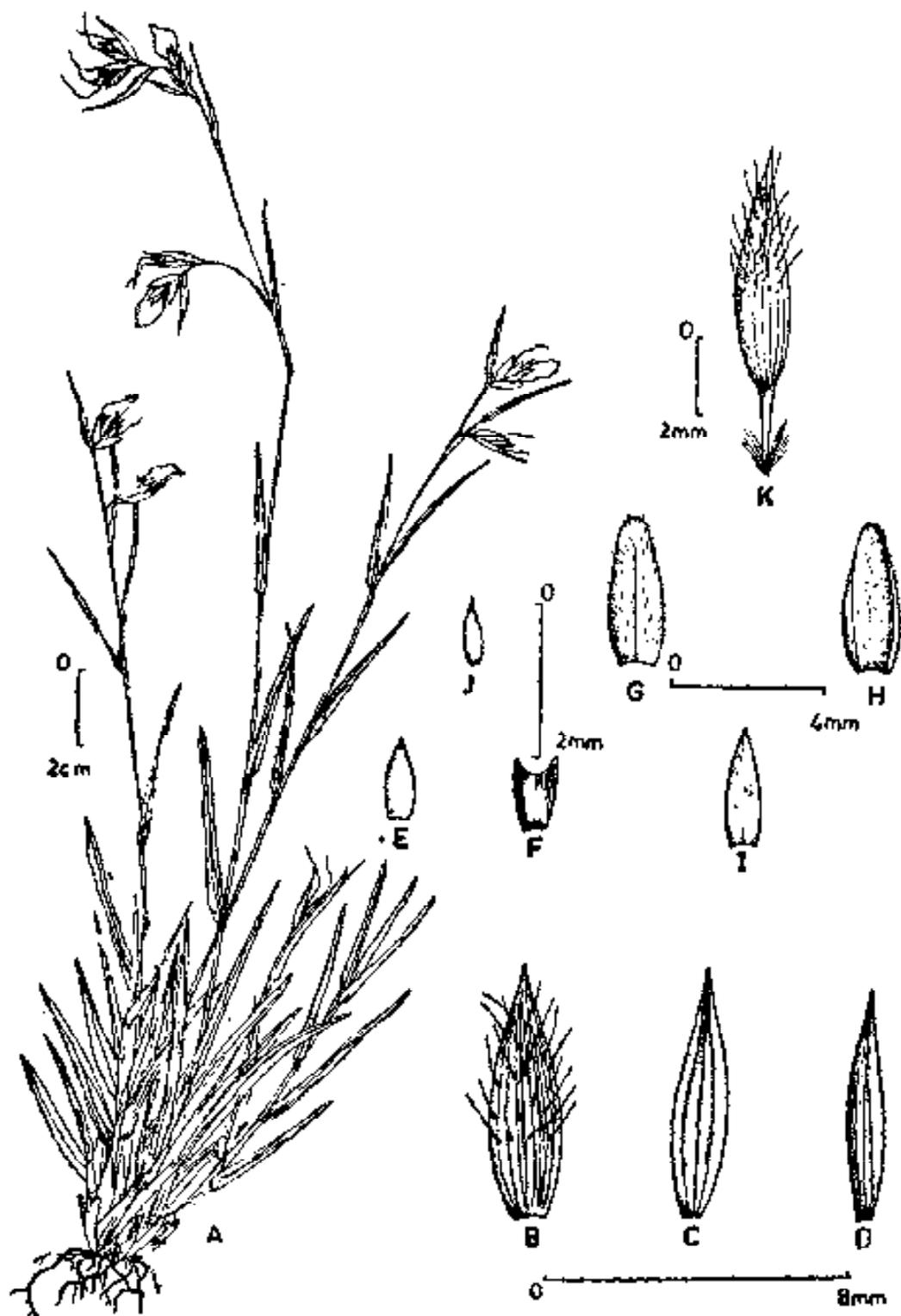


PLATE No 42 : *THEMEDA TREMULA* (Nees ex Steud.) Hack.

A. Habit ; B. Lower glume of involucrel spikelet ; C. Upper glume ; D. First lemma ; E. Palea of the second lemma ; F. Lodicule ; G. Lower glume of sessile spikelet ; H. Upper glume ; I. First lemma of sessile spikelet ; J. Palea of second lemma of sessile spikelet ; K. Pedicelled spikelet.

This grass may often get confused with some species of *Pseudanthistiria*, but can be separated from it by its 2 pairs of sessile involucreal spikelets, rufous-brown callus hairs and grooved lower glume of the sessile spikelets. *Themeda tremula* is distinct from all other species of the genus by the presence of 2 sessile spikelets in a raceme, with dorsally grooved lower glume.

CALICUT : Pavagada; CANNANORE: Taliparamba; IDUKKI : Peermade, Devicolam, Eravikulam, Munnar, Sabarimala; QUILON: Anathode; WYNAD : Chandanathode, Cherambadi.

4. *Themeda trandra* Forssk. Fl. Aegypt.-Arab. 178. 1775; Fischer in Gamble, Fl. Pres. Madr. 1746. 1934 (Repr. ed. 3: 1209. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 254. t. 27. 1960; Manilal & Sivarej. Fl. Calic. 336. 1982. *Anthistiria imberbis* Retz. Obs. Bot. 3: 11. 1783; Hook. f. Fl. Brit. Ind. 7: 211. 1896.

Perennials. Culms 30-250 cm high, erect, densely tufted; nodes glabrous. Leaves lanceolate or linear-lanceolate, 5-50 x 0.3-1 cm, acute, rounded or shallowly cordate at base, tubercle-based hairy or rarely glabrous. Sheaths keeled, tubercle-based hairy or rarely glabrous. Ligules fimbriate, membranous. Panicles 5-75 cm long, narrow, lax or with congested flabelliform clusters of spikelets. Peduncles of each raceme bearded below the involucreal spikelets. Involucreal spikelets 2 pairs, inserted at same or different levels, elliptic or broadly elliptic-lanceolate, 6-12 mm long, tubercled hairy, greenish tinged with reddish-brown; lower glume elliptic or broadly elliptic-lanceolate, 6-12x2-3mm, chartaceous, 9-11-nerved, densely or sparsely tubercled hairy, 2-keeled, keels broadly winged; upper glume lanceolate or narrowly elliptic-lanceolate, 6-12 x 1-2 mm, chartaceous, 3-nerved, margins hyaline, ciliate in the upper half; lower floret empty; upper floret male; first lemma narrowly elliptic-lanceolate, 6-10 x 1-2 mm, hyaline, 1-nerved, margins ciliate in the upper half; second lemma elliptic or ovate-acute, 0.6-1 mm, hyaline; lodicules 2, oblanceolate, 2-horned, c. 1 x 0.5 mm; stamens 3, anthers 2-4 mm long. Sessile spikelets solitary in a raceme, oblong or oblanceolate, 6-10 mm long, awned; callus sharp, rufous-brown hairy, hairs 2-8 mm long; lower glume oblong or oblong-lanceolate, 6-10 x 1-2 mm, truncate, rounded or acute at apex, coriaceous or crustaceous, faintly 7-9-nerved, glabrous or covered with brown bristles on dorsal side; upper glume linear-oblong, 6-8 x 1-1.5 mm, truncate or acute at apex, coriaceous, 2-keeled, 3-5-nerved; sparsely hairy; lower floret empty; upper floret bisexual; first lemma elliptic, 4-5 x 1-2 mm, hyaline; second lemma

stipitate 2-3 mm long chartaceous base of the awn, 1-nerved, awns 15-60 mm long; stamens 3, anthers 2-3 mm long; ovary oblong, c. 1 mm, styles 1-2 mm long, stigmas 2-3 mm, Pedicelled spikelets 2 in a raceme, lanceolate or narrowly elliptic-lanceolate, 6-10 mm long; pedicels 2-3 mm long; lower glume elliptic-lanceolate, 6-10 x 1-2 mm, chartaceous, 11-13-nerved, glabrous or sparsely hairy with tubercled hairs; upper glume and florets more or less similar to those of the involucre spikelets.

Very common, along the banks of streams and rivers, in grasslands and grassy hill-slopes, usually in damp situations.

Fl. & Fr. : Throughout the year.

Notes : This species shows extreme variations in its habit, culms, leaves and floral parts. Several specimens with a lot of differences were sent to Kew for expert opinion, and Dr. T. A. Cope confirmed them as variants of *Themeda triandra*. The culms and leaves before flowering form a very good fodder; and after flowering the whole plant turns reddish-brown and cattle avoid it due to its harmful awns and bristles.

CANNANORE : Begur R. F.; IDUKKI : Eravikulam, Munnar, Peermade, Thannikkudy; PALGHAT : Kanjarampuzha, Mukkali forest, Walayar R. F.; QUILON : Mannaraparal, Moozhiyar, Pamba, Thenmala; TRIVANDRUM : Kariavattom, Sreekariyam; WYNAD : Chandanathode, Theerthundamala.

31. VETIVERIA Lem.-Lisanc.

Lem.-Lisanc. in Bull. Soc. Philom. Paris 1822: 43. 1822; Bor, Grass. Bur. Cey. Ind. Pak. 258. 1960.

A genus of about 10 species in the tropics of the Old World, of which 2 species occur in India and one in Kerala.

Vetiveria zizanioides (Linn.) Nash in Small, Fl. S.E. U.S. 67. 1903; Fischer in Gamble, Fl. Pres. Madr. 1733. 1934 (Repr. ed. 3: 1201. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 258. 1960; Manilal & Sivaraj. Fl. Calic. 343. 1982. *Phalaris zizanioides* Linn. Mant. Pl. 2: 183. 1771. *Andropogon muricatus* Retz. Obs. Bot. 3: 43. 1783. *A. squarrosus* acut. non Linn. f. 1781; Hook. f. Fl. Brit. Ind. 7: 186. 1896.

Perennials. Culms 100-200 cm high, densely tufted, erect; nodes glabrous. Leaves linear-lanceolate, 25-80 x 0.5-1 cm, base narrowed and tapering down to sheath, convolute, midrib prominent, glaucous, tubercled hairy or glabrous. Sheaths sharply keeled. Ligules annular, membranous. Panicles elliptic or pyramidal, 10-30 cm long, contracted, densely spiculate. Joints linear-turbinate, 4-5 mm, dilated at apex, scabrid along the angles. Sessile spikelets lanceolate or oblong-lanceolate, 3-5 mm long, muricate, awnless; callus sparsely bearded; lower glume oblong-lanceolate or lanceolate, 3-4 x 1 mm, coriaceous, faintly 3-5-nerved, spinulose or muricate; upper glume boat-shaped or lanceolate when spread, 3-5 x 1 mm, shortly acuminate, coriaceous, faintly 3-nerved, keeled on dorsal side, keel spinulose, margins hyaline, retrorsely ciliate in the upper half; lower floret empty; upper floret bisexual; first lemma broadly elliptic, 3-4 x 1-2 mm, hyaline, faintly 3-5-nerved, margins ciliate; second lemma oblong, 2-3 x 0.5 mm, shortly notched, mucronate in between, hyaline, faintly 3-nerved; palea oblong, c. 2 x 0.5 mm, hyaline; lodicules 2, obovate, truncate, c. 0.5 x 0.5 mm, faintly 2-3-nerved; stamens 3, anthers c. 2 mm long; ovary elliptic, c. 0.5 mm long, styles 0.5-1 mm long; stigmas c. 2 mm. Pedicelled spikelets lanceolate, 3-4 mm long, acuminate, awnless; pedicels linear-turbinate, 3-4 mm long, scabrid; lower glume lanceolate, 3-4 x 1 mm, acuminate, coriaceous, faintly 5-nerved, sparsely spinulose; upper glume lanceolate, 3-3.5 x 1 mm, acuminate, coriaceous, faintly 3-nerved, keeled, spinulose along the keel, margins hyaline, ciliate; lower floret empty; upper floret male; first lemma elliptic, 3-3.5 x 1 mm, hyaline, faintly 3-5-nerved, margins ciliate; second lemma lanceolate, 2-2.5 x 0.5 mm, hyaline, faintly 3-nerved; palea oblong, c. 1 x 0.25 mm, hyaline; stamens 3, anthers c. 1 mm long.

Occasional, along the banks of streams, backwaters and rivulets.

Fl. & Fr. : July - December.

Notes : The aromatic roots of this grass is used for cooling water and making local fans. The famous 'Vettiver' or "*Ramacham*" is the medicinally important root of this grass.

TRICHUR : Kandasankadavu.

PANICOIDEAE - MAYDEAE

MAYDEAE Dumort.

Dumort. Obs. Gram. Belg. 84: 142. 1823; Bor. Grass. Bur. Cey. Ind. Pak. 261. 1960.

Key to the genera

- 1a. Female spikelets enclosed in a modified leaf-sheath forming a bead-like involucre, fruit case closed; panicles lax, not leafy *Coix* 2
- 1b. Female spikelets not enclosed as above; fruit case longitudinally opened; panicles interrupted, leafy *Chionachne* 1

1. CHIONACHNE R. Br.

R. Br. in Benn. et al. Fl. Jav. Rar. 15. 1838; Bor. Grass. Bur. Cey. Ind. Pak. 262. 1960.

A genus of about 5 species distributed in Southeast Asia and Australia, of which 2 species occur in India and one in Kerala.

Chionachne koenigii (Spreng.) Thw. Enum. Pl. Zeyl. 357. 1864; Fischer in Gamble, Fl. Pres. Madr. 1706. 1934 (Repr. ed. 3: 1183. 1957); Bor. Grass. Bur. Cey. Ind. Pak. 262. 1960. *Coix koenigii* Spreng. Syst. Veg. 1: 239. 1825. *Polytoca barbata* (Roxb.) Stapf ex Hook. f. Fl. Brit. Ind. 7: 102. 1896; Rang. & Tad. Handb. S. Ind. Grass. 144. t. 127. 1921. *Coix barbata* Roxb. Fl. Ind. 3: 569. 1832.

PLATE No. 43

Perennials. Culms robust. 50-250 cm high, densely tufted, erect; nodes densely bearded. Leaves linear-lanceolate or linear, 10-60 x 0.5-1.5 cm, acuminate, rounded or cordate at base, tubercle-based hairy, or scabrid, midrib prominent. Sheaths tubercle-based hairy, ciliate towards mouth. Ligules row of hairs or fimbriate membrane. Inflorescence much branched, leafy interrupted panicles 10-60 cm long, with clusters of racemes subtended by leaf-like spathes, the individual racemes subtended by spatheoles, ovate or ovate-elliptic, 0.5-1.5 mm, caudate-acuminate. Racemes 2-4 cm long, male or male above with a solitary female spikelet at the base. Male spikelets elliptic or elliptic-lanceolate, solitary or paired, 6-12 x 2-3 mm. Lower glume elliptic or oblong-lanceolate, 6-12 x 2-3 mm, chartaceous, 13-nerved, margins winged, ciliate or pectinate. Upper glume elliptic-lanceolate or lanceolate, 6-10 x 1.5-2 mm, chartaceous, hya-

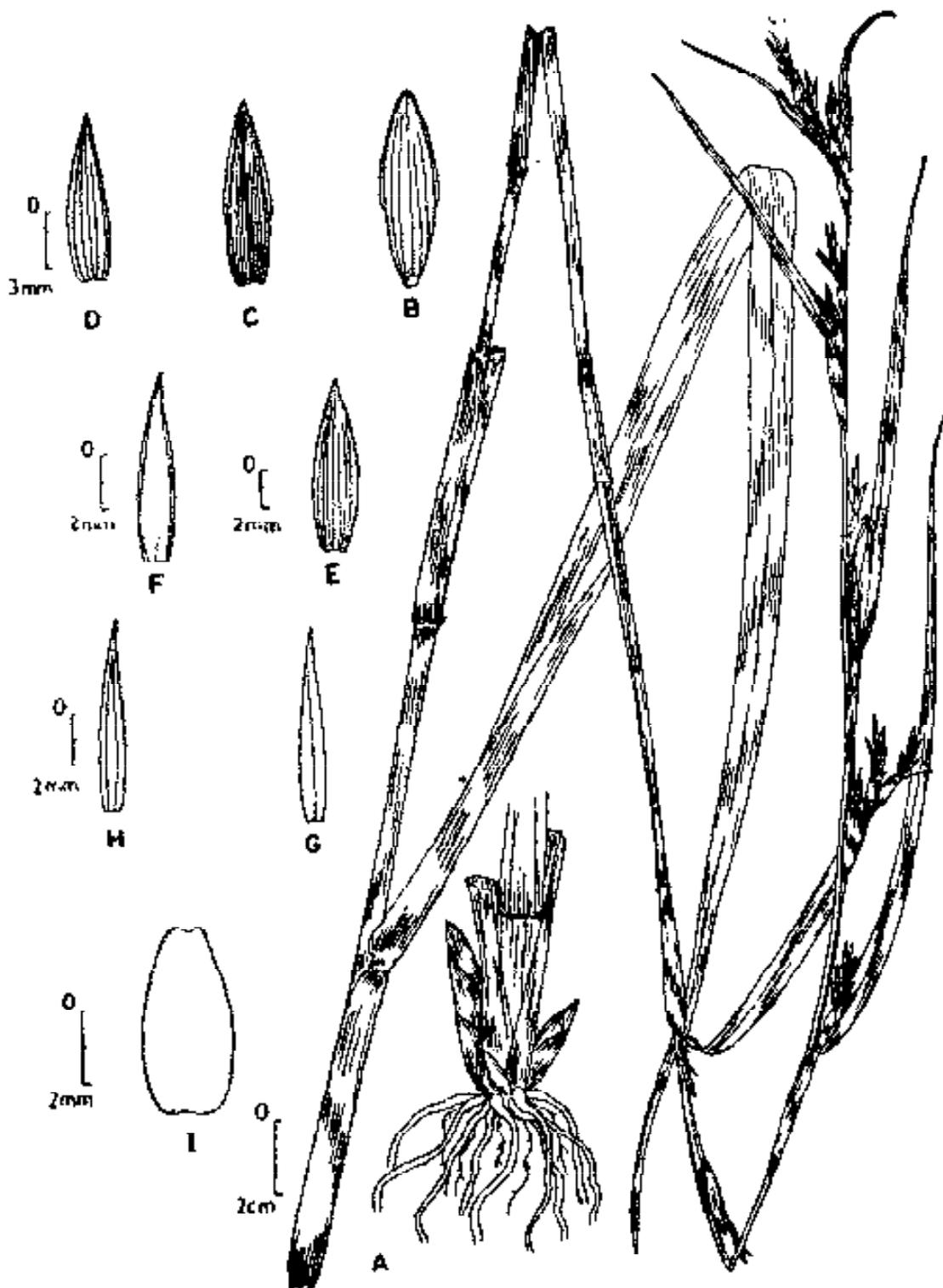


PLATE No. 43: *CHIONACHNE KOENIGII* (Spreng.) Thw.

A. Habit; B. Male spikelet; C. Lower glume of male spikelet; D. Upper glume; E. First lemma of male spikelet; F. Palea of the first lemma; G. Second lemma; H. Palea of the second lemma; I. Female spikelet.

line, 7-nerved. First lemma elliptic-lanceolate, 6-10 x 1.5-3 mm, chartaceous, hyaline, 7-9-nerved. Palea lanceolate, 6-8 x 1-1.5 mm, delicatly hyaline, 2-keeled, 2-nerved. Second lemma lanceolate, 6-8 x 1 mm, delicate, hyaline, 1-3-nerved. Palea lanceolate, 6-8x1 mm, hyaline 2-nerved. Stamens 3, anthers 2-3 mm long, dirty yellow. Female spikelets or involucre ovate-oblong or oblong, 4-6 x 2-3 mm, ivory white. Styles 2-4 mm long. Stigmas 4-8 mm long, violet or cream coloured.

Frequent along the wet, shady places like banks of streams, rivers and forest clearings.

Fl. & Fr. : July-October.

Notes : This species differs from *C.semiteres* by the solitary female involucre and broader leaves. Cattle avoid this grass due to the presence of irritating hairs on the leaves.

CALICUT : Pavagada; IDUKKI: Pattumudi.

2. COIX Linn.

Linn. Sp. Pl. 972. 1753; Hook. f. Fl. Brit. Ind. 7: 99. 1896; Bor, Grass. Bur. Cey. Ind. Pak. 263, 1960.

A genus of about 6 species distributed in tropical Asia, of which 3 species occur in India and probably only one in Kerala.

The occurrence of *Coix aquatic*a and *C. gigantea* in Kerala is to be confirmed. Several specimens of *C. lacryma-jobi* have been wrongly identified and kept in MH under the other two names. But the narrowly winged glumes and narrow involucre of these specimens tally well with the description of *C. lacryma-jobi*.

Coix lacryma-jobi Linn. Sp. Pl. 972. 1753; Hook. f. Fl. Brit. Ind. 7: 100. 1896; Rang. & Tad. Handb. S. Ind. Grass. 141. t. 126. 1921; Fischer in Gamble, Fl. Pres. Madr. 1705. 1934 (Repr. ed. 3: 1182. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 264, 1960; Manilal & Sivaraj, Fl. Calic. 331, 1982.

Annuals. Culms 25-100 cm high, densely tufted; nodes glabrous. Leaves lanceolate or linear-lanceolate, 10-40 x 1-3.5 cm, acuminate, cordate at base, glabrous or tubercle-based hairy. Ligules ovate, membranous narrow or thin rim. Inflorescence of peduncled,

false spikes, 5-30 cm long. Male spikelets 2 or 3, elliptic or elliptic-lanceolate or lanceolate, 5-15 x 2-4 mm. Lower glume ovate-elliptic or elliptic-lanceolate, 5-15 x 2-4 mm, chartaceous, 13 to several nerved, narrowly winged along margins. Upper glume elliptic-lanceolate or oblong-lanceolate, 5-12 x 2-3 mm, acuminate, chartaceous, 7-9-nerved. Lower floret male. Upper floret male or barren. First lemma elliptic-lanceolate or oblong-lanceolate, acuminate, 5-10 x 2-3 mm, delicate, hyaline, faintly 5-7-nerved. Palea elliptic-lanceolate or oblong-lanceolate or lanceolate, 5-10 x 1-2 mm, delicate, hyaline, 2-keeled, 2-nerved. Stamens 3; anthers 3-4 mm long. Second lemma elliptic or elliptic-lanceolate or oblong-lanceolate, 5-8 x 1-2 mm, delicate, hyaline, 5-nerved. Palea elliptic-lanceolate or oblong-lanceolate, 4-8 x 1-1.5 mm, delicate, hyaline, 2-nerved. Stamens 3; anthers 4-6 mm long. Female spikelets globose or ovoid, 5-15 mm long, bony, shining, white, grey or bluish. Lower glume ovate-oblong, acute. Upper glume ovate. Lower floret female or barren. Upper floret female. Second lemma ovate-oblong, 6-15 x 1-3 mm. Palea ovate-oblong, 5-12 x 1-2 mm, delicate.

Very common along marshy places, water-courses, banks of streams, rivers, backwaters, ponds and in paddy fields and other wetlands.

Fl. & Fr. : July - March.

Notes : It shows extreme variation in the habit, wings on the glumes and in the colour and texture of the involucreal shells. 'Job's Tears' is a very good fodder grass.

ALLEPPEY : Champakulam, Kidangara, Nedumudi; IDUKKI : Banks of Periyar; PALGHAT : Below Anavai, Karappa, Minnapara; QUILON : Nadjayara; TRIVANDRUM : Trivandrum.

PANICOIDEAE-PANICEAE

PANICEAE R. Br.

R. Br. in Flinders, *Voy. Terra Austr.* 2: 582. 1814; Bor, *Grass. Bur. Cey. Ind. Pak.* 271. 1860.

Key to the genera of Paniceae

- 1a. Spikelets dioecious, unisexual; the male and female spikelets collected in to separate spinose heads; leaves rigid, spiny *Spinifex* 32
- 1b. Spikelets not dioecious, often bisexual; inflorescence and leaves not as above:

- 2a. Inflorescence 1-3 stiff racemes; rachis of racemes broad, flat, disarticulating; spikelets in groups of 1-6, mixed with scale-like glumes, on the under surface of each joint *Trachys* 24
- 2b. Inflorescence often in panicles, spikes or racemes, if the latter, then the rachis of the raceme not jointed and disarticulating; spikelets not as above:
- 3a. Spikelets awned or subtended by bristles or at least aristate:
- 4a. Spikelets awned or aristate:
- 5a. Spikelets covered with long silky hairs; inflorescence an open panicle; upper glume and first lemma; notched, awned or mucronate from the sinus *Rhynchelytrum* 19
- 5b. Spikelets without silky hairs; inflorescence spiciform or digitate racemes or panicles of secund spikes; glumes and lemmas entire, awned or not:
- 6a. Spikelets lanceolate, acuminate or very shortly aristate; inflorescence cylindric spiciform panicle; culms spongy below *Hymenachne* 3
- 6b. Spikelets ovate-elliptic or elliptic lanceolate, usually awned or aristate; inflorescence not as above; culms not spongy below:
- 7a. Inflorescence of 3-10 digitate or subdigitate racemes; second lemma mucronate or aristate; glumes ciliate along the margins *Alloteropsis* 2
- 7b. Inflorescence in panicles of several racemes arranged on a central axis; second lemma never mucronate; glumes not ciliate:
- 8a. Leaf-blades ovate-elliptic or elliptic lanceolate; lower glume awned, culms creeping or geniculate *Oplismenus* 11
- 8b. Leaf-blades linear; lower glume not awned; culms erect or suberect; aquatic or wetland grasses *Echinochloa* 7
- 4b. Spikelets subtended by a solitary or an involucre of bristles:

- 9a. Bristle solitary, formed by the prolonged branch beyond the terminal spikelet; second lemma smooth, shining; aquatic or marsh grasses
Pseudoraphis 18
- 9b. Bristles numerous, forming an involucre around the spikelets, rarely solitary but then the second lemma transversely rugose:
- 10a. Inflorescence spiciform; second lemma more or less smooth; bristles falling with the spikelets
Pennisetum 16
- 10b. Inflorescence paniculate or spiciform; second lemma transversely rugose; bristles persistent
Setaria 21
- 3b. Spikelets not awned and not supported by bristles or aristae:
- 11a. Inflorescence in open panicles or the panicles contracted, spiciform:
- 12a. Panicles contracted, narrow, spiciform or cylindrical:
- 13a. Spikelets lanceolate, acuminate, 5-8 mm long, first lemma acuminate or aristate
Hymenachne 9
- 13b. Spikelets ovate or elliptic, more or less gibbous, obtuse or acute, 1-6 mm long; first lemma not aristate
Sacciolepis 20
- 12b. Panicles often lax, rarely contracted, but never spiciform:
- 14a. Spikelets with an annular callus at base, formed from the swollen lowest rachilla and lower glume; inflorescence in panicles of second racemes; spikelets elliptic-lanceolate or lanceolate, 3-4 mm long, softly silky hairy
Eriachloa 8
- 14b. Spikelets without an annular callus at base; inflorescence and spikelets not as above:
- 15a. Spikelets gibbous and laterally compressed:
- 16a. Upper glume with rows of transparent, hooked bristles or glands between the nerves; spikelets ovate-lanceolate, 3-6 mm long
Pseudechinolaena 17
- 16b. Upper glume without rows of glands or bristles between the nerves, glabrous or hairy; spikelets ovate or obovate, 1-3 mm long
Cyrtococcum 5

- 16b. Spikelets not gibbous:
- 17a. Lower glume absent or reduced to minute scale or rim *Digitaria* 9
- 17b. Lower glume well-developed:
- 18a. Upper glume as long as or longer than the second lemma; spikelets solitary at each node:
- 19a. Second lemma with 2 lateral basal appendages
Ichnanthus 10
- 19b. Second lemma without such appendages *Panicum* 13
- 18b. Upper glume much shorter than the second lemma; spikelets in groups of 2-10, at each node *Ottochloa* 12
- 11b. Inflorescence of spiciform subsacund racemes digitate or subdigitate, or scattered on a central axis, rarely solitary:
- 20a. Lower glume well-developed:
- 21a. Raceme solitary, terminal, spiciform; spikelets sunken in hollows of flat, thickened rhachis; leaf-blades rounded at apex
Stenotaphrum 23
- 21b. Racemes 2-many, scattered on a central axis, rarely solitary, but then the spikelets not sunken:
- 22a. Glumes and lemmas with laterally compressed and thickened apices *Acroceras* 1
- 22b. Glumes and lemmas not as above:
- 23a. Upper glume with rows of transparent, hooked bristles or glands between the nerves; spikelets gibbous; laterally compressed *Pseudechinolaena* 7
- 23b. Upper glume without rows of glands or transparent hooked hairs; spikelets not gibbous, dorsally compressed, terete:
- 24a. Lower glume turned away from the axis or spikelets abaxial:
- 25a. Second lemma mucronate; spikelets often flattened; racemes 3-5 in number
Urochloa 25
- 25b. Second lemma not mucronate; spikelets often plump or turgid:

- 26a. Inflorescence of dense panicle of spiciform racemes, spikelets crowded, often in 3-4 rows; glumes often acuminate or awned
Echinochloa 7
- 26b. Inflorescence of several distant spiciform racemes, arranged alternate on a central axis; spikelets not crowded, often in 1-2 rows; glumes acute, never awned
Paspalum 14
- 24b. Lower glume turned towards the axis or spikelets adaxial
Brachiaria 4
- 20b. Lower glume usually absent or reduced to minute scale or rim:
- 27a. Spikelets with an annular callus at base formed from the swollen lowest rachilla and lower glume⁶
Eriochloa 8
- 27b. Spikelets without an annular callus at base:
- 28a. Second lemma thin, cartilaginous with flat hyaline margins; spikelets binate or ternate rarely solitary, but then lemmas with verrucose hairs; inflorescence of 2-several digitate or subdigitate racemes, rarely a panicle of racemes, but then the spikelets binate
Digitaria 6
- 28b. Second lemma more or less crustaceous, usually with narrow involute margins, exposing much of the palea; spikelets usually solitary, rarely binate, but then the culms not stoloniferous:
- 29a. Lower glume strictly absent; peduncles of inflorescence often 2-3, exerted from terminal sheaths; spikelets solitary, oblong or oblong-lanceolate, flat; culms stoloniferous and mat forming
Axonopus 3
- 29b. Lower glume reduced to minute scale or absent, if latter but then the spikelets orbicular or ovate; spikelets solitary or paired, often plano-convex, ovate-elliptic or orbicular, rarely oblong-lanceolate and flat, but then the lower glume present; culms not as above
Paspalum 15

1. ACROCERAS Stapf

Stapf in Prain, Fl. Trop. Afr. 9: 621. 1920; Bor, Grass. Bur. Cey. Ind. Pak, 275, 1960.

A genus of about 15 species distributed in the tropics and subtropics of the World of which about 3 species occur in India and one in Kerala.

Acroceras munroanum (Balansa) Henr. in Blumea 3: 445. 1940; Bor, Grass. Bur. Cey. Ind. Pak. 275. 1960; Srø-kumar et al. in J. Econ. Tax. Bot, 3: 267, 1982

Panicum munroanum Balansa in Morot, J. Bot. 4: 140, 1890. *P. latifolium* Hook. f. Fl. Brit. Ind. 7: 39, 1896, p. p. *Acroceres crassipiculatum* (Merr.) Alst. in Trimen, Handb. Fl. Cey. 6 (Suppl.): 324, 1931; Bor, Fl. Assam 5: 200, 1940. *Panicum crassipiculatum* Merr. in Phil. J. Sci. 1 (Suppl.): 356, 1906.

Annuals or perennials. Culms creeping or geniculate, 30-75 cm long, rarely erect, often prostrate and rooting at the nodes, smooth and glabrous; nodes glabrous. Leaves lanceolate, 2.8 x 0.4-0.8 cm, glabrous on both surfaces or rarely ciliate on the rounded base, margins scabrid. Sheaths 1-3 cm long, loose below, closely fitting above, striate, glabrous except for the outer margins which are always ciliate. Ligules fimbriate, membranous. Inflorescence a panicle of 4-6 sub-erect, interruptedly spiciform racemes, 3-10 cm long, each raceme 2-4 cm long disposed on a short, central rhachis which is deeply channelled; branches hairy at the junction with the rhachis. Pedicels 1-6 mm long, trigonous, scabrid on the margins. Spikelets, elliptic or ovate-lanceolate, c. 4 x 2 mm, bluntly apiculate. Lower glumes ovate-lanceolate, c. 3 x 1.5 mm, chartaceous, 3-5-nerved, tip laterally compressed and thickened. Upper glume elliptic or broadly ovate, c. 3.5 x 1.75 mm, acute, tip laterally compressed and thickened, chartaceous, 5-7-nerved. Lower floret empty. Upper floret bisexual. First lemma broadly ovate, c. 3.5 x 1.75 mm, apiculate, tip laterally compressed, chartaceous, 7-nerved. Palea elliptic-lanceolate, c. 2 x 0.75 mm, delicate, 2-keeled, 2-nerved. Second lemma elliptic or ovate, c. 3.25 x 1.5 mm, apiculate, tip laterally compressed and thickened, subcoriaceous, faintly 5-7-nerved, smooth, shining, glabrous except for a few hairs below the tip. Palea elliptic, c. 2.5 x 1 mm, tip notched and reflexed, subcoriaceous, smooth, shining. Lodicules 2, obovate, c. 0.25 x 0.15 mm, wavy at apex. Stamens 3; anthers c. 1 mm long. Ovary ovate, c. 0.3 x 0.15 mm; styles c. 0.75 mm long; stigmas c. 0.5 mm long, plumose. Grains ovate, c. 2 x 1.25 mm, blunt at both ends.

Rare along the coastal areas.

Fl. & Fr.: March - November.

Notes: This grass superficially looks like some species of *Brachiaria* and it may be often confused with *B. ramosa*, but can be distinguished by the laterally compressed and thickened apices of the glumes and lemmas.

It was previously known only from Assam, Burma and Malaysia. Sræekumar *et al.* (*I.c.*) reported its occurrence for the first time from Kerala. While describing this species from eastern India, N. L. Bor in Flora of Assam (*I.c.*) stated that the lower glume is 3-nerved and upper glume 7-nerved. But it has been observed that there is a range of variation in the number of nerves in both the glumes.

It forms an important sand-binder along the coastal areas.

ALLEPPEY : Champakkulam; QUILON : Quilon.

2. ALLOTEROPSIS J. S. Presl ex C. B. Presl

J. S. Presl ex C. B. Presl, Rel. Haenk. 343, t. 47, 1830, emend Hitch. in Contrib. Unt. Stat. Nat. Herb. 12: 210, 1909; Fischer in Gamble, Fl. Pres. Madr. 1765, 1934 (Repr. ed. 3: 1223, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 276, 1960. *Axonopus* sensu Hook. f. Fl. Brit. Ind. 7: 63, 1896, non P. Beauv. 1812.

A genus of about 4 species distributed in the tropics and subtropics of the Old World, of which 2 species occur in India and Kerala.

Key to the species

- 1a. Spikelets 2-4 mm long, broadly elliptic; leaves rounded or cordate at base; plants with tubercle-based hairs *A. cimicina* 1
- 1b. Spikelets 5-6 mm long, elliptic-lanceolate; leaves narrowed and tapering at base; plants without tubercle-based hairs *A. semisata* 2

1. *Alloteropsis cimicina* : (Linn.) Stapf in Prain, Fl. Trop. Afr. 9: 487, 1919; Fischer in Gamble, Fl. Pres. Madr. 1766, 1934 (Repr. ed. 1223, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 276, 1960; Manilal & Sivaraj, Fl. Catic. 339, 1982. *Milium cimicinum* Linn, Mant. Pl. 2: 184, 1771. *Axonopus cimicinus* (Linn.) P. Beauv. Ess. Agrost. 154, 167, 1812; Hook. f. Fl. Brit. Ind. 7: 64, 1896; Rang. & Tad. Handb. S. Ind. Grass. 108, t. 107-108, 1921.

Annuals. Culms 15-120 cm high, erect or decumbent; nodes glabrous or tubercled hairy. Leaves ovate-lanceolate, oblong, oblong-lanceolate or lanceolate, rounded or cordate at base, margins ciliate with tubercle-based hairs, midrib hairy. Sheaths densely cov-

ered with tubercle-based hairs, or bristles. Ligules truncate, fimbriate. Racemes 3-10, digitate, umbellate or corymbose, 3-20 cm long. Rhachis angular, scabrid. Spikelet broadly elliptic, 2-4 mm long (excl. an arista of 1-3 mm), green with purple margins, pedicelled. Lower glume ovate-lanceolate, 1.5-2 x 1 mm, shortly acuminate, 2-4 x 1-1.5 mm, acuminate membranous, 7-nerved, 2-keeled; keels dorsally ciliate, purplish. Lower floret male, Upper floret bisexual. First lemma ovate, 2-3 x 1-1.5 mm, chartaceous, 5-nerved. Palea narrowly elliptic, 1-1.5 x 0.5 mm, 2-lobed at apex, delicate. Stamens 3, anthers 0.5-1 mm long, yellow. Second lemma elliptic, 2-3 x 1 mm, aristate, subcoriaceous or chartaceous, margins ciliate, arista 1-3 mm long. Palea ovate, 2-3 x 1 mm, chartaceous, 2-keeled, with faint wart-like tubercles on dorsal side. Ovary oblong, 0.25-0.5 mm; styles 0.5-1 mm, stigmas 0.5-1 mm, violet or reddish-brown. Grain ovate, 1-1.5 x 1 mm, laterally compressed,

Very common along the roadsides, waste places, margins of streams and rivulets and also as a weed in cultivated lands.

Fl. & Fr. : Throughout the year.

ALLEPPEY: Nedumudy, Pallana, Thrikkunnappuzha; CALICUT: Kutiyadi, Pavagada; CANNANORE: Alakode, Bandudka, Cheruvathur, Nedumpoyil, Tellicherry; ERNAKULAM: Cochin; IDUKKI: Pulluparai, Rajamudi, Vandiperiyar; KOTTAYAM: Ettumanoor; PALGHAT: Pulikkal forest; PATHANAMTHITTA: Adoor; TRIVANDRUM: Kottur R. F.; Pulimath; WYNAD: Meppadi.

2. *Alloferopsis semialata* (R. Br.) Hitch. var. *viatica* (Griff.) Ellis & Karthik. in J. Bomb. Nat. Hist. Soc. 70: 594. 1973; *Aira viatica* Griff. Not. 3: 54. 1851; Bor, Grass. Bur. Cey. Ind. Pak. 277. 1960.

Perennials. Culms 50-120 cm high, tufted, erect, base woolly with remnant leaf sheaths; nodes densely bearded. Leaves lanceolate or linear-lanceolate, 5-30 x 0.3-0.8 cm, narrowed and tapering at base, green or glaucous. Sheaths bearded at mouth, basal ones densely woolly hairy with remnant bases. Ligules thin, truncate, membranous, fimbriate. Racemes 3-5, digitate or subdigitate, 5-12 cm long. Rhachis and pedicels hairy. Spikelets ovate-elliptic or elliptic-lanceolate, 5-6 mm long (excl. arista of 3-4 mm long). Lower glume ovate-lanceolate, 4-5 x 1-2 mm, acuminate, shortly aristate, chartaceous, 3-5-nerved, margins ciliate. Upper glume ovate-lanceolate or elliptic-lanceolate, 5-6 x 2 mm, acuminate, aristate, chartaceous, 5-

nerved, 2-keeled; keels long ciliate. Lower floret male. Upper floret bisexual. First lemma ovate-lanceolate, 5-6 x 1.5-2 mm, coriaceous or crustaceous, 3-5-nerved. Palea deeply notched, c. 1 mm, delicate. Second lemma elliptic-lanceolate, 5-6 x 1-2 mm, aristate, coriaceous, 3-5-nerved, arista 3-4 mm long. Palea oblong-lanceolate, 4-5 x 1-1.5 mm, subcoriaceous or chartaceous, 2-keeled.

Rare, along the margins of forests.

Fl. & Fr. : April - June.

Notes : This grass has a densely tufted and thick rootstock. The basal sheaths often disintegrate into fibres forming a woolly mass.

This variety was previously known only from Assam and Sri Lanka. Ellis & Karthikeyan (*f.c.*) reported its occurrence for the first time in Peninsular India based on a collection from Calicut, Kerala.

CALICUT: Pavagada.

3. AXONOPUS P. Beauv.

P. Beauv. *Ess. Agrost.* 12: 154. 1812; *Bor. Grass. Bur. Cey. Ind. Pak.* 278. 1960.

A genus of about 35 species distributed in the tropics of the World, of which one species occurs in India and Kerala.

Axonopus compressus (Sw.) P. Beauv. *Ess. Agrost.* 12: 154. 1812; *Bor. Grass. Bur. Cey. Ind. Pak.* 278. 1960.
Milium compressum Sw. *Prodr. Veg. Ind. Occ.* 24. 1788.

PLATE No. 44

Perennials. Culms 10-60 cm long, creeping or stoloniferous, rooting at the nodes, erect when flowering, sometimes rosette-like and forming mats; nodes bearded. Leaves oblong to linear-lanceolate, 2-2.5 x 0.3-1.5 cm, acute or rounded at apex, base rounded or shallowly cordate, margins ciliate. Sheaths keeled. Ligules membranous, thin, fimbriate. Racemes 2-6, binate, digitate or alternate on a stalk, each 2-10 cm long. Rhachis trigonous, 0.5 mm wide, winged along the angles. Spikelets oblong-acute, elliptic or elliptic-lanceolate, 2-2.5 x 0.5-1 mm, sessile or shortly pedicelled, green or purplish. Lower glume wanting. Upper glume ovate, elliptic or elliptic-lanceolate, 2-2.5 x 1 mm, chartaceous, 5-7-nerved, softly hairy on side, especially along the nerves. First lemma ovate-acute, elliptic or elliptic-lanceo-

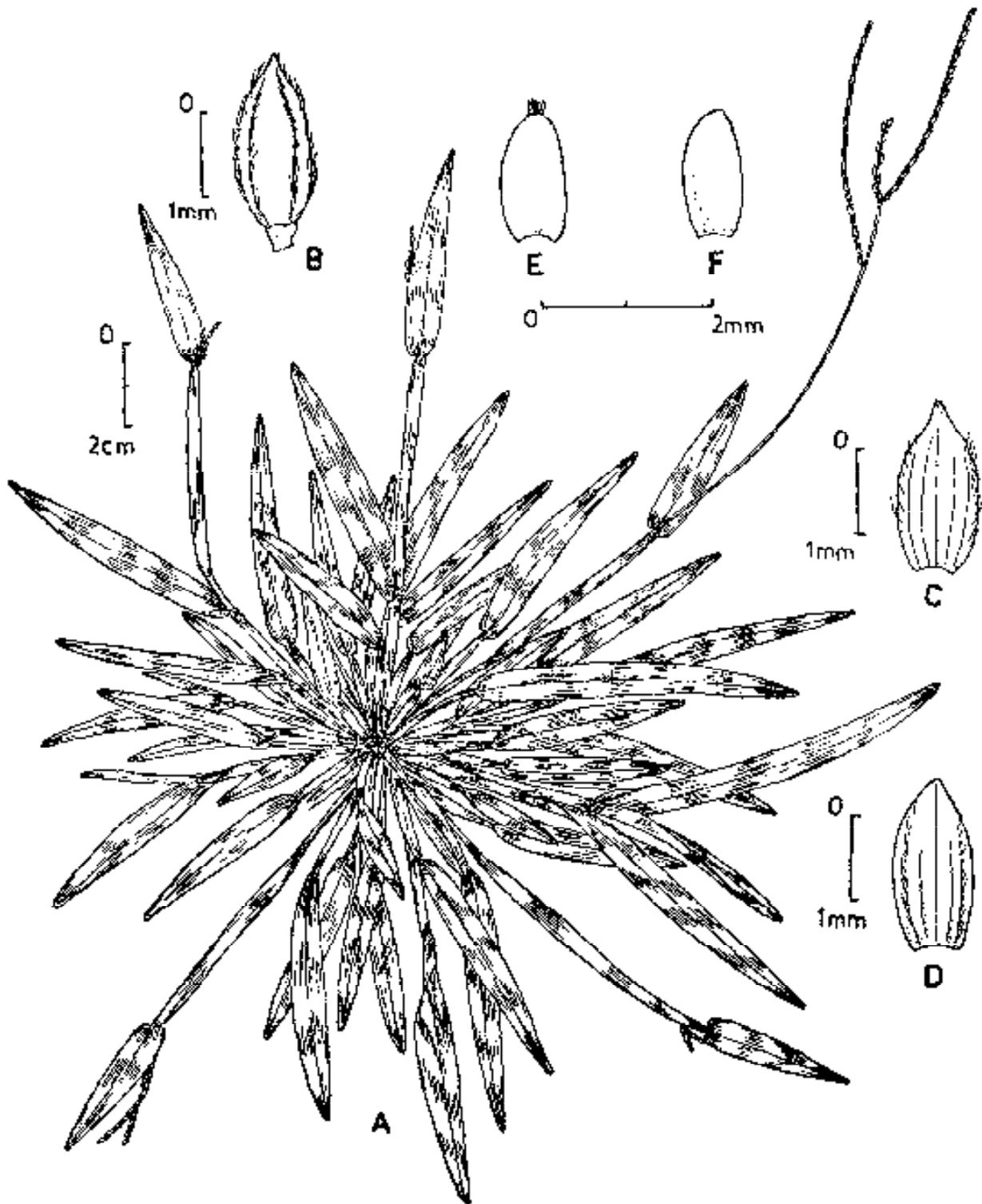


PLATE No. 44 : *AXONOPUS COMPRESSUS* (Swartz) P. Beauv.

A. Habit ; B. Spikelet ; C. Upper glume ; D. First lemma ; E. Second lemma ; F. Palea of the second lemma.

late, 2-2.5 x 1 mm, membranous, faintly 5-nerved, softly villous on dorsal side, epaleate. Second lemma ovate-oblong, 1.5-2 x 1 mm, crustaceous, faintly 3-5-nerved, bearded at apex. Palea oblong, 1.5-2 x 1 mm, crustaceous, margins infolded. Floret bisexual. Stamens 3, anthers c. 0.5 mm long, white with violet margins. Ovary oblong or elliptic, c. 0.5 mm long; styles 0.5 mm; stigmas c. 0.5 mm long, white.

Very common along the banks of backwaters, rivers, lakes and canals, bunds of paddy fields, roadsides and waste places, usually in wet situations.

Fl. & Fr. : Throughout the year.

Notes : This species shows extreme variation in the shape and size of the leaves. Leaves are either oblong, oblanceolate, linear-oblong, lanceolate or linear-lanceolate. This grass grows gregariously and forms mats and serves as a very good sand binder. The common "*Carpet Grass*"

ALLEPPEY : Pallana, Pallathuruthy, R. Block, Thrikkunnapuzha; CALICUT : Sultan Battery; CANNANORE : Panathur; IDUKKI : Munnar; KOTTAYAM : Kottayam town; PATHANAMTHITTA : Moozhiyar; TRIVANDRUM : Nilamel.

4. BRACHIARIA (Trin.) Griseb.

Griseb. in Ledeb. Fl. Ross. 4: 469. 1853; Fischer in Gamble, Fl. Pres. Madr. 1767. 1934 (Repr. ed. 3: 1224. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 278. 1960; Cope in Nasir & Ali, Fl. Pak. 143: 201. 1982. *Panicum* L. subd.v. *Brachiaria* Trin. in Mem. Acad. Sci. Petersb. ser. 6. 3: 194. 1834; Hook. f. Fl. Brit. Ind. 7: 33. 1896.

A genus of about 90 species distributed in the tropics and subtropics of the World, mostly in Africa, of which about 20 occur in India and 6 in Kerala.

Key to the species

- 1a. Culms robust, 6-10 mm in diameter, often tall and erect; racemes 10-20 in number; rachis flat, ribbon-like; spikelets 2.5-3.5 mm long; lower glume not clasping the spikelet *B. mutica* 3
- 1b. Culms not robust, often less than 3 mm in diameter, creeping or decumbent; racemes usually 2-8 in number, rarely more than 10 but then the rachis triquetrous or the spikelets gibbous; lower glume clasping the spikelet:

- 2a. Spikelets 1-2 mm long:
- 3a. Leaves lanceolate, glabrous; spikelets paired, elliptic, acute, 1.5-2 mm long *B. reptans* 5
- 3b. Leaves ovate-oblong or elliptic, softly villous, cartilaginous and undulate on one margin; spikelets solitary or paired, obovate, slightly gibbous, obtuse, 1-2 mm long *B. semiundulata* 6
- 2b. Spikelets 2-4 mm long:
- 4a. Rhachis flat; spikelets secund, solitary, oblong-obovate, tapering to the base; pedicels glabrous:
- 5a. Racemes 2 or rarely 3; peduncles softly hairy below the racemes; leaves up to 5 cm long; spikelets 2-3 mm long *B. distachya* 1
- 5b. Racemes 3-8; peduncles puberulous or glabrous; leaves up to 20 cm long; spikelets 3.5-4 mm long *B. miliiformis* 2
- 4b. Rhachis triquetrous; spikelets not secund, often paired, broadly elliptic, base not tapering, 2.5-3 mm long; pedicels often with long colourless hairs; racemes 3-16 *B. ramosa* 4

1. *Brachiaria distachya* (Linn.) Stapf in Prain, Fl. Trop. Afr. 9: 565, 1919; Fischer in Gamble, Fl. Pres. Madr. 1769, 1934 (Repr. ed. 3: 1226, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 281, 1960, *Panicum distachyon* Linn. Mant. Alt. 183, 1771.

Annuals or perennials. Culms 15-50 cm long, creeping or decumbent, rooting at the nodes, rarely erect; nodes glabrous or sparsely bearded. Leaves lanceolate or elliptic-lanceolate, 1.4 x 0.3-0.6 cm, rounded or shallowly cordate at base, softly hairy or glabrous. Sheaths softly hairy, ciliate along one margin. Ligule a tuft of hairs or fimbriate. Racemes 2 or rarely 3, 1-3 cm long, hairy or puberulous below the rhachis. Rhachis flat, 0.5 mm wide. Spikelets elliptic, 2-3 mm long, solitary. Pedicels triquetrous, 0.25-1 mm long, scabrid. Lower glume obovate or broadly ovate, c. 1-1.5 x 1.5-2 mm, acute at apex, chartaceous, 7-9-nerved. Upper glume broadly ovate, 2-3 x 1-1.5 mm, chartaceous, 5-7-nerved. Lower floret empty. Upper floret bisexual. First lemma more or less similar to the upper glume, 5-nerved, slightly depressed on dorsal side. Palea oblong, c. 2 x 0.5 mm, delicate, hyaline, 2-nerved. Second lemma ovate, 2-2.5 x 1-1.5 mm, coriaceous or crustaceous, faintly 3-5-nerved, rugulose. Palea ovate-oblong or elliptic, 2-2.5 x 0.6-1 mm, coriaceous or crustaceous, 2-keeled, faintly 2-nerved, rugulose. Lodicules obovate, c. 5 mm, 2-nerved at apex. Stamens 3; anthers c. 1 mm. Ovary elliptic, c. 0.5 mm; styles 0.5-1 mm; stigma 0.5-1 mm.

Fairly common along the banks of backwaters, seashores and in wastelands, usually in coastal areas.

Fl. & Fr. : November-March.

Notes : This species is closely allied to and often confused with *B. miliiformis*, but differs by the shorter leaves, puberulous smaller and fewer racemes and smaller spikelets. It is a very good sand-binder.

ALLEPPEY : Alleppey; QUILON : Chavara; TRIVANDRUM : Kariavattom, Kazhakkuttam.

2. *Brachiaria miliiformis* (J. Presl ex C. Presl) A. Chase in *Contrib. U. S. Nat. Herb.* 22: 35, 1920; Fischer in *Gamble, Fl. Pres. Madr.* 1769, 1934 (Repr. ed. 3: 1226, 1957); Bor, *Grass. Bur. Cey. Ind. Pak.* 283-284, 1960, *Panicum miliiforme* J. Presl ex C. Presl *Rel. Haenk.* 1: 300, 1830, *P. distachyon* sensu Hook. f. *Fl. Brit. Ind.* 7: 37, 1896, non Linn. 1771.

Annuals or perennials. Culms 30-100 cm long, creeping or willowy, rooting at the lower nodes; nodes glabrous. Leaves lanceolate or linear-lanceolate, 2-20 x 0.3-1.2 cm, rounded or shallowly cordate at base, glabrous or sparsely tubercled hairy. Sheaths glabrous or tubercled hairy, ciliate along the margins. Ligules fimbriate or row of hairs. Racemes 3-8 in number, 2-8 cm long, puberulous or glabrous below the rachis. Rachis flat, c. 1 mm wide. Spikelets elliptic or obovate, 3.5-4 mm, tapering and narrowed at base, apiculate at apex. Lower glume obovate or broadly ovate, 1.5-2 x 1.5-2 mm, chartaceous, 9-11-nerved. Upper glume ovate, 3-4 x 1.5-2 mm, acute, chartaceous, 7-9-nerved. Lower floret empty, epaleate. Upper floret bisexual. First lemma ovate, acute, chartaceous, 5-7-nerved. Second lemma elliptic or elliptic-oblong, 2.5-3.5 x 1-1.5 mm, acute, coriaceous or crustaceous, faintly 3-5-nerved, rugulose. Palea elliptic or elliptic-oblong, 2-3 x 1-1.5 mm, coriaceous or crustaceous, 2-keeled, 2-nerved, rugulose, except margins and keels. Stamens 3; anthers c. 1 mm, orange-red. Ovary elliptic, c. 0.5 mm; styles 0.5-1 mm; stigmas violet or dark-brown turning black.

Very common along the roadsides, wastelands, footpaths, railway tracks, bunds of paddy fields, banks of rivers and backwaters, usually in shades.

Fl. & Fr. : Throughout the year.

Notes : This species is nearer to *Brachiaria distachya*, but can be distinguished by the larger spikelets, longer leaves, more racemes and epaleate lower florets. It is a highly variable species.

ALLEPPEY: Alleppey, Champakkulam, Nedumudy, Pallathuruthy; IDUKKI: Valanchakkanam; KOTTAYAM: Kudamaloor; PALGHAT: Mukkali forest; PATHANAMTHITTA: Adoor, Anathode., Moozhiyar; TRICHUR: Peechi; TRIVANDRUM: Attingal; WYNAD: Meppadi.

3. *Brachiaria mutica* (Forssk.) Stapf in Prain, Fl. Trop. Afr. 9: 526. 1919; Fischer in Gamble, Fl. Pres. Madr. 1769, 1934 (Repr. ed. 3: 1226. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 284. 1960, *Panicum muticum* Forssk. Fl. Aegypt. 20, 1775; Hook. f. Fl. Brit. Ind. 7: 34. 1896.

PLATE No. 45

Tall perennials. Culms 50-150 cm high, tufted, erect; nodes densely bearded. Leaves linear-lanceolate, 10-30 x 0.5-2 cm, acuminate, rounded or shallowly cordate at base. Sheaths covered with dense tubercle-based hairs. Ligules membranous, thin, fimbriate. Racemes pseudopaniculate, 10-20 in number, each 2-8 cm long. Rachis flat, ribbon-like, 0.5-1 mm, laterally covered with solitary or paired stalked spikelets. Pedicels 0.5-2 mm long, with a few white bristles. Spikelets elliptic, 2.5-3.5 mm, crowded, arranged in 2 rows. Lower glume ovate, c. 1 x 0.5 mm, acute, scaly, faintly 1-3-nerved. Upper glume ovate, 3-3.5 x 1-1.5 mm, acute, chartaceous, 5-nerved. Lower floret male. Upper floret bisexual. First lemma ovate, acute, 3-3.5 x 1-1.5 mm, chartaceous, 5-nerved. Palea elliptic or ovate-elliptic, 2.5-3 x 1-1.5 mm, delicate, hyaline, 2-keeled, 2-nerved. Stamens 3; anthers 1-1.5 mm. Second lemma ovate, 2-3 x 1-1.5 mm, rounded at apex, crustaceous, faintly 3-nerved, rugulose. Palea ovate, or ovate-elliptic, 2-2.5 x 1 mm, rounded at apex, crustaceous, 2-keeled, 2-nerved, rugulose except on margins. Lodicules obovate, c. 0.5 mm, denticulate at apex. Stamens similar to those of the lower floret. Ovary oblong-elliptic; styles c. 1 mm long; stigmas c. 1 mm.

Very common, along the banks of streams, canals, backwaters and rivers, usually in semiaquatic habitats.

Fl. & Fr. : November-March.

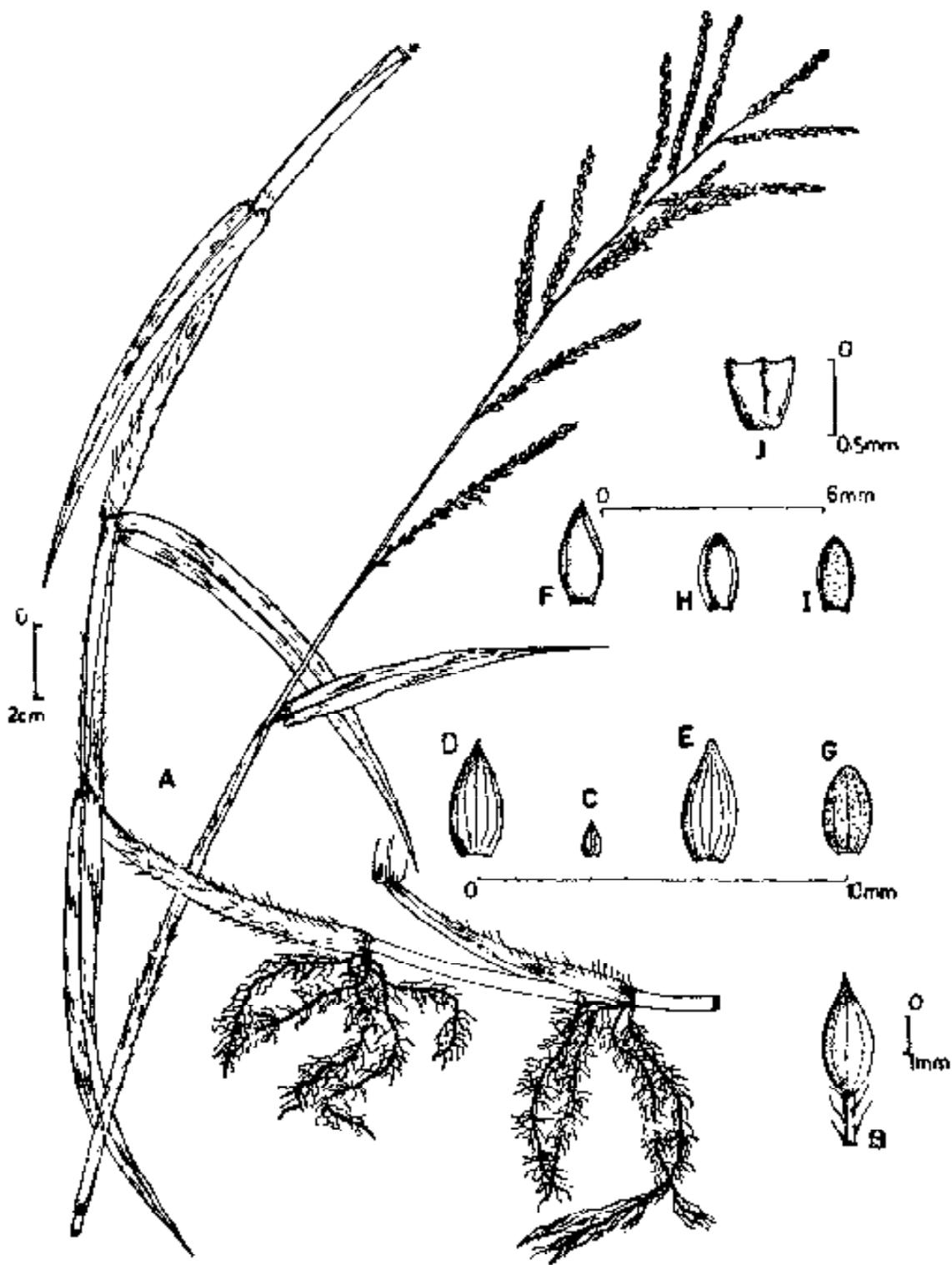


PLATE No. 45: *BRACHIARIA MUTICA* (Forsk.) Stapf

A. Habit; B. Spikelet; C. Lower glume; D. Upper glume; E. First lemma;
 F. Palea of the first lemma; G. Second lemma; H. Palea of the second
 lemma (inner view); I. Palea of the second lemma (outer view); J. Lodicule.

Notes : This tall, robust grass grows gregariously along the narrow intrusions of the backwaters and lakes. It is a very good fodder grass.

ALLEPPEY : Punnamada, R. Block, Thottappally, Thrikkunnapuzha; QUILON: Thamarakkulam.

4. *Brachiaria ramosa* (Linn.) Stapf in Prain, Fl. Trop. Afr. 9: 542. 1919; Fischer in Gamble, Fl. Pres. Madr. 1770. 1934 (Repr. ed. 3: 1226. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 284, 1960; Manilal & Siveraj, Fl. Calic. 343. 1982. *Panicum ramosum* Linn. Mant. Pl. 1: 29. 1767; Hook. f. Fl. Brit. Ind. 7: 36. 1896; Rang. & Yad. Handb. S. Ind. Grass. 89. t. 95-96. 1921.

Annuals or perennials. Culms 15-100 cm long, creeping or decumbent; nodes glabrous or softly villous. Leaves lanceolate or linear-lanceolate, 2-15 x 0.2-2 cm, acuminate, shallowly cordate or rounded at base, glabrous or softly villous. Sheaths slightly keeled. Ligules a row of hairs. Panicles 2-16 cm long, lax. Racemes 3-16, alternate, 1-5 cm long. Rachis angular. Spikelets broadly elliptic or ovate-elliptic, 2.5-3 mm, softly hairy or glabrous. Pedicels, with or without long colourless hairs. Lower glume ovate or obovate, 1-1.5 x 2 mm, chartaceous, 7-nerved, softly hairy or glabrous. Upper glume broadly ovate, 2.5-3 x 1.5-2 mm, chartaceous, 7-nerved, softly hairy or glabrous. Lower floret empty. Upper floret bisexual. First lemma broadly ovate, 2.5-3 x 2 mm, chartaceous, 5-nerved, softly hairy or glabrous. Palea oblong-lanceolate, c. 2 x 0.5 mm, delicate, hyaline, 2-keeled, 2-nerved. Second lemma broadly ovate, mucronate, 2-2.5 x 1.5-2 mm, crustaceous, rugose, faintly 5-7-nerved. Palea ovate, c. 2 x 1 mm, crustaceous, 2-keeled, muriculate. Stamens 3; anthers c. 1 mm long. Ovary c. 0.5 mm long; styles 0.5-1 mm; stigmas 0.5-1 mm long.

Very common along the bunds of paddy fields, roadsides, wastelands, and other moist habitats, as a weed in cultivated bunds.

Fl. & Fr. : March-September.

Notes : This grass is often associated with *Eleusine indica*. A highly variable species. The leaves show a gradation in their shape and size.

ALLEPPEY: Pallana, R. Block; CALICUT: Kutiyadi; CANNANORE: Cannanore; ERNAKULAM: Cochin; PALGHAT: Vetti-

lachola; QUILON: Kodumon; TRICHUR: Kuthiran R. F., Vellankkara; TRIVANDRUM: Sreekariyam.

5. *Brachiaria reptans* (Linn.) Gard. & C. E. Hubb. in Hook. Ic. Pl. subtab. 3363. 1938; Bor. Grass. Bur. Cey. Ind. Pak. 285. 1960, *Panicum reptans* Linn. Syst. Nat. ed. 10, 870. 1759, *P. javanicum* sensu Hook.f. Fl. Brit. Ind. 7: 35. 1896, non Polr. 1816, *Urochloa reptans* (Linn.) Stapf in Prain, Fl. Trop. Afr. 9: 610. 1920; Fischer in Gamble, Fl. Pres. Madr. 1775. 1934 (Repr. ed. 3: 1230. 1957).

Annuals. Culms 15-60 cm long, creeping, rooting at the nodes; nodes glabrous or sparsely bearded. Leaves lanceolate, 1-6 x 0.2-1.0 cm, rounded or shallowly cordate at base. Sheaths sparsely bearded or glabrous, margins ciliate. Ligules row of hairs. Panicles 3-6 cm long. Racemes 3-6 in number, alternate, 1-5 cm long. Spikelets elliptic, 1.5-2 mm, acute or shortly acuminate. Pedicels 0.5-2 mm with long white bristles. Lower glume broadly obovate or truncate, c. 0.5-1 mm, chartaceous, faintly 1-3-nerved. Upper glume ovate, 1.5-2 x 1 mm, acute, chartaceous, 5-nerved. Lower floret empty. Upper floret bisexual. First lemma broadly ovate, 1.5-2 x 1 mm, acute, chartaceous, 7-nerved. Palea ovate-elliptic, 1.5-2 x 1 mm, 2-keeled, 2-nerved, delicate, hyaline. Second lemma ovate, 1-1.5 x 1 mm, mucronate, crustaceous, rugulose. Palea ovate, 1-1.5 x 1 mm, crustaceous, 2-keeled, 2-nerved, rugulose. Stamens 3; anthers 0.5-1 mm. Pistil rudimentary.

Occasional, along the water-logged areas, wetlands and in the shades of bushes.

Fl. & Fr.: August September.

Notes: This species can easily be distinguished from the other species of the genus by its smaller, lanceolate leaves and smaller spikelets.

IDUKKI: Way to Munnar.

6. *Brachiaria semiundulata* (Hochst.) Stapf in Prain, Fl. Trop. Afr. 9: 556. 1919; Fischer in Gamble, Fl. Pres. Madr. 1770. 1934 (Repr. ed. 3: 1226. 1957); Bor. Grass. Bur. Cey. Ind. Pak. 285. 1960, *Panicum semiundulatum* Hochst. in Flora 24: 715. 1841, *P. villosum* sensu Hook. f. Fl. Brit. Ind. 7: 34. 1896, p.p., non Lam. 1791. PLATE No. 46

Annuals. Culms 10-50 cm long, creeping or decumbent; nodes densely villous. Leaves ovate-oblong, elliptic or ovate-lanceolate, 1-6 x 0.4-1.2 cm, densely or sparsely villous. Sheaths densely villous. Ligules a row of hairs or fimbriate membrane. Panicles 1-8 cm long. Racemes 3-15 in number, densely spiculate, each 0.5-1.5 cm long. Spikelets obovate, 1-2 mm long, slightly gibbous when fully mature, paired or solitary. Rhachis with a few white bristles. Lower glume ovate, 0.5-1 x 0.5-1 mm, acute, chartaceous, faintly 1-3-nerved, glabrous. Upper glume broadly ovate, 1.5-2 x 1 mm, chartaceous, 3-5-nerved, softly hairy or glabrous. Lower floret empty. Upper floret bisexual. First lemma broadly ovate, 1.5-2 x 1 mm, chartaceous, 5-nerved, softly hairy or glabrous. Palea oblong or oblong-lanceolate, delicate, hyaline. Second lemma ovate, 1-1.5 x 1 mm, crustaceous, faintly 5-nerved, rugulose. Palea ovate or broadly elliptic, 1-1.5 x 0.5-1 mm, acute, 2-keeled, 2-nerved, rugulose. Stamens 3; anthers 0.5-1 mm long. Stigmas violet.

Occasional, in moist rocky places, along roadsides and on hill slopes.

Fl. & Fr. : June - July.

Notes : This species can easily be distinguished from the other species of the genus by the peculiar shape of its leaves, with undulate margins and smaller, slightly gibbous spikelets.

IDUKKI : Pattumudi, Valanchakkanam.

5. CYRTOCOCCUM Stapf

Stapf in Prain, *Fl. Trop. Afr.* 9: 745. 1920; Fischer in Gamble, *Fl. Pres. Madr.* 1784. 1934 (Repr. ed. 3: 1236, 1957); Boy, *Grass. Bur. Cey. Ind. Pak.* 290. 1960. *Panicum* Linn. sect. *Gibboseae* Hook. f. *Fl. Brit. Ind.* 7: 56. 1896.

A genus of about 12 species distributed in Paletropical regions, of which about 7 species occur in India and 6 in Kerala.

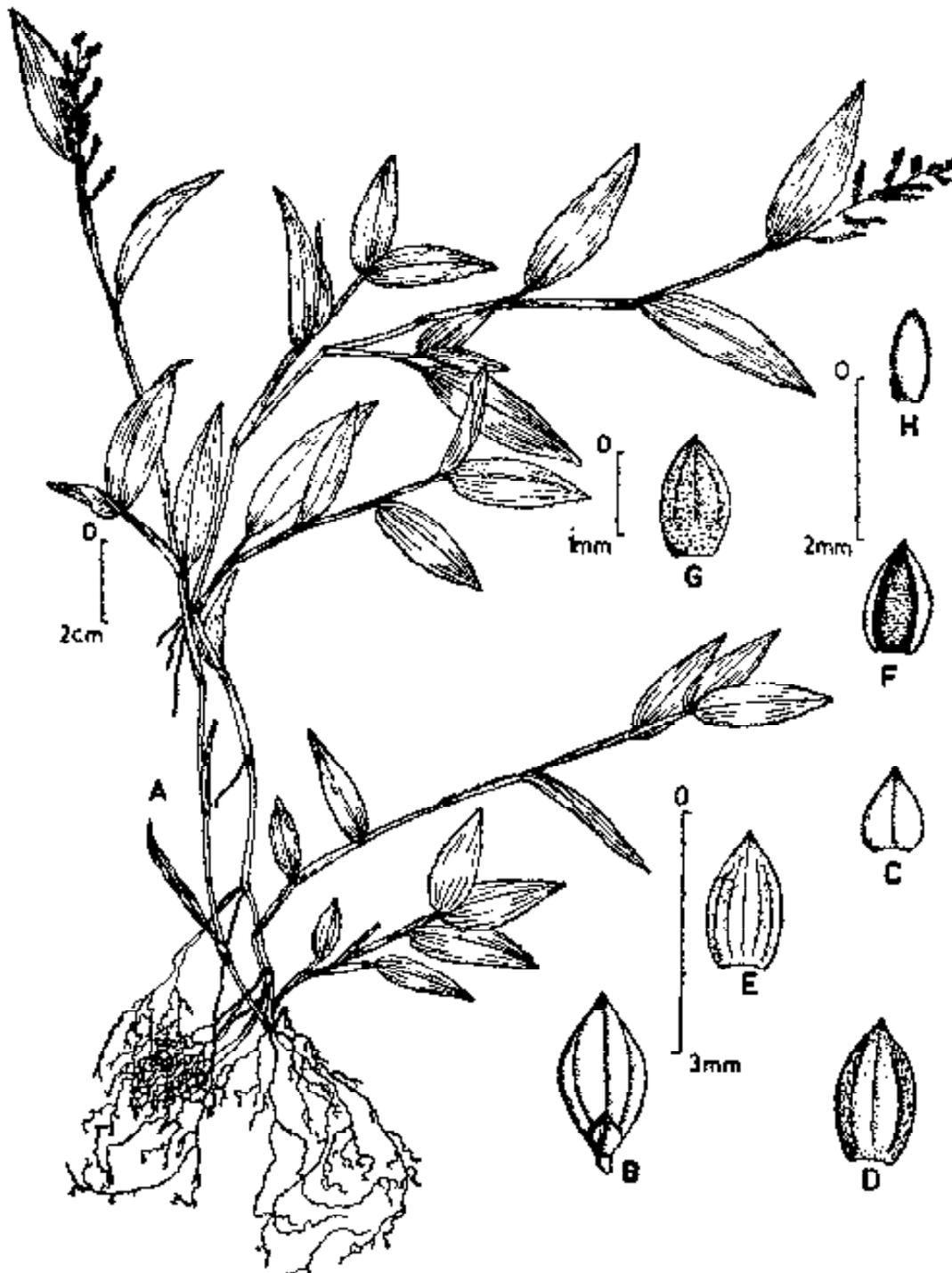


PLATE No. 46; *BRACHIARIA SEMIUNDULATA* (Hochst.) Stapf

A. Habit; B. Spikelet; C. Lower glume; D. Upper glume; E. First lemma;
 F. Palea of the first lemma; G. Second lemma; H. Palea of the second
 lemma.

Key to the species

- 1a. Panicles contracted; pedicels as long as or shorter than the spikelets:
- 2a. Culms slender, creeping; leaves up to 5 cm long, 8 mm wide; panicles up to 5 cm long *C. trigonum* 6
- 2b. Culms stouter, creeping or erect; leaves up to 20 cm long, 15 mm wide; panicles up to 20 cm long *C. oxyphyllum* 4
- 1b. Panicles lax; pedicels often much longer than the spikelets:
- 3a. Spikelets very few in a panicle, 2-3 mm long; leaves up to 6 mm wide, elliptic-lanceolate *C. deccanense* 1
- 3b. Spikelets numerous in a panicle, 1-2 mm long; leaves up to 20 mm wide:
- 4a. Leaves cuneate at base, up to 10 cm long; glumes and lemmas obtuse; branches of panicles not flabellate:
- 5a. Upper glume and lower lemma with brown wart-like outgrowths *C. muricatum* 3
- 5b. Upper glume and lower lemma smooth, without wart-like outgrowths *C. patens* 5
- 4b. Leaves not cuneate at base, up to 25 cm long; glumes and lower lemmas acute or cuspidate; branches of panicles flabellate *C. longipes* 2

1. *Cyrtococcum deccanense* Bor in Kew Bull, 1956: 256, 1956; Bor, Grass, Bur. Cey. Ind. Pak. 291, 1960. *Panicum patens* auct. non Linn, 1753: Hook. f, Fl. Brit. Ind. 7: 57, 1896. PLATE No. 47

Annuals. Culms 15-50 cm long, creeping or decumbent; nodes glabrous or sparsely bearded. Leaves elliptic or elliptic-lanceolate, 1-8 x 0.2-0.6 cm, acuminate, narrowed at base, softly villous or glabrous. Sheaths with sparse tubercle-based hairs in the upper half, ciliate along the margins. Ligules membranous, thin. Panicles 2-15 cm long, lax. Pedicels 1-20 mm long. Spikelets ovate or obovate, 2-3 x 1-1.5 mm. Lower glume ovate, 1.5-2 x 1 mm, acute, chartaceous, 3-nerved. Upper glume boat-shaped, c. 2 x 1 mm, chartaceous, 7-nerved. Lower floret empty. Upper floret bisexual. First lemma ovate-oblong, 1.5-2 x 1-1.5 mm, obtuse, chartaceous, 7-nerved. Palea rudimentary. Second lemma deltoid, 1.5-2 x 1-1.5 mm, crustaceous, faintly 5-7-nerved. Palea ovate-oblong, 1-2 x 1 mm, crustaceous, 2-keeled, 2-nerved. Stamens 3; anthers c. 1 mm long, pink.

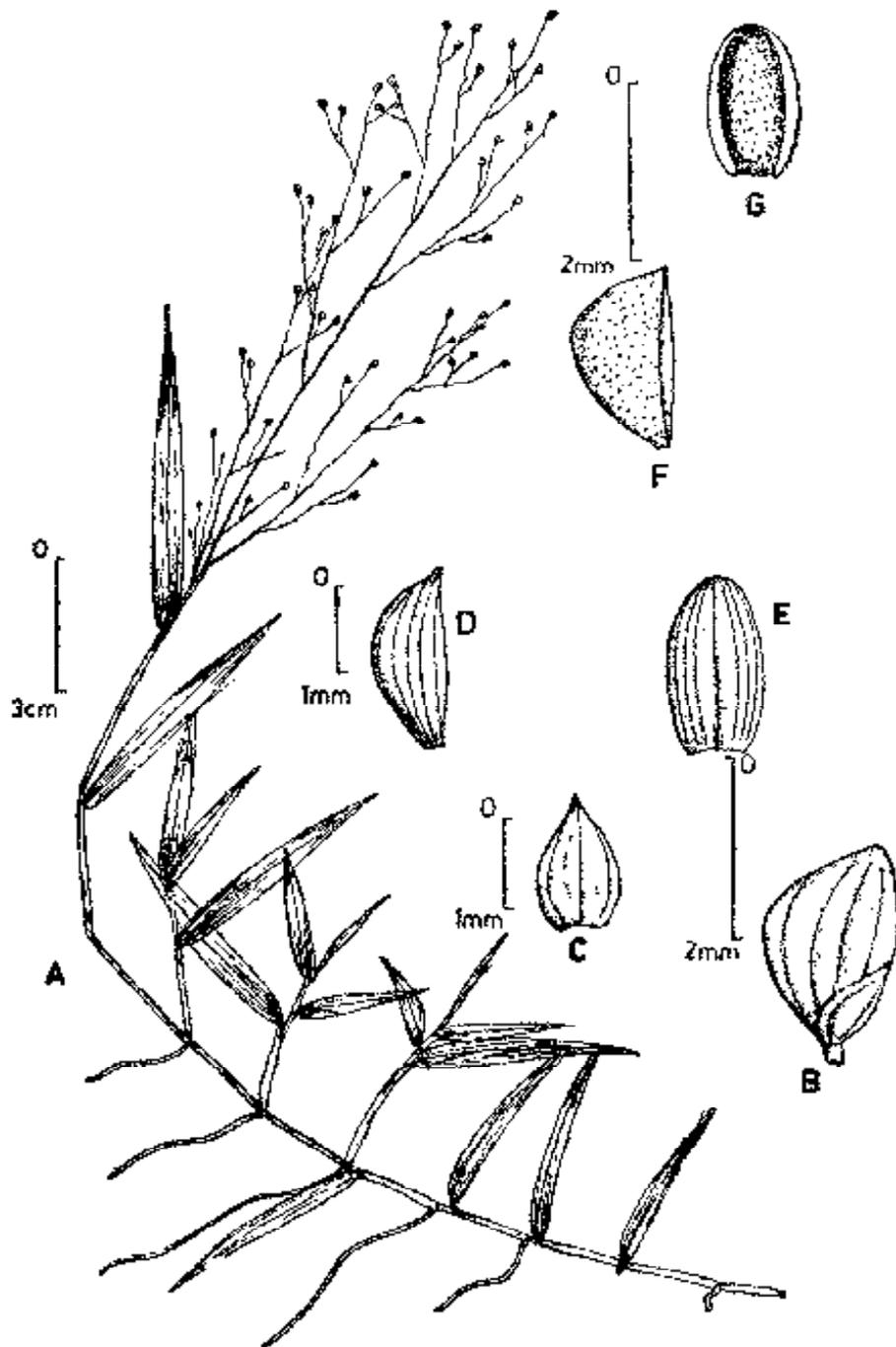


PLATE No. 47: *CYRTOCOCCUM DECCANENSE* Bor

A. Habit; B. Spikelet; C. Lower glume; D. Upper glume; E. First lemma;
 F. Second lemma; G. Palea of the second lemma.

Ovary oblong, c. 0.5 mm; styles 1-1.5 mm long; stigmas c. 1 mm long, pink.

Occasional, along moist shady places, fringes of forests and as undergrowth in scrub jungles, usually at higher elevations.

Fl. & Fr. : June - October.

Notes : This species is similar to *Cyrtococcum patens* but differs by the few and larger spikelets with long pedicels and narrower, elliptic-lanceolate leaves with narrowed bases. J.D. Hooker (*l.c.*) treated it as a variety of *C. patens*. But it is quite distinct by its peculiar long narrow leaves and larger spikelets and also by the habitat specificity.

IDUKKI : Devicolam, Eravikulam, Munnar.

2. *Cyrtococcum longipes* (Wight & Arn. ex Hook. f.) A Camus in Bull. Mus. Hist. Nat. Paris 27: 118, 1921; Fischer in Gamble, Fl. Pres. Madr. 1786, 1934 (Repr. ed. 3: 1237, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 291, 1960. *Panicum longipes* Wight & Arn. ex Hook. f. Fl. Brit. Ind. 7: 58, 1896.

Perennials. Culms 50-120 cm long, tall, erect, trailing or willowy; nodes glabrous or sparsely bearded. Leaves elliptic-lanceolate or linear-lanceolate, acuminate, 6-25 x 0.5-2 cm, narrowed at base. Sheaths glabrous or covered with sparse tubercle-based hairs. Ligules ovate, membranous. Panicles 5-35 cm long, lax, consisting 4-8 alternate, flabelliform branches. Spikelets ovate or obovate, 1.5-2 mm. Pedicels 0.5-2.5 cm long, angular, scabrid, golden-yellow. Lower glume ovate-lanceolate, 1.2 x 1 mm, acuminate, chartaceous, 3-nerved. Upper glume boat-shaped, 1.5-2 x 1 mm, cuspidate, chartaceous, 5-7-nerved. Lower floret empty, epaleate. Upper floret bisexual. First lemma ovate, obtuse, 1.5-2 x 1-1.5 mm, chartaceous, 5-nerved, margins ciliate towards apex. Second lemma deltoid, 1.5-2 x 1-1.5 mm, crustaceous, shining, faintly 5-7-nerved. Palea oblong, 1-1.5 x 0.5 mm, crustaceous, 2-keeled, 2-nerved. Stamens 3; anthers 0.5-1 mm. Pistil c. 1 mm long.

Fairly common, along the margins of the forests, as undergrowth in wet-evergreen forests and scrub jungles.

Fl. & Fr. : December - May.

Notes : This true forest grass can easily be distinguished from

all other species of the genus by its robust habit, longer panicles with drooping flabellate branches and very long pedicels.

CANNANORE: Kottiyur; IDUKKI: Uppupara; MALAPPURAM: Mancheri; PALGHAT: Aruvampara, Poochipara; PATHANAMTHITTA: Sabarimala; TRIVANDRUM: Suryakanthi, on way to Agasthiarkudam; WYNAD: Chandanathode, Meppadi, Tembra-cheri.

3. *Cyrtococcum muricatum* (Retz.) Bor. Grass. Bur. Cey. Ind. Pak. 291. 1960. *Panicum muricatum* Retz. Obs. Bot. 4: 18. 1786.

Annuals. Culms 10-75 cm long, creeping or trailing, rooting at the lower nodes, rarely decumbent; nodes glabrous. Leaves ovate-lanceolate, elliptic or elliptic-lanceolate, 1-10 x 0.4-1.8 cm, acuminate, cuneate and ciliate at base, softly villous from minute tubercled bases. Sheaths ciliate along the margins. Ligules truncate, membranous. Panicles 5-20 cm long, lax. Spikelets obovate, 1.5-2 mm, brown or purplish. Pedicels long. Lower glume ovate, acute, 1-1.5 x 0.5 mm, chartaceous, 3-nerved. Upper glume boat-shaped or ovate-oblong, 1-1.75 x 0.75-1 mm, chartaceous, 3-nerved, softly hairy with a few brown wart-like outgrowths. Lower floret empty; epaleate. Upper floret bisexual. First lemma ovate-oblong, 1-1.75 x 1 mm, chartaceous, 5-nerved, softly hairy with a few brown wart-like outgrowths. Second lemma deltoid, 1-1.5 x 1-1.5 mm, crustaceous, faintly 5-7-nerved. Palea oblong, 1-1.5 x 0.5 mm, crustaceous, 2-keeled, 2-nerved. Stamens 3; anthers 0.5-1 mm, pale yellow. Pistil c. 1 mm long; stigmas white or purple.

Frequent, along the margins of the forests usually in shades and hill slopes, as a weed in pepper plantations.

Fl. & Fr.: July-November.

Notes: This species is very close to *Cyrtococcum patens* and is often confused and mistaken with it, but can be distinguished by the warty outgrowths on the lower lemma and the upper glume. The specific status of this plant is doubtful, as the warts on the lemma and glume are quite unreliable and insufficient. Both these species prefer moist shady habitats.

ALLEPPEY: Karthikeppally; CALICUT: Peruvannamuzhi; CANNANORE: Angadimogaru, Bandudka; PATHANAMTHITTA: Moozhiyar, on way to Anathode; TRIVANDRUM: Nilamel.

4. *Cyrtococcum oxyphyllum* (Steud.) Stapf in Hook. Ic. Pl. subtab. 3096. 1922; Fischer in Gamble, Fl. Pres. Madr. 1786. 1934 (Repr. ed. 3: 1237. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 291-292. 1960. *Panicum oxyphyllum* Steud. Syn. Pl. Glum. 1: 65. 1854. *P. pilipes* Nees et Arn. ex Buese in Miq. Pl. Junghn. 3: 376. 1854; Hook. f. Fl. Brit. Ind. 7: 57. 1896.

Annuals or perennials. Culms 20-100 cm long, creeping, willowy or erect; nodes glabrous, basal ones with long roots. Leaves elliptic-lanceolate, lanceolate or linear-lanceolate, 2-20 x 0.5-1.5 cm, acuminate, narrowed or rounded at base, softly villous or glabrous. Sheaths softly villous, ciliate, along one margin. Ligules ovate, acute, membranous. Panicles 5-20 cm long, dense, congested. Spikelets obovate, 1.25-2 mm long, shortly pedicelled. Lower glume ovate, acute or ovate-lanceolate, 1-1.5 x 1 mm, chartaceous, 3-nerved. Upper glume boat-shaped or ovate, 1.5-2 x 1 mm, acute, chartaceous, 3-nerved. Lower floret empty, epaleate. Upper floret bisexual. First lemma broadly ovate, 1.5-2 x 1-1.5 mm, chartaceous, 5-nerved. Second lemma deltoid, 1-1.5 x 1 mm, crustaceous, faintly 5-nerved. Palea ovate-oblong, 1-1.5 x 1 mm, crustaceous, 2-keeled, 2-nerved. Stamens 3; anthers 0.5-1 mm long, cream-coloured. Pistil c. 1 mm long; stigmas white.

Very common along the fringes of forests, often scrambling in scrub jungles, occasional in open grasslands.

Fl. & Fr.: Throughout the year.

Notes: This true forest grass grows gregariously in damp shady situations.

CALICUT: Peruvannamuzhi, Thoovakkadavu; CANNANORE: on way to Kannothe; IDUKKI: Edapalayam, Munnar, Pullupara, Thekkadi; MALAPPURAM: Mancheri; PALGHAT: Poochipara; PATHANAMTHITTA: Ponnambalamedu, on way to Sabarimala; TRICHUR: Parambikulam; TRIVANDRUM: Kottur R.F., Pulimath, way to Kallar; WYNAD: Chandanathode, Meppadi.

5. *Cyrtococcum patens* (Linn.) A. Camus in Bull. Mus. Hist. Nat. Paris 27: 118. 1921; Fischer in Gamble, Fl. Pres. Madr. 1786. 1934 (Repr. ed. 3: 1237. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 292. 1960. *Panicum patens*

Linn. Sp. Pl. 58. 1753. *Cyrtococcum radicans* (Retz.) Stapf in Hook. icon. Pl. subtab. 3096. 1922; Fischer in Gamble, Fl. Pres. Madr. 1786. 1934 (Repr. ed. 3: 1237. 1957). *Panicum radicans* Retz. Obs. Bot. 4: 18. 1786.

Annuals. Culms 10-80 cm long, creeping or trailing, rooting at the lower nodes, rarely decumbent; nodes glabrous. Leaves ovate-lanceolate, elliptic-lanceolate or lanceolate, acuminate, 1-8 x 0.3-1.5 cm, cuneate at base, softly villous or glabrous. Sheaths softly villous or glabrous, margins ciliate. Ligules ovate, acute, membranous. Panicles 3-20 cm long, lax, rarely congested. Spikelets ovate or obovate, 1-2 mm long, purplish-green. Lower glume ovate, acute, c. 1 x 1 mm, chartaceous, 3-5-nerved. Upper glume ovate or obovate, 1-1.5 x 1 mm, chartaceous, 5-nerved, softly hairy. Lower floret empty, epaleate. Upper floret bisexual. First lemma ovate, 1.5-2 x 1-1.5 mm, chartaceous, 5-nerved, softly hairy. Second lemma deltoid, 1.5-2 x 1 mm, crustaceous, faintly 5-nerved. Palea ovate-oblong, 1-1.5 x 1 mm, crustaceous, 2-keeled, 2-nerved. Stamens 3; anthers c. 1 mm, cream-coloured. Pistil c. 1 mm long; stigmas white or pink.

Fairly common in moist shady places, as undergrowth in scrub jungles and along forest margins, often associated with *Pseudanthistiria umbellata*.

Fl. & Fr. : Throughout the year.

Notes : This species is very close to *Cyrtococcum muricatum*, but differs by having smooth glumes and lemmas.

ALLEPPEY : Komana, Pulinkunnu; CANNANORE : way to Kannoth; PALGHAT : Karivara slopes; PATHANAMTHITTA : Pampa Dam, Sebarimala; TRICHUR : Peechi Dam; TRIVANDRUM : Ponmudi; WYNAD : Cherambadi.

6. *Cyrtococcum trigonum* (Retz.) A. Camus in Bull. Mus. Hist. Nat. Paris 27: 118. 1921; Fischer in Gamble, Fl. Pres. Madr. 1785. 1934 (Repr. ed. 3: 1237. 1957); Bor, Grass. Bur. Cey Ind. Pak. 292. 1960; Manilal & Sivaram, Fl. Calic. 348. 1982. *Panicum trigonum* Retz. Obs. Bot. 3: 9. 1783; Hook. f. Fl. Brit. Ind. 7: 56. 1896.

Annuals. Culms 5-50 cm long, creeping or trailing, rarely decumbent, rooting at the nodes; nodes sparsely bearded or glabrous. Leaves lanceolate or elliptic-lanceolate, 1-4 x 0.1-0.6 cm, acute or acuminate, cuneate or narrowed at base, softly villous or glabrous. Sheaths softly villous or glabrous, ciliate along one margin. Ligules ovate, membranous. Panicles 1-5 cm long, contracted. Spikelets obovate or oblong, 1-2 mm long, softly hairy. Lower glume ovate, acute, 1-1.25 x 1 mm, chartaceous, 3-nerved, softly hairy. Upper glume ovate or ovate-oblong, 1.5-2 x 1 mm, chartaceous, 3-nerved, softly hairy. Lower floret empty. Upper floret bisexual. First lemma ovate or ovate-oblong, 1.5-2 x 1 mm, chartaceous, 5-7-nerved, softly hairy. Second lemma deltoid, 1-1.5 x 1 mm, crustaceous, faintly 5-nerved. Palea oblong, c. 1 x 0.5 mm, crustaceous, 2-keeled, 2-nerved. Stamens 3; anthers 0.5-1 mm long. Pistil c. 1 mm long.

Occasional in damp, shady places, along the coast.

Fl. & Fr. : August - November.

Notes : This species is nearer to *C. oxyphyllum* but differs by the slender culms, which are creeping and rooting at the nodes, forming dense mats in moist shady places. It is a good sand binder.

TRIVANDRUM : Trivandrum.

6. DIGITARIA Heist. ex Fabricus

Heist. ex Fabricus, Enum. ed. 1: 207, 1759; Fischer in Gamble, Fl. Pres. Madr. 1762, 1934 (Repr. ed. 3: 1221, 1957); Bor, Grass. Bur. Cey. Ind. Pak, 292, 1960; Henr. Mon. Dig. 1950; Veldkamp in Blumea 21: 20, 1973, *Paspalum* sensu Hook. f. Fl. Brit. Ind. 7: 10, 1896, p.p. non Linn, 1759.

A genus of about 200 species distributed in the tropical and temperate regions of the World, of which about 28 species occur in India and 9 in Kerala.

Key to the species

1a. Rhachis winged:

2a. Spikelets 1-2 mm long; hairs on the spikelets verrucose; lower glume absent:

3a. Culms slender, creeping; leaves oblong to lanceolate, up to 10 cm long; racemes 2 or 3; fertile lemma pale at maturity
D. longiflora 5

3b. Culms stouter, erect; leaves often linear, up to 20 cm long; racemes 3-25 in number; fertile lemma dark coloured
D. violascens 8

2b. Spikelets 2-4 mm long; hairs on the spikelets not verrucose; lower glume usually present:

4a. Spikelets with glassy bristles; racemes usually 2, stiff
D. bicornis 2

4b. Spikelets without glassy bristles; racemes 2-16 in number:

5a. Lower glume absent or reduced to a rim; upper glume usually less than $\frac{1}{2}$ the length of the spikelet
D. setigera 7

5b. Lower glume a triangular scale; upper glume always more than $\frac{1}{2}$ the length of the spikelet:

6a. Rhachis distinctly serrate; racemes 2-12 in number; spikelets elliptic or elliptic-lanceolate, 2.5-3.5 mm long
D. ciliaris 3

6b. Rhachis smooth; racemes 2-4 in number; spikelets narrowly lanceolate, 3-4 mm long
D. radicata 6

1b. Rhachis triquetrous, usually not winged, rarely narrowly winged, but then the spikelets distant:

7a. Inflorescence paniculate; racemes 10-20 in number, verticillate or subverticillate; spikelets 2-2.5 mm long
D. waltichiana 9

7b. Inflorescence digitate or subdigitate; racemes 3-16 in number:

8a. Spikelets 1-2 mm long, oblong-elliptic or obovate; racemes branched
D. obtusens 1

8b. Spikelets 2.5-3.5 mm long, elliptic-lanceolate or lanceolate; racemes not branched, with interrupted groups of spikelets
D. griffithii 4

1. *Digitaria abludens* (Roem. & Schult.) Veldk. in Blumea 21: 53. 1973. *Panicum abludens* Roem. & Schult. Syst. Veg. 2: 457. 1817. *Digitaria granularis* (Trin. ex Spreng.) Henr. Monogr. Gen. Digit. 302. 1950; Bor, Grass. Bur. Cey. Ind. Pak. 301. 1960. *Paspalum granulare* Trin. ex Spreng. Neue Entdeck. 2: 47. 1821. *Digitaria pedicellaris* (Trin. ex Hook. f.) Prain, Beng. Pl. 1191. 1903; Fischer in Gamble, Fl. Pres. Madr. 1765. 1934 (Repr. ed. 3: 1223. 1957). *Paspalum pedicellare* Trin. ex Hook. f. Fl. Brit. Ind. 7: 19. 1896.

Annuals. Culms 25-100 cm high, erect or geniculate, tufted; nodes glabrous. Leaves linear, 5-10 x 0.3-0.5 cm, acuminate, rounded at base, glabrous or scabrid. Sheaths glabrous or rarely pilose. Ligules truncate, erose or fimbriate, membranous. Racemes 3-8 in number, each 3-12 cm long, lax with secondary branches. Rhachis triquetrous, scabrid, c. 0.3 mm wide. Pedicels 0.5-5 mm long, abscission discoid. Spikelets elliptic, oblong-elliptic or obovate, 1-2 mm long, acute or apiculate, softly hairy. Lower glume absent. Upper glume ovate-acute or oblong, 1-1.5 x 0.5-0.75 mm, chartaceous, 3-7-nerved, softly silky hairy. Lower floret empty; epaleate. Upper floret bisexual. First lemma ovate, acute or oblong, 1-1.5x0.5-0.75 mm, chartaceous, 5-7-nerved, softly hairy. Second lemma ovate or elliptic, 1-1.5x1 mm, apiculate or acuminate, crustaceous, yellowish-brown. Palea elliptic, acute, 1-1.5 x 0.5 mm, crustaceous, 2-keeled, 2-nerved. Stamens 3; anthers 0.25-0.5 mm, violet with white connective. Stigmas pink or purplish.

Occasional, along the hill slopes, moist shady places, open grasslands and rocky places, usually at higher elevations.

Fl. & Fr. : May - August.

Notes : This species is quite distinct by its peculiar, loosely arranged spikelets and often branched, compound racemes. Spikelets here are long-pedicelled and glumes show a gradation of variation in hairiness.

IDUKKI : Pattumudi, Rajamudi; PATHANAMTHITTA : Kula-thupuzha.

2. *Digitaria bicornis* (Lam.) Roem. & Schult. Hort. Brit. 24: n. 1578. 1830; Bor, Grass. Bur. Cey. Ind. Pak. 299. 1960; Henr. Monogr. Gen. Digit. 71. 1950; Veldkamp in Blumea 21: 30. 1973; Manilal & Sivarej. Fl. Calic. 335.

1982, *Paspalum bicorne* Lam. Tab. Encycl. Meth. Bot. 1: 176. 1791. *P. heterantherum* sensu Hook. f. Fl. Brit. Ind. 7: 16. 1896, non Nees & Meyen, 1843, *Digitaria bifarmis* Willd. Enum. Pl. Hort. Berol. 92. 1809; Bor, Grass. Bur. Cey. Ind. Pak. 219. 1960.

Annuals. Culms 10-60 cm high; nodes glabrous. Leaves lanceolate, linear-lanceolate or linear, 1-15 x 0.2-0.6 cm, acute or acuminate, rounded or shallowly cordate at base. Sheaths glabrous or rarely pilose. Ligules truncate, erose, membranous, 1-4 mm long. Racemes usually 2, rarely 3 or more, each 3-12 cm long. Rhachis winged, serrate, 0.5-1 mm wide. Abscission of pedicels truncate. Spikelets paired, heteromorphous, sessile ones glabrous to slightly pubescent, pedicelled ones pectinate, pubescent, elliptic or oblong-elliptic, acute, 2.5-3.5 mm long. Lower glume a very variable, triangular scale, 0.25-0.5 mm, sometimes absent. Upper glume lanceolate, 1-2.5 mm long, chartaceous, 3-nerved, silky pubescent. Lower floret empty. Upper floret bisexual. First lemma elliptic-lanceolate or oblong-lanceolate, 2.5-3.5 x 1 mm, chartaceous, 7-nerved, glabrous or pubescent, those of the pedicelled spikelet often pectinate. Second lemma elliptic-lanceolate, 2.5-3 x 1 mm, acuminate, crustaceous. Palea elliptic-lanceolate, 2.5-3 x 1 mm, acuminate, crustaceous, 2-keeled, 2-nerved. Stamens 3; anthers c. 1 mm, yellow or purple. Pistil 1-2 mm long; stigmas c. 1 mm long, pink or purplish.

Frequent in waste places, roadsides, damp, shady places, sea-shores and banks of rivers; also as a weed in tapioca fields, and other cultivated places.

Fl. & Fr.: March September.

Notes: This species possesses normally only 2, sometimes 3 and rarely more racemes, each with a slightly swollen base. The midrib is thick and the wings are usually narrow. The pedicels are stout and straight and this, combined with the thick midrib, gives the spikelets the appearance of being sunk in the rhachis. This species is also distinct by the presence of glassy bristles on the lower lemma of the pedicelled spikelets.

ALLEPPEY: Champakkulam, Haripad, Mancompu, Pailana, Pallathuruthy; ERNAKULAM: Cochin; KOTTAYAM: Ettumanur; TRICHUR: Vellanikkara.

3. *Digitaria ciliaris* (Retz.) Koel. Descr. Gram. 27. 1802; Veldkamp in Blumea 21: 32. 1973; Cope in Nasir & Ali, Fl. Pak. 143, 228. 1982; Manilal & Sivaraj. Fl. Calic. 335. 1982. *Panicum ciliare* Retz. Obs. Bot. 4: 16. 1786. *Digitaria adscendens* (H.B.K.) Henr. in Blumea 1: 92. 1934; Bor, Grass. Bur. Cey. Ind. Pak. 298. 1960. *Panicum adscendens* H.B.K. Nov. Gen. et Sp. 1: 97. 1816. *Digitaria marginata* Link, Enum. Hort. Berol. 1: 102. 1821; Fischer in Gamble, Fl. Pres. Madr. 1764. 1934 (Repr. ed. 3: 1222, 1957) p.p.; *Paspalum sanguinale* (Linn.) Lam. var. *rottleri* Hook. f. Fl. Brit. Ind. 7: 15. 1896, p. p. *Digitaria sanguinalis* (Linn.) Scop. var. *ciliaris* Rang. & Tad. Handb. S. Ind. Grass. 53. t. 71-72. 1921.

Annuals or perennials. Culms 20-120 cm long, tufted, erect or decumbent, rarely creeping and rooting at the lower nodes; nodes glabrous. Leaves linear, linear-lanceolate or rarely lanceolate, 2-20 x 0.3-1.2 cm, acuminate, rounded or shallowly cordate at base, undulate on one margin, villous or glabrous. Sheaths slightly keeled, glabrous or pilose with tubercle-based hairs. Ligules ovate or truncate, 1-3 mm long, lanceolate, membranous. Racemes 2-12, digitate or subdigitate, 5-25 cm long. Rhachis winged, serrate, 0.5-1 mm wide, spicules prominent. Pedicels triquetrous, scabrid, abscission truncate. Spikelets binate, homomorphous, one sessile and the other pedicelled, elliptic or elliptic-lanceolate, 2.5-3.5 mm long. Lower glume triangular, 0.2-0.5 mm long. Upper glume lanceolate, 2-2.5 x 0.5 mm, chartaceous, 3-nerved, pubescent. Lower floret empty, epaleate. Upper floret bisexual. First lemma elliptic or elliptic-lanceolate, 2.5-3.5 x 0.5-0.75 mm, chartaceous, 7-nerved, silky pubescent along the nerves, occasionally glabrous. Second lemma elliptic or elliptic-lanceolate, 2.5-3 x 1 mm, acuminate, crustaceous or subcoriaceous, brownish-yellow in fruit. Palea elliptic-lanceolate, acuminate, 2.5-3 x 1 mm, subcoriaceous or crustaceous, 2-keeled, 2-nerved. Stamens 3; anthers 0.5-1 mm long, violet with white connectives. Ovary c. 1-1.5 mm long; stigmas c. 1 mm long, pink or purplish.

Very common in wastelands, along sea-shores, river-banks, moist shady places, roadsides and as a weed in gardens and cultivated lands; occasional along the fringes of forests.

Fl. & Fr.: Throughout the year.

Notes : The number and length of racemes and pubescence of the lower lemmas of this species vary considerably. It is a polymorphic species. Said to be an excellent fodder grass, with much nutritive value and cattle eat it with relish.

ALLEPPEY : Champakulam, Edathua, Kumarakam, Nedumudy, Pallana, R. Block, Thrikkunnapuzha, Thykkuttam; CANNANORE : Kumbia, Nileswar; ERNAKULAM : Cochin; IDUKKI : Munnar, Vandiperiyar, Vegaurrai Estate; KOTTAYAM : Kottayam town; PALGHAT : Silent Valley R.F.; Walayar, Malampuzha; PATHANAMTHITTA : Pampa Dam site; QUILON : Thenmalai; TRICHUR : Vellanikkara; TRIVANDRUM : Sreekariyam.

4. *Digitaria griffithii* (Hook. f.) Henr. in *Blumea* 1: 100, 1934; Fischer in Gamble, *Fl. Pres. Madr.* 1785, 1934 (Repr. ed. 3: 122, 1957); Bor, *Grass. Bur. Cey. Ind. Pak.* 301, 1960. *Paspalum sanguinale* (Linn.) Lam. var. *griffithii* Hook. f. *Fl. Brit. Ind.* 7: 15, 1896. *Digitaria sanguinalis* (Linn.) Scop. var. *griffithii* (Hook. f.) Rang. & Tad. *Handb. S. Ind. Grass.* 54, t. 73, 1921.

Annuals or perennials. Culms 30-120 cm long, creeping, geniculate or erect, rooting at the lower nodes; nodes glabrous. Leaves lanceolate, linear-lanceolate or linear, acuminate, 3-40 x 0.3-1.5 cm, rounded or shallowly-cordate at base, glabrous or softly villous, undulate on one margin. Sheaths keeled, densely tubercled hairy or glabrous. Ligules ovate, truncate, 1-4 mm long, membranous. Racemes 3-15 or more, digitate or subdigitate, each 2-20 cm long. Rhachis triquetrous, 0.25-0.5 mm wide, narrowly winged, scaberulous. Pedicels triquetrous, 2-6 mm long, scaberulous, abscission discoid. Spikelets binate, one sessile, the other pedicelled, elliptic-lanceolate or lanceolate, 2.5-3.5 mm long. Lower glume triangular, c. 0.25 mm long. Upper glume lanceolate or oblong-lanceolate, 2-3 x 0.5-0.75 mm, acuminate, chartaceous, 3-5-nerved, softly pubescent. Lower floret empty. Upper floret bisexual. First lemma elliptic or elliptic-lanceolate, 2.5-3.5 x 1 mm, chartaceous, 7-9-nerved, glabrous or softly pubescent. Second lemma elliptic, acute or acuminate, 2.5-3 x 1 mm, crustaceous, faintly 3-5-nerved. Palea elliptic-lanceolate, 2.5-3 x 1 mm, crustaceous, 2-keeled, 2-nerved. Stamens 3; anthers 1-1.5 mm long. Ovary 0.25-0.5 mm; styles 1-1.5 mm long; stigmas 1-1.5 mm long.

Rare, along the grassy hill slopes, banks of rivers and canals.

Fl. & Fr. : May-September.

Notes: This species is closely allied to and often confused with *Digitaria ciliaris*, but differs by the considerably longer pedicels and the longer (almost equal to the length of the spikelets) upper glumes. The specific status of this plant is doubtful.

CALICUT : Pavagada; PALGHAT : Karivara slopes.

5. *Digitaria longiflora* (Retz.) Pers. Syn. Pl. 1: 85. 1805; Rang. & Tad, Handb. S. Ind. Grass. 59. t. 76-77. 1921; Fischer in Gamble, Fl. Pres. Madr. 1765. 1934 (Repr. ed. 3: 1223. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 302. 1960; Veldkamp in Blumea 21: 66. 1973; Manilal & Sivaraj. Fl. Calic. 335. 1982. *Paspalum longiflorum* Retz. Obs. Bot. 4: 15. 1786; Hook. f. Fl. Brit. Ind. 7: 17. 1896, p.p.

Annuals or perennials. Culms 10-50 cm long, slender, creeping or geniculate, rooting at the nodes, rarely erect; nodes glabrous. Leaves oblong-lanceolate, elliptic, elliptic-lanceolate, or lanceolate, 1-10 x 0.2-1.0 cm, acute, rounded, or shallowly cordate at base. Sheaths keeled. Ligules ovate, 1-3 mm long, membranous. Racemes 2 or 3, rarely 4, digitate, 2-10 cm long. Rhachis flat, 0.5-1 mm wide, winged. Pedicels terete, 0.5-2 mm long, abscission discoid or cupuliform. Spikelets ovate-elliptic or broadly elliptic, solitary, 1-2 mm long, softly hairy, greenish-yellow. Lower glume absent. Upper glume ovate-elliptic, 1-2 x 1 mm, chartaceous, 5-9-nerved, softly hairy with appressed hairs. Lower floret empty. Upper floret bisexual. First lemma similar to the upper glume. Second lemma ovate-elliptic, 1-1.5 x 1 mm, acute, crustaceous, yellow to brownish in fruits. Palea broadly elliptic, 1-1.5 x 0.5 mm, acute, 2-keeled, 2-nerved. Stamens 3; anthers c. 0.5 mm long. Styles 0.5 mm; stigmas 0.5-1 mm long.

Very common in open grasslands, along the roadsides and waste places, and as a weed in 'Tapioca plots' and other cultivated lands; rarely along the fringes of forests.

Fl. & Fr.: Throughout the year.

Notes: This species is closely related to *Digitaria violascens*, but usually differs by the slender, creeping culms, fewer racemes (2-4), smaller leaves and pale coloured fruits.

ALLEPPEY: Kakkazham, Laxmithop, Nedumudy, Pallana, Pallathuruthy, Putimkunnu, Thakazhy, Thanneermukkam; CALICUT: Calicut; CANNANORE: Nileswar; IDUKKI: Munnar, Valanchakkanam; PATHANAMTHITTA: Pampa Dam site, Ponnambalamedu; QUILON: Residency ward; TRICHUR: Vellanikkara; TRIVANDRUM: Nilamel; WYNAD: Chandanathode.

6. *Digitaria radicata* (Presl) Miq. Fl. Ind. Bat. 3: 437. 1857; Veldkamp in Blumea 21: 35. 1973. *Panicum radicosum* Presl, Rel. Haenk. 1: 297. 1830. *Digitaria timorensis* (Kunth) Bal. in Morot, J. Bot. 4: 138. 1890; Bor, Grass. Bur. Cey. Ind. Pak. 306. 1960. *Panicum timorense* Kunth, Enum. Pl. 1: 83. 1833; *Paspalum sanguinale* (Linn.) Lam. var. *debile* Hook. f. Fl. Brit. Ind. 7: 16. 1896.

Annuals. Culms 15-60 cm long, slender, creeping and rooting at the nodes, rarely decumbent or geniculate; nodes glabrous. Leaves elliptic-lanceolate, lanceolate, linear-lanceolate or linear, 1-10 x 0.2-0.6 cm, acute or shortly acuminate, rounded or narrowed at base. Sheaths keeled. Ligules ovate or truncate, lanceolate, membranous. Racemes 2-4, digitate or subdigitate, slender, 3-12 cm long. Rhachis winged, 0.5-1 mm wide, margins smooth. Pedicels triquetrous, 0.5-3 mm long, abscision truncate. Spikelets binate, one sessile, other pedicelled, lanceolate, 3-4 mm long. Lower glume triangular, 0.1-0.25 mm long. Upper glume lanceolate, 1.5-3 x 0.25-0.5 mm, acuminate, chartaceous, 3-nerved, pubescent with long silky hairs. Lower floret empty. Upper floret bisexual. First lemma lanceolate or oblong-lanceolate, 3-4 x 1 mm, chartaceous, 6-nerved, pubescent along the nerves. Second lemma elliptic-lanceolate or lanceolate, 2.5-3 x 1 mm, acuminate, crustaceous or subcoriaceous, faintly 3-nerved. Palea lanceolate, 2.5-3 x 0.5-1 mm, acuminate, crustaceous or subcoriaceous, 2-keeled, 2-nerved. Stamens 3; anthers 0.5-1 mm long, violet. Ovary linear, c. 0.3 mm long; styles c. 0.5 mm long; stigmas c. 1 mm long, purple.

Rare, in shady areas along the fringes of forests, banks of rivers and in waste places.

Fl. & Fr. : July - March.

Notes : This species is closely related to *D. ciliaris*, but it can be distinguished by the slender, weak, trailing culms, few and slender racemes, smooth-edged rhachis and narrow lanceolate spikelets.

ALLEPPEY: Kumarakam, Meledum, R. Block; PATHANAM-THITTA: Karimala, Upper Moozhiyar.

7. *Digitaria setigera* Roth ex Roem. & Schult. Syst. Veg. 2: 474. 1817; Veldkamp in Blumea 21: 37. 1973; Bor, Grass. Bur. Cey. Ind. Pak. 305. 1960; Cope in Nasir & Ali, Fl. Pak. 143. 226. 1982. *Paspalum sanguinale* (Linn.) Lam. var. *extensum* Hook. f. Fl. Brit. Ind. 7: 15. 1896. *Digitaria sanguinalis* (Linn.) Scop. var. *extensum* (Hook. f.) Rang. & Tad. Handb. S. Ind. Grass. 56. t. 74-75. 1921.

Annuals. Culms 20-120 cm long, creeping and geniculate, rarely erect; nodes glabrous. Leaves elliptic-lanceolate, lanceolate, linear-lanceolate or linear, acuminate, rounded or shallowly cordate at base. Sheaths keeled, with or without tubercle-based hairs. Ligules ovate, truncate or erose, 1-5 mm long, membranous. Racemes 3-15, digitate or subdigitate, 3-20 cm long. Rhachis flat, winged, 0.75-1.5 mm wide, margins serrulate. Pedicels triquetrous, 0.5-3mm long, scabrid, abscission truncate. Spikelets elliptic, elliptic-lanceolate or lanceolate, 2-3 mm long. Lower glume absent or a minute rim. Upper glume ovate-lanceolate or triangular, 0.25-0.75 mm, chartaceous, pubescent, 0-3-nerved. Lower floret empty; upper floret bisexual. First lemma elliptic or ovate-lanceolate or lanceolate, 2-3 x 1 mm, chartaceous, 7-nerved, pubescent; second lemma elliptic-lanceolate or elliptic, 2-2.5 x 1 mm, acuminate, crustaceous or subcoriaceous. Palea ovate-lanceolate or elliptic-lanceolate, 2-2.5 x 1 mm, crustaceous or subcoriaceous, 2-keeled, 2-nerved. Stamens 3; anthers 0.5-1 mm long, yellow or purple with yellow connective. Ovary oblong, c. 0.5 mm; styles 0.5-1 mm long; stigmas 0.5-1 mm long, white.

Very common, along the banks of rivers, waste places, roadsides, hedges, forest-clearings and as a weed in cultivated lands, pepper plantations and other estates.

Fl. & Fr. : Throughout the year.

Notes : This species is allied to *Digitaria ciliaris*, but can be distinguished by the absence or reduction to a rim of the lower glume and the smaller upper glume which is usually less than half the length of the spikelets. It is also nearer to *D. griffithii*, but differs by its smaller upper glumes, reduced lower glumes and shorter pedicels.

ALLEPPEY: Ambalapuzha, Kuppapuram; CALICUT: Vengeri; CANNANORE: Bandudka, Baveli, Taliparamba; IDUKKI: Gavi, Koruthod, Mudirapuzha, Pattumudi, Rajemudi, Valanchakkanam; PALGHAT: Karivara slopes, Kumathanthode; PATHANAMTHITTA: Moozhiyar, Sabarimala; TRIVANDRUM: Nedumangad; WYNAD: Meppadi.

8. *Digitaria violascens* Link, Hort. Berol. 1: 229. 1827; Bor, Grass. Bur. Cey. Ind. Pak. 307. 1960. *D. chinensis* (Nees) A. Camus in Not. Syst. 4: 48. 1923, non Hornem. 1819; Fischer in Gamble, Fl. Pres. Madr. 1765, 1934 (Repr. ed. 3: 1223. 1957). *Paspalum chinense* Nees in Hook. & Arn. Bot. Beech. Voy. 231. 1841. *Paspalum longiflorum* auct. non Retz. 1786; Hook. f. Fl. Brit. Ind. 7: 17. 1896.

Annuals. Culms 15-60 cm long, erect or geniculate; nodes glabrous. Leaves lanceolate or linear-lanceolate, 3-20 x 0.2-0.6 cm. Sheaths keeled. Ligules truncate or ovate-acute, entire or erose, membranous. Racemes 3-25 in number, each 3-12 cm long. Rhachis flat, winged, 0.5-1 mm wide, margins serrulate. Pedicels subterete or angular, scabrid, 0.5-2 mm long, abscission discoid or cupuliform. Spikelets broadly elliptic or ovate-elliptic, acute, 1.5-2 mm, long, pubescent. Lower glume absent or rarely a rim. Upper glume ovate-lanceolate, 1.5-2 x 0.5-0.75 mm, chartaceous, 5-nerved, pubescent. Lower floret empty. Upper floret bisexual. First lemma elliptic or ovate-elliptic, chartaceous, 5-7-nerved, pubescent. Second lemma broadly elliptic, 1-2 x 1 mm, subcoriaceous or crustaceous, faintly 5-nerved, brownish. Palea elliptic, 1-1.5 x 1 mm, subcoriaceous, 2-keeled, 2-nerved. Stamens 3; anthers c. 0.5 mm long. Ovary c. 0.25 mm; styles 0.5-1 mm long; stigmas 0.5-1 mm long.

Very common along the grassy hill slopes, fringes of forests, roadsides and waste places; occasional along the banks of rivers.

Fl. & Fr. : July - November.

Notes : This species is closely allied to *D. longiflora* but can be distinguished by the erect habit, more number of racemes, longer leaves and dark-coloured fruits.

These two species intergrade to a certain extent, and enough reliable characters are not available for separating them.

This grass shows extreme variation especially in the number of racemes and indumentum on the spikelets. A few specimens with a lot of variations were sent to Dr. J. F. Veldkamp, Agrostologist, Rijks-herbarium, Leiden and according to him (personal communication) 'these specimens are excessively rich flowering ones and I cannot remember having seen specimens with so many racemes, but otherwise there seems to be no differences in the structure of the spikelets, which is the decisive character' Further he says that *D. violascens* is a polymorphic species.

IDUKKI : Munnar.

9. *Digitaria wallichiana* (Wight & Arn. ex Steud.) Stapf in Prain, Fl. Trop. Afr. 9: 436. 1919; Fischer in Gamble, Fl. Pres. Madr. 1765. 1934 (Repr. ed. 3: 1223. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 307. 1960; Veldkamp in Blumea 21: 49. 1973. *Panicum wallichianum* Wight & Arn. ex Steud. Syn. Pl. Glum. 1: 41. 1854. *Paspalum perrottetii* Hook. f. Fl. Brit. Ind. 7: 20. 1896, non *Panicum perrottetii* Kunth 1831. PLATE No. 48

Annuals or perennials. Culms 20-80 cm long, decumbent or erect, rarely rooting at the nodes; nodes shortly bearded. Leaves lanceolate or linear-lanceolate, 1-10 x 0.2-1 cm, rounded or shallowly cordate, acuminate, softly hairy or glabrous. Sheaths slightly keeled. Ligules truncate or erose, 2-3 mm long, membranous. Inflorescence pseudopaniculate, 4-10 cm long. Racemes verticillate or subverticillate, 10-20, each 2-10 cm long. Rhachis triquetrous, serrate. Pedicels triquetrous, abscission discoid or cupuliform. Spikelets oblong or elliptic, 2-2.5 mm long. Lower glume absent. Upper glume lanceolate or ovate-lanceolate, 1.5-2 x 0.5 mm, chartaceous, 3-nerved, hairy along the nerves. Lower floret empty. Upper floret bisexual. First lemma elliptic or elliptic-lanceolate, 2-2.5 x 0.5-1 mm, chartaceous, 7-nerved, pubescent along the nerves. Second lemma elliptic, 1.75-2 x 0.5-1 mm, acute, subcoriaceous. Palea elliptic, 1.5-2 x 0.5-1 mm, subcoriaceous, 2-keeled, 2-nerved. Stamens 3; anthers c. 1 mm long, pink. Stigmas cream-coloured.

Frequent along the roadsides, hill-slopes and moist shady places, usually at higher elevations.

Fl. & Fr. : June-August.

IDUKKI : Munnar.

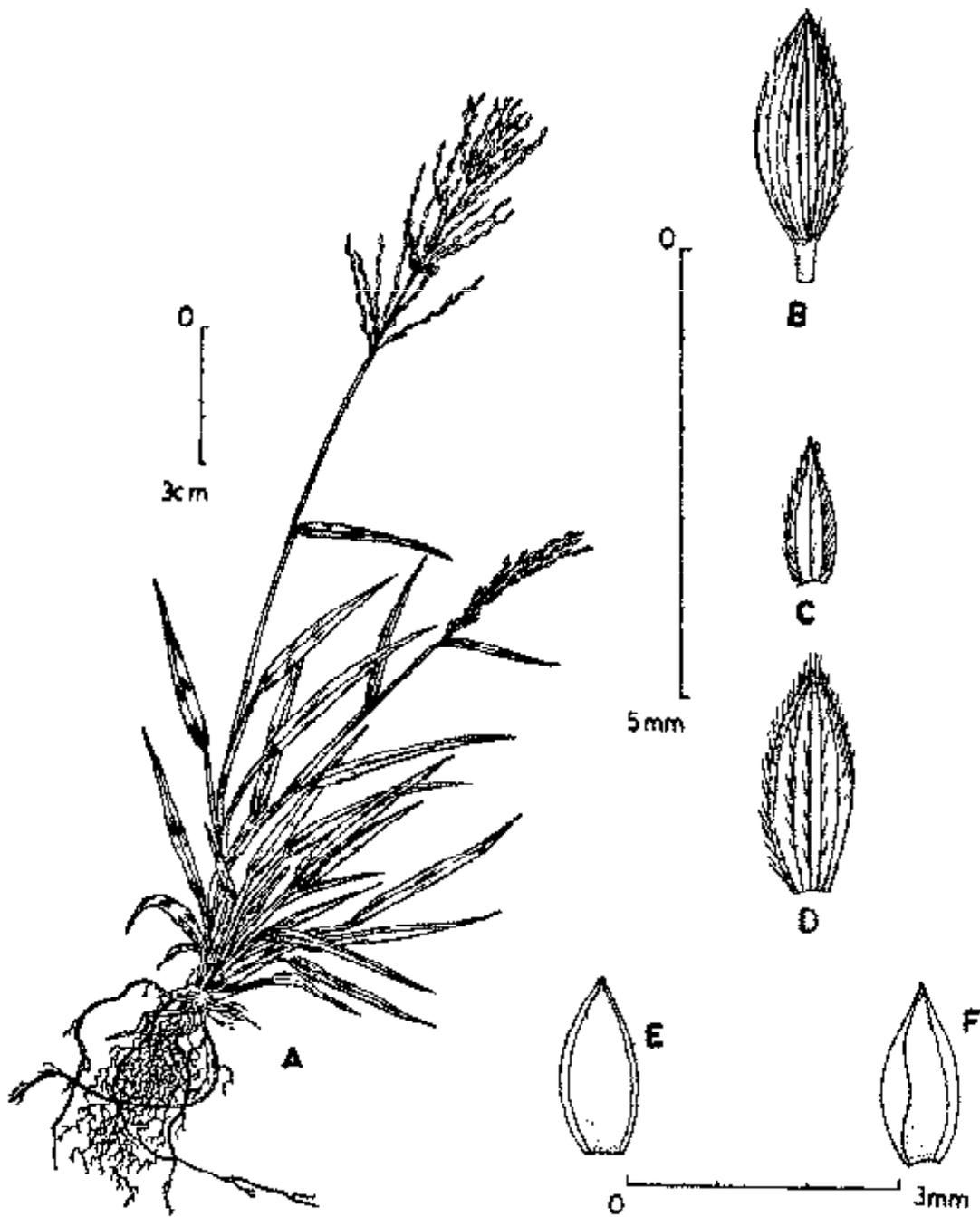


PLATE No. 48 : *DIGITARIA WALLICHIANA* (Wight & Arn. ex Steud.) Stapf
 A. Habit; B. Spikelet; C. Upper glume; D. First lemma; E. Second
 lemma; F. Palea of the second lemma.

7. ECHINOCHLOA P. Beauv.

P. Beauv. Ess. Agrost. 53: 161, 1812; Fischer in Gamble, Fl. Pres. Madr. 1776. 1934 (Repr. ed. 3: 1230, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 307, 1960; Cope in Nasir & Ali, Fl. Pak. 143: 192, 1982. *Panicum* Linn. sect. *Echinochloa* Hook. f. Fl. Brit. Ind. 7: 30, 1896.

A genus of about 20 species distributed in the tropics and temperate regions of the World, of which about 7 species occur in India and 4 in Kerala.

Echinochloa is a very difficult genus and it may often get confused with certain species of *Brachiaria*. According to Cope (*l.c.*) the reflected tip of the upper palea is the most reliable distinguishing feature.

This genus shows a number of intergrading polymorphic complexes. Hence it is hard to make intraspecific or sometimes even specific delimitation.

Key to the species

- 1a. Ligules present as fringes of hairs; spikelets awned *E. stagnina* 4
- 1b. Ligules absent; spikelets awned or not:
 - 2a. Spikelets awned or very rarely awnless, but then the upper glume and lower lemma acuminate or cuspidate *E. crus-galli* 2
 - 2b. Spikelets awnless:
 - 3a. Racemes incurved at maturity; spikelets densely crowded, 3-5mm long *E. frumentacea* 3
 - 3b. Racemes not incurved, straight; spikelets openly spaced, 4-rowed, 2-4 mm long *E. colona* 1

1. *Echinochloa colona* (Linn.) Link, Hort. Berol. 2: 209, 1833; Fischer in Gamble, Fl. Pres. Madr. 1776. 1934 (Repr. ed. 3: 1230, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 308. t. 34, 1960; Cope in Nasir & Ali, Fl. Pak. 143, 196, 1982; Manilal & Sivaraj. Fl. Calic. 342, 1982. *Panicum colonum* Linn. Syst. Nat. ed. 10, 2: 870, 1759; Hook. f. Fl. Brit. Ind. 7: 32, 1896; Rang. & Tad. Handb. S. Ind. Grass. 80, t. 89-90, 1921.

Annuals. Culms 10-100 cm high, erect, tufted; nodes glabrous. Leaves lanceolate, linear-lanceolate or linear, acuminate, 2-30 x 0.2-0.8 cm, acuminate, rounded or shallowly cordate at base, undulate on one margin. Sheaths keeled. Ligules absent. Panicles linear-oblong, lanceolate or spiciform, 2-15 cm long; racemes 4-12, each 0.5-3 cm long. Spikelets ovate-acute or ovate-lanceolate, 2-4 mm long, hispid, greenish-yellow or purplish. Lower glume ovate, 1-2 x 1-1.5 mm, acuminate or shortly cuspidate, chartaceous, 5-nerved, hispid. Upper glume boat-shaped or ovate, 2-4 x 1.5-2 mm, acuminate, chartaceous, 7-11-nerved, hispid. Lower floret barren. Upper floret bisexual. First lemma ovate, 2-4 x 1.5-2 mm, acuminate, chartaceous, 7-nerved. Palea ovate-oblong, 1.5-2 x 1 mm, hyaline, 2-keeled, 2-nerved. Second lemma ovate-elliptic, 2-3 x 1 mm, chartaceous, faintly 3-5-nerved. Palea ovate-oblong, 1.5-2 x 1 mm, mucronate, chartaceous, 2-keeled, 2-nerved. Stamens 3; anthers 0.5-1 mm long, violet. Ovary oblong, 0.25-0.5 mm long; styles 0.5-1 mm long; stigmas c. 0.5 mm long, pink.

Very common in the paddy fields, wastelands, fallow fields and marshes along the bunds of paddy fields.

Fl. & Fr. : Throughout the year.

Notes : This grass is very similar to *Echinochloa frumentacea* but can be distinguished by the short straight racemes. This species shows certain amount of variation in their shape and size of the spikelets and it may sometimes intergrade (Cope, *l.c.*) with *E. crus-galli*. The common 'Jungle Rice' "

This is considered one of the very good fodder grasses before flowering and is also an obnoxious weed in paddy fields.

ALLEPPEY: Ambalapuzha, Kidangara, Nedumudi, Pallathuruthy, R. Block, Thottapally, way to Kumarakam; CANNANORE: Bekal, Nedumpoyil, Payyanur, Taliparamba; ERNAKULAM: Cochin; PALGHAT: Aruvampara, Kanjirampuzha, Panangotteri; QUILON: Thenmala; TRICHUR: Chavakkad; TRIVANDRUM: Kariavattom, Veli.

2. *Echinochloa crus-galli* (Linn.) P. Beauv. Ess. Agrost. 53: 161. 1812; Fischer in Gamble, Fl. Pres. Madr. 1777. 1934 (Repr. ed. 3: 1231 1957); Bor, Grass. Bur. Cey. Ind. Pak. 310. 1960; Cope in Nasir & Ali Fl. Pak. 143: 193. 1982. *Panicum crus-galli* Linn. Sp. Pl. 56.

1753; Hook. f. Fl. Brit. Ind. 7: 30. 1896; Rang. & Tad. Handb. S. Ind. Grass. 75. t. 86-87. 1921.

Annuals. Culms 15-100 cm high, robust, erect, tufted; nodes glabrous. Leaves lanceolate, linear-lanceolate or linear, acuminate, 5-40 x 0.2-1.5 cm, rounded at base. Sheaths slightly keeled. Ligules absent. Panicles ovate or pyramidal, 3-20 cm long, congested; racemes 5-15, each 1-6 cm long. Spikelets ovate-lanceolate or ovate-elliptic, 3-5 mm long, acuminate or awned, hispid; awns 1-3 cm long. Pedicels with a few glassy bristles. Lower glume ovate, cuspidate, 2-3 x 1.5-2 mm, chartaceous, 5-nerved. Upper glume ovate-lanceolate, long-acuminate or cuspidate, 3-5 mm long, chartaceous, 5-nerved, scabrid along the nerves. Lower floret male or barren. Upper floret bisexual. First lemma ovate-lanceolate, cuspidate or awned, chartaceous, 5-7-nerved, scabrid. Palea elliptic-oblong, 2.5-3 x 1 mm, hyaline, 2-keeled, 2-nerved. Stamens 0 or 3; anthers 0.5-1 mm long, yellow. Second lemma ovate, acuminate, 3-4 x 1.5-2 mm, chartaceous, or subcoriaceous, faintly 3-5-nerved. Palea elliptic-oblong, 2-3 x 1 mm, chartaceous or subcoriaceous, 2-keeled, 2-nerved. Stamens 3; anthers c. 1 mm long, yellow. Ovary oblong, c. 0.5 mm long; styles 0.5-1 mm long; stigmas 0.5-1 mm long, white.

Fairly common in the marshy fields, muddy wastelands and paddy fields.

Fl. & Fr. : March-September.

Notes : This species is very similar to *E. stagnina*, but differs by the racemes not spreading in the panicles and the absence of ligule. '*Barnyard Grass*' is a very common weed in paddy fields of Kerala, and is said to be a very good fodder.

ALLEPPEY: Champakkulam, Kidangara, Nedumudy, Pallathuruthy, Thakazhy; PALGHAT: Silent Valley; WYNAD: Manantoddy.

3. *Echinochloa frumentacea* Link, Hort. Berol. 1: 234. 1827; Bor, Grass. Bur. Cey. Ind. Pak. 311. 1960; Cope in Nasir & Ali, Fl. Pak. 143. 197. 1982, *E.colona* Link var. *frumentacea* Blatt. & Hallb.; Fischer in Gamble, Fl. Pres-Madr. 1777. 1934 (Repr. ed. 3: 1231. 1957). *Panicum crus-galli* Linn. var. *frumentaceum* (Link) Trimen, Syst. Cat. Cey. Pl. 104, 1885; Hook. f. Fl. Brit. Ind. 7: 31. 1896.

Annuals or perennials. Culms robust, 50-150 cm high, tufted; nodes glabrous. Leaves linear, acuminate, 10-30 x 0.8 cm, rounded at base. Sheaths slightly keeled. Ligule absent. Panicles pyramidal, 8-15 cm long; racemes 10-20, each 1-4 cm long, incurved. Spikelets ovate-acute or broadly elliptic, 3-5 mm long. Glumes and florets more or less similar to those of *E. colona*. Anthers deep violet.

Occasional along the banks of canals and streams near the paddy fields.

Fl. & Fr. : June-September.

Notes : This Species is very closely related to *E. colona* and may often be confused with it when young. But it can be distinguished by the robust culms, broader leaves, incurved racemes at maturity and larger spikelets. This *Billion-dollar Grass* is often cultivated for the grains.

ALLEPPEY: Nedumudy, Pallathuruthy.

4. *Echinochloa stagnina* (Retz.) P. Beauv. Ess. Agrost. 53: 161, 171. 1812; Fischer in Gamble, Fl. Pres. Madr. 1777. 1934 (Repr. ed. 3: 1231, 1937); Bor, Grass. Bur. Cey. Ind. Pak, 311. 1960. *Panicum stagninum* Retz. Obs. Bot. 5: 7, 1789; Rang, & Tad. Handb. S. Ind. Grass. 77, t. 88, 1921. *P. crus-galli* sensu Hook. f. Fl. Brit. Ind. 7: 30. 1896, p.p.
PLATE No. 49

Annuals. Culms 20-120 cm high, erect tufted; nodes glabrous. Leaves lanceolate, linear-lanceolate or linear, acuminate, rounded or narrowed at base. Sheaths slightly keeled. Ligules row of hairs. Panicles ovate-lanceolate or pyramidal, open; racemes 5-15, secund, ascending, spreading, each 1-6 cm long. Spikelets ovate or elliptic acuminate or awned, 4-6 mm long, hispid or pectinate. Lower glume ovate, 2-3 x 1-1.5 mm, acuminate, chartaceous, 5-nerved, scabrid or pectinate. Upper glume ovate-lanceolate, 5-6 x 2-3 mm, acuminate, chartaceous, 7-9-nerved, pectinate. Lower floret male. Upper floret bisexual. First lemma ovate-lanceolate, 4-6 x 2-3 mm, acuminate, awned, chartaceous, 7-nerved, pectinate along the nerves; awn 5-10 mm long. Stamens 3; anthers 1.5-2 mm long, deep-yellow. Second lemma elliptic, 4-5 x 1.5-2 mm, acuminate,

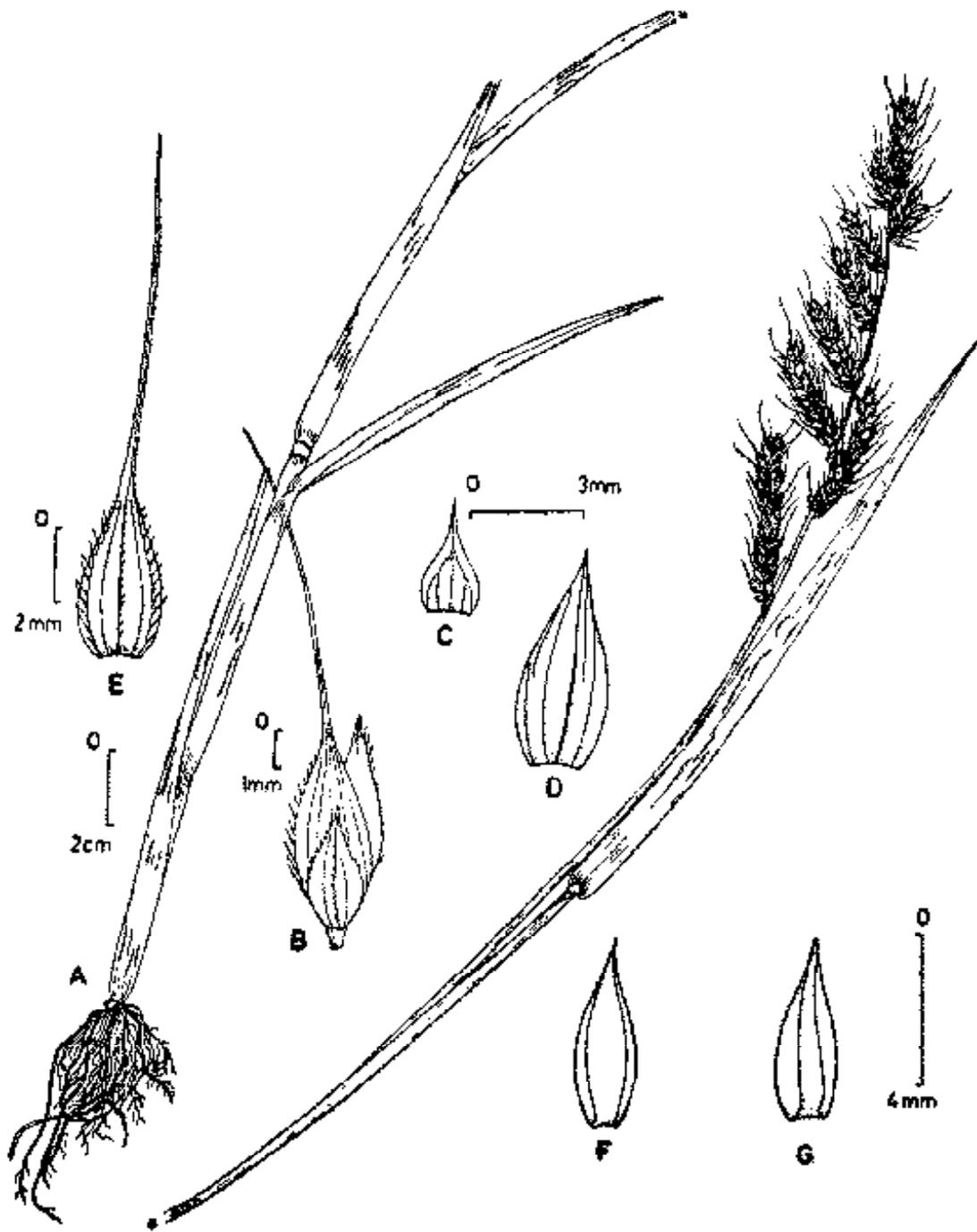


PLATE No. 49 : *ECHINOCHLOA STAGNINA* (Retz.) P. Beauv.

A. Habit; B. Spikelet; C. Lower glume; D. Upper glume; E. First lemma;
 F. Second lemma; G. Palea of the second lemma.

subcoriaceous, faintly 5-nerved. Palea elliptic, 4-5 x 1.5-2 mm, acuminate, subcoriaceous, 2-keeled, 2-nerved. Stamens 3; anthers c. 2 mm long, yellow. Ovary oblong, 0.5-1 mm long; styles 1-2 mm long; stigmas 1-2 mm long, pink or violet.

Fairly common, along the marshy places, wetlands, paddy fields and other water-logged areas. A semiaquatic species.

Fl. & Fr.: March-September.

Notes: A common weed in the paddy fields of coastal areas. This species closely resembles *E. crus-galli*, but differs by the presence of ligules, spreading and ascending racemes, larger spikelets and shorter awns.

ALLEPPEY: Champakkulam, Kidangara, Nedumudy, Pallathuruthy, Pulimkundu, R. Block, Thottappally; QUILON: Oachira, WYNAD: Mananthody.

8. ERIOCHLOA Kunth

Kunth in Humb. & Bonpl. Nov. Gen. Sp. 1: 94, t. 30, 31, 1816; Hook. f. Fl. Brit. Ind. 7: 20, 1896; Fischer in Gamble, Fl. Pres. Madr. 1767, 1934 (Repr. ed. 3: 1224, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 312, 1960.

A genus of about 30 species distributed throughout the tropics, of which 2 occur in India and one in Kerala.

Eriochloa procera (Retz.) C. E. Hubbard in Kew Bull, 1930: 256, 1930; Fischer in Gamble, Fl. Pres. Madr. 1767, 1934 (Repr. ed. 3: 1224, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 312, 1960. *Agrostis procera* Retz. Obs. Bot. 4: 19, 1786. *Eriochloa polystachya* auct. non H.B.K. 1816; Hook. f. Fl. Brit. Ind. 7: 20, 1896; Rang. & Tad. Handb. S. Ind. Grass. 62, t. 78-79, 1921.

Annuals or perennials. Culms 30-80 cm high, tufted, erect; nodes glabrous. Leaves linear-lanceolate or linear, acuminate, 10-30 x 0.2-0.8 cm, rounded at base. Sheaths slightly keeled. Ligules membranous, fimbriate. Panicles 3-20 cm long, lax, purplish; racemes simple or branched, 2-10 cm long, rachis triquetrous, bearing paired spikelets. Spikelets elliptic-lanceolate, or lanceolate, 3-4 mm long, softly silky hairy, green or purplish. Lower glume absent or reduced

to a ring. Upper glume ovate-lanceolate, 3-4 x 1-1.5 mm, chartaceous, 5-nerved, softly silky hairy. Lower floret barren, epaleate. Upper floret bisexual. First lemma elliptic-lanceolate, 3-3.5 x 1-1.5 mm, chartaceous, faintly 5-nerved, softly silky hairy. Second lemma ovate-oblong, mucronate, 2-2.5 x 1 mm, crustaceous, faintly 3-5-nerved. Palea ovate-oblong, 2-2.5 x 1 mm, crustaceous, 2-keeled, 2-nerved. Stamens 3; anthers c. 1 mm long, violet with yellow connectives. Pistil c. 1 mm long; stigmas reddish-brown.

Fairly common along the wetlands, ditches, edges of paddy fields, banks of backwater and similar damp habitats. A semiaquatic species.

Fl. & Fr. : March-September.

Notes : This 'Cup Grass' is quite distinct by having a ring like growth just below the spikelets which may often serve to identify it in the field. It shows considerable variation in the size of the culms and spikelets and also in habitat.

ALLEPPEY : Champakkulam, Muhamma, Pullassery; QUILON : Chavara.

9. HYMENACHNE P. Beauv.

P. Beauv. Ess. Agrost. 48: 1812; Bor. Grass. Bur. Cey. Ind. Pak. 313. 1960.

A genus of about 8 species distributed in the tropics of the World of which 2 species occur in India and one in Kerala.

Hymenachne acutigluma (Steud.) Gilliland in Gard. Bull. Singap. 20: 314. 1863. *Panicum acutiglumum* Steud. Syn. Pl. Gram. 66. 1854. *Hymenachne pseudointerrupta* C. Muell. in Bot. z. 19: 333. 1861; Fischer in Gamble, Fl. Pres. Madr. 1784. 1934 (Repr. ed. 3: 1236. 1957); Bor. Grass. Bur. Cey. Ind. Pak. 313. 1960. *Panicum myuros* auct. non Lam. 1791; Hook. f. Fl. Brit. Ind. 7: 39. 1896. PLATE No. 50

Perennials. Culms 50-150 cm long, tough, creeping or trailing, rooting at the lower nodes, spongy below, rarely decumbent or erect; nodes glabrous. Leaves lanceolate, linear-lanceolate, or linear, 10-35 x 0.5-1.5 cm, acuminate, rounded or shallowly cordate at base, softly villous or glabrous. Sheaths ciliate along the margins. Ligules

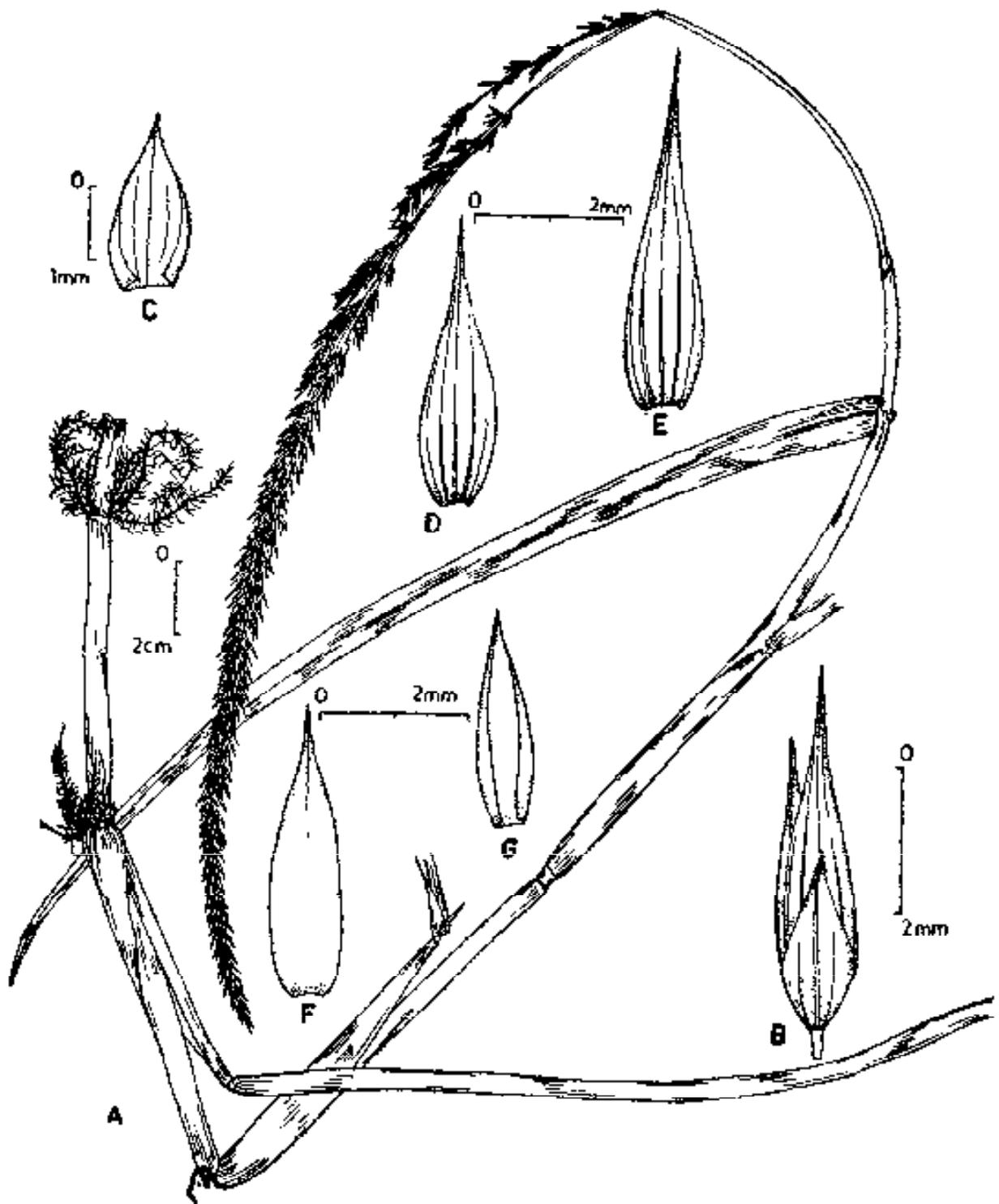


PLATE No. 50 : *HYMENACHNE ACUTIGLUMA* (Steud.) Gilliland

A. Habit; B. spikelet; C. Lower glume; D. Upper glume; E. First lemma;
 F. Second lemma; G. Palea of the second lemma.

truncate, narrow, membranous. Panicles spiciform, interrupted, 10-35 cm long, densely spiculate. Spikelets narrowly elliptic-lanceolate or lanceolate, 5-8 x 0.5-1 mm, acuminate. Lower glume ovate-lanceolate, 1.5-2.5 x 1 mm, acuminate, chartaceous, 3-nerved. Upper glume lanceolate, acuminate, or narrowly elliptic-acuminate, 3-4 x 1 mm, chartaceous, 5-nerved, scabrid. Lower floret barren. Upper floret bisexual. First lemma lanceolate, long-acuminate, 5-8 x 1 mm, tapering into an arista, chartaceous, 5-nerved, scabrid towards apex. Palea small. Second lemma oblong-lanceolate, acuminate or aristate, 3-4 x 1 mm, coriaceous, faintly 3-5-nerved, scabrid towards apex. Palea elliptic-lanceolate or oblong-lanceolate, 2-3 x 0.5-1 mm, coriaceous, 2-keeled, 2-nerved. Stamens 3; anthers 0.5-1 mm long. Ovary oblong, c. 0.5 mm long; styles 0.5-2 mm long; stigmas 1-2 mm long.

Rare, along the stagnant waters, ditches, shallow streams, backwaters and in swamps.

Fl. & Fr. : March August.

It may be confused with *Sacciolepis interrupta*, in the field because of its interrupted, spiciform panicles and creeping or trailing spongy culms. But this grass can be easily distinguished from *Sacciolepis* by the rigid culms, lanceolate leaves with cordate bases and lanceolate, acuminate spikelets with long-acuminate or aristate glumes and lemmas.

The specimens collected from Kerala shows considerable difference in the size of the spikelets from that given by Bor (*f.c.*).

ALLEPPEY : Alleppey, Pallathuruthy, Thakazhy.

10. ICHNANTHUS P. Beauv.

P. Beauv. Ess. Agrost. 56. 1812; Hook. f. Fl. Brit. Ind. 7; 60, 1896; Bor, Grass. Bur. Cey. Ind. Pak. 314, 1960.

A genus of about 25 species distributed mainly in the tropics of the World especially in tropical America of which one species occurs in India and Kerala.

Ichnanthus vicinus (F.M. Bail.) Merr. in Enum. Philipp. Fl. Pl. 1: 70. 1923; Bor, Grass. Bur. Cey. Ind. Pak. 314, 1960. *Panicum vicinum* F.M. Bail. Syn. Queens. Fl. Suppl. 3: 82. 1890. *Ichnanthus pallens* auct. non Munro 1861; Hook. f. Fl. Brit. Ind. 7; 60. 1896. PLATE No. 61

Annuals. Culms 20-50 cm long, creeping or geniculate, rooting at the lower nodes; nodes glabrous. Leaves elliptic or elliptic-lanceolate, 1-8 x 0.5-2 cm, acuminate, oblique at base. Sheaths slightly inflated, ciliate along one margin. Ligules tuft of hairs. Panicles pyramidal, 3-12 cm long, racemes 6-12 in number. Spikelets elliptic, or elliptic-lanceolate, 4-6 mm long. Lower glume ovate-lanceolate, 3-4 x 1-1.5 mm, chartaceous, 3-nerved, keeled, scabrid along the keels. Upper glume ovate-lanceolate or elliptic-lanceolate, 4-5 x 1-1.5 mm, chartaceous, 5-7-nerved, keeled, scabrid along the keels. Lower floret barren. Upper floret bisexual. First lemma ovate-lanceolate, 3-5 x 1-2 mm, chartaceous, 5-7-nerved. Palea elliptic, 2-3 x 1 mm, hyaline, 2-keeled, 2-nerved. Second lemma oblong or elliptic-oblong, 2-3 x 1-1.5 mm, crustaceous, faintly 3-5-nerved, shining, with 2 scales. Palea elliptic or oblong-acute, 2.5-3 x 1 mm, crustaceous, slightly 2-keeled, 2-nerved. Stamens 3, anthers 1-1.5 mm long, pale yellow. Ovary σ . 0.5 mm long; styles 0.5-1 mm long; stigmas 0.5-1 mm long, white.

Occasional along the margins of the forests and as an undergrowth in cardamom plantations, usually in shady places.

Fl. & Fr.: March-August.

Notes: This species is quite distinct by having glumes with pale hyaline margins and widely gaping spikelets. It often grows gregariously in the shade of trees and shrubs. The leaves here are delicate and flaccid.

This rare grass was previously not reported from South India by C.E.C. Fischer (1934), Bor (l.c.) and other earlier workers. Karthikeyan (1971) reported its occurrence in South India based on a few collections from Nilgiris and Visakhapatnem.

PATHANAMTHITTA: Pampa Dam site; **TRIVANDRUM**: Way to Agastyarkudam.

11. OPLISMENUS P. Beauv.

P. Beauv. Fl. Owar. 2: 14, t. 68/1, 1810; Hook. f. Fl. Brit. Ind. 7: 65, 1896; Fischer in Gamble, Fl. Pros. Madr. 1777, 1934 (Repr. ed. 3: 1231, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 315, 1960.

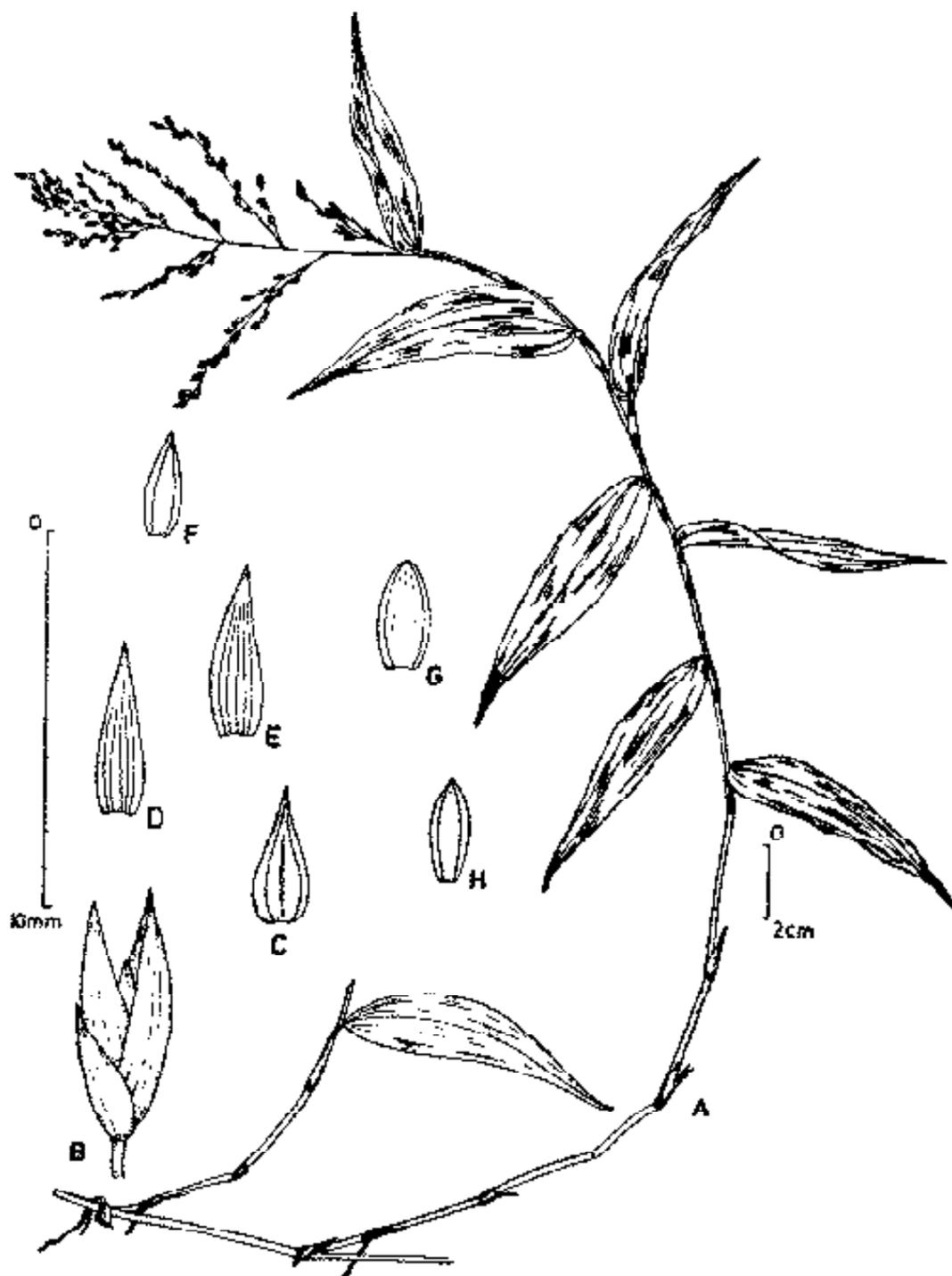


PLATE No. 51 : *ICHNANTHUS VICINUS* (F.M. Bail.) Merr.

A. Habit: B. Spikelet: C. Lower glume: D. Upper glume: E. First lemma; F. Palea of the first lemma; G. Second lemma; H. Palea of the second lemma.

A genus of about 5 species distributed in the tropics of the World, of which 3 species occur in India and 2 in Kerala.

Key to the species

- 1a. Awns pale yellow, slender, flaxuous; lower lemma aristate; culms prostrate, wiry *O. burmannii* 1
- 1b. Awns purplish, stiff; lower lemma acute, not aristate; culms rambling *O. compositus* 2

1. *Optismenus burmannii* (Retz.) P. Beauv. Ess. Agrost. 54, 168, 169, 1812; Hook. f. Fl. Brit. Ind. 7: 68, 1896; Fischer in Gamble, Fl. Pres. Madr. 1778, 1934 (Repr. ed. 3: 1232, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 317, 1960; Manilal & Sivaraaj, Fl. Calic. 341, 1982. *Panicum burmannii* Retz., Obs. Bot. 3: 10, 1783.

Annuals. Culms 15-60 cm long, prostrate or trailing, slender creeping and rooting at the nodes, rarely decumbent; nodes, glabrous or sparsely bearded. Leaves elliptic or elliptic-lanceolate, 0.5-8 x 0.3-1.4 cm, acute or shortly acuminate, oblique at base, hairy or glabrous. Sheaths slightly keeled, softly hairy. Ligules row of hairs. Inflorescence 2-8 cm long; racemes 2-8, each 0.5-4 cm long; rachis triquetrous, densely bristly. Spikelets elliptic or elliptic-lanceolate, 2-3 mm long, pedicels with a few colourless bristles. Lower glume ovate-lanceolate, 1.5-2 x 0.5-1 mm, chartaceous, softly hairy, 3-5-nerved, median nerve running into a long bristle-like awn, 6-8 mm long, pale yellow, scabrid. Upper glume ovate or elliptic, 1.5-2 x 1 mm, chartaceous, 5-nerved, softly hairy, awned, awn 3-4 mm long, pale yellow, scabrid. Lower floret barren; epaleate. Upper floret bisexual. First lemma elliptic or elliptic-lanceolate, aristate, 2-3 x 1-1.5 mm, chartaceous, 7-9-nerved. Second lemma ovate-elliptic, 1.5-2 x 1 mm, subcoriaceous, faintly 3-5-nerved. Palea elliptic, 1.5-2 x 1 mm, subcoriaceous, 2-keeled, 2-nerved. Stamens 3; anthers c. 1 mm long, pale yellow. Ovary c. 0.25 mm long; styles c. 0.5 mm long; stigmas c. 1 mm long, cream coloured.

Fairly common along the bunds, roadsides, hill slopes, often in moist, shady places forming pure mats along the shades of trees and shrubs.

Fl. & Fr. : September-January.

ALLEPPEY: Ambalapuzha; CANNANORE: Bandudka. KASARAGOD: Nileswar, Papinisseri, Taliparamba; PALGHAT: Kanjarempuzha, QUILON: Chavara; TRICHUR: Korati, TRIVANDRUM: Nedumangad, Ponmudi.

2. *Oplismenus compositus* (Linn.) P. Beauv. Ess. Agrost. 54 168, 1812; Hook. f. Fl. Brit. Ind. 7: 66, 1896; Fischer in Gamble, Fl. Pres. Madr. 1778. 1934 (Repr. ed. 3: 1231. 1967); Bor. Grass. Bur. Cey. Ind. Pak. 317. 1960; Manilal & Sivarej. Fl. Calic. 341. 1982. *Panicum compositum* Linn. Sp. Pl. 57. 1763.

Annuals or perennials. Culms 20-120 cm long, rambling or trailing, creeping and rooting at the lower nodes; nodes glabrous or softly villous. Leaves ovate-elliptic to lanceolate, acute or shortly acuminate, 1-12 x 0.5-2.5 cm, oblique at base, hispid or villous. Sheaths covered with tubercle-based hairs. Ligules row of hairs. Inflorescence 5-30 cm long; racemes 4-8, each 1-8 cm, rachis triquetrous, glabrous or pilose. Spikelets paired, elliptic or elliptic-lanceolate, 3-4 mm, pedicels with or without bristles. Lower glume lanceolate, 2-3 x 1 mm, chartaceous, awned, awn 4-6 mm long. Upper glume ovate-elliptic, 2-3 x 1 mm, chartaceous, aristate; arista c. 1 mm long. Lower floret barren, Upper floret bisexual. First lemma ovate, 3-4 x 1-2 mm, chartaceous, 7-9-nerved. Palea lanceolate, 1-2 mm long. Second lemma elliptic, 2-3 x 1 mm, subcoriaceous, faintly 5-7-nerved. Palea elliptic, 2-3 x 1 mm, subcoriaceous, 2-keeled, 2-nerved. Stamens 3; anthers c. 1 mm long, violet. Ovary c. 0.25 mm long; styles c. 0.5 mm long; stigmas c. 1 mm long, pink or crimson-red.

Very common as undergrowth in scrub jungles, forest margins, raised bunds and other shady places. A true forest grass.

Fl. & Fr. : Throughout the year.

CANNANORE: Bandudka, Chandanathode, Kannothe, Manantoddy, way to Peria; IDUKKI: Kuttikanam, Munnar, Thekady, way to Eravikulam; PALGHAT: Silent Valley R. F. QUILON: Kodumon; TRICHUR: Parambikulam. TRIVANDRUM: Aruvikkara, Kazhakkuttam, Kottur R. F.; WYNAD: Meppadi, Vayitri.

12. OTTOCHLOA Dandy

Dandy in J. Bot. 69: 54. 1931; Fischer in Gamble, Fl. Pres. Madr. 1778. 1934 (Repr. ed. 3: 1232. 1957); Bor, Grass. Bur. Cey. Ind. Pak, 318, 1960. *Panicum* Linn. sect. *Breviglume* Hook. f. Fl. Ind. 7: 43. 1896.

A genus of about 6 species distributed in the tropics and subtropics of the World, of which one species occurs in India and Kerala.

Ottochloa nodosa (Kunth) Dandy in J. Bot. 69: 55. 1931; Fischer in Gamble, Fl. Pres. Madr. 1778. 1934 (Repr. ed. 3: 1232. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 318. 1960. *Panicum nodosum* Kunth, Enum. Pl. 1: 97. 1833; Hook. f. Fl. Brit. Ind. 7: 43. 1896.

Annuals or perennials. Culms 30-100 cm long, creeping or geniculate, rooting at the lower nodes; nodes glabrous. Leaves ovate-lanceolate, elliptic-lanceolate or lanceolate, 1-10 x 0.5-1.5 cm, rounded or shallowly cordate at base. Sheaths glabrous or tubercled hairy, ciliate along one margin. Ligules ovate, narrow, membranous. Panicles 5-20 cm long, lax, rarely spiciform and without branches; racemes 4-12, alternate, opposite or whorled, each 0.5-12 cm long. Spikelets elliptic-lanceolate, 3-4 mm long. Lower glume ovate-lanceolate, 1-1.5 x 0.5-1 mm, chartaceous, 3-5-nerved. Upper glume elliptic or elliptic-lanceolate, 1.5-2 x 1 mm, chartaceous, 7-nerved. Lower floret barren; epikleate. Upper floret bisexual. First lemma elliptic or elliptic-lanceolate, 3-4 x 1 mm, chartaceous, 7-9-nerved. Second lemma elliptic, 3-3.5 x 1-1.5 mm, subcoriaceous, faintly 5-nerved. Palea elliptic, 2-3 x 1 mm, subcoriaceous, 2-keeled, 2-nerved. Stamens 3; anthers 0.5-1 mm long, yellow. Ovary elliptic, 0.25-0.5 mm long; styles 0.5-1 mm long, stigmas 0.5-1 mm long, purple.

Frequent along the margins of forests and roadsides, rare along the muddy banks of rivers, streams and canals, sometimes in shades of cocoa & rubber plantations.

Fl. & Fr. : July - December,

Notes : This is a true forest grass. Usually panicles of this species are open and with several branched racemes, but rarely spiciform and unbranched, where the leaves are very narrow and flaccid; and spikelets are narrowly elliptic or elliptic-lanceolate. This species shows extreme variation in the size, shape and texture of leaves, shape of the spikelets and nature of panicles.

CALICUT: Peruvannamuzhi; KOTTAYAM: Mundakkayam;
PATHANAMTHITTA: Aranamudi.

13. PANICUM Linn.

Linn. Sp. Pl. 55. 1753; Fischer in Gamble, Fl. Pres. Madr. 1779. 1934 (Repr. ed. 3: 1232. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 319. 1960; Majumdar in Bull. Bot. Soc. Beng. 27: 39. 1973. *Panicum* Linn. Sect. *Effusae* Hook. f. Fl. Brit. Ind. 7: 44. 1896.

A genus of about 600 species distributed in the tropics and temperate regions of the World, of which about 55 species occur in India and 13 in Kerala.

Key to the species

- 1a. Leaves broadly ovate, acuminate, amplexicaul; spikelets slightly gibbous; lower glumes nearly as long as the spikelets *P. brevifolium* 3
- 1b. Leaves narrowly elliptic, lanceolate or linear, rounded or shallowly cordate, but never amplexicaul; spikelets symmetrical:
 - 2a. Panicles much contracted, narrow, spiciform; branches densely spiculate; spikelets 2.5-3 mm long, ovate-lanceolate or lanceolate *P. auritum* 2
 - 2b. Panicles effuse, usually broader; branches widely spreading:
 - 3a. Upper lemma transversely rugose; nerves of the upper glume and lower lemma obscure *P. maximum* 6
 - 3b. Upper lemma smooth; nerves of the upper glume and lower lemma conspicuous:
 - 4a. Lower glume less than half the length of the spikelet:
 - 5a. Lower glume longer than broad, cuspidate-acuminate; spikelets widely gaping *P. trypheron* 12
 - 5b. Lower glume broader than long, not cuspidate-acuminate; spikelets not gaping:
 - 6a. Spikelets oblong-lanceolate to narrowly lanceolate, acute; lower glume orbicular, obtuse:
 - 7a. Culms tough, rhizomatous; leaves distichous, usually involute, glaucous; spikelets not opening at maturity *P. repens* 10

- 7b. Culms spongy, not rhizomatous; leaves not distichous, flat, green; spikelets normally opening at maturity *P. paludosum* 8
- 8a. Spikelets ovate-oblong to elliptic, acute or obtuse; lower glume broadly ovate, acute:
- 8a. Panicles contracted, up to 40 cm long; spikelets persistent, 2.5-3.5 mm long *P. sumatrense* 11
- 8b. Panicles effuse, up to 20 cm long; spikelets deciduous, 2-3 mm long *P. psilopodium* 9
- 4b. Lower glume more than half the length of the spikelets:
- 9a. Spikelets 1-2 mm long:
- 10a. Culms up to 40 cm high; leaves narrower, up to 4 mm wide, upper glume 3-nerved; lower floret paleate *P. walense* 13
- 10b. Culms up to 150 cm high; leaves broader, up to 10 mm wide; upper glume 5-nerved; lower floret epaleate *P. humidorum* 5
- 9b. Spikelets over 2 mm long:
- 11a. Leaves ovate-lanceolate to broadly lanceolate, cordate at base; panicles effuse; spikelets not crowded:
- 12a. Spikelets 4-6 mm long; lower floret paleate *P. gardneri* 4
- 12b. Spikelets 2-3 mm long; lower floret paleate *P. notatum* 7
- 11b. Leaves linear-lanceolate, narrow or rounded at base, but never cordate; panicles not effuse; spikelets often crowded on the branches, 2-3 mm long; glume with broad, hyaline margins *P. antidotale* 1
1. ***Panicum antidotale*** Retz, Obs. Bot, 4: 17, 1786; Hook, f. Fl. Brit. Ind. 7: 2, 1896; Fischer in Gamble, Fl. Pres. Madr. 1783, 1934 (Repr. ed. 3: 1235, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 322, 1960; Majumdar in Bull. Bot. Soc. Beng. 27: 51, 1973.

Perennials. Culms 50-150 cm high, erect or creeping with stout root-stock; nodes thickened, glabrous or puberulous. Leaves linear-lanceolate, tapering or long acuminate, 10-40 x 0.2-1.5 mm, narrow or rounded at base, midrib prominent. Ligules ring of tufted hairs. Panicles pyramidal, ovate or oblong, 10-30 cm long, effuse or contracted, densely spiculate; branches alternate or sub-verticillate, 5-15 cm long. Pedicels 0.5-2 mm long, slender, angular, scaberulous, slightly dilated at apex. Spikelets ovate-lanceolate, elliptic or oblong, 2-3 mm long, acute, turgid, greenish-white. Lower glume broadly

ovate, 1.5-2 x 1-1.25 mm, acute, membranous, 3-nerved, with broad hyaline margins. Upper glume broadly ovate, 2-2.5 x 1-1.5 mm, acute, membranous, 7-9-nerved, with broad hyaline margins. Lower floret barren. Upper floret bisexual. First lemma ovate-acute, 2-2.5 x 0.5 mm, cartaceous, 7-9-nerved. Palea oblong-lanceolate, 1.75-2 x 0.5 mm, 2-keeled, hyaline. Second lemma oblong, subacute, shortly spiculate, 1.5-1.75 x 0.5-0.75 mm, subcoriaceous, shining. Palea oblong lanceolate, 1.5-1.75 x 0.5 mm, subcoriaceous, shining. Lodicules 2, obovate, wavy at apex, c , 0.26 x 0.15 mm. Stamens 3; anthers 1-2 mm long. Ovary ovate or oblong, 0.25-0.4 mm long; styles 0.5-0.75 mm long; stigmas 0.5-1 mm long. cream yellow.

Frequent along the sandy belts of coastal areas, dry river-beds and other similar drier habitats.

Fl. & Fr. : May-December.

Notes : This species can be easily distinguished from the other species of the genus by the broad hyaline margins of the glumes.

It is a very good sand-binder and fodder grass. Sometimes used in native medicine.

ERNAKULAM : Chalfanam.

2. *Panicum auritum* Presl ex Nees, *Agrost. Bras.* 176, 1829; Hook. f. *Fl. Brit. Ind.* 7: 40, 1896; Bor. *Grass. Bur. Cey. Ind. Pak.* 324, 1960; Majumdar in *Bull. Bot. Soc. Beng.* 27: 53, 1973; Nair et al. in *J. Econ. Tax. Bot.* 3: 270, 1982. PLATE No. 52

Perennials. Culms 50-200 cm high, erect; nodes glabrous. Leaves linear-lanceolate, 10-40 x 0.5-1.5 cm, broadly rounded or shallowly cordate at base, glabrous or sparsely hairy beneath. Sheaths long-ciliate along one-margin, densely bearded at mouth. Ligules narrow, membranous. Panicles linear-oblong, spiciform, 10-30 x 0.5-1.5 cm, much contracted, densely spiculate; branches 1-6 cm long; densely crowded, erect. Pedicels 0.5-2 mm long, angular, scabrid, slightly dilated at apex. Spikelets ovate-lanceolate, elliptic or narrowly lanceolate, 2.5-3 mm long, greenish with purple tinge. Lower glume broadly ovate, 1-1.5 x 0.75-1 mm, acute or acuminate, chartaceous, 5-nerved. Upper glume ovate or oblong-lanceolate, 2-2.5 x 1 mm, chartaceous, 5-nerved, margins hyaline. Lower floret barren, upper floret bisexual. First lemma ovate-lanceolate, 2-3 x

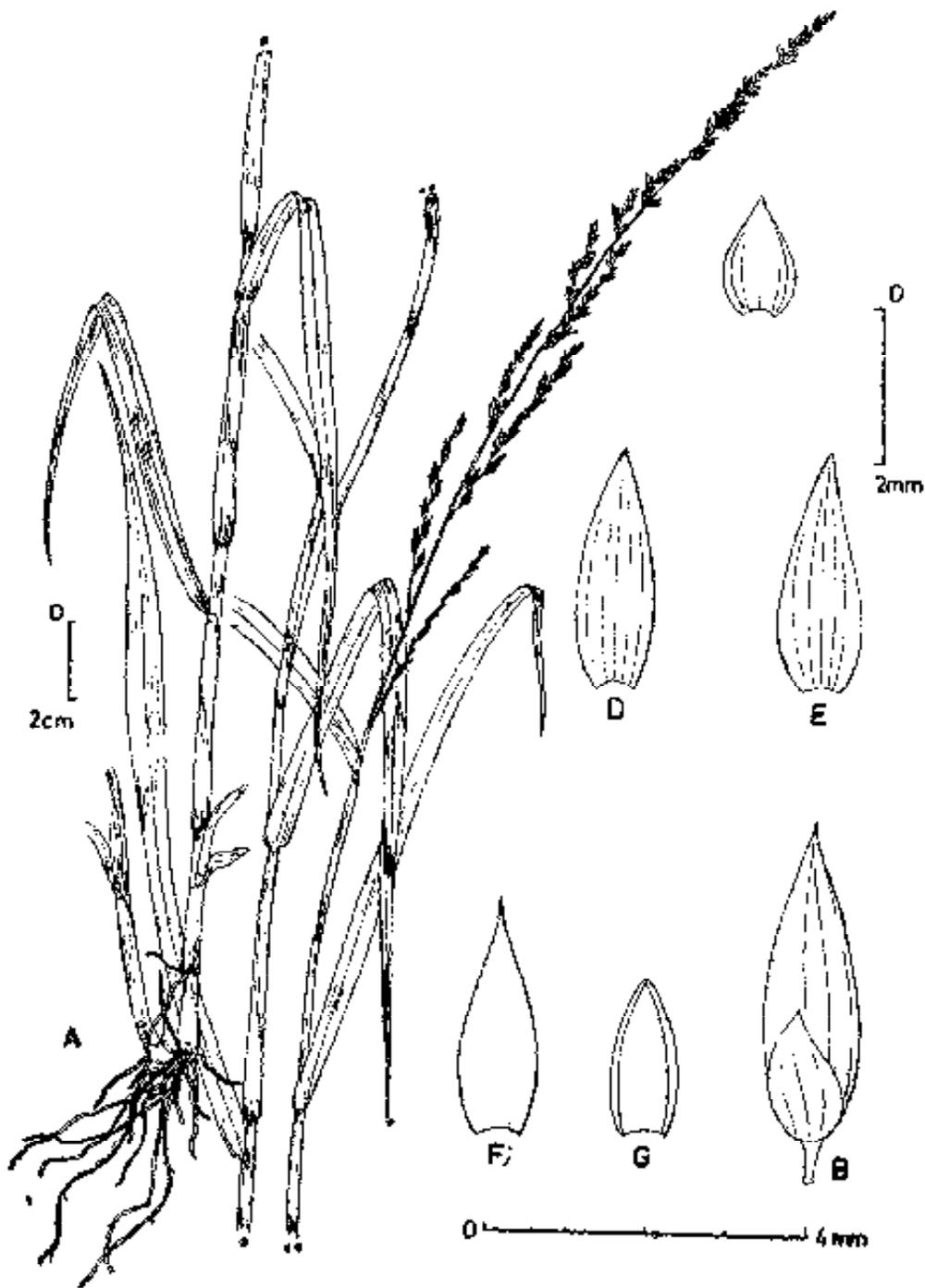


PLATE No. 62 : *PANICUM AURITUM* Presl ex Nees

A. Habit; B. Spikelet; C. Lower glume; D. Upper glume; E. First lemma; F. Second lemma; G. Plea of the second lemma.

1-1.25 mm, chartaceous, 5-nerved, margins hyaline. Palea linear-oblong, minute, c. 1 x 0.25 mm, delicate, hyaline. Second lemma ovate-lanceolate or elliptic, 2-2.5 x 0.75-1 mm, acute or shortly acuminate, subcoriaceous, faintly nerved, shining. Palea oblong-lanceolate, 1.75-2 x 0.5-0.75 mm, subacute, subcoriaceous, margins intumed. Lodicules 2, oblanceolate, c. 0.4 x 0.2 mm, cuneate at base, 2-horned at apex. Stamens 2 or 3; anthers 1-1.5 mm long, yellow with violet margins. Ovary ovate-oblong, 0.3-0.5 mm long; styles 0.5-1 mm long; stigmas 0.5-1 mm long, pink. Grains ovate or oblong, 1-1.5 x 0.5-0.75 mm, stipitate, rounded or shortly apiculate at apex.

Fairly common along the banks of rivers, streams and canals, usually in moist habitats of plains, rarely along the margins of forests and hill slopes.

Fl. & Fr. : May-December.

Notes : It is a very distinct species with peculiar, much contracted, densely spiculate spiciform panicles and broad flat leaves, and is hence very easy to be distinguished from other species of the genus. This species shows some resemblance to *Hymenachne* and also to *Sacciolepis* especially because of the spiciform panicles. It has been treated under the genus *Sacciolepis* by both A. Camus and Ohwi, but here the view of Bor (*l. c.*) is followed.

ALLEPPEY: R. Block, Thakazhy; CALICUT: Chelannur, Thoovakkadavu.

3. *Panicum brevifolium* Linn. Sp. Pl. 59, 1753; Fischer in Gamble, Fl. Pres. Madr. 1783, 1934 (Repr. ed. 3: 1235, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 324, 1960; Majumdar in Bull. Bot. Soc. Beng. 27: 54, 1973; Manilal & Sivaraj, Fl. Calic. 349, 1982, *P. ovalifolium* Poir. in Lam. Encycl. Suppl. 4: 279, 1816; Hook. f. Fl. Brit. Ind. 7: 44, 1896.

Annuals. Culms 10-80 cm long, slender, creeping or geniculate; nodes glabrous. Leaves ovate, 1-8 x 0.5-3 cm, acute or acuminate, cordate or amplexicaul, with a few tubercle-based cilia at base, glabrous or with scattered hairs on both surfaces. Sheaths ciliate along one margin. Ligules membranous, ciliate. Panicles ovate or pyramidal, 2-16 cm long, effuse; branches alternate or fascicled, rachis with or without tubercle-based

hairs. Pedicels 2-16 mm long, slender. Spikelets ovate or elliptic, slightly gibbous, 1.5 - 2 mm long, acute, hairy. Lower glume ovate-oblong, 1.5-2 x 0.5 mm, obtuse, chartaceous, 5-nerved, sparsely hairy, margins hyaline. Upper glume ovate-acute, boat-shaped, 1.5-2 x 1 mm, chartaceous, 5-nerved, sparsely hairy. Lower floret male. Upper floret bisexual. First lemma ovate, acute, 1.5-1.75 x 1 mm, membranous, 3-nerved. Palea oblong, 1-1.5 x 0.5 mm, 2-keeled, scabrid along the keels. Stamens 3, anthers c. 1 mm long, cream coloured. Second lemma ovate, c. 1.25 x 1 mm, acute, dorsally convex, coriaceous, faintly 5-nerved, shining. Palea ovate or elliptic, c. 1 x 0.5 mm, flat on the back, 2-keeled, coriaceous. Stamens 3; anthers c. 0.75 mm long, cream coloured. Ovary elliptic, c. 0.3 mm long; styles 0.25 mm long; stigmas c. 0.5 mm long, white. Grains ovate or orbicular, c. 1 x 0.75 mm.

Common in moist, shady places, along the margins of forests, banks of backwaters and as an undergrowth in cultivated lands.

Fl. & Fr.: March-December.

Notes: The ovate-elliptic leaves and slightly gibbous spikelets of this species make it distinct from other Indian species of the genus.

In forests and such similar habitats the plants are robust and the rachis is covered with tubercle-based hairs while in plains they are moderate-sized and glabrous.

ALLEPPEY: Pallana, Punnamada, Thottappally; CANNANORE: Chandanathode; IDUKKI: Sabarimala; KOTTAYAM: Mundakkayam; QUILON: Kottarakkara; TRIVANDRUM: Sreekariyam.

4. *Panicum gardneri* Thw, Enum. Pl. Zeyl. 359. 1864; Fischer in Gamble, Fl. Pres. Madr. 1783, 1934 (Repr. ed. 3: 1235. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 326. 1960; Majumdar in Bull. Bot. Soc. Beng. 27: 44. 1973. *Isachne gardneri* Benth. in Gen. Pl. 3: 1100. 1883; Hook. f. Fl. Brit. Ind. 7: 26. 1896.

Annuals or perennials. Culms 30-150 cm long, slender, trailing or decumbent, rooting at the lower nodes; nodes glabrous. Leaves ovate-lanceolate, 2-20 x 0.6-3 cm, acuminate, rounded or shallowly cordate at base, hairy on both surfaces. Sheaths densely ciliate

along one margin. Ligules membranous, fimbriate. Panicles ovate, 8-22 x 2-12 cm, lax; branches 2-14 cm long, alternate or 2-3 at each node; rachis and peduncle villous or rarely glabrous. Pedicels 0.5-6 cm long, undulate or straight, dilated at apex. Spikelets ovate or elliptic, 4-6 mm long, sharply acute, greenish. Lower glume ovate-lanceolate, 3-3.5 x 1-1.5 mm, acute, chartaceous, 3-nerved, margins hyaline. Upper glume broadly ovate, 3.5-4 x 2 mm, acute, chartaceous, 5-7-nerved, margins hyaline. Lower floret male. Upper floret bisexual. First lemma ovate, 3.5-4 x 2 mm, acute, chartaceous, 7-nerved, margins hyaline. Palea oblong, 3-3.5 x 1 mm, obtuse, keels minutely winged, scaberulous. Stamens 2-3, anthers rudimentary. Second lemma ovate, c. 3 x 1.5 mm, acute, coriaceous, faintly 5-nerved, shining. Palea ovate, c. 3 x 1 mm, acute, coriaceous, shining, margins hyaline and overlapping. Lodicules 2, obovate, c. 0.4 x 0.4 mm, emarginate. Stamens 3; anthers c. 2 mm long. Ovary elliptic, c. 0.75 mm; styles c. 1 mm long; stigmas c. 1.25 mm long, violet. Grains ovate, c. 2 x 1 mm, blunt at both ends.

Occasional along the shores and fringes of other types of forests; usually at higher elevations.

Fl. & Fr. : July - January.

Notes : This species can easily be distinguished from the other species of the genus by its larger spikelets and the silvery hyaline margins of the glumes. *Panicum gardneri* may be confused with *Isachne walkeri* in the field due to the similarity in the shape of leaves and spikelets.

IDUKKI: Peermade, Eravikulam National Park, Umeyamala; PATHANAMTHITTA: Moozhiyar; TRIVANDRUM: Agastyamala.

6. *Panicum humidorum* Buch.-Ham. ex Hook. f. Fl. Brit. Ind. 7: 53. 1896; Bor, Grass. Bur. Cey. Ind. Pak. 326. 1960; Majumdar in Bull. Bot. Soc. Beng. 27: 47. 1973; Ramachandran, Sreekumar & Nair in J. Econ. Tax. Bot. 5(5): 1009. 1984.

Perennials. Culms 30-150 cm high, decumbent or erect; nodes glabrous. Leaves 5-20 x 0.4-1 cm, linear-lanceolate, base rounded or shallowly cordate. Sheaths shortly ciliate along one margin. Ligule very narrow, membranous. Panicles 10-40 x 2-20 cm, effuse; branches 2-20 cm long, alternate or rarely opposite, angular, scaberulous. Pedicels 1-8 mm long, angular, sca-

berulous. Spikelets 1-1.5 mm long, ovate, acute, green. Lower glume 1-1.25 x 0.5-0.75 mm, ovate-lanceolate, chartaceous, 3-nerved, glabrous. Upper glume 1.25-1.5 x 0.75-1 mm, ovate, acute, chartaceous, 5-nerved, glabrous. Lower floret empty; lemma 1-1.25 x 0.75-1 mm, ovate, acute, chartaceous, 5-nerved, glabrous; palea absent. Upper floret bisexual; lemma 1-1.25 x 0.5-0.75 mm, elliptic, acute, coriaceous, smooth, shining, glabrous; palea 0.75-1 x 0.5-0.75 mm, ovate, acute, coriaceous, shortly 2-keeled, 2-nerved, glabrous; stamens 3. anthers 0.5-1 mm long, filaments short; ovary 0.1-0.25 mm, oblong, styles 0.5-1 mm, stigmas 0.5-1 mm long, pink, feathery.

Fl. & Fr. : February - March.

CANNANORE : Aralam.

6. *Panicum maximum* Jacq. Collect. Bot. 1: 76; Hook. f. Fl. Brit. Ind. 7: 49, 1896; Fischer in Gamble, Fl. Pres. Madr. 1783, 1934 (Repr. ed. 3: 1235, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 327. t. 37, 1960; Majumdar in Bull. Bot. Soc. Beng. 27: 53, 1973.

Perennials. Culms 75-300 cm high, tufted, erect, robust; nodes densely bearded. Leaves linear-lanceolate, 15-60 x 0.5-2 cm, tapering to a fine point, rounded or cordate at base, glabrous or covered with tubercle-based hairs, midrib prominent. Sheaths glabrous or covered with dense tubercle-based hairs, lower ones keeled. Ligules thin, membranous, with a tuft of hairs behind. Panicles ovate or elliptic or pyramidal, 10-60 x 5-15 cm, effuse, decomposed; branches whorled at the lower nodes, alternate towards apex, 3-30 cm long. Rhachis angular, bearded at the lowest node, scaberulous upwards. Pedicels 2-12 mm long, slender. Spikelets oblong, 3-4 mm long, acute or subobtuse, rarely tinged with purple, glabrous or puberulous. Lower glume broadly ovate or orbicular, 1-1.25 x 1 mm, obtuse, chartaceous, faintly 0-3-nerved, glabrous. Upper glume oblong, c. 3 x 1.5 mm, obtuse, chartaceous, faintly 5-nerved, glabrous. Lower floret male. Upper floret bisexual. First lemma oblong, c. 3 x 1.5 mm, acute, chartaceous, faintly 5-nerved. Palea elliptic-acute, c. 3 x 1 mm, 2-nerved, keels winged, hyaline. Stamens 3; anthers c. 1.5 mm long. Second lemma ovate, c. 2 x 1.25 mm, acute, transversely rugose, faintly 5-nerved, nerves visible only from the innerside, subcoriaceous. Palea elliptic, c. 2 x 2 mm, obtuse, subcoriaceous, dorsally rugose. Lodicules 2, obovate, c. 0.25 x 0.1 mm, cuneate at base, denticulate at apex. Stamens 3; anthers c. 1 mm

long. Ovary elliptic, c. 0.5 mm long; styles c. 0.5 mm long; stigmas c. 1 mm long, broadly plumose, pink. Grains ovate or elliptic, c. 1.5 x 0.75 mm.

Often cultivated as a fodder grass, occasionally runs wild.

Fl. & Fr.: May - December.

Notes: This grass is a native of Tropical Africa, and is introduced and cultivated as an important fodder grass. *P. maximum* is distinct because of the rugose upper lemmas and faintly nerved lower lemmas.

It shows extreme morphological variations; and varies from tall robust forms to small slender ones. The spikelets are either glabrous or pubescent.

'Guinea Grass'; very palatable to and readily eaten by the cattle.

ALLEPPEY: Alleppey town; TRICHUR: Vellianikkara.

7. *Panicum notatum* Retz. Obs. Bot. 4: 18. 1786; Bor, Grass. Bur. Cey. Ind. Pak. 701. 1960; Majumdar in Bull. Bot. Soc. Beng. 27: 48. 1973. *P. montanum* Roxb. Fl. Ind. 1: 315. 1820; Hook. f. Fl. Brit. Ind. 7: 53. 1896; Fischer in Gamble, Fl. Pres. Madr. 1783. 1934 (Repr. ed. 3: 1235. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 329. 1960.

Perennials. Culms 80-200 cm high, erect or rarely climbing, wiry, nodes glabrous. Leaves lanceolate, 5-20 x 1-3.5 cm, acuminate, flat, rigid, cordate at base with a few tubercle-based hairs along the margins, glabrous or sparsely villous on both surfaces, midrib prominent. Sheaths shortly ciliate along one margin, glabrous or sparsely villous. Ligules thin fimbriate membrane with a few long hairs behind. Panicles 10-40 x 5-20 cm, lax, spreading; branches 5-25 cm long, verticillate in the lower nodes, opposite or alternate in the upper ones; rachis angular, scaberulous. Pedicels 2-20 mm long, capillary, straight, dilated at apex. Spikelets ovate-oblong, 2.5-3 mm long, acute, sparsely hairy, greenish or tinged with purple. Lower glume ovate-lanceolate, c. 2.25 x 1 mm, acute, chartaceous, 5-nerved, with a few hairs along the margins. Upper glume ovate, c. 2.5 x 1.25 mm, acute, chartaceous, 5-nerved, sparsely hairy especially along the margins. Lower floret barren. Upper floret bisexual. First lemma ovate, c. 2.5 x 1.25 mm, acute, chartaceous, 5-nerved. Pales absent. Second lemma ovate, c. 2 x 1.5 mm, acute, subcoriaceous, faintly 5-nerved,

shining. Palea ovate, *c.* 2 x 1 mm, acute, subcoriaceous, margins hyaline and overlapping. Lodicules 2, oblong, *c.* 0.3 x 0.1 mm, retuse at apex. Stamens 3; anthers *c.* 1.5 mm, yellow. Ovary elliptic, *c.* 0.5 mm long; styles *c.* 0.25 mm long; stigmas *c.* 0.75 mm long, pink or violet. Grains ovate, *c.* 1.5 x 0.75 mm.

Very common along the margins of forests and scrub jungles, usually in moist and shady habitats. Sometimes the culms are wiry and trailing over the branches of shrubs like *Helicteres isora* and *Canthium* sp.

Fl. & Fr. : July - March.

Notes : *Panicum notatum* can be distinguished from the other species of the genus by its peculiar trailing habit, lanceolate leaves, lax panicles and epaleate lower florets. This grass resembles a miniature 'bamboo' with clumps of firm roots.

CALICUT : Pavagada; CANNANORE : Taliparamba; IDUKKI : Koruthodu, Murinjapuzha, Pattumudi, Thekkady; PALGHAT : Chindaki Forest; PATHANAMTHITTA : Moozhiyar; QUILON : Kottarakkara; TRICHUR : Parambikulam, Peechi.

8. *Panicum paludosum* Roxb. Fl. Ind. 1: 310. 1820; Fischer in Gamble, Fl. Pres. Madr. 1783. 1934 (Repr. ed. 3: 1235, 1957); Bor, Grass Bur. Cey. Ind. Pak. 329. 1960; Majumdar in Bull. Bot. Soc. Beng. 27. 51. 1973; Manilal & Sivaraj. Fl. Calic. 349. 1982. *P. proliferum* auct. non Lam. 1797; Hook. f. Fl. Brit. Ind. 7: 50. 1896.

Aquatic perennials. Culms 30-100 cm long, spongy below, erect or geniculate and rooting at the lower nodes, sometimes floating; nodes glabrous. Leaves linear or linear-lanceolate or ensiform, 2-20 x 0.3-1 cm, acute, rounded or subcordate at base, flat, glabrous, margins scaberulous. Ligules a ring of white hairs. Panicles ovate or oblong, 6-25 x 4-16 cm, widely spreading, effuse, usually as broad as its length, branches 1-10 cm long, whorled or opposite below, alternate above. Pedicels 2-8 mm long, angular, scaberulous, slightly dilated at apex. Spikelets elliptic-lanceolate or narrowly lanceolate, acuminate, 3-4 mm long, parallel to the branches, greenish. Lower glume ovate or orbicular, *c.* 1 x 1.25 mm, obtuse, broader than long, membranous, obscurely 0-5-nerved. Upper glume ovate to elliptic-lanceolate, *c.* 3.5 x 1 mm, acute or acuminate, chartaceous, distinctly 7-9-nerved. Lower floret usually barren, rarely male. Upper floret

bisexual. First lemma ovate to elliptic-lanceolate, c. 3.5 x 1 mm, acute or acuminate, chartaceous, distinctly 7-9-nerved. Palea sometimes absent or oblong, c. 2 x 0.5 mm, acute, 2-nerved, hyaline. Second lemma ovate to oblong, acute, c. 2.25 x 1 mm, subcoriaceous, faintly 7-nerved, shining. Palea elliptic or oblong, c. 2 x 1 mm, acute, subcoriaceous, shining, margins inturred, auricled at base. Lodicules 2, obovate or obconical, c. 0.5 x 0.4 mm, wavy and oblique at apex. Stamens 3; anthers c. 1 mm long, orange-red. Ovary ovate, c. 0.5 mm long, stipitate; styles c. 0.25 mm long; stigmas c. 0.75 mm long, pink. Grains oblong, c. 1.5 x 0.5 mm, rounded at apex.

Fairly common in wetlands, marshes, submerged or floated in shallow and still waters like pools, ponds and along the banks of streams and backwaters.

Fl. & Fr. : March-December.

Notes : A common, vigorously spreading aquatic grass eaten by elephants and buffaloes.

It is often confused with *Panicum repens*, but can be distinguished by the spongy under-water culms, broader flat, green leaves, widely spreading panicles and narrowly lanceolate spikelets which are parallel and adpressed to the branches. This species does not possess the sharp pointed rhizomes, unlike the other one.

ALLEPPEY: Nedumudy; IDUKKI: Munnar; PATHANAMTHITTA: Ponnambalamedu; QUILON: Oachira.

9. *Panicum psilopodium* Trin. Gram, Panic, 217, 1826 var. *coloratum* Hook. f. Fl. Brit. Ind. 7: 47, 1896; Bor, Grass. Bur. Cey. Ind. Pak. 330, 1960; Majumdar in Bull. Bot. Soc. Beng. 27: 50, 1973; V.J. Nair et al. in J. Econ. Tax. Bot. 3: 271, 1982. PLATE No. 53

Annuals or perennials. Culms 15-40 cm high, erect; nodes glabrous. Leaves lanceolate, 4-15 x 0.3-0.5 cm, acute or shortly acuminate, rounded at base; glabrous or very sparsely villous above. Ligules membranous, narrow, truncate at apex. Panicles open, 5-15 x 3-10 cm, widely spreading; branches 2-6 cm long, alternate or rarely opposite. Pedicels 1-6 mm long, angular, scaberulous, slightly dilated at apex. Spikelets ovate-lanceolate or elliptic-oblong, 2-3 mm long, acute, purplish, deciduous. Lower glume ovate or orbicular, c.

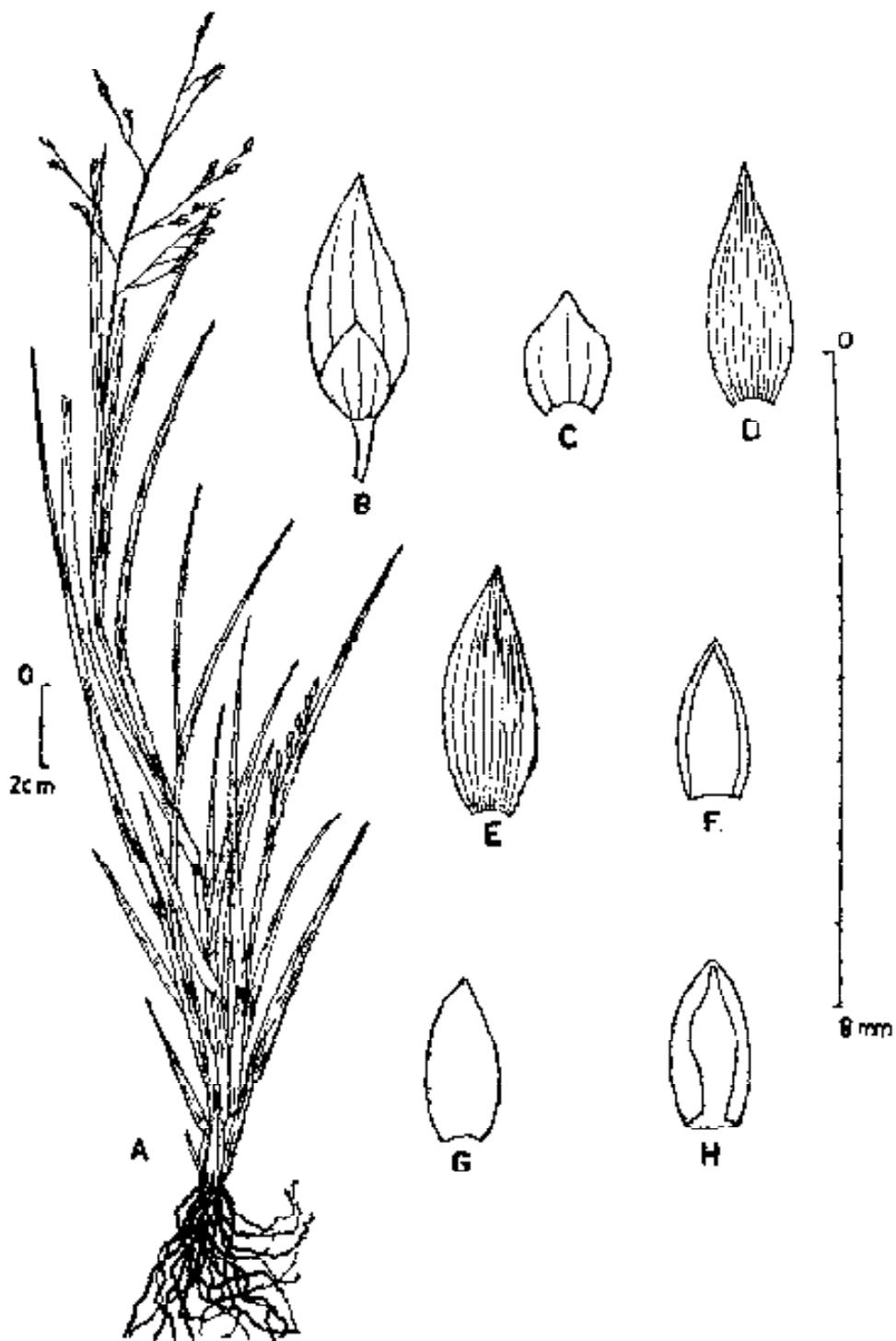


PLATE No. 53 : *PANICUM PSILOPODIUM* Trin. var. *COLORATUM* Hook. f.

A. Habit; B. Spikelet; C. Lower glume; D. Upper glume; E. First lemma; F. Palea of the first lemma; G. Second lemma; H. Palea of the second lemma.

1 x 1.5 mm, obtuse, chartaceous, faintly 5-nerved, glabrous. Upper glume ovate-lanceolate, c. 3 x 1.5 mm, chartaceous, 11-nerved. Lower floret barren. Upper floret bisexual. First lemma ovate-lanceolate, c. 2.75 x 1.5 mm, acute, chartaceous, 9-11-nerved. Palea ovate-lanceolate or narrowly oblong, c. 2 x 0.75 mm, 2-keeled, hyaline. Second lemma broadly ovate or ovate-oblong, c. 2 x 1.25 mm, obtuse, apiculate, coriaceous, shiny, faintly 7-9-nerved. Palea ovate-lanceolate or elliptic, c. 1.8 x 0.75 mm, obtuse, subcoriaceous, shining. Lodicules 2, obovate, c. 0.4 x 0.15, oblique and 2-horned at apex. Stamens 3; anthers c. 1 mm long. Ovary ovate, c. 0.4 mm; styles c. 0.4 mm; stigmas c. 0.75 mm. Grains ovate or orbicular, c. 1.5 x 0.75 mm, with a dark hilum at the base.

Very rare, in wetlands and as a weed in cultivated fields.

Fl. & Fr. : August.

Notes : This variety is distinct by the purplish-red spikelets. Previously it was known only from Himalayas, Mount Abu and Shan hills of Burma. Subsequently it was reported from North Canara by Singh *et al.* (1976). The recent report of this variety by Nair *et al.* (*J. c.*) extends its known distribution further down to Kerala.

TRICHUR : Vellanikkara.

10. *Panicum repens* Linn. Sp. Pl. ed. 2: 87. 1762; Hook. f. Fl. Brit. Ind. 7: 49. 1896; Rang. & Tad. Handb. S. Ind. Grass. 99, t. 102-103. 1921; Fischer in Gamble, Fl. Pres. Madr. 1783. 1934 (Repr. ed. 3: 1235. 1957); Bor. Grass. Bur. Cey. Ind. Pak. 330. 1960; Majumdar in Bull. Bot. Soc. Beng. 27: 51. 1973; Manilal & Sivaraj. Fl. Calic. 349. 1982.

Perennials. Culms 30-100 cm long, erect or trailing, rhizomatous, or stoloniferous, stout, rooting at the lower nodes and ascending; nodes glabrous. Leaves linear-lanceolate, 3-20 x 0.3-0.8 cm, acuminate, rounded or shallowly cordate at base, rigid, distichous, convolute, glaucous, covered with a few tubercle-based hairs on the upper surface. Sheaths ciliate along the margins, densely bearded at the mouth. Ligules membranous, thin, annular with a dense tuft of hairs behind. Panicles oblong-lanceolate, 7-20 cm long, contracted, not much exerted; branches 4-10 cm long, mostly alternate, slender, scaberulous; rachis angular, scabrid. Pedicels angular, 1-6 mm long, scabrid, dilated at apex. Spikelets ovate-lanceolate or oblong-lanceo-

late, 2.5-3 mm, acute, greenish. Lower glume broadly ovate or orbicular, c. 0.75 x 1.75 mm, subacute, membranous, faintly 3-5-nerved. Upper glume ovate-lanceolate, 2.5-3 x 1.25-1.5 mm, acute, chartaceous, 5-9-nerved. Lower floret male. Upper floret bisexual. First lemma ovate-lanceolate, 2.5-3 x 1.25-1.5 mm, acute, chartaceous, 7-9-nerved. Palea oblong-lanceolate, 2-2.5 x 0.75-1 mm, acute, hyaline, 2-keeled, scaberulous along the keels. Stamens 3; anthers 1-1.25 mm long. Second lemma oblong, 1.75-2 x 0.75-1 mm, acute, subcoriaceous, faintly 7-9-nerved, shining. Palea elliptic, 1.5-1.75 x 0.5-0.75 mm, acute, subcoriaceous. Stamens 3; anthers 1-1.5 mm long. Ovary ovate, 0.4-0.5 mm; styles 0.3-0.5 mm long; stigmas 0.5-0.75 mm long.

Very common along the bunds of paddy fields, banks of backwaters, streams and rivers, as an obnoxious weed in tea estates and other cultivated fields; occasionally in wetlands and marshes. A peculiar species with a wide range of adaptability.

Fl. & Fr. : January-December.

Notes: A cosmopolitan species. It may be confused with *Panicum paludosum*, but can easily be distinguished from it by the thick rhizomes, rigid, glaucous and convolute leaves, and non-spongy culms. The rhizomes of this grass are thick and robust which superficially look like the rhizomes of Ginger, hence it is commonly called "Ginger grass" or "Ginger root grass". The rhizomes are said to be a very good lactagogue. A species with considerable fodder value.

Several attempts to find out an open spikelet in the field, were in vain; probably cleistogamous.

ALLEPPEY : Alleppey, Punnamada, Thanneermukkam; CANNANORE : Taliparamba; ERNAKULAM : Cochin; IDUKKI : Munnar; Murinjapuzha; QUILON : Adoor.

11. *Panicum sumatrense* Roth ex Roem. & Schult. Syst. Veg. 2: 434. 1817; Bor. Grass. Bur. Cey. Ind. Pak. 701. 1960; Majumdar in Bull. Bot. Soc. Beng. 27: 50. 1973. *P. miliare* acut. non Lam. 1791; Hook. f. Fl. Brit. Ind. 7: 46. 1896; Fischer in Gambie, Fl. Pres. Madr. 1782. 1934 (Repr. ed. 3: 1234. 1957); Bor. Grass. Bur. Cey. Ind. Pak. 329. 1960. PLATE No. 54

Annuals. Culms 30-100 cm high, erect; nodes glabrous. Leaves linear-lanceolate, 20-60 x 0.5-1.5 cm, tapering from a broad, rounded or shallowly cordate base, flat, midrib prominent. Ligules membranous, truncate, c. 1 mm long, narrow, shortly ciliate at apex. Panicles oblong much contracted, 5-40 x 1-5 cm, densely branched; branches 3-15 cm long, alternate or thyrsiform, densely spiculate; rachis angular, scabrid. Pedicels angular, 1-6 mm long, slender, scabrid, dilated at apex. Spikelets ovate-oblong or elliptic, 2.5-3.5 mm long, acute, greenish. Lower glume broadly ovate or orbicular, 0.75-1.25 x 1.25-1.5 mm, acute or apiculate, membranous, 3-5-nerved. Upper glume ovate-lanceolate, 2.25-2.5 x 1.25-1.5 mm, chartaceous, 11-13-nerved. Lower floret barren. Upper floret bisexual. First lemma ovate-lanceolate, 2.25-2.5 x 1.25 mm, chartaceous, 9-11-nerved. Palea oblong or elliptic, 2.5-2.75 x 0.5-0.75 mm, acute, hyaline, 2-keeled. Second lemma ovate-oblong, 2-2.5 x 1.25-1.5 mm, obtuse, apiculate, subcoriaceous, faintly 7-9-nerved, shining, pale grey turning dark-brown or black when fully mature. Palea elliptic or oblong, 1.8-2 x 0.75-1 mm, acute, subcoriaceous, margins inflexed. Lodicules 2, obovate, c. 0.4 x 0.2 mm, oblique and 2-horned at apex. Stamens 3; anthers 1.25-1.5 mm long, orange-yellow. Ovary ovate, 0.4-0.5 mm long; styles 0.5-0.6 mm long, stigmas 0.75-1 mm long, pink or white. Grains ovate or orbicular, 1.5-1.75 x 0.75-1 mm, with a black hilum at the base.

Often cultivated as "Little millet" and occasionally runs wild along the margins of forests and roadsides.

Fl. & Fr. : July-December.

Notes : This species may be a cultivated form of *Panicum psilopodium*, from which it is very difficult to be separated. Still, the much contracted panicles, persistent spikelets, broader leaves and the taller culms help to distinguish *P. sumatrense* from its allied species. Most of the floral characters of both the species qualitatively and quantitatively are more or less similar and often overlapping.

CANNANORE : Elimala, Kannothe; PATHANAMTHITTA : Upper Moozhi yar.

12. *Panicum trypheron* Schult. Syst. Veg. 2: Mant. 244. 1824; Hook. f. Fl. Brit. Ind. 7: 47. 1896; Rang. & Tad. Handb. S. Ind. Grass. 96, t. 101 1921; Fischer in Gamble, Fl. Pres. Madr. 1783. 1934 (Repr. ed. 3: 1235. 1957); Bor. Grass. Bur. Cey. Ind. Pak. 331. 1960; Majumdar in Bull. Bot. Soc. Beng. 27: 47. 1973.

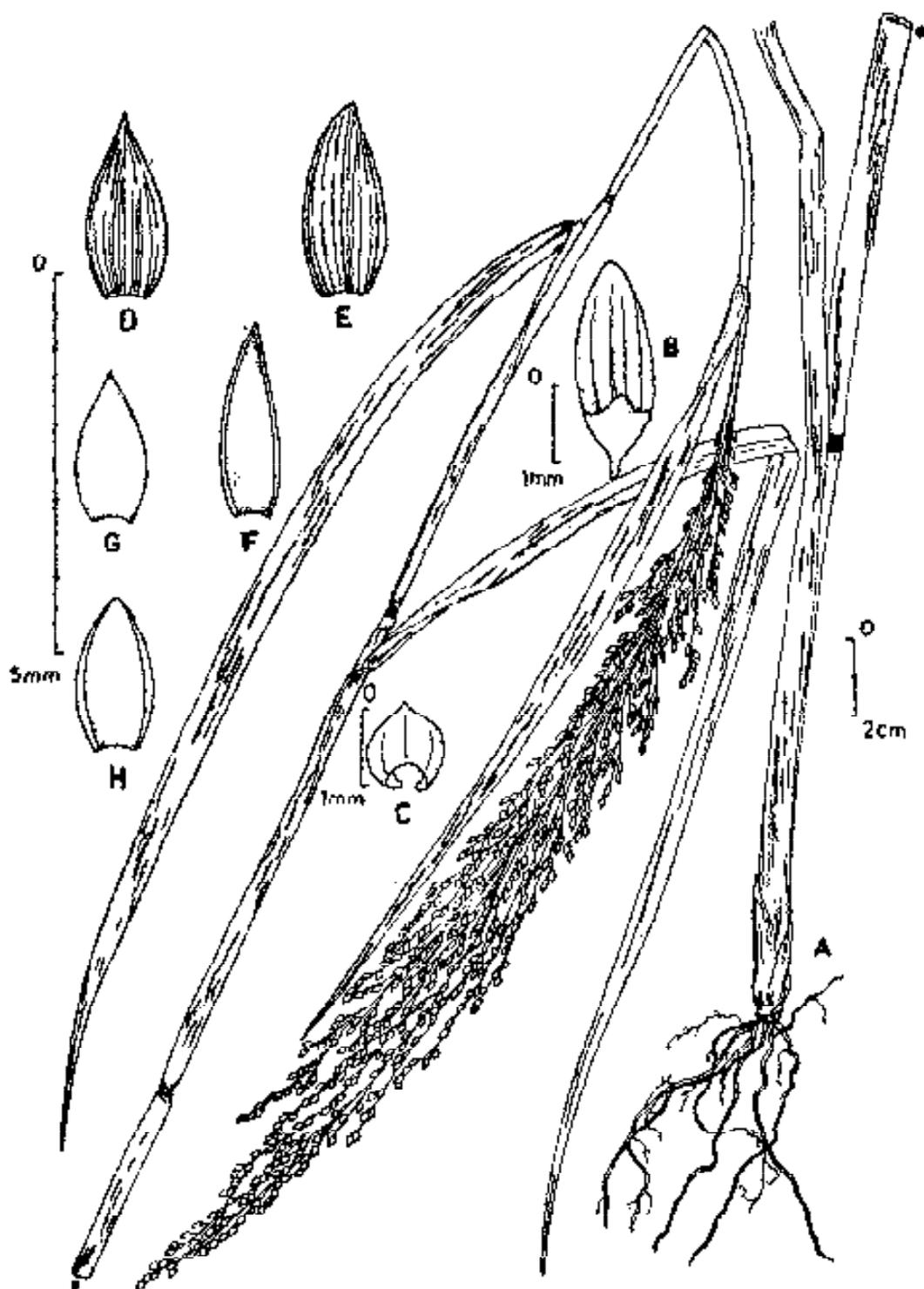


PLATE No. 64 : *PANICUM SUMATRENSE* Roth ex Roem. & Schult.

A. Habit; B. Spikelet; C. Lower glume; D. Upper glume; E. First lemma;
 F. Palea of the first lemma; G. Second lemma; H. Palea of the second
 lemma.

Annuals. Culms 10-75 cm high, erect or geniculate, slender, leafy at the base; nodes glabrous. Leaves linear-lanceolate, 4-30 x 0.2-0.8 cm, flat, mostly basal, narrow, rounded or shallowly cordate at base, tubercle-based or simple hairy on both surfaces, margins minutely serrate and ciliate with tubercle-based hairs especially at base, midrib prominent. Sheaths slightly compressed, hispid or glabrous, ciliate along one margin. Ligules dense tuft of hairs. Panicles oblong or elliptic, 5-45 cm long, very effuse; branches 2-20 cm long, alternate or rarely whorled, drooping, spikelets sparse, distant. Pedicels angular, 1-15 mm long, slender, scabrid, slightly dilated at apex. Spikelets elliptic-lanceolate or ovoid, 2.5-4 mm long, acuminate, very distant and widely gaping, greenish or pink. Lower glume broadly ovate, 1.5-2 x 0.75-1 mm, cuspidate-acuminate, membranous, 3-5-nerved. Upper glume ovate-lanceolate, 2.5-3.5 x 1-1.5 mm, shortly acuminate, membranous, 5-7-nerved. Lower floret barren. Upper floret bisexual. First lemma ovate-oblong or lanceolate, 2.5-3.5 x 1.5-2 mm, membranous, 7-9-nerved. Palea oblong, 1-1.5 x 0.4-0.5 mm, obtuse or subacute, hyaline, 2-keeled. Second lemma oblong, obtuse, 1.5-3 x 0.75-1.5 mm, rounded at apex, subcoriaceous, faintly 7-9-nerved, shining. Palea oblong-elliptic, 1.5-2 x 0.75-1 mm, obtuse, rounded at apex, subcoriaceous, shining, margins inflexed. Lodicules 2, oblanceolate, c. 0.15 x 0.1 mm. Stamens 3; anthers 0.5-1 mm long. Ovary ovate, 0.3-0.5 mm long; styles 0.5-0.6 mm long; stigmas 0.5-0.75 mm long, pink. Grains ovate or orbicular, 1-1.25 x 0.75-1 mm.

Fairly common in open grasslands, along the fringes of forests, and also along the roadsides in hilly areas.

Fl. & Fr. : July - January.

CALICUT : Pokkunnemala; CANNANORE : Angadimogaru; PALGHAT : Mukkeli; TRICHUR : Peechi; TRIVANDRUM : Nilamel; WYNAD : Vayitri.

13. *Panicum walense* Mez in Bot. Jb. 34: 146. 1904; "*P. watense*"; Majumdar in Bull. Bot. Soc. Beng. 27: 47. 1973; T.A. Cope in Nasir & Ali, Fl. Pak. 143: 166. 1982. *P. austro-asiaticum* Oliver in Acta Phytotax. Geobot. Kyoto 11: 45. 1942; Bor. Grass. Bur. Cey. Ind. Pak 324. 1960. *P. humile* Nees ex Steud. Syn. Pl. Glum. 1: 84. 1854, non Thunb. ex Trin. 1826; Hook. f. Fl. Brit. Ind. 7: 48. 1896; Fischer in Gamble, Fl. Pres. Madr. 1782. 1934 (Repr. ed. 3: 1234. 1957).

Annuals. Culms 5-40 cm high, erect, tufted; nodes glabrous. Leaves lanceolate, linear-lanceolate or linear, 1-15 x 0.1-0.4 cm, rounded at base. Sheaths villous towards mouth. Ligules membranous, narrow, fimbriate. Panicles 1-10 cm long, open. Pedicels very long, capillary. Spikelets elliptic, 1-2 mm, acute. Lower glume ovate-lanceolate, 1-1.5 x 0.5 mm, acuminate, chartaceous, 3-nerved. Upper glume ovate, 1-1.5 x 1 mm, acute, chartaceous, 3-nerved. Lower floret barren. Upper floret bisexual. First lemma ovate, 1-1.5 x 1 mm, acute, chartaceous, 3-nerved. Palea elliptic, c. 1 x 0.5 mm, hyaline, 2-keeled, 2-nerved. Second lemma ovate-oblong, c. 1 x 0.5 mm, crustaceous, faintly 3-nerved, shining. Palea oblong, c. 1 x 0.5 mm, acute, crustaceous, 2-keeled, 2-nerved. Stamens 3; anthers c. 0.5 mm long, yellow. Pistil 0.5-1 mm long; stigmas pink.

Occasional along the bunds of paddy fields, roadsides and wastelands; usually in moist habitats. Appears to be an introduced grass that runs wild.

Fl. & Fr. : August-December.

CANNANORE : Angadi-mogaru; TRICHUR : Vellanikkara.

14. PASPALIDIUM Stapf

Stapf in Prain, *Fl. Trop. Afr.* 9 : 582, 1920; Fischer in Gamble, *Fl. Pres. Madr.* 1773, 1934 (*Repr.* ed. 3 : 1228, 1967); Bor, *Grass. Bur. Cey. Ind. Pak.* 332, 1960. *Panicum* Linn. Sect. *paspaloideae* Hook. f. *Fl. Brit. Ind.* 7 : 28, 1896.

A genus of about 27 species distributed in the tropics, mainly confined to Australia, of which about 3 species occur in India and Kerala.

Key to the species

- 1a. Leaves blunt; spikes much shorter than the internodes; spikelets gibbously globose *P. flavidum* 1
- 1b. Leaves not blunt, acuminate or acute; spikes equal to or longer than the internodes; spikelets not gibbous :
 - 2a. Upper glume nearly as long as the spikelet; lower glume 1-1.5 mm long; lower floret male, paleate *P. geminatum* 2
 - 2b. Upper glume about half the length of the spikelets; lower glume 0.5-1 mm long; lower floret barren, apaleate *P. punctatum* 3

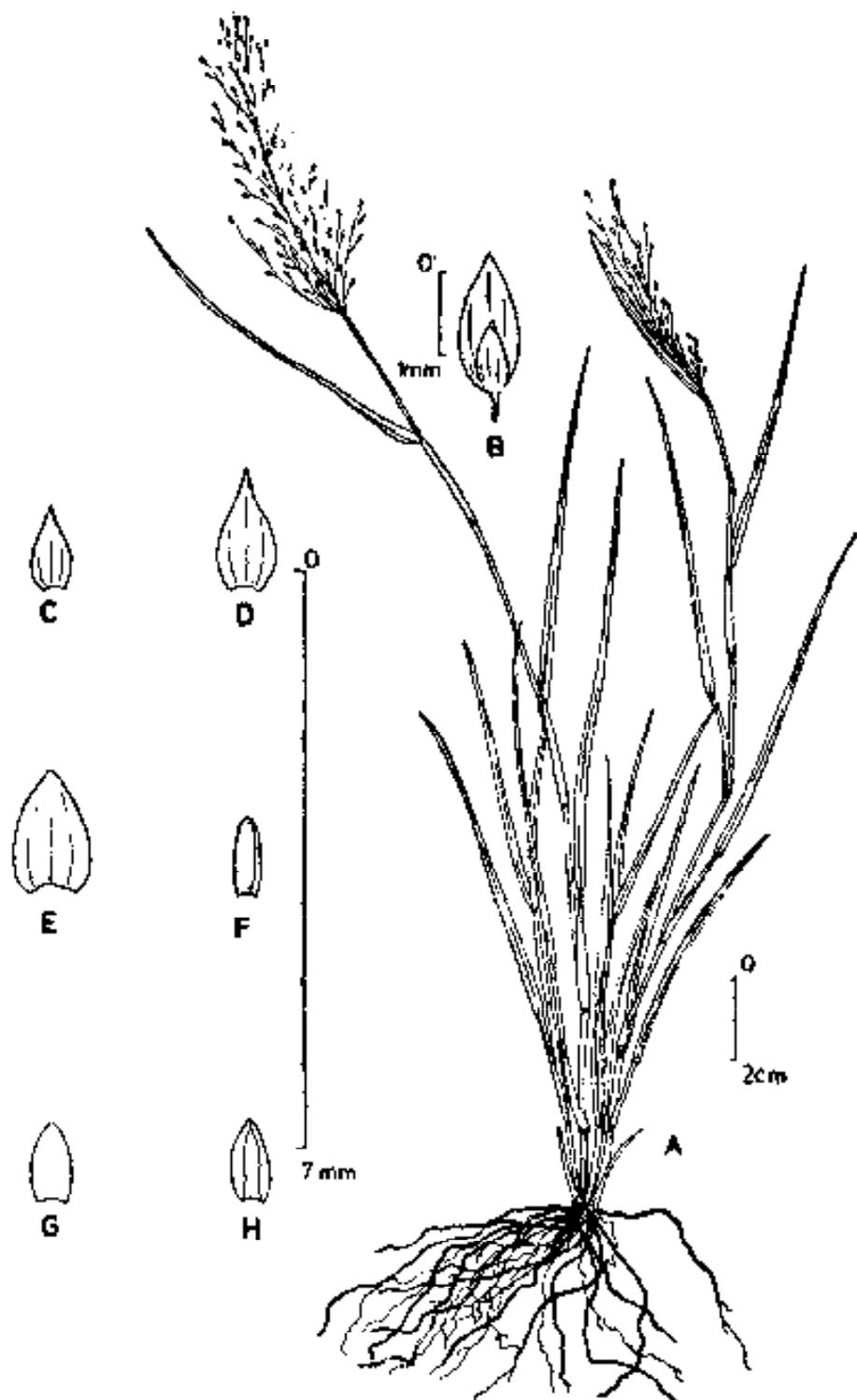


PLATE No. 55 : *PANICUM WALENSE* Mez

A. Habit; B. Spikelet; C. Lower glume; D. Upper glume; E. First lemma; F. Palea of the first lemma; G. Second lemma; H. Palea of the second lemma.

1. *Paspalidium flavidum* (Retz.) A. Camus in Lecomte, Fl. Gen. Indo Chine 7: 419. 1922; Fischer in Gamble, Fl. Pres. Madr. 1774, 1934 (Repr. ed. 3: 1229, 1957); Bor, Grass. Bur. Cey, Ind. Pak. 333, 1960; Manilal & Sivaraaj, Fl. Calic. 343, 1982. *Panicum flavidum* Retz. Obs. Bot. 4: 1786; Hook. f. Fl. Brit. Ind. 7: 28, 1896; Rang. & Tad. Handb. S. Ind. Grass. 69, t. 82-83, 1921.

Annuals or perennials. Culms 10-80 cm long, tufted, erect, or geniculate; nodes glabrous. Leaves linear-oblong, or linear, blunt at apex, 5-35 x 0.3-0.8 cm, flat, rounded, or shallowly cordate at base. Sheaths compressed, strongly keeled. Ligules annular. Inflorescence 5-30 cm long, spiciform; spikes 3-10 in number, alternate, each 0.5-2 cm long, distant by 2-4 times of their length. Rhachis narrowly winged, midrib triquetrous, 0.5-0.8 mm wide. Spikelets ovate, gibbous, 1-3 mm long. Lower glume ovate or orbicular, 0.5-1 x 1-1.5 mm, chartaceous, 3-nerved. Upper glume ovate, 2-3 x 1.5-2 mm, chartaceous, 3-9-nerved. Lower floret barren. Upper floret bisexual. First lemma ovate, 2-3 x 1.5-2 mm, chartaceous, 5-nerved. Palea ovate-elliptic, 1.5-2 x 1 mm, hyaline, 2-keeled, 2-nerved. Second lemma elliptic, 1.5-2 x 1 mm, crustaceous, faintly 5-7-nerved, granulate. Palea elliptic, 1-2 x 0.5-1 mm, crustaceous or subcoriaceous, 2-keeled, margins inflexed. Stamens 3, anthers c. 1 mm long. Ovary oblong, c. 0.2 mm long; styles 0.5-1 mm long; stigmas 0.5-1 mm long.

Fairly common along the bunds of paddy fields, banks of backwaters, streams and rivers, in shallow watered ditches and other wet, damp localities of the plains; shade-loving species.

Fl. & Fr. : July - December.

Notes : *Paspalidium flavidum* shows much variation in size and habit and also in the number of nerves of the glumes. This species has a wide range of adaptability. It is quite distinct from the other species of the genus by having leaves with blunt apices, distantly placed spikes and gibbously ovate spikelets.

ALLEPPEY: Nedumudy; CANNANORE: Tellicherry; KOTTAYAM: Kudamaloor; PALGHAT: Karivara slopes, Mukkali forest, Vetrilachola; TRICHUR: Peechi; TRIVANDRUM: Pulimath,

2. *Paspalidium geminatum* (Forssk.) Stapf in Prain, Fl. Trop. Afr. 9: 583, 1920; Fischer in Gamble, Fl. Pres. Madr. 1774, 1934 (Repr. ed. 3: 1229, 1957); Bor, Grass. Bur. Cey. Ind. Pak, 333, 1960, *Panicum geminatum* Forssk. Fl. Aegypt. Arab. 18, 1775, *P. paspaloides* Pers. Syns Pl. 81, 1805; Hook, f. Fl. Brit. Ind. 7: 30, 1896.

Perennials. Culms 30-150 cm long, creeping or floating, stoloniferous or spongy-rhizomatous, rooting at the lower nodes; nodes glabrous. Leaves lanceolate or linear-lanceolate, 5-30 x 0.3-1.5 cm, tapering or setaceously acuminate, rounded or shallowly cordate at base. Ligules tuft of hairs. Panicles 5-30 cm long, interrupted, spiciform; spikes several, congested, 0.5-3 cm long. Rhachis narrowly winged, midrib triquetrous, 0.5-1 mm wide, glabrous or sparsely villous. Spikelets ovate, acute, elliptic or elliptic-lanceolate, 1.5-4 mm, greenish-yellow. Lower glume ovate-lanceolate, rounded or truncate, 1-1.5 x 1.5-2 mm, membranous, faintly 3-5-nerved. Upper glume ovate, obtuse, 2-3 x 1.5-2 mm, chartaceous, 5-7-nerved. Lower floret male. Upper floret bisexual. First lemma ovate, acute or elliptic-acute, 3-3.5 x 1.5-2 mm, chartaceous, 5-nerved. Palea broadly elliptic, acute or shortly acuminate, 2-3 x 1-1.5 mm, hyaline, 2-keeled, 2-nerved. Stamens 3, anthers 1-1.5 mm long. Second lemma broadly elliptic-acute or shortly acuminate, 2-3 x 1.5-2 mm, coriaceous, faintly 5-nerved. Palea broadly elliptic, acute, 2-2.5 x 1-1.5 mm, subcoriaceous, 2-keeled, 2-nerved. Stamens 3, anthers 1.5-2 mm long, orange-yellow. Ovary ovate-oblong, c. 0.25-0.5 mm long; styles 0.5-1 mm long; stigmas 1-1.5 mm long, cream-yellow.

Frequent along the water-logged areas, bunds of paddy fields, marshes, shallow watered ditches, wetlands and other such damp places of the coastal areas.

Fl. & Fr. : June-March.

Notes : This species is very closely related to and often confused with *Paspalidium punctatum*, but can be distinguished by its larger glumes, congested spikes and male paleate lower florets. It is a very good fodder grass.

ALLEPPEY: Alleppey, Kuppapuram, Pallathuruthy, Pulinkunnu, R. Block, Thakazhy; KOTTAYAM: Kottayam; QUILON: Ayiramthengu, Quilon.

3. *Paspalidium punctatum* (Burm.) A. Camus in Lecomte, Fl. Gen. Indo-Chine 7: 419. 1922; Fischer in Gamble, Fl. Pres. Madr. 1774, 1934 (Repr. ed. 3: 1229. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 333. 1960. *Panicum punctatum* Burm. Fl. Ind. 26. 1768; Hook. f. Fl. Brit. Ind. 7: 29. 1896. PLATE No. 56

Perennials. Culms 30-160 cm long, creeping, or floating with spongy rhizomatous, trailing, rooting at the lower nodes, rarely decumbent; nodes glabrous. Leaves lanceolate, linear-lanceolate or linear, 3-30 x 0.3-1 cm, acute or acuminate, narrow or rounded at base. Sheaths slightly keeled. Ligules tuft of hairs. Panicles spiciform, 10-50 cm long; spikes 5-15, each 1-4 cm long, sheaths narrowly winged, 0.5-1.5 mm wide. Spikelets ovate, or broadly elliptic, 2-4 mm long. Lower glume ovate, 0.5-1 x 1 mm, truncate or rounded, chartaceous, faintly 3-5-nerved. Upper glume ovate, obtuse, 2-3x1.5-2 mm, chartaceous, 5-7-nerved. Lower floret barren, epaleate. Upper floret bisexual. First lemma ovate-elliptic, 2.5-3.5 x 1-1.5 mm, acute, chartaceous, 5-nerved. Second lemma broadly elliptic, 3-3.5 x 1-1.5 mm, acute or shortly acuminate, crustaceous, faintly 3-5-nerved, rugulose. Palea elliptic-acute, 2-2.5 x 1-1.5 mm, shortly acuminate, crustaceous, 2-keeled, 2-nerved, rugulose. Stamens 3, anthers 1-1.5 mm long. Ovary oblong, c. 0.5 mm long; styles 0.5-1 mm long; stigmas 0.5-1 mm long.

Occasional along the ditches, canals, banks of streams, backwaters and other wetlands.

Fl. & Fr. : August March.

Notes : This aquatic species is closely allied to *Paspalidium geminatum* and is often confused with it, but can be distinguished by the smaller glumes, loose spikes and barren epaleate florets. *P. punctatum* is rather rare when compared to the other allied species.

ALLEPPEY : Alleppey; IDUKKI : Anamudi slopes; TRICHUR : Puliappara.

15. PASPALUM Linn.

Linn. Syst. Nat. ed. 10, 2: 855. 1759; Hook. f. Fl. Brit. Ind. 7: 10. 1896; Fischer in Gamble, Fl. Pres. Madr. 1770. 1934 (Repr. ed. 3: 1226. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 334. 1960.

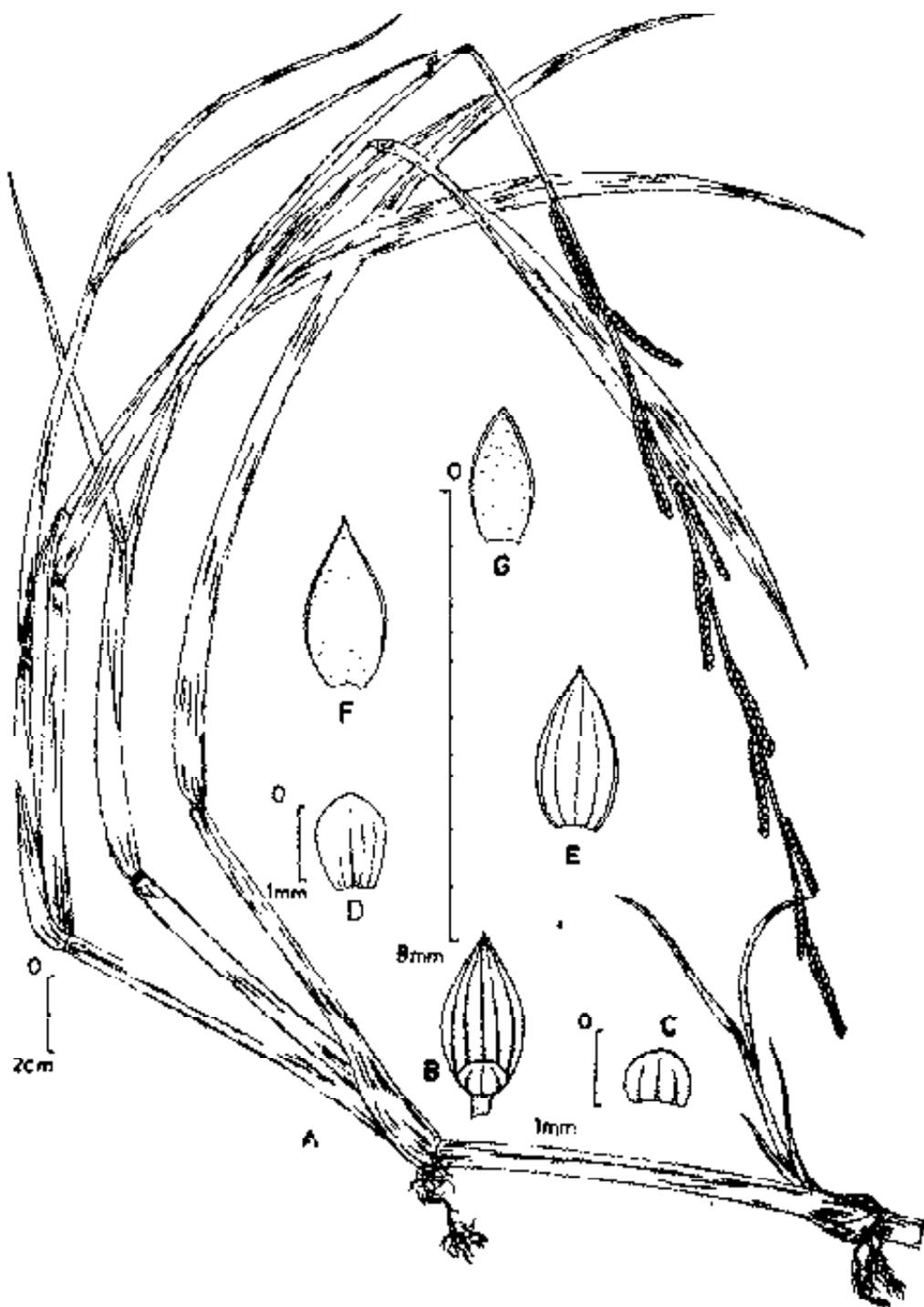


PLATE No. 58: *PASPALIDIUM PUNCTATUM* (Burm.) A. Camus
 A. Habit; B. Spikelet; C. Lower glume; D. Upper glume; E. First lemma;
 F. Second lemma; G. Palea of the second lemma.

A genus of about 260 species, throughout the tropics, of which about 12 species occur in India and 5 species and one variety in Kerala.

Key to the species

- 1a. Spikelets with a ciliate fringe from the margins of the upper glume:
- 2a. Racemes usually 2; spikelets 1-2 mm long; culms creeping, stoloniferous; pedicels without an appendage at the base *P. conjugatum* 3
- 2b. Racemes 3-8; spikelets 2-4 mm long; culms erect, not stoloniferous; pedicels with a scale-like appendage at the base *P. dilatatum* 4
- 1b. Spikelets without a ciliate fringe, rarely fimbriate with tubercle-based hairs, but then the leaves oblong-elliptic:
- 3a. Spikelets 1-2 mm long; culms slender; leaves ovate-oblong or oblong-elliptic:
- 4a. Margins of the upper glume and lower lemma fimbriate with tubercle-based hairs *P. canaræ* var. *fimbriatum* 2
- 4b. Margins of the upper glume and lower lemma not fimbriate, glabrous *P. canaræ* var. *canaræ* 1
- 3b. Spikelets 2-4 mm long; culms stouter; leaves lanceolate or linear:
- 5a. Spikelets obovate or orbicular, obtuse *P. scrobiculatum* 6
- 5b. Spikelets ovate-elliptic or lanceolate, acute *P. distichum* 5

1. *Paspalum canaræ* (Steud.) Veldk. in *Blumea* 21(1): 72. 1973, *Panicum canaræ* Steud. Syn. Pl. 1: 58. 1853. *Paspalum compactum* auct. non Roth, 1821; Hook. f. Fl. Brit. Ind. 7: 12. 1896; Fischer in Gamble, Fl. Pres. Madr. 1772. 1934 (Repr. ed. 3: 1228. 1957); Bor. var. *canaræ* Grass. Bur. Cey. Ind. Pak. 336. 1960.

Annuals. Culms 10-40 cm long, creeping or geniculate, rarely erect; nodes villous. Leaves ovate-elliptic, elliptic-lanceolate or lanceolate, acute or shortly acuminate, 1-5 x 0.3-1 cm, slightly cordate or decurrent at base, densely tubercle-based hairy. Sheaths covered with dense tubercle-based hairs. Ligules obscure. Racemes 3-15 in number, usually perpendicular to the axis, 0.5-2 cm long. Spikelets broadly elliptic or ovate-acute, 1-1.75 mm long. Pedicels 0.5-1 mm long, with a few glassy bristles. Lower glume absent. Upper floret bisexual. First lemma broadly ovate, acute, 1-1.75 x 1-1.5 mm, chartaceous, 5-nerved. Second lemma broadly ovate or orbicular,

1-1.25 x 1 mm, crustaceous, faintly 3-5-nerved. Palea ovate, c. 1 x 0.5-1 mm, crustaceous, 2-keeled, margins inflexed. Stamens 3, anthers 0.3-0.5 mm long. Pistil c. 1 mm long.

Occasional along marshy areas.

Fl. & Fr. : October-December.

Notes : This species is quite distinct because of its slender creeping culms, smaller ovate-elliptic leaves with decurrent bases and small, orbicular spikelets.

PALGHAT : Silent Valley.

2. *Paspalum canarae* (Steud.) Veldk. var. *fimbriatum* (Bor) Veldk. in *Blumea* 21: 72. 1973; Ramachandran et al. in *J. Econ. Tax. Bot.* 1: 95. 1980. *Paspalum compactum* auct. var. *fimbriatum* Bor, *Grass. Bur. Cey. Ind. Pak.* 336. 1960. PLATE No. 57

Annuals. Culms 10-30 cm long, creeping or erect; nodes villous. Leaves oblong-elliptic or elliptic-lanceolate, 1-5 x 0.2-1 cm, decurrent at base, glabrous or sparsely tubercle-based hairy. Sheaths sparsely villous with tubercle-based hairs. Ligules obscure. Racemes 3-16 in number, placed at about 60° angle to the axis, each 0.5-1.5 cm long; rachis winged, c. 0.5 mm wide, tubercled hairy. Spikelets ovate-acute or broadly elliptic, 1-2 x 1 mm, covered with dense tubercle-based hairs. Lower glume absent. Upper glume obovate, acute, 1-1.5 x 0.5-0.75 mm, chartaceous, 3-5-nerved, tubercle-based hairy. Lower floret barren. Upper floret bisexual. First lemma broadly ovate, acute, chartaceous, 5-nerved, tubercled hairy. Second lemma broadly ovate or orbicular, c. 1 x 0.75-1 mm, crustaceous, faintly 3-5-nerved. Palea ovate, c. 1 x 1 mm, crustaceous, 2-keeled. Stamens 3, anthers 0.25 mm long. Pistil 0.5-1 mm long.

Rare, along the marshes and wetlands.

Fl. & Fr. : November-December.

Notes : This very rare plant was earlier known only from Bombay. Recently Ramachandran et al. (*l.c.*) have reported its occurrence in Kerala.

WYNAD : Chandanathode.

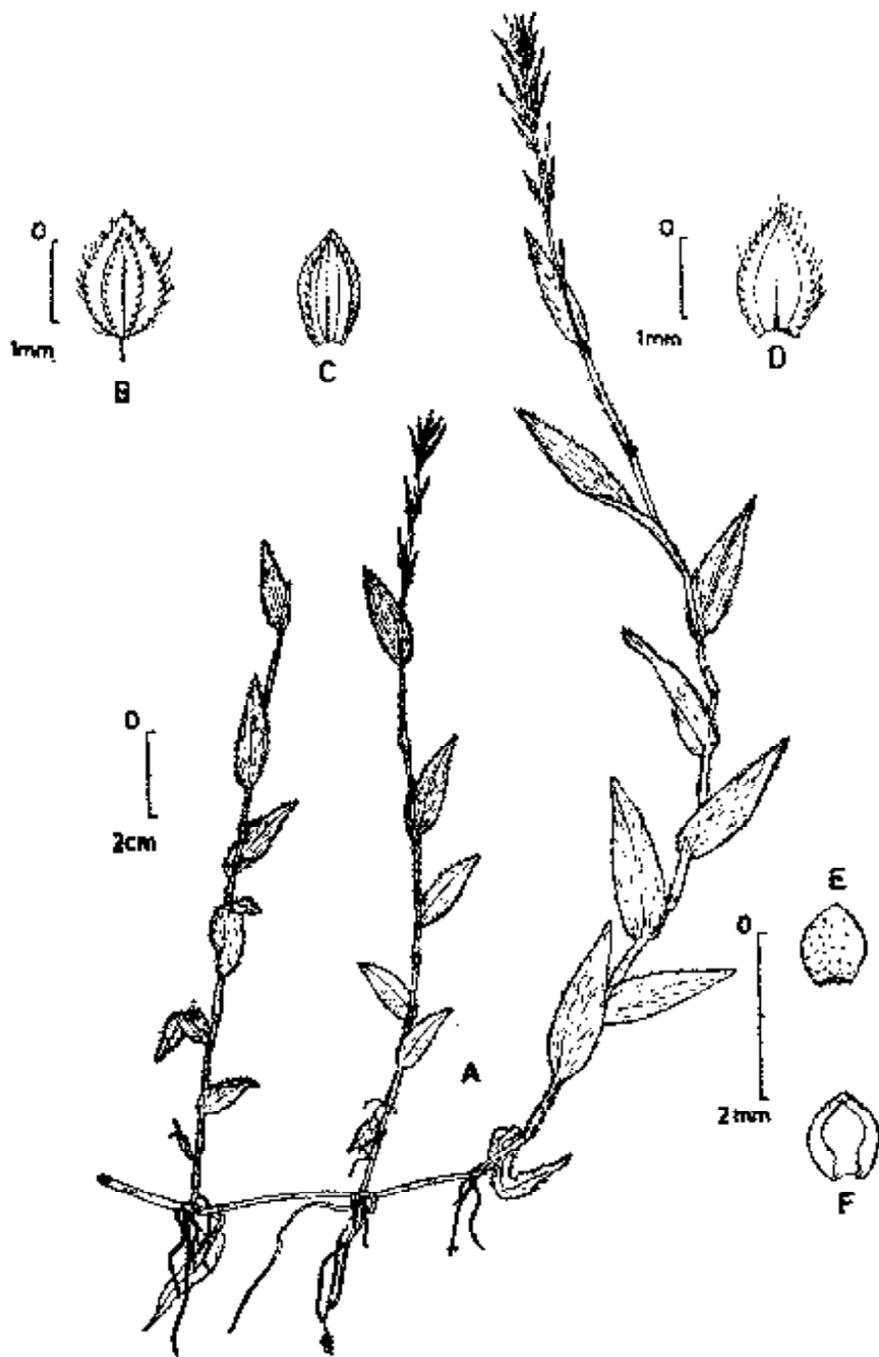


PLATE No. 57: *PASPALUM CANARAE* (Steud.) Veldk. var. *FIMBRIATUM* (Bor) Veldk.

A. Habit; B. Spikelet; C. Upper glume; D. First lemma; E. Second lemma; F. Palea of the second lemma.

3. *Paspalum conjugatum* Berg. in Act. Helv. Phys. Math. 7: 129. t. 8. 1772. Hook. f. Fl. Brit. Ind. 7: 11. 1896; Fischer in Gamble, Fl. Pres. Madr. 1772. 1934 (Repr. ed. 3: 1228. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 336. 1960; Manilal & Sivaraj. Fl. Calic. 337. 1982.

Perennials. Culms 30-100 cm long, creeping or stoloniferous, compressed, rooting at the nodes; nodes glabrous. Leaves lanceolate or linear-lanceolate, acuminate, 4-25 x 0.3-1.5 cm, rounded or narrowed and ciliate at base. Sheaths compressed, keeled, ciliate along one margin. Ligules membranous, narrow. Racemes 2, conjugate, very rarely 3, 4-15 cm long. Spikelets broadly elliptic or ovate, or orbicular acute, 1.25-2 mm long, greenish-yellow. Lower glume absent. Upper glume ovate or orbicular, 1-1.5 x 1 mm, membranous, 2-nerved, long ciliate along the margins. Lower floret barren. Upper floret bisexual. First lemma ovate or orbicular, 1-1.5 x 1 mm, membranous, 2-nerved. Second lemma ovate and acute or orbicular, 1-1.25 x 1 mm, crustaceous, 2-keeled. Stamens 3, anthers c. 0.5 mm long, deep yellow. Pistil c. 1 mm long; stigmas white.

Very common along the banks of backwaters, rivers and canals, in Tea and Rubber estates as an undergrowth and occasional along the margins of the forests; usually in moist, shady places.

Fl. & Fr. : Throughout the year.

Notes : This is a very common and distinct species of the genus, which can be easily distinguished by its conjugate racemes; during the opening stage the extreme ends of the two racemes remain together leaving the middle portion open. This grass can thrive well in shaded places.

ALLEPPEY: Alleppey, Ambalapuzha, Pallathuruthy, Punnamada, R. Block; CALICUT: Chedaleth; CANNANORE: Taliparamba; IDUKKI: Vandiperiyar; PALGHAT: Aruvampara estate, Attappadi R. F., Panthanhode, Silent Valley; PATHANAMTHITTA: Kulathupuzha, Pamba, Teenmala; TRIVANDRUM: Pulimath, Suryakanthi; WYNAD: Chandanethode, Cherambadi.

4. *Paspalum dilatatum* Poir. in Lam. Encycl. Meth. Bot. 5: 35. 1804; Fischer in Gamble, Fl. Pres. Madr. 1772. 1934 (Repr. ed. 3: 1228. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 338. 1960.

Perennials. Culms 30-70 cm high, erect, tufted or geniculate; nodes glabrous. Leaves lanceolate, linear-lanceolate or linear, 5-25 x 0.3-1 cm, acuminate, rounded or shallowly cordate at base. Sheaths slightly keeled. Ligules ovate, acute, membranous. Racemes 3-8, alternate, villous at the nodes, each 1-8 cm long. Spikelets broadly ovate, acute, 2-4 mm long, greenish-yellow. Pedicels 0.5-1 mm long, with a rudimentary scale-like spikelet at the base. Lower glume absent. Upper glume broadly ovate, acute, 2-4 x 2 mm, chartaceous, 7-nerved, ciliate along the margins, softly villous. Lower floret barren. Upper floret bisexual. First lemma similar to the upper glume, but not ciliate. Second lemma orbicular, 2-2.5 x 1.5-2 mm, crustaceous, faintly 5-7-nerved. Palea orbicular or ovate, 2-2.5 x 1.5-2 mm, crustaceous, 2-keeled, margins inflexed and auriculate at base. Stamens 3, anthers c. 1 mm long. Ovary oblong, 0.25-0.5 mm long; styles 0.5-1 mm long; stigmas 1-1.5 mm long, violet or brown.

Frequent as a weed in tea estates, in shades at higher elevations.

Fl. & Fr. : June - August.

Notes : This valuable introduced forage grass, is a native of South America and has established very well in most of the hill stations. 'Golden Crown Grass' or 'Dallis Grass' or 'Caterpillar Grass'

IDUKKI : Devicolam, Vegavurrai estate.

5. *Paspalum distichum* Linn. Syst. Nat. ed. 10. 2: 855. 1759; Hook. f. Fl. Brit. Ind. 7: 12. 1896; Bor, Grass. Bur. Cey. Ind. Pak. 338. 1960; Brummitt in Taxon 32 (2): 281. 1983. *Paspalum paspaloides* (Michx.) Scribn. in Mem. Torr. Bot. Club. 5: 29. 1894; Manilal & Sivraj. Fl. Calic. 337. 1982. *Digitaria paspaloides* Michx. Fl. Borr. Amer. 1: 46. 1803.

Annuals or perennials. Culms 10-90 cm long, creeping and rooting at the nodes, floating or rarely erect, stoloniferous; nodes glabrous. Leaves lanceolate, linear-lanceolate or linear, acuminate, 1-20 x 0.1-0.8 cm, rounded or shallowly cordate at base. Ligules ovate, membranous. Racemes 2 or rarely 3, 1-8 cm long. Spikelets ovate-elliptic, elliptic or elliptic-lanceolate, 2.5-4 mm long, softly hairy or glabrous. Lower glume absent or a subulate scale, 0.25-0.5 mm long. Upper glume broadly ovate-acute or elliptic-lanceolate, 2.5-3.5 x 1-2 mm, chartaceous, 5-9-nerved, softly hairy or glabrous. Lower floret barren. Upper floret bisexual. First lemma ovate-acute or elliptic-lanceolate, chartaceous, 5-7-nerved. Upper

lemma ovate-oblong or oblong-elliptic, acute, 2-2.5 x 1-1.5 mm, crustaceous, faintly 5-7-nerved. Palea ovate-oblong or oblong, 2-2.5 x 1-1.5 mm, acute, crustaceous, 2-keeled, margins inflexed. Stamens 3, anthers 1-1.5 mm long, pale yellow or violet with white connectives. Ovary oblong, c. 0.5 mm long; styles 0.5-1 mm long; stigmas 0.5-1 mm, reddish-brown or pink.

Very common along the banks of backwaters, streams and canals, as a weed in paddy fields, frequent in fallow fields and salt marshes, near the beach or on tidal flats.

Fl. & Fr. : May-December.

ALLEPPEY : Mancombu, Pallathuruthy; ERNAKULAM : Cochin; IDUKKI : Munnar; KOTTAYAM : Kottayam; QUILON : Ayiranthengu; TRIVANDRUM : Kovalam, Veli.

6. *Paspalum scrobiculatum* Linn. Mant. Pl. 1: 29. 1767; Hook. f. Fl. Brit. Ind. 7: 10. 1896; Rang. & Tad. Handb. S. Ind. Grass. 49. t. 69-70. 1921; Fischer in Gamble, Fl. Pres. Madr. 1772. 1934 (Repr. ed. 3: 1227. 1957); Bor. Grass. Bur. Cey. Ind. Pak. 340. 1960; W. D. Clayton in Kew Bull. 30(1): 101. 1975; Cope in Nasir & Ali, Fl. Pak. 143: 213. 1982; Manilal & Sivaraj. Fl. Calic. 337. 1982. *P. orbiculare* Forst. Fl. Ins. Aust. Prodr. 7. 1786; Fischer in Gamble, Fl. Pres. Madr. 1772. 1934 (Repr. ed. 3: 1227. 1957); Bor. Grass. Bur. Cey. Ind. Pak. 340. 1960. *P. commersonii* Lam. Tab. Encycl. 1: 176. t. 43/1. 1791; Bor. Grass. Bur. Cey. Ind. Pak. 335. t. 38. 1960.

Annuals or perennials. Culms 10-100 cm high, densely tufted and erect or creeping and rooting at the lower nodes, rarely trailing or geniculate; nodes glabrous. Leaves lanceolate, linear-lanceolate or linear, 2-40 x 0.2-1.2 cm, acute, or acuminate, rounded or shallowly cordate at base, midrib prominent. Sheaths slightly keeled. Ligules membranous, narrow, fimbriate or not. Racemes usually 2, rarely 3 or 4, 1-10 cm long; rachis flat. Spikelets ovate, obovate or orbicular, 2-3 mm long. Pedicels 0.5-1 mm long. Lower glume absent. Upper glume ovate or orbicular, 2-3 x 1.5-2 mm, membranous, 3-5-nerved. Lower floret barren. Upper floret bisexual. First lemma ovate or orbicular, 2-3 x 1.5-2 mm, membranous, 3-nerved. Second lemma ovate, 2-2.5 x 1-1.5 mm, crustaceous, faintly 3-7-nerved. Palea ovate-oblong or orbicular, 1.5-2 x 1-1.5 mm, crustaceous, inflexed. Stamens 3, anthers, 0.5-1 mm long, yellow

or brownish. Ovary c. 0.5 mm long; styles 0.5-1 mm long; stigmas 0.5-1 mm long, cream yellow, reddish-brown or violet.

Very common along the bunds of fields, wetlands puddies and other water-logged areas, along the roadsides, sometimes cultivated.

Fl. & Fr. : Throughout the year.

Notes : This is a highly polymorphic species, which exhibits considerable variation in the habit and habitat. Annual or perennial nature of this grass is a quite unreliable character to segregate *P. scrobiculatum*, *P. commersonii* or *P. orbiculare*. Similarly, a supposed difference in the nervation of the lower lemmas is also quite unhelpful. According to Clayton (*J.C.*) there seems to be no reliable character for distinguishing *P. orbiculare* and *P. commersonii* from the complex and hence are to be merged under *P. scrobiculatum*.

In all districts.

16. PENNISSETUM L. C. Rich.

L. C. Rich, in Pres. Syn. Pl. 1: 72. 1805; Hook. f. Fl. Brit. Ind. 7: 82. 1896, p.p.; Fischer in Gamble, Fl. Pres. Madr. 1792, 1934 (Repr. ed. 3: 1240. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 341, 1960.

A genus of about 75 species distributed in the tropics and subtropics, of which about 16 species occur in India and 5 in Kerala.

Key to the species

- 1a. Lemmas similar, lower not 3-lobed; rachis without winged ribs:
 - 2a. Anthers panicillate; culms pubescent below the inflorescence; bristles glabrous *P. purpureum* 5
 - 2b. Anthers not panicillate; culms glabrous below the inflorescence; bristles glabrous or ciliate:
 - 3a. Bristles glabrous; involucre enclosing a sessile spikelet, 6-8 mm long; rachis glabrous *P. hohenackeri* 1
 - 3b. Bristles, atleast inner ones ciliate; involucre enclosing 2-3 spikelets, 4-6 mm long; rachis pubescent *P. orientale* 2
- 1b. Lemmas dissimilar, lower of 3-lobed; rachis with prominently winged ribs:

- 4a. Spikelets pedicelled, solitary or in a group of 2-5 in an involucre, 4-6 mm long; bristles densely woolly plumose *P. pedicellatum* 3
- 4b. Spikelets sessile, solitary in an involucre, 3-4 mm long; inner bristles plumose, but not woolly *P. polystachyon* 4

1. ***Pennisetum hohoenackeri*** Hochst. ex Steud. Syn. Pl. Glum. 1: 102. 1854; Fischer in Gamble, Fl. Pres. Madr. 1792, 1934 (Repr. ed. 3: 1241, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 344. 1960. *P. alopecuroides* Nees ex Steud. Syn. Pl. Glum. 1: 102. 1854; Hook. f. Fl. Brit. Ind. 7: 84. 1896; Rang. & Tad. Handb. S. Ind. Grass. 114. t. 113. 1921.

Perennials. Culms 30-150 cm high, erect, densely tufted; nodes glabrous. Leaves narrowly linear, acuminate, 10-60 x 0.2-0.8 cm, narrow or rounded at base, convolute, glaucous, glabrous or sparsely pilose. Sheaths keeled, distichous. Ligules row of hairs. Panicles spiciform, 5-25 cm long, involucre enclosing one sessile spikelet bristles glabrous or scaberulous, 3-20 cm long. Spikelet elliptic-lanceolate or lanceolate, 6-8 mm long. Lower glume ovate, obovate or sub-orbicular, 1-1.5x1 mm, membranous, faintly 0-3-nerved. Upper glume ovate-lanceolate, 4-5 x 1-1.5 mm, chartaceous, 5-7-nerved. Lower floret male or barren, epaleate. Upper floret bisexual. First lemma ovate-lanceolate, 6-8 x 2-3 mm, chartaceous, 9-13-nerved. Second lemma ovate-lanceolate, 6-8 x 1.5-2 mm, acuminate, chartaceous, 5-7-nerved. Palea lanceolate, 6-8 x 1-1.5 mm, acuminate, chartaceous, 2-keeled, 2-nerved. Stamens 3, anthers 3-4 mm long, yellow; ovary oblong, 0.5-1 mm long; styles 2 mm long; stigmas 3-4 mm long.

Occasional along the banks of streams, backwaters and other water-courses, along the bunds of paddy fields and on river-beds; often found in association with *Dichanthium caricosum*.

Fl. & Fr. : February-August.

Notes : This uncommon grass can be distinguished from the other species of the genus *Pennisetum* by its peculiar tough culms with convolute, glaucous leaves and distichous sheaths, and almost glabrous involucre bristles. The densely tufted and extremely tough culms of this grass form large tussocks with tough roots. This grass can well be used as a very good sand binder.

CALICUT: Chedalet; WYNAD: Tirunalli.

2. *Pennisetum orientale* L.C. Rich. in Pers. Syn. Pl. 1: 72. 1805; Hook. f. Fl. Brit. Ind. 7: 86. 1896; Bor, Grass. Bur. Cey. Ind. Pak. 345. 1960; V. J. Nair et al. in J. Econ. Tax. Bot. 3: 271. 1982.

Perennials. Culms 50-100 cm high, rhizomatous, erect or ascending; nodes glabrous. Leaves linear, 10-50 x 0.3-1 cm, acuminate, flat or convolute, glabrous or hispid. Sheaths bearded at mouth. Ligules row of hairs. Panicles spiciform, interrupted, 10-25 cm long, cream-yellow. Rachis scaberulous or pubescent. Involucre enclosing 1-3 spikelets, one sessile and the other shortly pedicelled; bristles, atleast the inner plumose, 10-30 mm long. Spikelets lanceolate, 4-6 mm long, cream-yellow. Lower glume oblong-lanceolate, 1.5-2 x 0.5-0.75 mm, chartaceous, 0-1-nerved. Upper glume lanceolate, 4-5 x 1-1.5 mm, acuminate or aristate, chartaceous, 1-3-nerved. Lower floret male or barren. Upper floret bisexual. First lemma oblong-lanceolate, setaceously acuminate, 5-6 x 1.5-2 mm, chartaceous, 5-nerved. Palea elliptic-lanceolate, 4-5 x 1-1.5 mm, chartaceous, 2-keeled, 2-nerved. Stamens 3, anthers c. 2 mm long, yellow. Second lemma elliptic-lanceolate, acuminate, 5-6 x 1.5-2 mm, subcoriaceous, 5-nerved. Palea elliptic-lanceolate, notched, 5-6 x 1.5-2 mm, subcoriaceous, 2-keeled, 2-nerved. Stamens 3; anthers 2-3 mm long, yellow. Ovary 0.25-0.5 mm long; styles 2-3 mm long; stigmas 2-3 mm long.

Rare; introduced and running wild.

Fl. & Fr. : March-October.

Notes : May be an escape from the University Botanic Garden. It is an important fodder grass and is also a good soil binder.

TRIVANDRUM : Kariavattom.

3. *Pennisetum pedicellatum* Trin. in Mem. Acad. Sci. Petersb. ser. 6, 3: 184. 1834; Hook. f. Fl. Brit. Ind. 7: 86. 1896; Fischer in Gamble, Fl. Pres. Madr. 1792, 1934 (Repr. ed. 3: 1241. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 346. 1960.

Annuals. Culms 30-150 cm high, tufted, erect, nodes glabrous. Leaves linear-lanceolate, acuminate, 5-25 x 0.3-1 cm, rounded at base, tubercle-based hairy or glabrous. Sheaths slightly keeled, sparsely tubercle-based hairy. Ligules membranous, fimbriate. Panicles spiciform, interrupted, 5-15 cm long, fluffy-white or purplish. Rha-

chis puberulous. Involucre enclosing 1-5 spikelets, atleast one of them pedicelled, pedicels 1-3 mm long, villous; bristles densely woolly plumose, 0.5-2.5 cm long. Spikelets lanceolate, 4-6 mm long. Lower glume ovate-lanceolate, 1.5-2 x 0.5-1 mm, hyaline, faintly 1-3-nerved, silky villous. Upper glume ovate-lanceolate, 2-3 x 1-1.5 mm, hyaline, faintly 5-nerved, silky villous. Lower floret male or barren. Upper floret bisexual. First lemma ovate, 3-4 x 1-1.5 mm, 3-lobed at apex, hyaline, faintly 5-nerved, teeth ciliolate. Palea minute, hyaline. Stamens 3, anthers 1-1.5 mm long, yellow. Second lemma elliptic, 2-2.5 x 1-1.5 mm, coriaceous, shining, faintly 5-nerved. Palea elliptic, 2-2.5 x 1 mm, coriaceous, 2-keeled. Stamens 3, anthers c. 2 mm long. Ovary oblong, 0.25-0.5 mm; styles 1-2 mm long; stigmas 2-3 mm long, cream-yellow.

Occasional along grassy hill-slopes, roadsides, water-courses and in scrub-jungles.

Fl. & Fr. : September-December.

Notes : *P. pedicellatum* can be distinguished from all other species of the genus by its fluffy-white or purplish panicles, densely woolly plumose involucreal bristles and pedicelled spikelets. This species is similar to *P. polystachyon* but differs by the same characters mentioned above. The specimens collected from Kerala show a gradation of variation in the hairiness of the rachis and in the size of the lemmas and paleas of the upper florets. Here the lemmas and paleas are much shorter in comparison to the specimens examined from elsewhere.

KASARAGOD: Kasaragod; PALGHAT: Silent Valley; TRICHUR: Adirapally; TRIVANDRUM: Vellayani.

4. *Pennisetum polystachyon* (Linn.) Schult. *Syt. Veg. Mant.* 2: 146. 1824; Fischer in Gamble, *Fl. Pres. Madr.* 1792. 1934 (Repr. ed. 3: 1241. 1957); Bor, *Grass. Bur. Cey. Ind. Pak.* 346, t. 39. 1960; Manilal & Sivaraj, *Fl. Calic.* 340. 1982. *Panicum polystachyon* Linn. *Syst. Nat.* ed. 10. 2: 870. 1759. *Pennisetum setosum* (Sw.) L. C. Rich. in Pers. *Syn. Pl.* 1: 72. 1806; Hook. f. *Fl. Brit. Ind.* 7: 87. 1896. *Cenchrus setosus* Sw. *Prodr. Veg. Ind. Occ.* 26. 1788.

Annuals or perennials. Culms 50-200 cm high, densely tufted, erect; nodes glabrous. Leaves lanceolate or linear-lanceolate, 5-30 x 0.3-1.5 cm, rounded or shallowly cordate at base, tubercle-based hairy or glabrous. Sheaths keeled, tubercle-based hairy, villous at mouth. Ligules membranous, fimbriate. Panicles spiciform, 8-20 cm long, cream-yellow or purplish. Rhachis angular with sharp-edged decurrent wings, glabrous. Involucre enclosing one sessile spikelet; bristles, atleast the inner ones plumose in the lower half. Spikelets lanceolate, 3-4 mm long. Lower glume ovate-acute, 0.5-1 mm long, chartaceous. Upper glume ovate-lanceolate, 3-3.5 x 1-1.5 mm, chartaceous, 5-7-nerved. Lower floret male or barren. Upper floret bisexual. First lemma ovate-lanceolate, 3-3.5 x 1-1.5 mm, chartaceous, 5-7-nerved. Palea short, hyaline. Second lemma oblong-acute, 2-3x1 mm, coriaceous, faintly 3-5-nerved. Palea oblong or ovate-oblong, acute, c. 2 x 1 mm, coriaceous, slightly 2-keeled. Stamens 3, anthers 1.1-5 mm long, yellow. Ovary oblong, c. 0.5-1 mm long; stigmas 1-2 mm long, golden-yellow.

Very common along the secondary forests, roadsides, waste-places, scrub jungles and in cleared forest patches; often associated with *Cymbopogon flexuosus* and *Themeda cymbaria*.

Fl. & Fr. : Throughout the year.

Notes : The occurrence of this grass in a forest is an indication of secondary formation. This is a very good fodder. It shows much variation in the habit and also in the colour of panicles. It differs from other species of *Pennisetum* by having an angular rhachis with sharp decurrent wings below the scars of the fallen involucre.

CANNANORE: Aralam, Beckal, Taliparamba; ERNAKULAM: Cochin; (DUKKI: Peermade, Puffucara; PALGHAT: Aruvampara; Walayar; PATHANAMTHITTA: Ranni R.F.; QUILON: Paravur; TRICHUR: ChalaKkudi; TRIVANDRUM: Kariavattom; WYNAD: Chandanathode, Mananthoddy.

5. *Pennisetum purpureum* Schum. Beskr. Guin. Pl. 44. 1827; Bor, Grass. Bur. Cey. Ind. Pak. 348. 1960.

Perennials. Culms 50-250 cm high, erect, tufted, rarely decumbent from a creeping rhizome; nodes sparsely bearded. Leaves linear or linear-lanceolate, acuminate, 20-80 x 0.5-2.5 cm, rounded at base, dull green or glaucous. Sheaths slightly keeled, glabrous or tubercle-based hairy towards tip. Ligules membranous, thin, fimbriate. Pani-

cles spiciform, compact, 15-25 cm long yellow, or purplish-black, villous or puberulous at base. Rhachis densely pubescent. Involucre subsessile enclosing 1-4, sessile or pedicelled spikelets; bristles 4-18 mm long, almost glabrous. Spikelets lanceolate, 5-8 mm long. Lower glume ovate-acute, c. 0.5 mm long, rudimentary or scaly or absent. Upper glume ovate-lanceolate, or lanceolate, 1-2 x 0.5-1 mm, chartaceous, faintly 1-3-nerved. Lower floret male or barren. Upper floret bisexual. First lemma ovate-lanceolate or lanceolate, 4-5 x 1-2 mm, acuminate, chartaceous, 3-5-nerved. Palea lanceolate, 3-4 x 1-1.5 mm, acuminate, delicate, 2-keeled, 2-nerved, scabrid along the keels. Second lemma ovate-lanceolate, 5-6 x 1.5-2 mm, coriaceous, faintly 5-nerved. Palea lanceolate, 4-5 x 1 mm, acuminate, subcoriaceous, slightly 2-keeled, faintly 2-nerved. Stamens 2 or 3; anthers 2-3 mm long, penicillate at tip, dirty-yellow or purplish. Stigmas 2-4 mm long, cream-yellow.

Occasional along the banks of rivers, streams and backwaters.

Notes : The 'Napier Grass' is a native of Tropical Africa, but now introduced into many tropical countries including India as a valuable fodder grass. Like *Themeda cymbaria* this species is also commonly known as 'Elephant Grass'

This tall reed-like grass looks like some species of *Saccharum* in juvenile stages. *Pennisetum purpureum* can be easily distinguished from all other species of the genus by having almost glabrous involucreal bristles, pubescent rhachis as well as the portion below the inflorescence of the culms and penicillate anthers. This grass is often cultivated, and occasionally runs wild.

ALLEPPEY : Pallathuruthy; KASARAGOD : Kasaragod.

17. PSEUDECHINOLAENA (Hook. f.) Stapf

Stapf in Prain, Fl. Trop. Afr. 9: 494, 1919; Fischer in Gamble, Fl. Pres. Madr. 1766, 1934 (Repr. ed. 3: 1223, 1957); Bor. Grass, Bur. Cey. Ind. Pak. 352, 1960. *Panicum* Linn. sect. *Pseudechinolaena* Hook. f. Fl. Brit. Ind. 7: 28, 1896.

A monotypic genus distributed mainly in the tropics.

Pseudechinolaena polystachya (H. B. K.) Stapf in Prain, Fl. Trop. Afr. 9: 495, 1919; Fischer in Gamble, Fl. Pres. Madr. 1766 1934 (Repr. ed. 3: 1223, 1957); Bor.

Grass. Bur, Cey, Ind, Pak. 352. 1960. *Echinoalaena polystachya* H.B.K. Nov. Gen. et Sp. 1: 119. 1816; *Panicum uncinatum* Raddi, Agrost. Bras, 41. 1823; Hook. f. Fl. Brit. Ind, 7: 58. 1896. PLATE No. 58

Annuals or perennials. Culms 15-80 cm long, creeping or decumbent, rooting at the lower nodes; nodes glabrous or softly bearded. Leaves oblong-lanceolate, elliptic or elliptic-lanceolate, 1-8 x 0.5-1.5 cm, acute or acuminate, cuneate at base, softly villous or glabrous, margins scarious. Ligules truncate or lacerate, membranous. Panicles 5-25 cm long, of 4-8 racemes, each 1-6 cm long with slender, triquetrous rachis. Spikelets ovate-lanceolate, elliptic or elliptic-lanceolate, slightly gibbous, 3-5 x 1-2.5 mm, pedicelled, glistening in dew. Lower glume ovate-lanceolate, 3-5 x 1.5-2.5 mm, acuminate, chartaceous-3-5-nerved, margins scarious. Upper glume boat-shaped or ovate-lanceolate when spread, 3-5 x 1.5-2 mm, chartaceous, 7-nerved, scabrid on dorsal side with retrorsely hooked hairs from glandular bases. Lower floret empty or male with rudimentary stamens. Upper floret bisexual. First lemma boat-shaped or ovate, 3-4 x 1.5-2.5 mm, chartaceous, faintly 5-7-nerved. Palea oblong-lanceolate or linear, 3-4 x 0.5-1 mm, acuminate, 2-keeled, faintly 2-nerved. Second lemma ovate-lanceolate, 2-3 x 1.5-2 mm, crustaceous or subcoriaceous, faintly 3-5-nerved. Palea ovate-lanceolate, 2-3 x 1-1.5 mm, crustaceous, faintly 2-nerved. Stamens 3, anthers 1-2 mm long, cream-yellow. Ovary elliptic, 0.5-1 mm; styles 0.5-1 mm long; stigmas 1-1.5 mm long, white.

Frequent along the margins of the forests, in scrub jungles, usually in shades.

Fl. & Fr. : Throughout the year.

Notes : This true forest grass grows gregariously in secondary forests and form thick masses. The spikelets here are glandular and glistening in sunlight. The glumes are often bristly, but rarely glabrous and smooth. This creeping species do have stilt roots at the nodes.

CALICUT: Chedaleth; **IDUKKI**: Pachakkanam, Peermade; **PALGHAT**: Silent Valley; **PATHANAMTHITTA**: Karimela, Pampa; **TRIVANDRUM**: on way to Bramore Estate; **WYNAD**: Chandanathode, Vayitri.

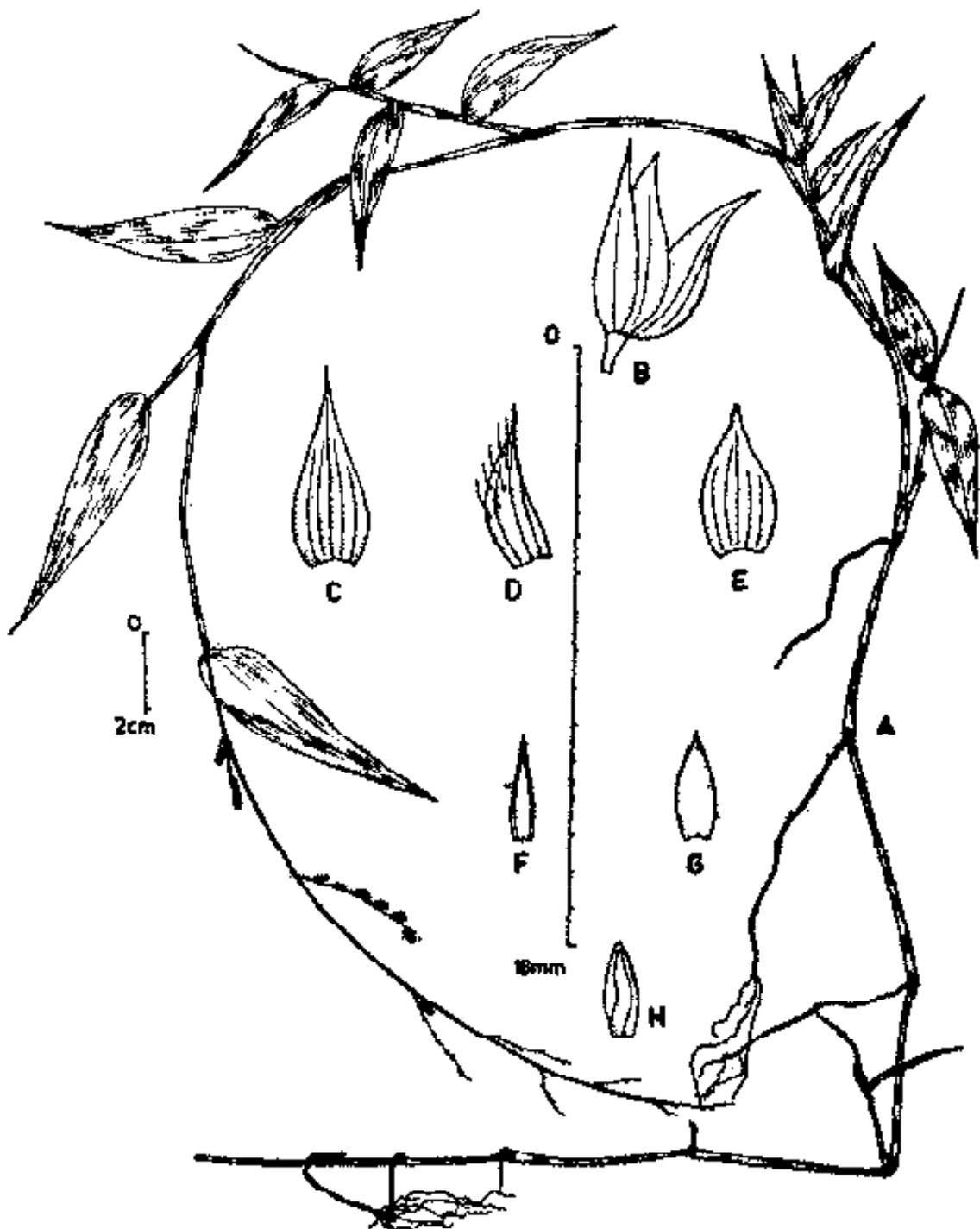


PLATE No. 58 : *PSEUDECHINOLAENA POLYTACHYA* (H. B. K.) Stapf
 A. Habit; B. Spikelet; C. Lower glume; D. Upper glume; E. First lemma;
 F. Palea of the first lemma; G. Second lemma; H. Palea of the second
 lemma.

18. PSEUDORAPHIS Griff.

Griff. Notulae 3: 29, 30, 1851; Fischer in Gamble, Fl. Pres. Madr. 1789, 1934 (Repr. ed. 3: 1239, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 352, 1960. *Chamaeraphis* auct. non R. Br. 1810; Hook. f. Fl. Brit. Ind. 7: 62, 1896, p.p.

A genus of about 5 species distributed in the tropics, of which 3 occur in India and one in Kerala.

Pseudoraphis spinescens (R. Br.) Vickery in Proc. Roy. Soc. Queensl. 62, n. 7, 69, 1952; Bor, Grass. Bur. Cey. Ind. Pak. 353, 1960. *Panicum spinescens* R. Br. Prodr. 193, 1810. *Pseudoraphis aspera* (Koen.) Pilger in Notizbl. Bot. Gard. Berlin 10: 210, 1928; Fischer in Gamble, Fl. Pres. Madr. 1790, 1934 (Repr. ed. 3: 1239, 1957); *Panicum asperum* Koen. in Naturforscher 23: 209, 1788. *Chamaeraphis spinescens* (R. Br.) Poir. in Lam. Encycl. Meth. Bot. Suppl. 2: 189, 1811; Hook. f. Fl. Brit. Ind. 7: 62, 1896; Rang. & Tad. Handb. S. Ind. Grass, 102, t. 104, 1921.

Annuals or perennials. Culms 30-100 cm long, softly villous. Leaves lanceolate or linear-lanceolate, 1-10 x 0.1-0.8 cm, acuminate, rounded or shallowly cordate at base, tubercle-based hairy, glaucous. Sheaths strongly keeled. Ligules truncate, membranous. Inflorescence pyramidal, 3-15 cm long; branches produced into bristles, triquetrous, 4-15 mm long, scabrid. Spikelets narrowly lanceolate, 4-8 mm long. Lower glume ovate, truncate or rounded 0.5-1 x 0.5-1 mm, membranous, faintly 3-nerved. Upper glume lanceolate, 4-8 x 1-1.5 mm, acuminate, chartaceous, 11-13-nerved, scabrid or glabrous. Lower floret male. Upper floret female or bisexual. First lemma lanceolate, 4-6 x 1-1.5 mm, chartaceous, 11-13-nerved. Palea lanceolate or elliptic-lanceolate, 2-4 x 0.5-1 mm, delicate, hyaline, 2-keeled, 2-nerved. Stamens 3, anthers 1-2 mm long, deep violet. Second lemma oblong, 1.5-3 x 0.5-1 mm, acute, chartaceous, shining, faintly 3-nerved. Palea oblong-lanceolate, 1-2 x 0.5-1 mm, hyaline. Stamens rudimentary or absent. Ovary oblong, c. 0.5 mm long; styles 0.5-1 mm long; stigmas 1.5-2 mm long, pinkish.

Frequent along ponds, marshes, shallow stagnant waters, usually creeping and rooting on the muddy surfaces or floating or submerged in shallow streams and rivers.

Rhynchelytrum repens (Willd.) C. E. Hubb. in Kew Bull. 1934: 110. 1934: Bor. Grass. Bur. Cey. Ind. Pak. 335. 1960; Cope in Nasir & Ali, Fl. Pak. 143, 176. 1982. *Saccharum repens* Willd. Sp. Pl. ed. 4. 1(1): 322. 1798. *Rhynchelytrum villosum* (Parl.) Chiov. in Annuar. R. Inst. Bot. Roma 8: 310. 1908; Fischer in Gamble, Fl. Pres. Madr. 1791. 1934 (Repr. ed. 3: 1240. 1957); Bor. I.C. *Monachyron villosum* Parl. in Hook. Niger Fl. 191. 1841. *Tricholaena wightii* in Linnaea 16: 218. 1842; Hook. f. Fl. Brit. Ind. 7: 65. 1896.

Annuals or perennials. Culms 20-100 cm high, erect or willowy, tufted; nodes softly villous or glabrous. Leaves lanceolate or linear, 2-20 x 0.1-0.8 cm, glabrous or pubescent. Sheaths glabrous or tubercle-based hairy. Ligules row of hairs. Panicles rhomboid or pyramidal, 4-20 cm long, silvery-white, purple or reddish-brown. Pedicels pilose at the tip. Spikelets ovate or oblong, 3-8 mm long, villous. Lower glume oblong, 1-1.5 x 0.5 mm, emarginate, chartaceous, 1-nerved, separated from the upper glume by an internode 0.25-1.25 mm long. Upper glume gibbous, boat-shaped or ovate-lanceolate when spread, 3-6 x 1.5-2.5 mm, keeled, emarginate, mucronate or aristate, subcoriaceous or chartaceous, 5-nerved, densely villous, aristate, 3-6 mm long. Lower floret male or barren. Upper floret bisexual. First lemma boat-shaped or ovate-lanceolate, 3-6 x 1.5-2.5 mm, emarginate, aristate, subcoriaceous, 5-nerved, arista 3-8 mm long. Palea elliptic or elliptic-lanceolate, 3-5 x 1-1.5 mm, hyaline, 2-keeled, 2-nerved, keels ciliate. Second lemma ovate-oblong or oblong-elliptic, 2-3 x 1.5-2 mm, coriaceous, shining, faintly 5-nerved. Palea elliptic, 2-2.5 x 1 mm, coriaceous, 2-keeled, shining. Stamens 3, anthers 1.5-2 mm long, deep dirty yellow. Ovary oblong, c. 0.6 mm long; styles 0.5-1 mm long; stigmas 1-1.5 mm long, golden-yellow to brownish.

Frequent, along dry rocky hill-slopes, roadsides, grasslands and rare along the forest margins as secondary formation, usually in dry habitats.

Fl. & Fr.: March-August.

Notes: This grass can be easily distinguished from the other grasses by its peculiar feathery white or pink-coloured, shining panicles. The colour and indumentum of the spikelets vary considerably. According to Cope (I.C.) *R. repens* is a polymorphic species with considerable variation in the size, indumentum and colouring of the spikelets,

and in the habit of the plant. Similarly the length of internodes between the glumes also varies. The key characters given by Bor (*l.c.*) to separate *R. repens* from *R. villosum* are quite overlapping and ambiguous; and it is very difficult to segregate them.

ERNAKULAM: Bhuthathankettu; IDUKKI: Mankulam, Pattumudi, Rajamudi; PATHANAMTHITTA: Pampa; QUILON: Thenmala; TRIVANDRUM: Boneccord, Kariavattom, Klamala R.F., Thakarampamba.

20. SACCIOLEPIS Nash

Nash in Britton. Man. Fl. N. Stat. Canada 89. 1901; Fischer in Gamble, Fl. Pres. Madr. 1786. 1934 (Repr. ed. 3: 1237. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 356. 1960; *Panicum* Linn Sect. *Hymenachne* Hook. f. Fl. Brit. Ind. 7: 39. 1896, p. p.

A genus of about 30 species distributed in the tropics of which 4 species occur in India and 3 in Kerala.

Key to the species

- 1a. Culms spongy and floating below; spikelets 3-5 mm long; panicles interrupted
S. interrupta 2
- 1b. Culms never spongy and floating; spikelets 1-3 mm long; panicles not interrupted:
 - 2a. Panicles up to 10 cm long; spikelets elliptic or lanceolate, acute, 2-3 mm long; leaves up to 20 cm long
S. indica 1
 - 2b. Panicles up to 35 cm long; spikelets subglobose, obtuse, 1-2 mm long; leaves up to 40 cm long
S. mysuroides 3

1. *Sacciolepis indica* (Linn.) A. Chase in Proc. Biol. Soc. Wash. 21: 8. 1908; Fischer in Gamble, Fl. Pres. Madr. 1787. 1934 (Repr. ed. 3: 1238. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 357. 1960; Manilal & Sivaraj, Fl. Calic. 341. 1982; *Aira indica* Linn. Sp. Pl. 1753, in errata, *Panicum indicum* Linn. Mant. Pl. 2: 184. 1771, non Mill. 1768; Hook. f. Fl. Brit. Ind. 7: 41. 1896.

Annuals. Culms 5-100 cm high, tufted, slender, erect or ascending; nodes glabrous. Leaves lanceolate, linear-lanceolate or linear, 0.5-20 x 0.1-0.5 cm, narrow, rounded or shallowly cordate at base,

midrib prominent. Sheaths slightly keeled. Ligules membranous, rounded or truncate, shortly fimbriate. Panicles spiciform, 0.5-8 cm long. Spikelets ovate-acute, elliptic or elliptic-lanceolate slightly gibbous, 2-3 mm long. Lower glume ovate-acute, 0.5-1.5 x 0.25-0.75 mm, chartaceous, 3-5-nerved. Upper glume ovate-oblong, 1.5-3 x 0.5-1 mm, acute, chartaceous, 5-11-nerved, setose or glabrous. Lower floret male or barren. Upper floret bisexual. First lemma ovate-lanceolate, 1-3 x 0.5-1 mm, chartaceous, 5-11-nerved, setose or glabrous. Palea a minute scale or absent. Second lemma oblong-acute, 0.5-1 x 0.25-0.5 mm, coriaceous, shining. Palea oblong-acute, 0.5-1 x 0.25-0.5 mm, coriaceous, shining, margins inflexed. Stamens 3, anthers c. 0.5 mm long, deep violet. Stigmas c. 1 mm long, violet.

Very common in wetlands, marshes, moist sandy soils, along the banks of backwaters and bunds of paddy fields, as a weed in tapioca plots and rubber plantations; usually in moist, shady habitats.

Fl. & Fr. : May-December.

It is a highly variable species. The shape and size of the leaves as well as the spikelets and the number of nerves and indumentum on the glumes and lemmas show much variation. This grass is common in the wetlands of the plains.

ALLEPPEY : Kakkazham, Pallana; CANNANORE : Periyar; IDUKKI : Munnar; PALGHAT : Malampuzha; QUILON : Neendakara; TRICHUR : Thunakkadavu; TRIVANDRUM : Aruvikkara, Kurisumala, Ponmudi; WYNAD : Chandanathode.

2, *Sacciolepis interrupta* (Willd.) Stapf in Prain, Fl. Trop. Afr. 9: 757, 1920; Fischer in Gamble, Fl. Pres. Madr. 1787, 1934 (Repr. ed. 3: 1238, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 358, 1960; Manilal & Sivaraj, Fl. Calic. 341, 1982. *Panicum interruptum* Willd., Sp. Pl. 1: 341, 1798; Hook. f. Fl. Brit. Ind. 7: 40, 1896; Rang. & Tad. Handb. S. Ind. Grass. 95. t. 99-100, 1921.

Annuals or perennials. Culms 10-100 cm long, creeping or geniculate, rarely erect from a creeping and rooting or floating rootstock, spongy and rooting at the nodes below; nodes glabrous. Leaves elliptic-lanceolate, lanceolate or linear, 4-35 x 0.3-1.4 cm, acute or acuminate, rounded or sub-cordate at base. Ligules ovate, rounded or truncate, membranous, panicles spiciform, interrupted, 3-35 cm long. Spikelets ovate-lanceolate or elliptic, 3-5 mm long. Lower glume

ovate-oblong, 1-1.5 x 0.5-1 mm, chartaceous, 3-5-nerved. Upper glume ovate-lanceolate, 3-5 x 1-2 mm, chartaceous, 7-9-nerved. Lower floret male or barren. Upper floret bisexual. First lemma similar to the upper glume. Palea oblong, 1-3 x 0.5-1 mm, delicate, hyaline. Second lemma ovate-oblong, 2-3 x 1-1.5 mm, subcoriaceous, faintly 6-nerved. Palea oblong or elliptic, 2-3 x 1 mm, subcoriaceous, 2-keeled, hyaline. Stamens 3, anthers 1-2 mm long, violet or bluish. Ovary c. 0.5 mm long; styles 0.5-1 mm long; stigmas 1-2 mm, pink.

Very common in marshy fields, wetlands and stagnant waters, and as a weed in paddy fields.

Notes : This species can be distinguished from other species of *Sacciolepis* by its robust, spongy, floating culms and larger spikelets. Occasionally the entire plant will be purplish or bluish. It grows gregariously in water-logged fields and is a good fodder grass.

Fl. & Fr. : Throughout the year.

ALLEPPEY: Alleppey, Nedumudy, Pulimkunnu; CANNANORE: Manjeswar; IDUKKI: Thekkadi; PALGHAT: Olavakkot, Thankara; PATHANAMTHITTA: Konni, Ranni; QUILON: Ayiramthenqu; TRICHUR: Chalakudi, Guruvayur; TRIVANDRUM: Pulimath, Thakaraparamba.

3. *Sacciolepis myosuroides* (R. Br.) A. Camus in Lecomte, *Fl. Gen. Indo-Chine* 7: 460, 1922; Fischer in Gamble, *Fl. Pres. Madr.* 1787, 1934 (Repr. ed. 3: 1238, 1957); Bor. Grass. Bur. Cey. Ind. Pak. 358, 1960; *Panicum myosuroides* R. Br. *Prodr.* 189, 1810; Hook. f. *Fl. Brit. Ind.* 7: 42, 1896. PLATE No. 59

Annuals. Culms 50-120 cm high, erect or decumbent; nodes glabrous. Leaves linear-lanceolate or narrowly linear, 15-40 x 0.2-0.6 cm, rounded or narrowed at base, acuminate, glabrous or sparsely pilose. Sheaths compressed, glabrous or sparsely tubercle-based hairy. Ligules truncate, thin, membranous. Panicles spiciform, narrow, 5-35 cm long. Spikelets ovate-oblong or elliptic, subglobose, 1-2 x 0.5-1 mm, obtuse. Lower glume ovate, 0.5-1 x 0.5 mm, acute, chartaceous, 3-5-nerved. Upper glume ovate or ovate-oblong, 1-2 x 1 mm, chartaceous, 5-9-nerved. Lower floret barren. Upper floret bisexual. First lemma similar to the upper glume. Palea elliptic, minute, second lemma elliptic, c. 1 x 1 mm, coriaceous, faintly 5-7-nerved, shining. Palea elliptic, c. 1 x 0.6 mm, shining, margins inflexed. Stamens 3, anthers c. 0.5 mm long, purple. Ovary c. 0.25 mm; styles c. 0.5 mm long; stigmas c. 0.5 mm long.

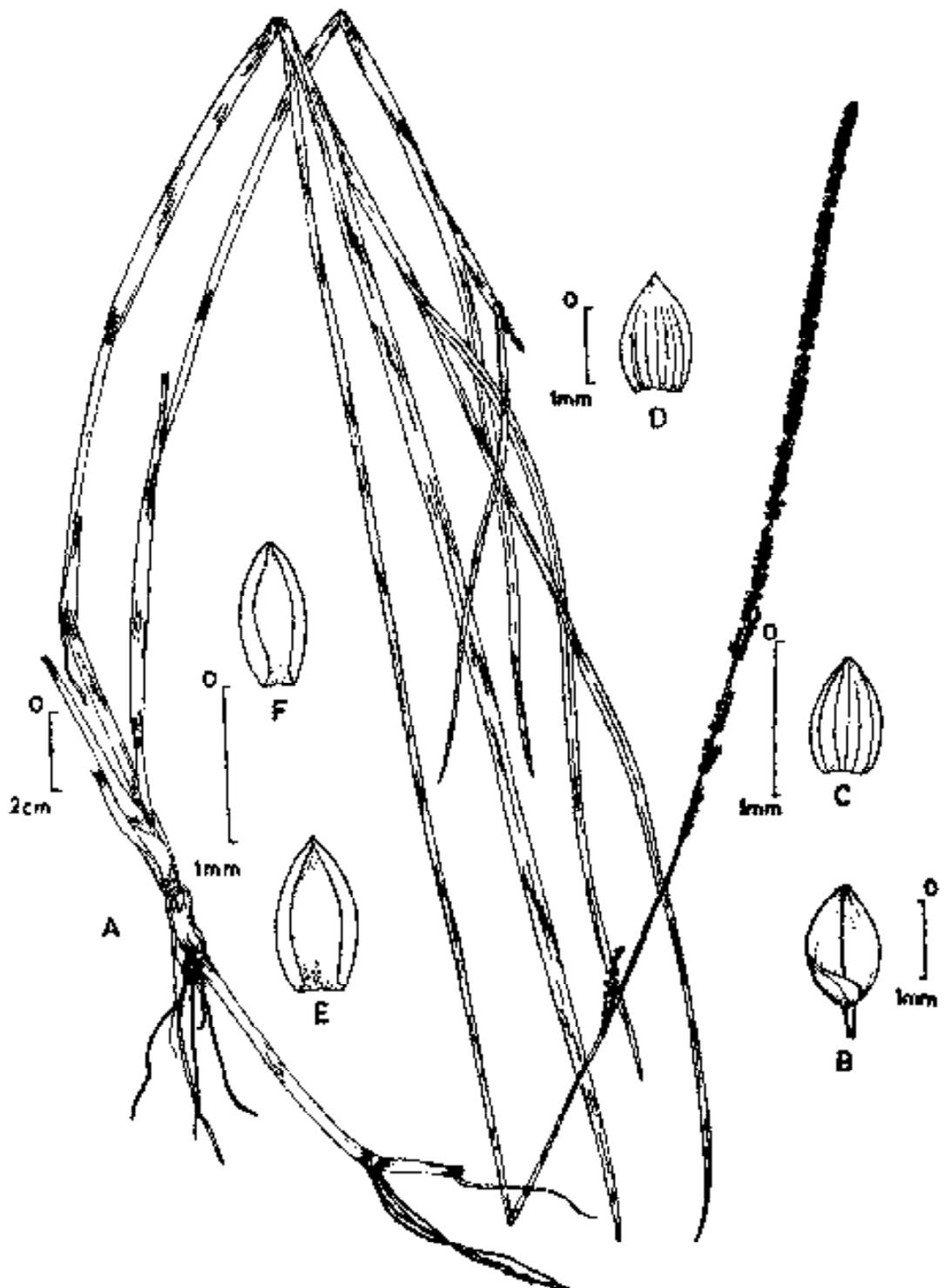


PLATE No. 59: *SACCIOLEPIS MYOSUROIDES* (R. Br.) A. Camus

A. Habit; B. Spikelet; C. Lower glume; D. Upper glume; E. Second lemma; F. Pelea of the second lemma.

Rare, along the ditches, water-logged fields and as a weed in cultivated lands.

Fl. & Fr. : August-December.

Notes : *S. myosuroides* can easily be distinguished from all other species of the genus by its smaller ovate or subglobose, blunt spikelets, very long and narrow whip-like spiciform panicles and long narrow leaves.

This is a variable species.

TRIVANDRUM : Kottur R. F.

21. SETARIA P. Beauv.

P. Beauv. Ess. Agrost. 51, 1812; Hook. f. Fl. Brit. Ind. 7: 77, 1896; Fischer in Gamble, Fl. Pres. Madr. 1788, 1934 (Repr. ed. 3: 1238, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 358, 1960.

Key to the species

- 1a. Inflorescence contracted, narrow, lobed or spiciform or cylindrical; leaves flat not folded :
 - 2a. Inflorescence a cylindrical, false spike *S. pumila* 7
 - 2b. Inflorescence a narrow, lobed panicle *S. intermedia* 3
- 1b. Inflorescence lax, widely spreading; leaves plicately folded, atleast towards base :
 - 3a. Leaves plicately folded from base to apex; panicles often lax, rarely contracted, but then shorter :
 - 4a. Panicles very dense, contracted, up to 20 cm long; branches not more than 8 cm long; lower floret male *S. poiretiana* 6
 - 4b. Panicles very lax, up to 60 cm long; branches often much longer; lower floret barren :
 - 5a. Bristles below the spikelet about twice as long as the spikelet; pales of the lower floret rudimentary, triangular, hyaline scale, up to 0.5 cm long *S. palmifolia* 4

- 5b. Bristles below the spikelet up to five times as long as the spikelet; palea of the lower floret well-developed, lanceolate or elliptic-lanceolate, 1.5-2 mm long *S. paniculifera* 5
- 3b. Leaves plicately folded only at the base; panicles contracted, narrow:
- 6a. Lower floret male or barren, its palea elliptic, broader; upper glume half to three quarters the length of the upper lemma; panicles compact, densely spiculate *S. barbata* 1
- 6b. Lower floret barren; its palea oblong-lanceolate, narrow; upper glume almost as long as the upper lemma; panicles lax, loosely spiculate *S. homonyma* 2
1. *Setaria barbata* (Lam.) Kunth, Rev. Gram. 1: 47, 1829; Bor, Grass. Bur. Cey. Ind. Pak, 360, 1960; V.J. Nair et al. in J. Econ. Tax. Bot. 3: 271, 1982. *Panicum barbatum* Lam. Tab. Encycl. Meth. Bot. 1: 171, 1791. *P. flavescens* auct. non Sw. 1788; Hook. f. Fl. Brit. Ind. 7: 56, 1896. PLATE No. 60

Annuals. Culms 15-60 cm long, creeping or decumbent, rooting at the lower nodes; nodes sparsely bearded. Leaves elliptic or elliptic-lanceolate or lanceolate, 2-20 x 0.3-2.5 cm, acuminate, narrow or rounded at base, slightly plicate towards base, glabrous or softly hispid. Sheaths keeled, sparsely tubercle-based hairy, villous towards mouth. Ligules row of hairs. Panicles narrow, 2-15 cm long, lax. Bristles 1-10 mm long, angular, scabrid. Spikelets elliptic or elliptic-lanceolate, 1.5-3 x 0.5-1.5 mm long. Lower glume ovate, 0.5-1 x 0.5-1 mm, obtuse or acute, chartaceous, 3-nerved. Upper glume ovate-oblong, 1.5-2 x 1-1.25 mm, obtuse, chartaceous, 5-7-nerved. Lower floret male. Upper floret bisexual. First lemma elliptic or elliptic-lanceolate, 1.5-3 x 0.5-1.5 mm, chartaceous, 7-nerved. Palea elliptic, 1.5-2.5 x 0.5-1 mm, hyaline, 2-keeled, 2-nerved. Stamens 3, anthers 0.5-1 mm long. Second lemma elliptic or elliptic-lanceolate, 1.5-2.5 x 1-1.5 mm, acute or shortly acuminate, crustaceous, rugose, faintly 5-7-nerved. Palea elliptic, 1.5-2 x 1-1.5 mm, crustaceous, rugose, 2-keeled. Stamens 3, anthers 0.5-1 mm long. Ovary oblong, c. 0.5 x 0.25 mm; styles 0.5-1 mm long; stigmas 0.5-1 mm long, purple.

Rare, along the banks of streams, canals, usually in shady places,

Fl. & Fr. September-March.

Notes: This grass was not recorded either by Ranga Achariyar & Tadulinga Mudaliyar ('Handbook of some South Indian Grasses' 1921)

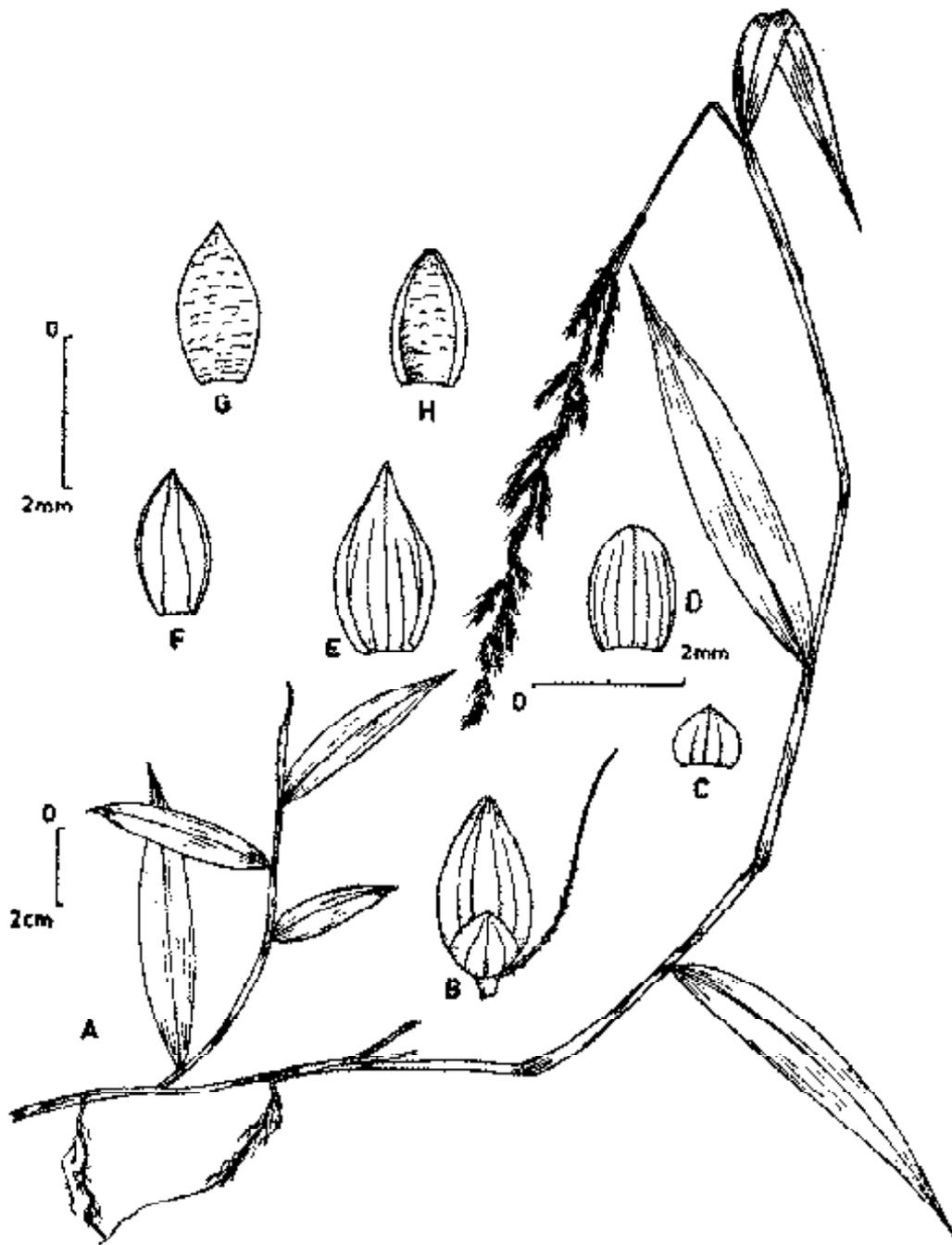


PLATE No. 60: *SETARIA BARBATA* (Lam.) Kunth

A. Habit; B. Spikelet; C. Lower glume; D. Upper glume; E. First lemma; F. Palea of the first lemma; G. Second lemma; H. Palea of the second lemma.

or by C.E.C. Fischer (Flora of the Presidency of Madras 1934). Karthikeyan (1971) included this species in his list, probably based on Bor (*l.c.*). It was thought to be not represented in MH. However, an MH sheet which was wrongly identified earlier as *Setaria intermedia* by C. E. C. Fischer, after a critical study with reference to some authentic specimens obtained from CAL turned out to be this species.

According to Bor (*l.c.*), this species has a wide distribution in Tropical Asia and Africa, being found in north-eastern India, Burma and Ceylon, but it is 'nowhere very common'. Recently we could locate this grass at Quilon and Trivandrum in Kerala.

The panicles of this grass look like those of *Echinochloa colona* and hence it may be confused with it.

ALLEPPEY: Laxmithope; QUILON: Residency ward; TRIVANDRUM: Pulimath, Sreekariyam, Trivandrum.

2. *Setaria homonyma* (Steud.) Chiov. in Nuovo Giorn. Bot. Ital. n. s. 26: 78, 1919; Bor, Grass, Bur. Cey. Ind. Pak. 361, 1960, *Panicum homonymum* Steud. Syn. Pl. Glum. 1: 43, 1854, *P. thachitrichum* auct. non Hochst. 1844; Hook. f, Fl. Brit. Ind. 7: 56, 1896.

Annuals. Culms 20-70 cm long, creeping or decumbent, rarely erect; nodes softly bearded or glabrous. Leaves elliptic or elliptic-lanceolate, 2-15 x 0.5-2.5 mm, acuminate, rounded or narrowed at base, slightly plicate towards base, glabrous or sparsely villous. Sheaths keeled, sparsely hispid or glabrous. Ligule a row of hairs. Panicles pyramidal or linear-oblong, 5-12 cm long, lax; racemes sparsely spiculate; bristles 2-10 mm long, more or less straight, scabrid. Spikelets ovate-oblong or elliptic, 2-3 x 1-1.5 mm. Lower glume ovate, 0.5-1 x 0.5-1 mm, chartaceous, 3-5-nerved. Upper glume ovate-oblong or elliptic 2-3 x 1-1.5 mm, chartaceous, 5-7-nerved. Lower floret barren. Upper floret bisexual. First lemma similar to the upper glume. Palea oblong-lanceolate, 1-2 x 0.5 mm, delicate, 2-keeled, 2-nerved. Second lemma elliptic or elliptic-lanceolate, 1-2.5 x 1-1.5 mm, coriaceous, rugose, faintly 5-7-nerved. Palea elliptic, 1-2x1 mm, coriaceous, rugose, 2-keeled. Stamens 3, anthers c. 1 mm long. Ovary oblong, c. 0.5 x 0.2 mm; styles 1-1.5 mm long; stigmas 1-1.5 mm long.

Rare, along the scrub jungles and hill slopes;

Fl. & Fr. : September-January.

Notes : This species is closely allied to *S. barbata*, but differs by the loose, sparsely spiculate panicles, empty lower florets with narrow, oblong-lanceolate paleas.

CANNANORE : Taliparamba.

3. *Setaria intermedia* Roem. & Schult. Syst. Veg. 2: 489. 1817; Hook. f. Fl. Brit. Ind. 7: 79. 1896; Rang. & Tad. Handb. S. Ind. Grass. 111. t. 110. 1921; Fischer in Gamble, Fl. Pres. Madr. 1789. 1934 (Repr. ed. 3: 1239. 1957); Shukla & Jain in Bull. Bot. Surv. Ind. 20(1-4): 66. 1978; Cope in Nasir & Ali, Fl. Pak. 143: 183. 1982. *S. tomentosa* (Roxb.) Kunth, Rev. Gram. 1: 47. 1829; Bor, Grass. Bur. Cey. Ind. Pak. 365. 1960. *Panicum tomentosum* Roxb. Fl. Ind. 1: 303. 1820.

Annuals. Culms 20-60 cm high, erect or decumbent, rooting at the lower nodes; nodes glabrous. Leaves linear-lanceolate or linear, 5-30 x 0.3-1 cm, rounded at base, softly hairy. Sheaths keeled, sparsely tubercle-based hairy, ciliate along one margin. Ligules row of hairs. Panicles spiciform, narrow, interrupted, 5-20 cm long. Bristles 1-8 mm long, angular, scabrid. Spikelets broadly elliptic or ovate or subglobose, 1-2 x 1-1.5 mm. Lower glume ovate-acute, 0.5-1 x 0.5-1 mm, chartaceous, 3-nerved. Upper glume ovate or orbicular, 1-1.5 x 1-1.5 mm, chartaceous, 5-7-nerved. Lower floret barren or male, with rudimentary stamens; anthers c. 0.5 mm long. Upper floret bisexual. First lemma ovate or orbicular, 1.5-2 x 1-1.5 mm, apiculate, chartaceous, 5-7-nerved. Palea ovate or orbicular, 1-2 x 1 mm, delicate, hyaline, 2-keeled, 2-nerved. Second lemma boat-shaped, beaked, broadly ovate when spread, 1-2 x 1-1.5 mm, crustaceous, transversely rugose, faintly 5-nerved. Palea broadly elliptic, 1-2 x 1 mm, crustaceous, rugose, 2-keeled. Stamens 3; anthers 0.5-1 mm long. Ovary oblong, 0.25-0.5 mm; styles 0.5-1 mm; stigmas 0.5-1 mm long.

Fairly common along the banks of streams, shades of trees, bunds of paddy fields, wastelands and road-cuttings of hills and plains.

Fl. & Fr. : September - December.

Notes : This species is closely allied to *S. verticillata* and may often be confused with it by the similar habit and panicles; but it can

be distinguished from the other by the antroorsely barbed bristles of the involucre.

IDUKKI : Vandiperiyar; PALGHAT : Walayar; WYNAD : Wynad.

4. *Setaria palmifolia* (Koen.) Stapf in J. Linn. Soc. (Bot.) 42: 186. 1914; Fischer in Gamble, Fl. Pres. Madr. 1789, 1934 (Repr. ed. 3: 1239. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 363. 1960. *Panicum palmaefolium* Koen. in Naturf. 23: 208. 1788. *P. plicatum* sensu Hook. f. Fl. Brit. Ind. 7: 55. 1896, p.p., non Lam. 1791.

Perennials. Culms 50-150 cm high, densely tufted, erect or ascending; nodes glabrous or sparsely bearded. Leaves elliptic or elliptic-lanceolate, acuminate, 20-50 x 2-4 cm, rounded or narrow at base, plicate between the veins, glabrous or sparsely hairy. Ligules row of hairs or fimbriate membrane. Panicles 20-40 cm long, lax. Bristles 3-10 mm long, angular, scabrid. Spikelets elliptic or lanceolate, 3-4 x 1-1.5 mm, sessile or shortly pedicelled. Lower glume ovate, 1-1.5 x 1 mm, chartaceous, 3-5-nerved. Upper glume elliptic or ovate-elliptic, 2-2.5 x 1-1.5 mm, chartaceous, 5-7-nerved. Lower floret barren. Upper floret bisexual. First lemma elliptic or ovate-lanceolate, 3-4 x 1-1.5 mm, chartaceous, 5-nerved. Palea absent or a triangular hyaline scale, c. 0.5 mm long. Second lemma ovate-lanceolate or elliptic, 2.5-3.5 x 1-1.5 mm, crustaceous, rugose, faintly 5-nerved. Palea elliptic, 2-3 x 1-1.5 mm, crustaceous, rugose, 2-keeled. Stamens 3, anthers 1-1.5 mm long. Ovary oblong, c. 0.5 mm long; styles 1-1.5 mm long, stigmas 1-1.5 mm long.

Found along the fringes of forests, banks of streams and rivers, in open sholas and other shady places.

Fl. & Fr. : August - December.

Notes : This true forest grass very closely resembles *S. paniculifera* in its plicate leaves and lax panicles, but it differs by the smaller culms, leaves and panicles as well as shorter involucreal bristles.

QUILON : Aryankavu.

5. *Setaria paniculifera* (Steud.) Fourn. ex Hemsl. Biol. Centr. Amer. Bot. 3: 505. 1855; Bor. Grass. Bur. Cey. Ind. Pak. 363. 1960; *Panicum paniculiferum* Steud. Syn. Pl. Glum. 1: 54. 1854.

Perennials. Culms 60-200 cm high, densely tufted, erect, nodes sparsely bearded. Leaves elliptic-lanceolate or lanceolate, acuminate, 15-40 x 1-5 cm, narrow or rounded at base, plicate. Sheaths tubercle-based hairy. Ligules membranous, thin, fimbriate or row of hairs. Panicles 15-60 cm long, very lax. Bristles 5-15 mm long, angular, scabrid. Spikelets elliptic or elliptic-lanceolate, 2-4 x 1-2 mm. Lower glume ovate or orbicular, c. 1 x 1 mm, chartaceous, 3-nerved. Upper glume ovate or ovate-oblong, 2-2.5 x 1-1.5 mm, chartaceous, 7-nerved. Lower floret barren. Upper floret bisexual. First lemma elliptic or elliptic-lanceolate, 2-4 x 1-2 mm, chartaceous, 5-nerved. Palea lanceolate or elliptic-lanceolate, 1.5-2 x 0.5 mm, delicate, hyaline. Second lemma elliptic or elliptic-lanceolate, 2-3.5 x 1-1.5 mm, crustaceous, rugulose, faintly 5-nerved. Palea elliptic, 2-3 x 1-1.5 mm, crustaceous, rugulose, 2-keeled. Stamens 3; anthers 1-2 mm long. Ovary oblong, c. 0.5 mm long; styles 1-1.5 mm long; stigmas 1-1.5 mm long, pinkish.

Rare, along the fringes of sholas, scrub jungles and margins of the forests.

Fl. & Fr. : July-September.

Notes : This species is very closely related to *S. palmifolia* but can be distinguished from it by the robust culms, larger panicles and longer involucral bristles. There is no earlier collection of this grass at MH.

It is a tropical American grass, reported to be introduced in Ceylon for fodder and ornament. Jain (1968) reported its occurrence in Bhutan and Naga hills.

IDUKKI: Muzinjapuzha; PATHANAMTHITTA: Ponnembalamedu; TRIVANDRUM: Ponmudi.

6. *Setaria poiretiana* (Schult.) Kunth, Rev. Gram. 1: 47. 1829; Bor. Grass. Bur. Cey. Ind. Pak. 364. 1960. *Panicum poiretianum* Schult. Syst. Veg. 2: Mant. 229. 1824.

Annuals or perennials. Culms 50-150 cm high, erect or willowy; nodes glabrous or shortly bearded. Leaves elliptic or elliptic-lanceolate, 5-30 x 1-4 cm, acuminate, plicate, rounded or narrow at base, villous. Sheaths keeled, tubercle-based hairy. Ligules row of hairs. Panicles contracted, 5-20 cm long, densely spiculate. Bristles 1-10 mm long, angular, scabrid. Branches and pedicels covered with dense glassy bristles. Spikelets elliptic or elliptic-lanceolate, 1.5-3 x 1-1.5 mm. Lower glume ovate, 0.5-1 x 0.5-1 mm, chartaceous, faintly 3-nerved. Upper glume ovate or ovate-oblong, 1.5-2.5 x 1-1.5 mm, chartaceous, 7-nerved. Lower floret male. Upper floret bisexual. First lemma elliptic or ovate-acute, 1.5-3 x 1-2 mm, chartaceous, 7-nerved. Palea elliptic, 1.5-3 x 1-1.5 mm, delicate, hyaline, 2-keeled, 2-nerved. Stamens 3, anthers 0.5-1 mm long. Second lemma elliptic, 1.5-2.5 x 1-1.5 mm, acute, crustaceous, transversely rugose, faintly 5-nerved. Palea elliptic, 2.5-2 x 1-1.5 mm, acute, crustaceous, 2-keeled. Stamens 3; anthers 1-1.5 mm long. Ovary oblong, c. 0.5 mm long; styles 0.5-1 mm long; stigmas 0.5-1 mm long.

Rare, in the open grasslands and along the hill slopes.

Fl. & Fr.: August-September.

Notes: This very rare grass seems to be an introduced one. Bor (*l.c.*) says that it is a most ornamental grass and is worth growing for its handsome plicate leaves and very dense panicles. He reports this species from India probably based on a single collection by J. S. Gamble from Coonoor, Nilgiris, where he notes that it was 'cultivated'. This Grass has a distribution in Mexico to Brazil and also in the West Indies; but nowhere it is very common.

QUILON: On way to Umayar.

7. *Setaria pumila* (Poir.) Roem. & Schult. Syst. Veg. 2: 891. 1817; Cope in Nasir & Ali, Fl. Pak. 143; 181. 1982. *Panicum pumilum* Poit. Encycl. Meth. Bot. Suppl. 4: 273. 1816; *Setaria pallide-fusca* (Schum.) Stapf & C. E. Hubb. in Kew Bull. 1930: 259. 1930; Fischer in Gamble, Fl. Pres. Madr. 1789. 1934 (Repr. ed. 3: 1239. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 363. 1960; Manilal & Sivaraj. Fl. Calic. 340. 1982. *Panicum pallide-fuscum* Schum. Beskr. Guin. Pl. 58. 1827. *Setaria glauca* sensu Hook. f. Fl. Brit. Ind. 7: 78. 1896. p.p.

Annuals. Culms 5-120 cm high, creeping, decumbent or erect, tufted; nodes glabrous. Leaves lanceolate, linear-lanceolate or linear, 2-30 x 0.1-1 cm, rounded or shallowly cordate at base, glabrous or sparsely hairy. Sheaths keeled. Ligules ovate, membranous, thin. Panicles spiciform, cylindrical, 0.5-15 cm long, yellowish. Bristles numerous, 1-6 mm long, scabrid. Spikelets ovate or subglobose, 1.5-2.5 x 1-1.5 mm, slightly gibbous. Lower glume ovate-acute, 1-1.6 mm, chartaceous, faintly 3-5-nerved. Upper glume ovate or orbicular, acute, 1-2 x 1-1.5 mm, chartaceous, 5-nerved. Lower floret male or barren. Upper floret bisexual. First lemma ovate-elliptic or ovate-acute, 1.5-2.5 x 1-2 mm, chartaceous, 5-7-nerved. Palea elliptic, 1.5-2 x 1-1.5 mm, delicate, hyaline, 2-keeled, 2-nerved. Stamens 3, anthers c. 1 mm long. Second lemma boat-shaped or ovate-acute, 2-2.5 x 1-1.5 mm, slightly keeled, beaked, coarsely rugose, faintly 5-nerved. Palea ovate-oblong or elliptic, 1.5-2 x 1 mm, crustaceous; rugose, 2-keeled. Stamens 3; anthers 1-1.5 mm long. Ovary oblong, c. 0.5-1 mm long; styles 0.5-1 mm long; stigmas 0.5-1 mm long.

Very common in wetlands, bunds of paddy fields, roadsides, along the margins of forests, in open grasslands, along the banks of streams-backwaters and canals, along seashores and in waste places, as well as a weed in tapioca plots and rubber plantations; often associated with *Sacciolepis indica* and *Brachiaria miliiformis*.

Fl. & Fr. : May-December.

Notes : *S. pumila* is a polymorphic species, where the length of leaves and panicles show a gradation in variation. This highly variable grass occurs in all sorts of localities in the plains and hills of the state.

ALLEPPEY; Ambalapuzha; CALICUT: Pavagada; CANNANORE: Payyanur, Karimbam, Taliparamba, Tellicherry; ERNAKULAM: Bhuthathankettu; IDUKKI: Munnar, Peermade; PALGHAT: Aruvampara, Kanjarampuzha, Panthanthode; QUILON: Thenmaia; TRICHUR: Peechi; TRIVANDRUM: Pulimath, Veli; WYNAD: Theerthundamala, Tolpetty.

22. SPINIFEX Linn.

Linn. Mant. Pl. 2: 163. 1771; Hook. f. Fl. Brit. Ind. 7: 63. 1896; Fischer in Gamble, Fl. Pres. Madr. 1706. 1934 (Repr. ed. 3: 1163. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 366. 1960.

A genus of about 3 species distributed in Eastern Asia, Indo-Malayan and Pacific regions of the world, of which one species occurs in India and Kerala.

Spinifex littoreus (Burm.f.) Merr. in Philip. J. Sci. Bot. 7: 229. 1912; Fischer in Gamble, Fl. Pres. Madr. 1706. 1934 (Repr. ed. 3: 1183. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 368. 1960; Manilal & Sivraj, Fl. Calic. 336. 1982. *Stipa littorea* Burm. f. Fl. Ind. 29. 1768. *Spinifex squarrosus* Linn. Mant. Pl. 2: 300. 1771; Hook. f. Fl. Brit. Ind. 7: 63. 1896; Rang. & Tad. Handb. S. Ind. Grass. 104. t. 105-106. 1921. PLATE No. 61 & 62

Perennials. Culms 20-60 cm high, stoloniferous, trailing and rooting at the nodes, decumbent, glaucous; nodes glabrous. Leaves acicular, 3-20x0.1-0.6 cm, sharply acute, occasionally falcate, convolute, rigid, glaucous. Sheaths striate, margins ciliate towards mouth. Ligules row of hairs. Male inflorescence capitate or flabelliform consists of several spikes, 5-15 cm long. Spikelets lanceolate, 8-12 x 1.2 mm. Lower glume ovate-lanceolate, 5-6 x 1.5-3mm, subcoriaceous, 7-11-nerved. Upper glume ovate-oblong or oblong-lanceolate, 6-8 x 1.5-3 mm, subcoriaceous, 5-9-nerved. First lemma oblong-lanceolate, 8-10 x 2-3 mm, chartaceous, 5-7-nerved. Palea lanceolate, 8-10 x 1-2 mm, delicate, 2-keeled, 2-nerved. Second lemma elliptic-lanceolate or lanceolate, 8-10 x 1.5-3 mm, acuminate, chartaceous, 5-9-nerved. Palea elliptic-lanceolate or lanceolate, 8-10 x 1-1.5 mm, acuminate, delicate, hyaline, 2-keeled, 2-nerved. Lodicules 2, oblong or spatulate, c. 1 x 0.5 mm, faintly 3-nerved. Stamens 3; anthers 3-5 mm long. Female inflorescence capitate, 10-25 cm wide, globose.

Fairly common along the sea-shore, often associated with *Ipomoea pescapree* and *Launaea sarmentosa*.

Fl. & Fr. : September - March.

Notes : This grass grows luxuriantly in sandy places near the sea, where it acts as a good sand-binder.

ALLEPPEY : Ambalapuzha; CANNANORE: Kumbia; MALAPURAM: Ponnani; TRICHUR: Chavakkadu, Chiklai, Kandasankadavu,

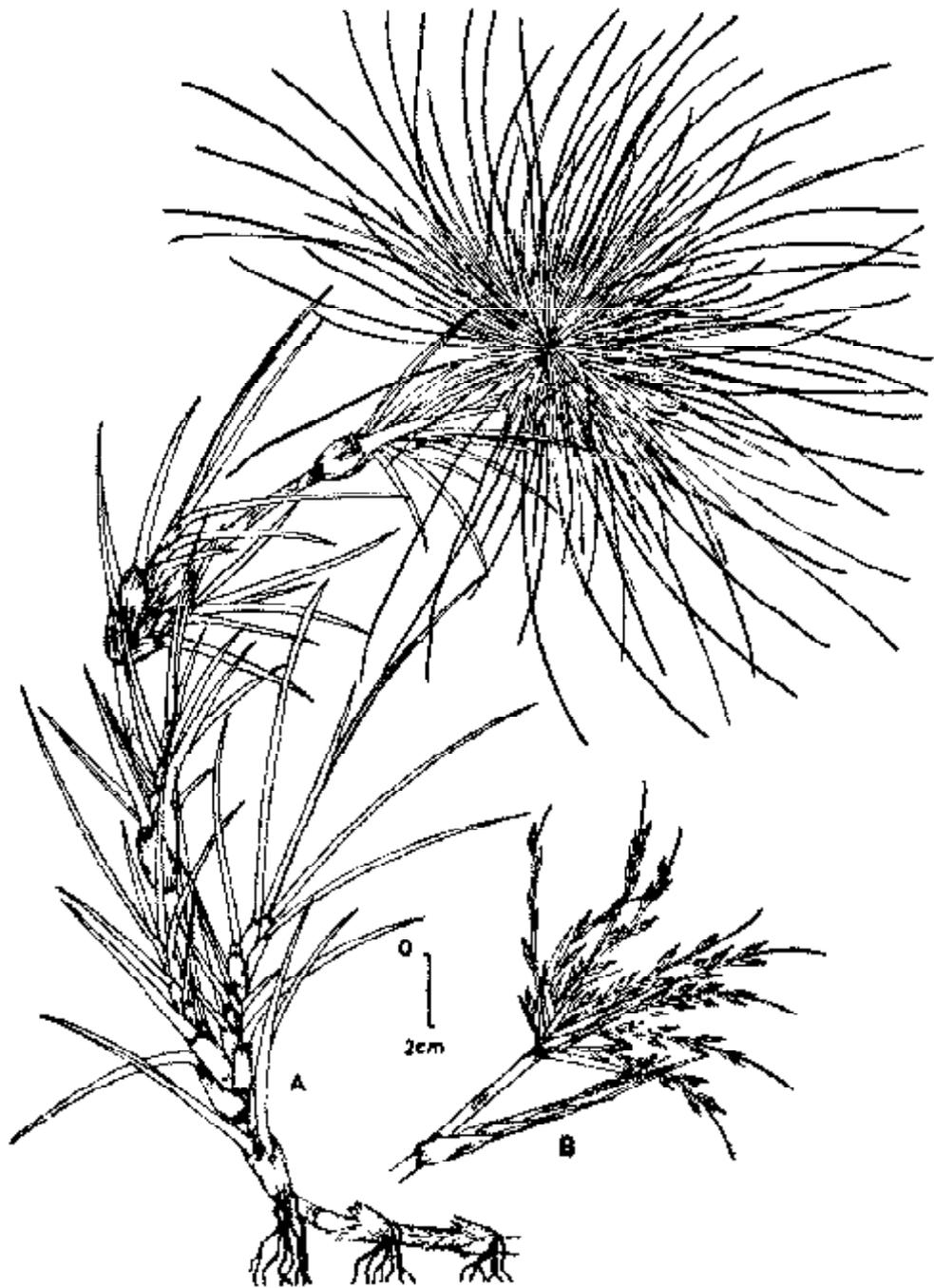


PLATE No. 81 : *SPINIFEX LITTOREUS* (Burm. f.) Merr.
A. Habit (female); B. Male Inflorescence.

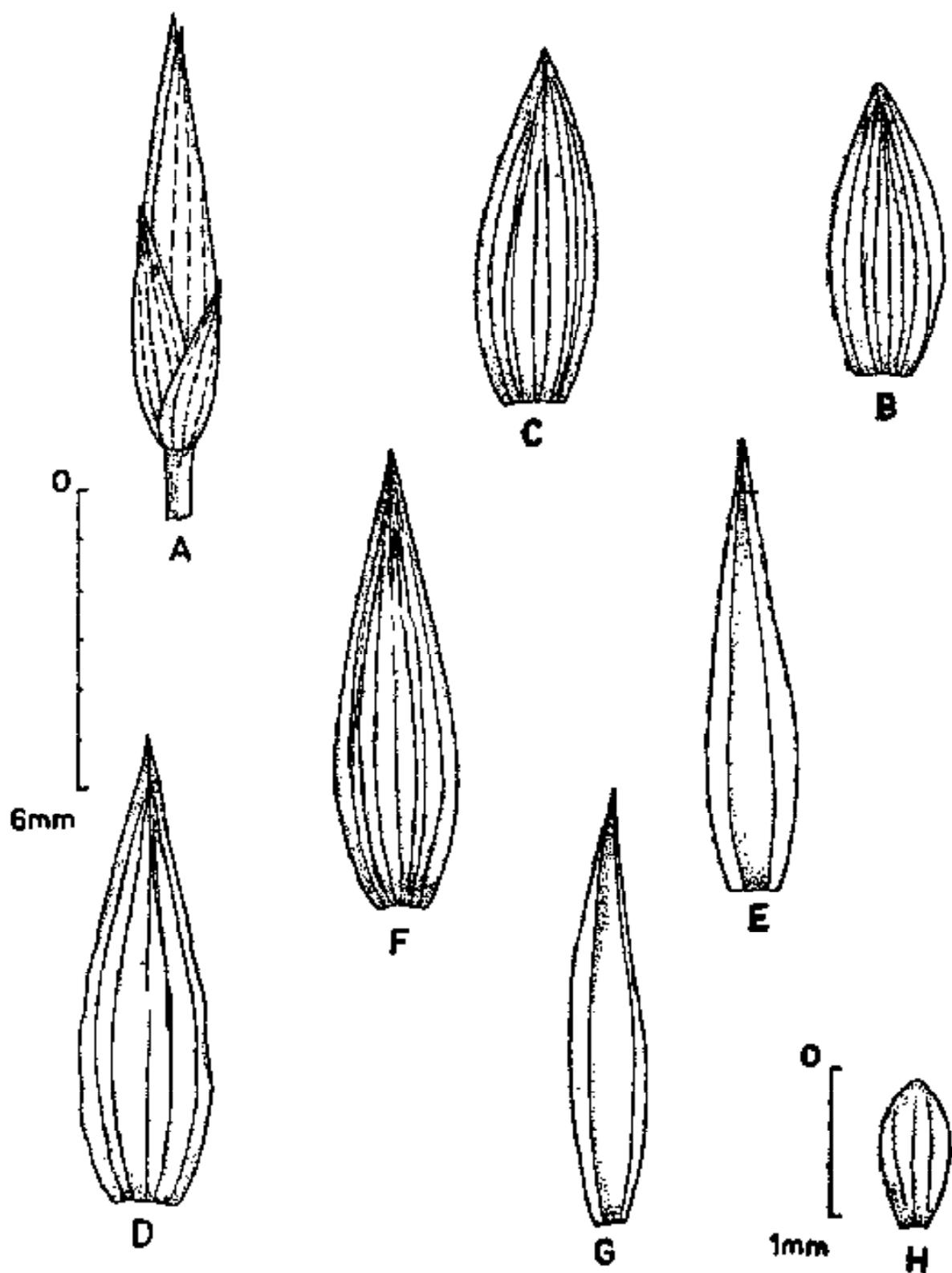


PLATE No. 62 : *SPINIFEX LITTOREUS* (Burm. f.) Merr.

A. Male spikelet; B. Lower glume; C. Upper glume; D. First lemma; E. Palea of the first lemma; F. Second lemma; G. Palea of the second lemma; H. Lodicule.

21. STENOTAPHRUM Trin.

Trin. Fund. Agrost. 176, 1820; Fischer in Gamble, Fl. Pres. Madr. 1772, 1934 (Repr. ed. 3: 1228, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 366, 1960.

A genus of about 7 species distributed in the tropics and subtropics of the World of which one species occurs in India as well as in Kerala.

Stenotaphrum dimidiatum (Linn.) Brongn. in Duperr. Bot. Voy. Coquille 127, 1831; Fischer in Gamble, Fl. Pres. Madr. 1773, 1934 (Repr. ed. 3: 1228, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 366, t. 41, 1960. *Panicum dimidiatum* Linn. Sp. Pl. 57, 1753, *Stenotaphrum glabrum* Trin. Fund. Agrost. 176, 1820; Hook. f. Fl. Brit. Ind. 7: 90, 1896.

Perennials. Culms 10-60 cm long, creeping, stoloniferous, rooting at the nodes, forming mats; nodes glabrous or sparsely bearded. Leaves oblong, linear-oblong or linear, 3-15 x 0.3-1 cm, sub-obtuse or rounded at apex, narrow or rounded at base, flat or folded. Sheaths compressed, strongly keeled. Ligules fringe of hairs. Racemes solitary, spiciform, 3-10 cm long. Rhachis flat, wavy, or zig-zag, hiding the spikelets. Spikelets 3-6 together, elliptic or elliptic-lanceolate, 4.5 x 1-2 mm. Lower glume ovate or orbicular, 1-1.5 x 1 mm, chartaceous, ciliate at apex. Upper glume boat-shaped or ovate-elliptic when spread, 3-4 x 2-3 mm, chartaceous, 5-9-nerved, ciliate at apex. Lower floret male or barren. Upper floret bisexual. First lemma elliptic or elliptic-lanceolate, 3-4 x 1-1.5 mm, crustaceous, faintly 3-7-nerved. Palea elliptic-lanceolate, faintly 3-7-nerved. Palea elliptic-lanceolate, 3-4 x 1-1.5 mm, delicate, hyaline, 2-keeled, 2-nerved. Second lemma elliptic-lanceolate, 3-4 x 1-2 mm, chartaceous, 5-nerved, ciliate towards apex. Palea elliptic-lanceolate, 3-3.5 x 1-1.5 mm, chartaceous, 2-nerved. Stamens 3, anthers 1-2 mm long. Ovary oblong, c. 0.5 mm long; styles 2-3 mm long; stigmas 1-2 mm long.

Frequent along the banks of streams, backwaters, rivers and canals, bunds of paddy fields; usually in shades of coconut and mango trees.

Fl. & Fr.: June-March.

Notes: This prostrate perennial grass grows gregariously along the banks of streams and backwaters forming thick mats by sending

numerous stolons with nodal roots. The spikelets of this curious species are hidden inside the flattened rhachis, just like the 'Kangaroos' hiding their cubs inside the pouches; hence it is popular as 'the Kangaroo Grass of Australia'. Since the leaf-tips are blunt and rounded and the spreading culms give numerous, stoloniferous branches this species has now been extensively introduced in gardens as a very good lawn grass.

S. dimidiatum shows much variation in the number of nerves on the glumes as well as lemmas and also in the indumentum.

ALLEPPEY: Alleppey, Ambalapuzha, R. Block, Thakazhy;
KOTTAYAM: Kottayam; TRIVANDRUM: Kovalam.

24. TRACHYS Pers.

Pers. Syn. Pl. 1: 85. 1805; Hook. f. Fl. Brit. Ind. 7: 96. 1896; Fischer in Gamble, Fl. Pres. Madr. 1812. 1934 (Repr. ed. 3: 1255. 1957); Bor. Grass. Bur. Cey. Ind. Pak. 369. 1960.

A monotypic genus distributed in the coastal regions of South India and Burma.

Trachys muricata (Linn.) Pers. ex Trin. in Mem. Acad. Sci. Petersb. ser. 6. 3: 189. 1834; Fischer in Gamble, Fl. Pres. Madr. 1813. 1934 (Repr. ed. 3: 1255. 1957); Bor. Grass. Bur. Cey. Ind. Pak. 369. t. 42. 1960. *Cenchrus muricatus* Linn. Mant. Pl. 2: 302. 1771. *Trachys mucronata* Pers. Syn. Pl. 1: 85. 1805; Hook. f. Fl. Brit. Ind. 7: 96. 1896; Rang. & Tad. Handb. S. Ind. Grass. 129. t. 121. 1921.

Annuals. Culms 10-60 cm long, creeping and rooting at the nodes decumbent; nodes bearded. Leaves elliptic-lanceolate, lanceolate or linear-lanceolate, 1-1.2 x 0.2-1 cm, acuminate, rounded or shallowly cordate at base, hispid, undulate on one margin. Sheaths tubercle-based hairy. Ligules ovate, membranous. Racemes 1-3, each 1-6 cm long. Spikelets clustered on a flat rhachis, 5-6 mm long. Lower glume lanceolate, 2-3 x 0.25-0.5 mm, chartaceous, 1-nerved. Upper glume lanceolate, 2-4 x 0.5 mm, chartaceous, 1-3-nerved. Lower floret barren, epaleate. Upper floret bisexual. First lemma broadly elliptic, acute or acuminate, 5-6x2-3 mm, chartaceous, 11-many nerv-

ed. Second lemma elliptic-lanceolate or lanceolate, 3-5 x 1-2 mm, coriaceous, hyaline, faintly 3-5-nerved. Palea elliptic-lanceolate or lanceolate, 3-5 x 1-1.5 mm, subcoriaceous, hyaline, 2-nerved. Stamens 3, anthers 1-2 mm long. Ovary oblong, c. 0.5 mm long; styles 1.5-2 mm long; stigmas 1.5-2 mm long.

Occasional along the sea-shores and other such dry sandy places.

Fl. & Fr.: October-December.

Notes: This grass grows gregariously along the coastal belts, sometimes forming mats and hence it avoids tidal-erosion. The young culms and leaves are said to be very good fodder, but when it flowers, the muricate prickly spikelets are quite unpalatable to the cattles.

TRIVANDRUM: Kovalam,

25. UROCHLOA P. Beauv.

P. Beauv. Ess. Agrost. 52. 1812; Fischer in Gamble, Fl. Pres. Madr. 1774. 1934 (Repr. ed. 3: 1229. 1957), p.p.; Bor, Grass. Bur. Cey. Ind. Pak. 371. 1960. *Panicum* Linn, sect. *Brachiaria* Hook. f. Fl. Brit. Ind. 7: 33. 1896, p.p.

A genus of about 12 species distributed in the tropics of the World, of which about 4 species occur in India and one in Kerala.

Urochloa is distinguished from *Brachiaria* by its abaxial cuspidate spikelets with obtuse, mucronate upper lemmas.

Urochloa panicoides P. Beauv. Ess. Agrost. 53. t. 11 1812; Fischer in Gamble, Fl. Pres. Madr. 1775. 1934 (Repr. ed. 3: 1230. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 372. 1960. *Panicum javanicum* Poir. Encycl. Meth. Bot. Suppl. 4: 274. 1816; Hook. f. Fl. Brit. Ind. 7: 35 1896; Rang. & Tad. Handb. S. Ind. Grass. 86. t. 93-94. 1921. PLATE No. 63

Annuals. Culms tufted, 20-60 cm high, erect or creeping and decumbent, rooting at the lower nodes; nodes sparsely bearded. Leaves ovate-lanceolate, lanceolate or linear-lanceolate, 1-8 x 0.3-1 cm, acute or acuminate, rounded or cordate at base, tubercle-based hairy or glabrous, margins tuberculate-ciliate towards base, undulate on one side. Sheaths keeled, tubercle-based hairy. Ligules row of

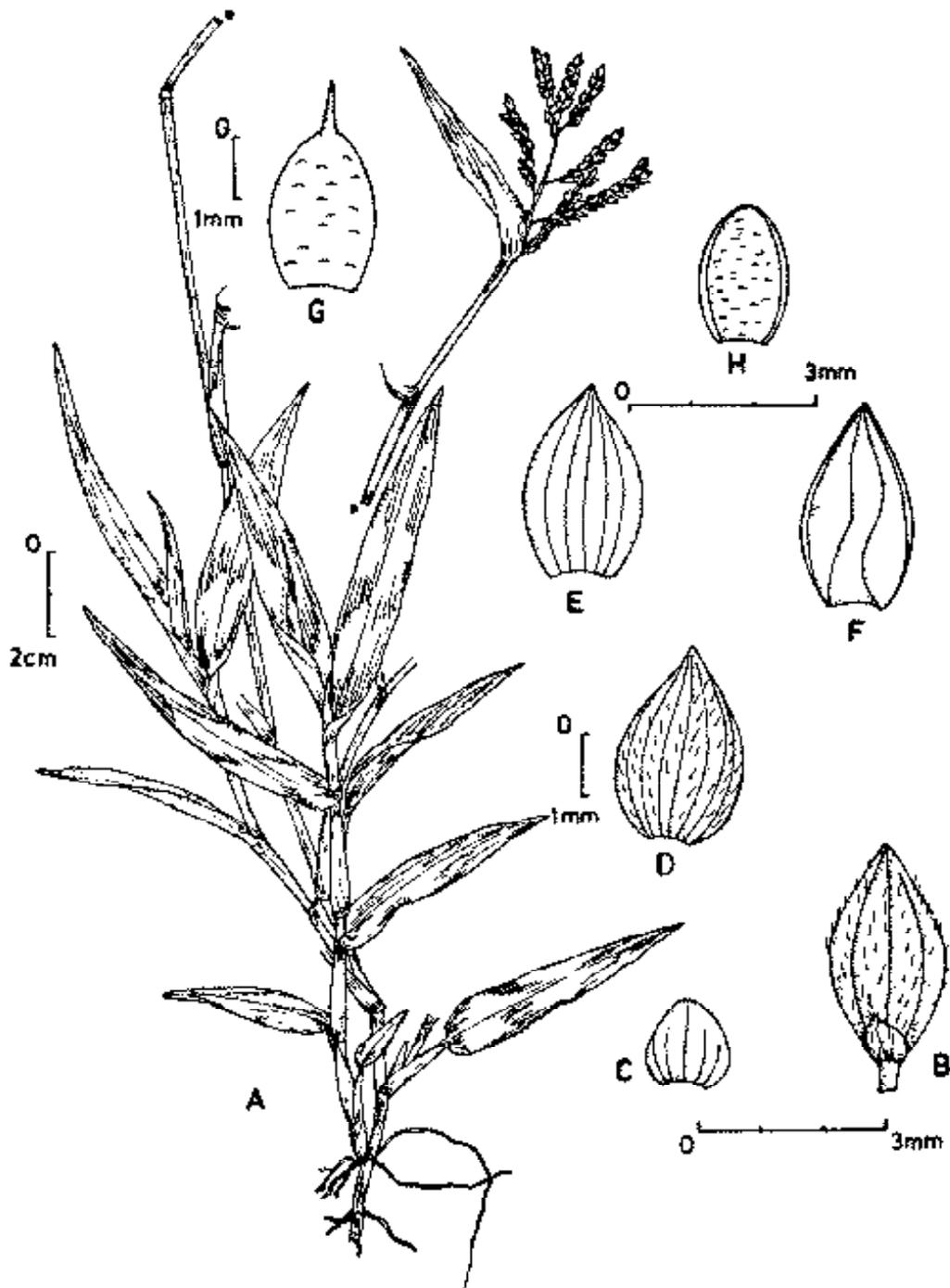


PLATE No. 63: *UROCHLOA PANICOIDES* P. Beauv.

A. Habit; B. Spikelet; C. Lower glume; D. Upper glume; E. First lemma; F. Palea of the first lemma; G. Second lemma; H. Palea of the second lemma.

hairs. Racemes 3-5, each 1-4 cm long, rachis flat, narrowly winged, bearing solitary or paired spikelets; pedicels with white glassy hairs. Spikelets biseriate, elliptic, 3-4 x 1.5-2 mm, acute, densely pubescent. Lower glume ovate, 1-1.5 x 1.5 mm, chartaceous, 3-5-nerved. Upper glume broadly ovate, 3-4 x 1.5-2.5 mm, acute, chartaceous, 7-9-nerved, densely pubescent. Lower floret male. Upper floret bisexual. First lemma broadly ovate, 3-4 x 1.5-2 mm, acute, chartaceous, 5-7-nerved. Palea ovate-elliptic, 3-3.5 x 1.5-2 mm, delicate, hyaline, 2-keeled, 2-nerved. Stamens 3, anthers 1-1.5 mm long. Second lemma ovate-oblong or elliptic, 2-3 x 1.5-2 mm, crustaceous, transversely rugose, mucronate. Palea ovate, 2-2.5 x 1-1.5 mm, obtuse or rounded, crustaceous, rugose, 2-keeled. Stamens 3, anthers 1-2 mm long. Ovary oblong; styles 1-1.5 mm long; stigmas 1-1.5 mm long.

Occasional along the bunds of paddy fields and along wet sandy shores.

Fl. & Fr. : July-December.

Notes : This grass superficially looks like some species of *Brachiaria*, but can be distinguished by the mucronate upper lemmas. *Urochloa panicoides* has forms with glabrous, pubescent or setosely fringed spikelets.

PALGHAT : Walayar.

POOIDEAE

Key to the Tribes of Pooideae

- 1a. Spikelets unisexual, monoecious; ovary enclosed in an inflated utricle-like lemma with an apical pore *Pharoseae*
- 1b. Spikelets bisexual; ovary not enclosed in a utricle:
 - 2a. Stamens 6 *Oryzeseae*
 - 2b. Stamens 1-3:
 - 3a. Stigmas spirally coiled and retrorsely barbed *Streptogyneseae*
 - 3b. Stigmas not spirally coiled, often plumose:
 - 4a. Spikelets with one floret:
 - 5a. Spikelets awned:
 - 6a. Awns trifid *Aristideae*

- 6b. Awns simple;
- 7a. Glumes with long capillary awns, several times longer than the glumes *Perotideae*
- 7b. Glumes not awned as above:
- 8a. Rhachilla produced beyond the floret:
- 9a. Prolongation of rhachilla spathulate; lemmas awned from the sinus, with two setae and tufts of hairs on either side of the awns *Danthonieae*
- 9b. Prolongation of rhachilla not spathulate; lemmas awned from the back, setae and tufts of hairs absent *Agrostideae*
- 8b. Rhachilla not produced beyond the floret:
- 10a. Inflorescence panicle *Garnotieae*
- 10b. Inflorescence of several digitate or subdigitate racemes or spikes *Chlorideae*
- 5b. Spikelets not awned:
- 11a. Inflorescence a solitary raceme or spike; glumes often stiff, cartilaginous *Zoysieae*
- 11b. Inflorescence and glumes not as above:
- 12a. Inflorescence of several digitate or subdigitate racemes or spikes *Chlorideae*
- 12b. Inflorescence a panicle; rarely spiciform but then the glumes delicate, hyaline, but never cartilaginous:
- 13a. Leaf-blades rigid, 5-25 cm wide, narrowed and tapering at base, densely villous *Garnotieae*
- 13b. Leaf-blades not rigid, often 1-15 mm wide, rounded or shallowly cordate at base, more or less glabrous:
- 14a. Paleas 2-keeled *Eragrostae*
- 14b. Paleas not 2-keeled *Sporoboleae*
- 4b. Spikelets with 2-many florets:
- 15a. Lemmas or rhachilla joints with long silky hairs enveloping the lemmas *Arundineae*
- 15b. Lemmas and rhachilla usually glabrous, rarely hairy but then the hairs not enveloping the lemmas:

- 16a. Leaf-blades tessellately nerved *Cenothecaceae*
- 16b. Leaf-blades not tessellately nerved:
- 17a. Tall reed-like grasses; leaves distichous *Thysanotaceae*
- 17b. Small or moderate sized grasses; leaves usually not distichous:
- 18a. Inflorescence of several digitate or subdigitate racemes or spikes:
- 19a. Spikelets awned; lowest floret of a spikelet bisexual, others reduced to awns or male or empty florets
Chloridaceae
- 19b. Spikelets not awned; all florets of a spikelet fertile
Eragrostaceae
- 18b. Inflorescence not as above:
- 20a. Leaf-blades convolute; inflorescence capitate; lemmas 7-8-nerved, without awns
Aeluropodaceae
- 20b. Leaf-blades flat; inflorescence not capitate; lemmas usually 1-5-nerved, rarely 7-nerved, but then with awns:
- 21a. Spikelets with one fertile floret, with one or two male or barren florets below it:
- 22a. Second lemma usually awned or at least with a bristle; glumes unequal in size
Arundinellaceae
- 22b. Second lemma not awned; glumes almost equal in size
Ischnaceae
- 21b. Spikelets with two or more fertile florets:
- 23a. Lemmas 1-3-nerved *Eragrostaceae*
- 23b. Lemmas 5-many nerved:
- 24a. Spikelets with 2-florets *Danthoniaceae*
- 24b. Spikelets with 3-many florets:
- 25a. Glumes as long as or longer than the lowest floret, often as long as the spikelets and enclosing the florets
Aveneae
- 25b. Glumes usually shorter than the lowest floret with the upper floret distinctly exserted
Festuceae

POOIDEAE AELUROPODEAE

AELUROPODEAE Nevski

Nevski in Act. Inst. Bot. Acad. Sci. U.R.S.S. ser. 1, 3: 336. 1937; Bor, Grass. Bur. Cey. Ind. Pak. 379. 1960.

AELUROPUS Trin.

Trin. Fund. Agrost. 143. 1820; Hook. f. Fl. Brit. Ind. 7: 333. 1896; Fischer in Gamble, Fl. Pres. Madr. 1843. 1934 (Repr. ed. 3: 1275. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 380. 1960.

A genus of about 6 species distributed from the mediterranean region to India, of which one species occurs in India and Kerala.

Aeluropus lagopoides (Linn.) Trin. ex Thw. Enum. Pl. Zeyl. 374. 1864; Fischer in Gamble, Fl. Pres. Madr. 1843. 1934 (Repr. ed. 3: 1276. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 380. 1960. *Dactylis lagopoides* Linn. Mant. Pl. 1: 33. 1767. *Aeluropus villosus* Trin. ex C. A. Mey. Verz. Pfl. Canc. 18. 1831; Hook. f. Fl. Brit. Ind. 7: 334. 1896. PLATE No. 64

Perennials. Culms 5-40 cm long, rhizomatous, creeping or trailing, decumbent; nodes glabrous. Leaves lanceolate, linear-lanceolate, narrow, 0.2-5 x 0.1-0.3 cm, distichous, rounded or shallowly cordate at base, glaucous. Ligules membranous, fimbriate. Inflorescence capitate, globose, densely crowded, 0.5-1.5 cm diameter. Spikelets elliptic or elliptic-lanceolate, 3-4 mm long, 6-8-flowered. Lower glume oblong-lanceolate, 1.5-2 x 0.5 mm, chartaceous, 1-3-nerved, densely villous. Upper glume oblong or elliptic-lanceolate, 2.5-3 x 0.5-1 mm, chartaceous, 5-7-nerved, densely villous. Lower floret male or barren. Lemmas oblong or ovate-oblong, 2-3 x 1-1.5 mm, shortly notched, mucronate, chartaceous, 7-9-nerved, softly villous. Paleas oblong or oblong-lanceolate, 2-3 x 1-1.5 mm, hyaline, 3-lobed, 2-keeled, 2-nerved, ciliate along the keels. Stamens 3, anthers 1-1.5 mm long. Ovary oblong or ovate, c. 0.5 mm long; styles 0.5-1 mm long, stigmas 1-1.5 mm long.

Rare, along the coastal belts and salt-marshes, often in damp soils, sometimes on sandy soils, in wastelands and other fallow fields.

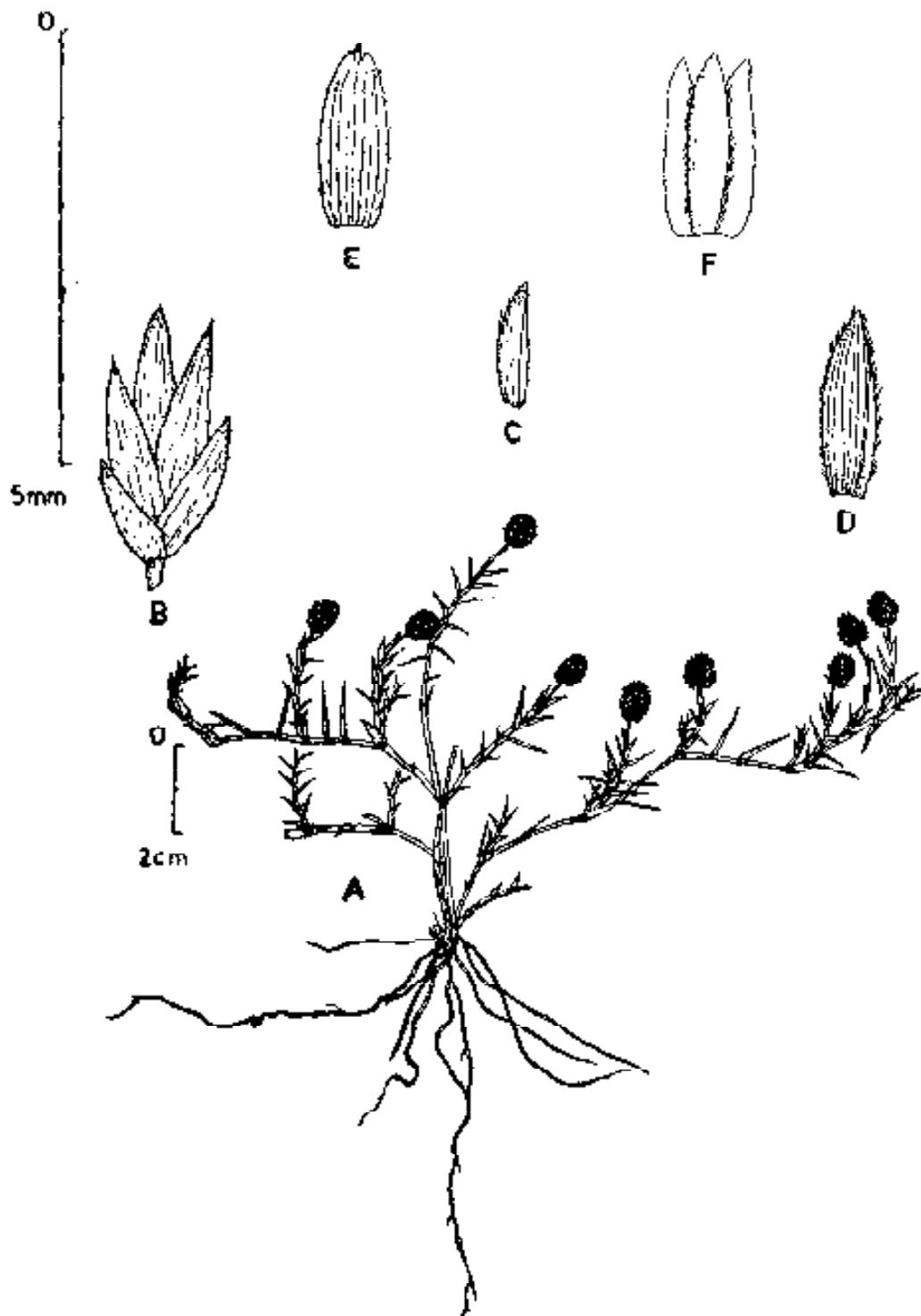


PLATE No. 64 : *AELUROPUS LAGOPOIDES* (Linn.) Trin.

A. Habit; B. Spikelet; C. Lower glume; D. Upper glume; E. Lemma;
F. Palea.

Fl. & Fr. : January-July.

Notes : This halophytic grass often serves as a very good soil-binder along the tidal marshes of seacoasts. The entire plant is glaucous. The plant seems to be rare in Kerala. There is only a very old gathering of this plant in MH, from this state. This could not be located during the present study.

Malabar (*Stacks, s.n. M.H.*)

POOIDEAE - AGROSTIDEAE

AGROSTIDEAE Dumort.

Dumort Obs. Gram. Belg. 83: 125, 1823; Bor, Grass, Bur. Cey. Ind. Dumort. Pak. 382, 1960.

AGROSTIS Linn.

Linn. Sp. Pl. 1: 61 1753 et Gen. Pl. ed. 5, 30, 1754; Bor, Grass, Bur. Cey. Ind. Pak. 383, 1960.

A genus of about 150-200 species distributed in temperate and cold regions of the World, of which about 25 species occur in India and 2 in Kerala.

Key to the species

- 1a. Spikelets 3-4 mm long; lemmas glabrous; paleas as long as the lemmas
A. peninsularis 1
 - 1b. Spikelets 2-3 mm long; lemmas hairy; paleas less than half as long as the lemmas
A. pilosula 2
1. *Agrostis peninsularis* Hook. f. Fl. Brit. Ind. 7: 255, 1896; Fischer in Gamble, Fl. Pres. Madr. 1810. 1934 (Repr. ed. 3: 1253, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 389, 1960.

Annuals or perennials. Culms 20-80 cm high, tufted, erect; nodes glabrous. Leaves lanceolate or linear-lanceolate or linear, 3-15 x 0.1-0.5 cm, acute or acuminate, rounded at base, glaucous or green. Ligules ovate, membranous, truncate or lacerate, 1-3 mm long. Panicles pyramidal, 5-20 cm long, very lax. Spikelets lanceolate, or elliptic-lanceolate, 1-flowered, 3-4 mm long, purplish; pedicels swollen at tip. Lower glume lanceolate or oblong-lanceolate, 3-4 x 0.5-1 mm, sharply acute, chartaceous, 1-nerved, keeled. Upper

glume lanceolate or oblong-lanceolate, 2.5-3 x 0.5-1 mm, sharply acute, chartaceous, 1-nerved, keeled. Upper glume lanceolate or oblong-lanceolate, 2.5-3 x 0.5-1 mm, keeled, chartaceous, 1-3-nerved. Lemma oblong or oblong-lanceolate, 2-3 x 1-1.5 mm, 2-lobed, awned in between, chartaceous, 5-nerved; awn basal, 4-6 mm long. Palea oblong-lanceolate, 2-2.5 x 0.5 mm, hyaline, 2-keeled, 2-nerved. Stamens 3, anthers 0.5-1.25 mm long. Ovary obovate or oblong; stigmas 0.5-1 mm long.

Rare, in open grasslands of higher elevations, often in association with *Arundinella purpurea*, *Helictotrichon virescens*, *Chrysopogon zeylanicus* etc.

Fl. & Fr. : November-January.

Notes : This species is closely allied to *A. pilosula*, but differs by the larger spikelets, glabrous lemmas and the paleas which are equal to the lemmas in length. *A. peninsularis* is rather uncommon than the other species. This endemic grass is represented in MH only by a single collection from Kerala.

IDUKKI : Umaiyamala.

2. *Agrostis pilosula* Trin. in Mem. Acad. Sci. Petersb. ser. 6, 6 : 372. 1841; Fischer in Gamble, Fl. Pres. Madr. 1810. 1934 (Repr. ed. 3 : 1254, 1957); Bor, Grass, Bur. Cey. Ind. Pak. 383. 1960. PLATE No. 65

Annuals or perennials. Culms 10-40 cm high, erect, tufted, rarely decumbent and rooting at the lower nodes; nodes glabrous. Leaves linear, lanceolate or linear acuminate, 3-12 x 0.1-4 cm, rounded at the base, scabrid. Ligules ovate, membranous, 1-3 mm long, lacerate. Panicles broadly ovate, pyramidal or lanceolate, 3-20 cm long, lax, green or purplish. Pedicels inflated at tip. Spikelets elliptic-lanceolate, 2-3 x 0.5-1.5 mm, 1-flowered. Lower glume lanceolate or oblong-lanceolate, 2-3 x 0.5-1 mm, chartaceous, 1-nerved, keeled. Upper glume oblong-lanceolate, 2-2.5 x 0.5-1 mm, chartaceous, 1-3-nerved, keeled. Lemma elliptic or oblong-lanceolate, 1.5-2 x 0.5-1 mm, notched, each lobe bipartite, awned, chartaceous, 5-nerved, villous; awns 3-6 mm long. Palea oblong, 0.5-1 mm long, hyaline. Stamens 3; anthers 0.5-1 mm long. Ovary oblong, c. 0.25 mm long; styles 0.25-0.5 mm long; stigmas 0.5-1 mm long.

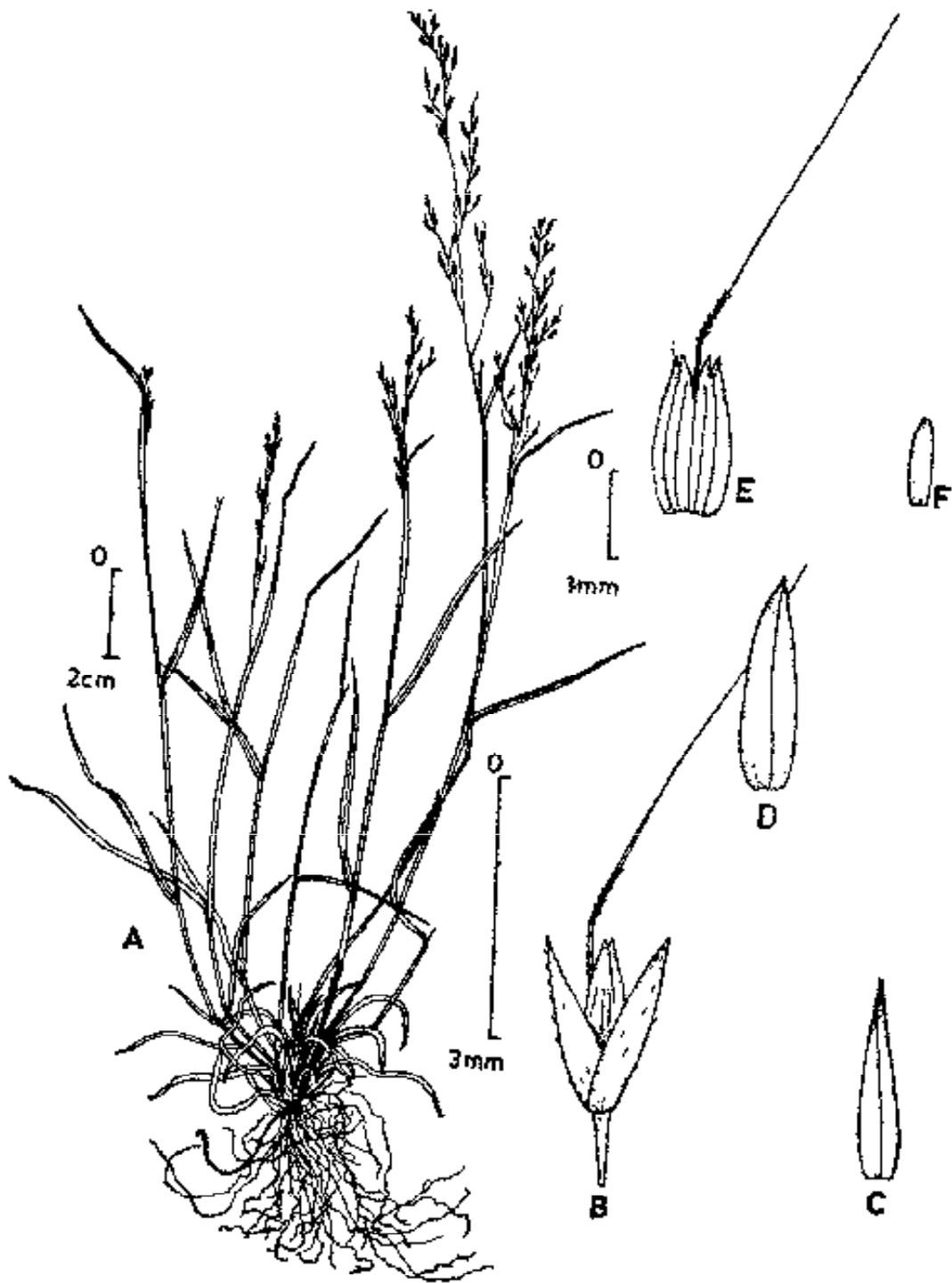


PLATE No. 65 : *AGROSTIS PILOSULA* Trin.

A. Habit; B. Spikelet; C. Lower glume; D. Upper glume; E. Lemma;
 F. Palea.

Frequent along open grasslands of higher elevations, often associated with *Chrysopogon zeylanicus*, *Arundinella purpurea*, *Helictotrichon virescens* etc.

Fl. & Fr. : August-January.

Notes : This species is very closely related to *A. peninsularis*, but differs by the smaller spikelets, hairy lemmas and the paleas that are less than half the length of the lemmas. This is rather common along the grasslands of higher elevations.

IDUKKI : Eravikulam National Park.

POOIDEAE ARISTIDEAE

ARISTIDEAE C.E. Hubb.

C. E. Hubb. In C. E. Hubb. & Vaughan, *Grass, Maur.* 20, 1940; *Bor, Grass, Bur. Cey. Ind. Pak.* 404, 1960.

ARISTIDA Linn.

Linn, *Sp. Pl.* 82, 1753 et *Gen. Pl.* ed. 5, 35, 1754; *Bor, Grass, Bur. Cey. Ind. Pak.* 404, 1960.

A genus of about 250 species distributed in the tropics and subtropics of the World, usually in areas of poor dry soils with low rainfall, of which about 15 species occur in India and 3 in Kerala.

Key to the species

- 1a. Panicles effuse, spreading, often as broad as long *A. hystrix* 2
- 1b. Panicles contracted:
 - 2a. Spikelets 8-20 mm long; glumes prominently awned; panicles up to 50 cm long; awns of the lemmas up to 40 mm long *A. setacea* 3
 - 2b. Spikelets 5-10 mm long; glumes not awned or very shortly aristate; panicles up to 20 cm long; awns of the lemmas up to 20 mm long *A. adscensionis* 1

- 1. *Aristida adscensionis* Linn, *Sp. Pl.* 82, 1753; Hook, f. *Fl. Brit. Ind.* 7: 224, 1896; Rang. & Tad, *Handb. S. Ind. Grass.* 223, t. 171-172, 1921; *Bor, Grass, Bur. Cey. Ind. Pak.*

407. t. 43. 1960; Cope in Nasir & Ali, Fl. Pak. 143. 41
1982. *A. depressa* Retz. Obs Bot. 4: 22. 1786; Fischer
in Gamble, Fl. Pres. Madr. 1809. 1934 (Repr. ed. 3:
1251 1957); Bor, Grass. Bur. Cey. Ind. Pak. 409. 1960.

Annuals or perennials. Culms 10-60 cm high, tufted, erect or geniculate; nodes glabrous. Leaves linear-acuminate, 1-15 x 0.1-0.3 cm, narrow or rounded at base, often convolute. Ligules membranous, fimbriate. Panicles flabelliform, 3-20 cm long, contracted or occasionally lax. Spikelets linear-lanceolate, 5-10 mm long, pale green or purplish. Callus softly bearded. Lower glume oblong-lanceolate or lanceolate, 4-6 x 0.5-1 mm, chartaceous, keeled, 1-nerved. Upper glume oblong-lanceolate or linear-lanceolate, 6-10 x 0.5-1 mm, chartaceous, keeled, 1-nerved. Lemma linear-oblong, 6-8 x 0.5-1 mm, laterally compressed, convolute, scabrid on the keels, 3-awned, awns 5-20 mm long. Palea oblong, minute, hyaline. Stamens 3, anthers 1-2 mm long. Stigmas 1-2 mm long.

Very common along the roadsides, wastelands, dry fields, hill-slopes, rocky places, and occasionally on old compound walls; often in dry habitats.

Fl. & Fr. : March-August.

Notes : This is a highly polymorphic species. Bor (*l.c.*) maintains *Aristida adscensionis* and *A. depressa* separately. It is often very difficult to segregate them. According to Cope (*l.c.*) there are no discontinuities between *A. depressa*, an extreme from completely intergrading with *A. adscensionis*. This species may be confused with *A. setacea*, but can be distinguished by the awnless glumes and smaller spikelets.

PALGHAT: Walayar; QUILON: Thenmala; TRIVANDRUM: Kariavattom,

2. *Aristida hystrix* Linn. f. Suppl. Pl. 113. 1781; Hook. f. Fl. Brit. Ind. 7: 225. 1896; Rang. & Ted. Handb. S. Ind. Grass. 226. t. 174. 1921; Fischer in Gamble, Fl. Pres. Madr. 1809. 1934 (Repr. ed. 3: 1252. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 410. 1960.

Perennials. Culms 20-80 cm high, tufted, erect; nodes glabrous. Leaves lanceolate or linear-lanceolate, 3-20 x 0.1-0.3 cm, acuminate, flat or convolute, glaucous. Ligules row of hairs or very narrow fim-

briate membranes. Panicles ovate, very lax, 5-20 cm long, 2-12 cm wide, spreading. Pedicels 3-8 mm long. Spikelets lanceolate or elliptic-lanceolate, 10-20 mm long, yellowish or straw-coloured. Callus 1-3 mm long, pungent, white-bearded. Lower glume oblong-lanceolate, 5-10 x 1-1.5 mm, chartaceous, keeled, aristate; arista 1-2 mm long. Upper glume oblong-lanceolate or elliptic-lanceolate, 10-18 x 1-2 mm, shortly aristate or acuminate, chartaceous, 1-nerved. Lemma linear, 8-12 x 1 mm, convolute, chartaceous, 3-awned; awn 20-50 mm long. Palea narrowly oblong, small, hyaline. Stamens 3; anthers 1-2 mm long. Ovary linear-oblong, 0.5-1 mm long; styles 0.5-1 mm long; stigmas 1-2 mm long. Grains linear or linear-oblong, terete, 6-8 x 0.5-1 mm.

Rare, along the coastal areas, on dry, rocky soil and other drier habitats.

Fl. & Fr. : June-December.

Notes : This species is quite distinct from the other species of the genus by its very effuse, spreading panicles which are almost as broad as long.

CANNANORE : Melarcode; TRIVANDRUM : Ponmudi.

3. *Aristida setacea* Retz, Obs. Bot. 4: 22. 1786; Hook. f. Fl. Brit. Ind. 7: 225. 1896; Rang. & Tad. Handb. S. Ind. Grass. 225. t. 173. 1921; Fischer in Gamble, Fl. Pres. Madr. 1809, 1934 (Repr. ed. 3: 1252. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 412. 1960.

Perennials. Culms 30-150 cm high, tufted, erect; nodes glabrous. Leaves linear or lanceolate, whip-like, 3-30 x 0.1-0.5 cm, acuminate, rounded or shallowly cordate at base, convolute, glaucous. Ligules rim of hairs or fimbriate membranes. Panicles flabelliform, contracted, 10-50 cm long. Spikelets linear-lanceolate or lanceolate, 8-20 mm long. Callus pungent, 1-3 mm long, bearded. Lower glume lanceolate or oblong-lanceolate, 6-12 x 0.5-1 mm, aristate, chartaceous, keeled, 1-nerved; arista 2-4 mm long. Upper glume lanceolate or oblong lanceolate, 6-14 x 0.5-1 mm, aristate, chartaceous, keeled, 1-nerved; arista 2-4 mm long. Lemma linear or lanceolate, 8-12 x 1 mm, chartaceous, convolute, 3-awned, awns 5-40 mm long. Palea small, oblong, hyaline. Stamens 3, anthers 2.5-4 mm long, bright-

yellow. Ovary oblong or linear, 1-2 mm long; styles 1-2 mm long; stigmas 3-4 mm long, pink.

Very common along the roadsides, hill-slopes, waste places, banks of backwaters, road-cuttings, in open grasslands and dry, rocky places.

Fl. & Fr. : Throughout the year.

Notes : *Aristida setacea* shows considerable variation in the habit, size of spikelets, and in the length of awns. This species is nearer to *A. adscensionis*, but differs by the awned glumes, robust culms and larger panicles.

The long, flabelliform panicles of this grass is extensively used for making brooms.

ALLEPPEY : Pallana, Thrikkunnappuzha; CALICUT : Kakkodi, Pokkunnamala; CANNANORE : Mambrom, Telficherry; QUILON : Kodumon. Residency ward; TRIVANDRUM : Kottur R. F., Sreekariyam.

POOIDEAE ARUNDINEAE

ARUNDINEAE Dumort.

Dumort, Obs. Gram. Belg. 82: 124. 1823; Bor, Grass. Bur. Cey. Ind. Pak. 413. 1960.

Key to the genera

- 1a. Lemmas hairy on the back, atleast in the lower half; rachilla glabrous *Arundo* 1
 1b. Lemma glabrous; rachilla densely silky-villous *Phragmites* 2

1. ARUNDO Linn.

Linn. Sp. Pl. 81. 1753 et Gen. Pl. ed. 5. 35. 1754; Bor, Grass. Bur. Cey. Ind. Pak. 413. 1960.

A genus of about 12 species distributed in the tropical and temperate regions of the World, of which 1 species occurs in India and also in Kerala.

Arundo donax Linn. Sp. Pl. 1: 81, 1753; Hook. f. Fl. Brit. Ind. 7: 302, 1896; Fischer in Gamble, Fl. Pres-Madr. 1805, 1934 (Repr. ed. 3: 1250, 1957); Bor, Grass. Bur. Cey. Ind. Pak, 413, t. 44, 1960.

Perennials. Culms reed-like, 40-200 cm or more high, erect, tufted, with creeping woody rhizomes; nodes glabrous. Leaves lanceolate or linear-lanceolate, acuminate, 8-40 x 0.5-3 cm, rounded, shallowly cordate or amplexicaul at base. Sheaths glabrous or tubercle-based hairy. Ligules membranous, fimbriate or ring of stiff hairs. Panicles 20-50 cm long, compact. Pedicels scaberulous. Spikelets elliptic-lanceolate or lanceolate, 8-18 mm long, 2-3-flowered. Rhachilla 0.5-1 mm long, glabrous. Lower glume lanceolate, 8-12 x 1-2 mm, acuminate, chartaceous, 3-nerved. Upper glume lanceolate, 8-10 x 1-2 mm, acuminate, chartaceous, 3-nerved. Lemma lanceolate, 10-16 x 1-2 mm, acuminate, chartaceous, 3-5-nerved, densely villous in the lower half, hairs 2-10 mm long. Palea elliptic or oblong-lanceolate, shortly notched, 3-5 x 1-1.5 mm, 2-keeled, 2-nerved, keels ciliolate in the upper half. Stamens 3, anthers 1-2 mm long. Ovary oblong, 0.5-1 mm long; styles 1-2 mm long; stigmas 1-2 mm long.

Frequent, along the railway tracks, banks of streams, backwaters and canals; usually in wet habitats.

Fl. & Fr. : August-December.

Notes : This common 'Giant reed' is very closely related to *Phragmites karka* and may often get confused with it, in juvenile stages. But *Arundo donax* differs from *Phragmites karka* by the silky beard at the base of the lowest panicle branch, hairy lemmas, glabrous rhachilla and broader leaves with conspicuously cordate bases.

CALICUT : Calicut; **PALGHAT** : Anakatti, Mathur; **TRICHUR** : on way to Kundazhi.

2. PHRAGMITES Adans.

Adans. Fam. Pl. 2: 34, 559, 1763; Hook. f. Fl. Brit. Ind. 7: 303, 1896; Bor, Grass. Bur. Cey. Ind. Pak. 415, 1960; Cope in Nasir & Ali, Fl. Pak. 143; 23, 1982.

A genus of about 3 species distributed in the tropical Asia, of which 2 species occur in India and one in Kerala.

According to Cope (*l.c.*) *Phragmites* Trin. is an invalid homonym, which has become superfluous by an earlier, validly published *Phragmites* Adans.

Phragmites karka (Retz.) Trin. ex Steud. Nom. Bot. ed. 2, 2: 324. 1841; Hook. f. Fl. Brit. Ind. 7: 304. 1896; Fischer in Gamble, Fl. Pres. Madr. 1807. 1934 (Repr. ed. 3: 1251. 1957); Bor. Grass. Bur. Cey. Ind. Pak. 416. 1960; Cope in Nasir & Ali, Fl. Pak. 143; 26. 1982; Manilal & Sivaraj, Fl. Calic. 345. 1982. *Arundo karka* Retz. Obs. Bot. 4: 21. 1786.

var. *karka*

Perennials. Culms reed-like, 50-300 cm or more high, densely tufted, erect, with creeping rhizomes; nodes glabrous. Leaves lanceolate, linear-lanceolate or linear, long acuminate, 10-60 x 0.5-2 cm, rounded or shallowly cordate at base, scabrid on both surfaces, green or glaucous. Ligules narrow rim or fringe of hairs. Panicles pyramidal, lax, 15-50 cm long, white woolly, lowest nodes bearded. Spikelets linear or lanceolate, 8-16 mm long, 3-6-flowered. Rhachilla 0.6-1.5 mm long, densely silky villous, hairs 5-12 mm long. Lower glume ovate-lanceolate or oblong-lanceolate, 3-4 x 1 mm, chartaceous, 1-3-nerved, keeled. Upper glume narrowly elliptic, elliptic-lanceolate or oblong-lanceolate, 4-6 x 1-1.5 mm, chartaceous, 3-nerved. Lowest lemma barren, narrowly elliptic. Fertile lemmas lanceolate or linear-lanceolate, 6-12 x 0.5-1 mm, acuminate, chartaceous, 1-3-nerved. Paleas oblong-lanceolate or elliptic-lanceolate, 2-4 x 0.5-1 mm, hyaline, 2-keeled, 2-nerved. Stamens 3; anthers 1-2 mm long.

Very common, along the banks of backwaters, beside streams and rivers, sometimes in swamps and marshes; often associated with *Saccharum spontaneum* and *Pandanus* sp.

Fl. & Fr.: Throughout the year.

Notes: This common reed-like grass often grows gregariously along the watercourses of the coastal areas. It is very similar to *Arundo donax* but can be distinguished by the narrower leaves, glabrous lemmas and densely villous rhachilla of the spikelets. This grass is said to be poisonous to cattle.

ALLEPPEY: Alleppey, Nedumudi, Punnamada, R. Block;
PALGHAT: Chindaki; Pottikkal forest.

POOIDEAE - ARUNDINELLEAE

ARUNDINELLEAE Stapf

Stapf in Dyer, Fl. Cap. 7: 314. 1898; Bor, Grass. Bur. Cey. Ind. Pak. 417. 1960.

Key to the genera

- 1a. Panicles contracted, spiciform, ovate, densely spiculate:
- 2a. Lemmas of the upper floret deeply notched, awned in the sinus, bearded on the dorsal side; awns twisted *Jansenella* 3
- 2b. Lemma of the upper floret entire, not bifid; awns straight
Chandrasekharania 2
- 1b. Panicles lax, not spiciform, loosely spiculate *Arundinella* 1

1. ARUNDINELLA Reddi

Reddi, Agrost. Bras. 36. 1823; Bor, Grass. Bur. Cey. Ind. Pak. 417. 1960.

A genus of about 50 species distributed in the tropical regions of the World, mainly in Asia, of which about 18 species occur in India and 10 species in Kerala, including a new species, *A. kannanorica*,

Key to the species

- 1a. Spikelets 1-2 mm long; culms slender, up to 60 cm long; panicles very effuse, up to 30 cm long *A. pumila* 7
- 1b. Spikelets well over 2 mm long; culms and panicles not as above:
- 2a. Upper lemma with 2 setae on either side of the awn at the tip:
- 3a. Spikelets elliptic-lanceolate, 4-6 mm long, greenish-yellow, glabrous; panicles 5-25 cm long, often drooping *A. satasa* 9
- 3b. Spikelets lanceolate-acuminata, 4-8 mm long, brown or purplish, densely tubercle-based hairy; panicles 2-15 cm long, with spreading branches *A. mesophylla* 4
- 2b. Upper lemma without such setae, awned or awnless:
- 4a. Culms, leaves and spikelets densely hairy with tubercle-based bilobes; panicles narrow, spiciform:
- 5a. Spikelets 2-4 mm long; panicles loosely spiculate; leaves elliptic-lanceolate or lanceolate, up to 15 mm long; lower glume much longer than the lower lemma *A. ciliata* 2

- 5b. Spikelets 2-8 mm long; panicles densely spiculate; leaves linear-lanceolate, up to 40 cm long; lower glume as long as the lower lemma
A. vaginata 10
- 4b. Culms, leaves and spikelets glabrous or sparsely hairy; panicles often lax, not spiciform:
- 6a. Panicles often contracted; leaves rounded at base or subcordate, often collected at the base of the plant, bluish-green turning yellow when dry:
- 7a. Pedicels very long; panicles effuse; spikelet more or less glabrous
A. purpurea var. *laxa* 8
- 7b. Pedicels short; panicles compact; spikelets bristly or at least scabrid
A. purpurea var. *purpurea* 8
- 6b. Panicles often very effuse; leaves not as above:
- 8a. Spikelets distinctly awned; base of the upper lemma bearded:
- 9a. Slender annuals; culms glabrous below the panicles; pedicels often longer:
- 10a. Spikelets 2-3 mm long; branches of panicles not ascending, more or less glabrous; upper lemma smooth, greenish yellow
A. mezii 5
- 10b. Spikelets 5-6 mm long; branches of panicles ascending, villous at nodes; upper lemma muriccate, chestnut brown when fully matured
A. cannanorica 1
- 9b. Stout perennials; culms puberulous below the panicles; pedicels much shorter; spikelets 3-4 mm long; panicles 20-40 cm long
A. nepalensis 6
- 8b. Spikelets not awned or very rarely aristate, 2-4 mm long; base of upper lemma glabrous; panicles 5-25 cm long
A. leptochloa 3

1. *Arundinella cannanorica* V.J. Nair, P.V. Sreekumar & N.C. Nair in J. Bomb. Nat. Hist. Soc. 80(2): 396. 1984.

PLATE No. 66

Annuals. Culms 20-50 cm tall, erect, slender; nodes glabrous. Leaves 2-5 cm long and 2-5 mm broad, mostly basal, lanceolate, base rounded or shallowly cordate, glabrous or covered with sparse tubercle-based hairs, especially along the margins. Sheaths 1-8 cm, lower ones shorter and upper ones much longer than the internodes, striate, glabrous or ciliate along one margin. Ligule a row of hairs. Panicles 10-40 cm

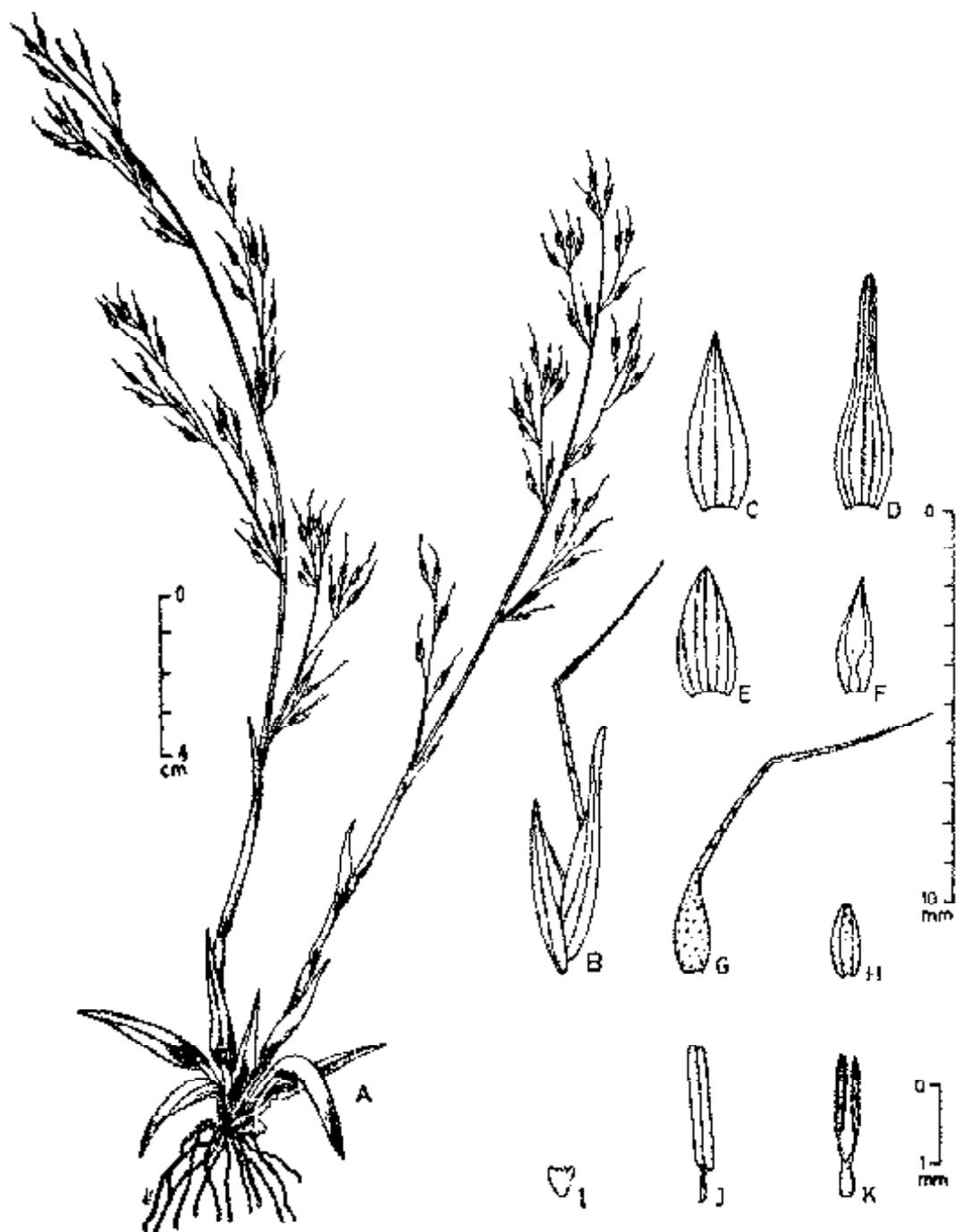


PLATE No. 66: *ARUNDINELLA CANNANORICA* V.J. Nair, P.V. Sreekumar & N. C. Nair

A. Plant; B. Spikelet; C. Lower glume; D. Upper glume; E. Lower lemma; F. Palea; G. Upper lemma; H. Palea; I. Lodicule; J. Stamen; K. Pistil.

long, lax, willowy; branches 1-12 cm long, ascending, alternate or rarely whorled, slender, filiform, angular, bearded at the nodes with long silky hairs, purple; rachis flexuous, angular and scaberulous; pedicels 2-15 mm long, slender, angular, scaberous. Spikelets 5-6 mm long, lanceolate, acuminate, turgid. Pale-green or purple, glabrous. Lower glume 3.5-4.5 x 1-1.5 mm, ovate-lanceolate, strongly 3-nerved, purple, glabrous. Upper glume 5-5.5 x 1.25-1.5 mm, ovate-lanceolate, caudate or long-acuminate, strongly 5-nerved, greenish with purple tinge, glabrous. Lower floret male; lemma 2.75-3 x 1-1.5 mm, and glabrous; palea 1-2.5 x 0.5-0.75 mm, elliptic-lanceolate, 2-keeled and auriculate at base, 2-nerved, hyaline, glabrous; stamens 3; anthers 1-1.5 mm long, filaments short. Upper floret bisexual; callus bearded, hairs 0.25-0.5 mm long; lemma 1.75-2 x 0.5-0.75 mm, ovate or elliptic, tip with a geniculate awn, dorsally covered with numerous wart-like outgrowths, chestnut brown when fully matured, awn 8-10 mm long, geniculate, column c. 4 mm long, chestnut brown; palea 1.25-1.5 x 0.4-0.5 mm, oblong, acute, 2-nerved, with a few wart like outgrowths on the dorsal surface; lodicules 2, each c. 0.3 x 0.25 mm, obovate, denticulate at apex; stamens 3, anther 1-2 mm long, violet, filaments short; ovary c. 0.25 x 0.15 mm, ovate, glabrous; styles c. 0.5 mm long, stigmas c. 1 mm long, pink, feathery.

Frequent in dry rocky areas and open grasslands, and other very dry localities along with other grasses such as *Arundinella mesophylla* Nees, *Bhidea burnsiana* Bor and a few *Dimeria* spp.

Fl. & Fr. : October-December.

CANNANORE: Bela, Paramba.

2. *Arundinella ciliata* (Roxb.) Nees ex Miq. in Verh. Konink. Nederl. Inst. 3(4): 30, 1851; Bor, Grass. Bur. Cey, Ind. Pak, 421 1960. *Holcus ciliatus* Roxb. Fl. Ind. 1: 321, 1820. *Arundinella holcoides* auct. non Trin. 1836; Fischer in Gamble, Fl. Pres. Madr. 1801, 1934, (Repr. ed. 3: 1247, 1957), *A. agrostoides* auct. non Trin. 1836; Hook. f. Fl. Brit. Ind. 7: 71, 1896.

Annuals. Culms 5-50 cm high, erect, densely tubercle-based hairy; nodes bearded. Leaves elliptic-lanceolate, lanceolate or linear-lanceolate, 2-15 x 0.2-1.2 cm, acuminate, rounded or shallowly cordate at base, densely tubercled hairy. Sheaths tubercled hairy. Ligules fimbriate membrane or row of hairs. Panicles oblong or oblong lanceolate, narrow, 2-20 cm, long, 2-20 mm wide, contracted. Spikelets elliptic-lanceolate or lanceolate, 2-4 mm long, densely tubercled, hairy. Lower glume lanceolate or oblong-lanceolate, 3-3.5 x 1 mm, acuminate, chartaceous, 5-nerved, densely tubercled hairy in the lower half. Upper glume oblong-lanceolate, 3-4 x 1 mm, caudate-acuminate, chartaceous, 5-7-nerved, tubercled hairy towards base. Lower floret male. Upper floret bisexual. First lemma oblong or elliptic-oblong, 2-2.5x1 mm, delicate, 3-nerved. Palea elliptic or oblong-elliptic, 1-1.5 x 0.5 mm, delicate, hyaline, 2-keeled, faintly 2-nerved. Second lemma oblong-elliptic or elliptic, 1-1.5x0.5-1 mm, subcoriaceous, granular, awned; awns 4-8 mm long, column 1-2 mm long. Palea elliptic, c. 1 x 0.5 mm, subcoriaceous, granular. Stamens 3; anthers 0.25-0.5 mm long.

Fairly common along the roadsides of hilly places, moist, rocky places and hill-slopes.

Fl. & Fr. : October-January.

Notes : The whole plant is densely tubercle-based hairy. This species can be easily distinguished from all other species of the genus by the narrowly contracted, spiciform panicles and densely tubercle-based hairy culms and leaves. This species shows some resemblance to *A. tuberculata*, where the spikelets are larger and the upper lemmas possess two setae on either side of the awn.

CANNANORE: Kannoth, Peria, way to Kannoth; IDUKKI: Pallivasal, Peermade, Kuttikanam, Munnur; PALGHAT: Silent Valley; QUILON: Anathode; TRIVANDRUM: Ponmudi; WYNAD: Vayitri.

3. *Arundinella leptochloa* (Nees ex Steud.) Hook. f. Fl. Brit. Ind. 7: 76. 1896; Fischer in Gamble, Fl. Pres. Madr. 1802. 1934 (Repr. ed. 3: 1247. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 423. 1960; Manilal & Sivraj, Fl. Calic. 346. 1982. *Panicum leptochloa* Nees ex Steud. Syn. Pl. Glum. 1: 62. 1854. *Arundinella lawsonii* Hook. f. Fl. Brit. Ind. 7: 76. 1896. PLATE No. 67

Perennials. Culms 30-150 cm high, erect or geniculate; nodes glabrous. Leaves lanceolate, linear-lanceolate or linear, 1-35 x 0.2-2 cm, acuminate, rounded or shallowly cordate at base, tubercle-based hairy or glabrous. Sheaths tubercle-based hairy or glabrous. Ligules ovate, thin, membranous. Panicles ovate, pyramidal or oblong-lanceolate, 5-25 cm long, lax. Spikelets elliptic-lanceolate, 2-4 mm long. Lower glume ovate-acute, 1.5-3 x 1-1.5 mm, acuminate, chartaceous, 3-nerved, scaberulous on the nerves. Upper glume ovate-lanceolate, 2-3 x 1-1.5 mm, acuminate, chartaceous, 5-nerved. Lower floret male. Upper floret bisexual. First lemma ovate-oblong or oblong-acute, 2-2.5 x 1-1.5 mm, chartaceous, 5-nerved. Palea elliptic or oblong-elliptic, 1.5-2 x 0.5-1 mm, delicate, hyaline. Stamens 3, anthers c. 1 mm long, pink. Second lemma oblong-elliptic or elliptic, 1-1.5 x 0.5-1 mm, muricate. Palea oblong-lanceolate, c. 1 x 0.5 mm, delicate, chartaceous with wart-like outgrowths. Stamens 3, anthers 1-1.5 mm long, pink. Ovary small, stigmas 1-1.5 mm long, violet.

Very common along the bunds of cultivated fields, hill-slopes, road-cuttings, wastelands and along the shades of cashew plantations; usually in shady places.

Fl. & Fr.: Throughout the year.

Notes: This species is very closely allied to *A. metzii* and may often be confused with it in the field because of the similarity in the shape of leaves, panicles and spikelets, but *A. leptochloa* can be distinguished from the other species by the robust culms and leaves, larger panicles and spikelets and the glabrous base of the upper lemma. It is a highly variable species.

CALICUT: Chelannur, Peruvannamuzhi; CANNANORE: Bandudka, Elimala, Muzhappilangad; PATHANAMTHITTA: Pathanamthitta; TRICHUR: Adirappally; TRIVANDRUM: Aruvikkara, Bonnacord, Nedumangad, Peppara.

4. *Arundinella mesophylla* Nees ex Steud. Syn. Pl. Glum. 1: 115. 1854; Hook. f. Fl. Brit. Ind. 7: 69. 1896; Fischer in Gamble, Fl. Pres. Madr. 1801. 1934 (Repr. ed. 3: 1246. 1957); Bor. Grass. Bur. Cey. Ind. Pak. 423. 1960; Manilat & Sivaraj. Fl. Calic. 346. 1982.

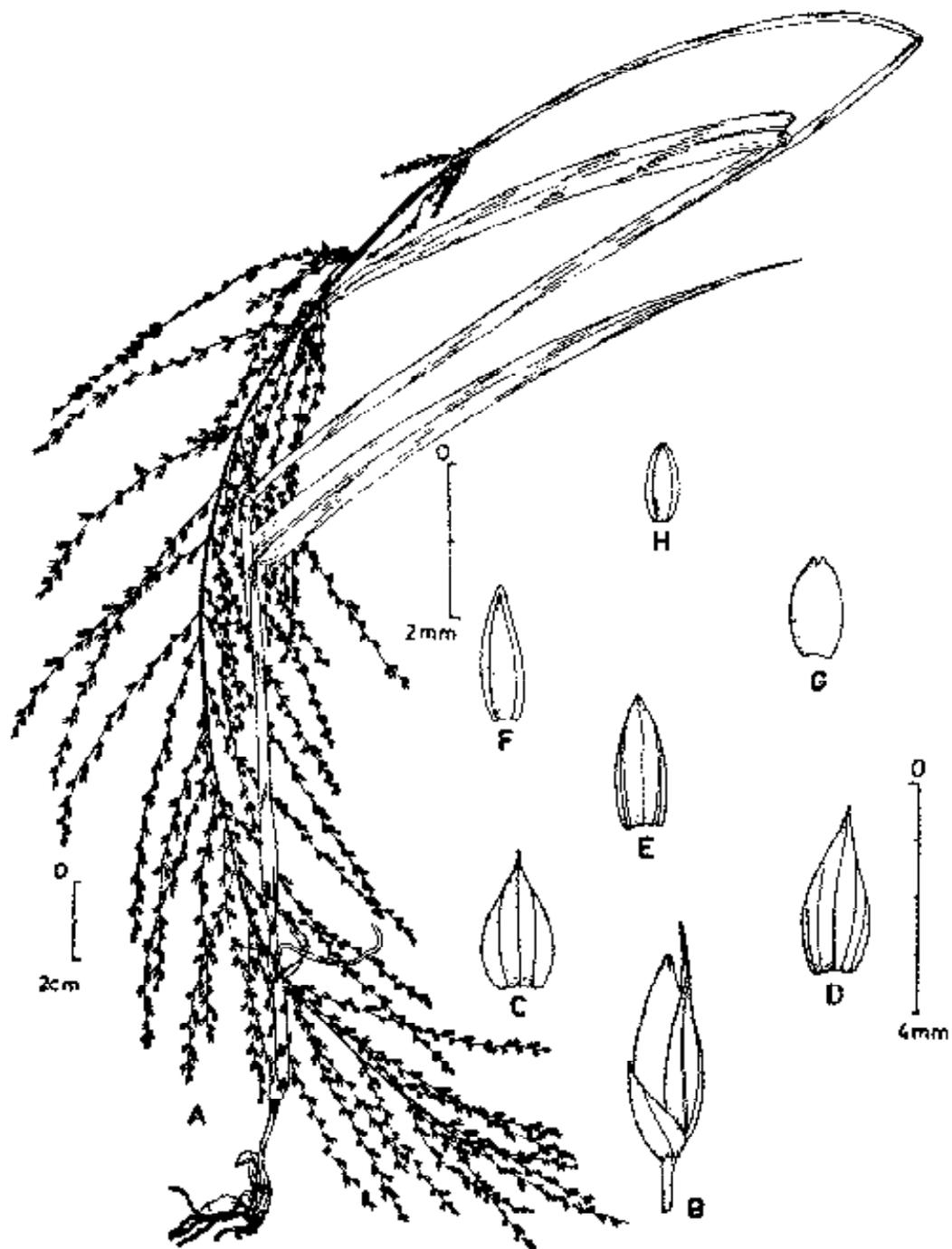


PLATE No. 67: *ARUNDINELLA LEPTOCHLOA* (Nees) Hook. f.

A. Habit; B. Spikelet; C. Lower glume; D. Upper glume; E. First lemma; F. Palea of the first lemma; G. Second lemma; H. Palea of the second lemma.

Perennials. Culms 15-100 cm long, erect, or creeping; nodes glabrous. Leaves lanceolate, elliptic-lanceolate or linear-lanceolate, 2-15 x 0.1-1.5 cm, rounded or cordate at base, tubercle-based hairy or glabrous. Sheaths tubercle-based hairy or glabrous. Ligules membranous, fimbriate. Panicles 2-15 cm long, often spreading. Spikelets lanceolate, acuminate, 4-8 mm long, brown or purplish, densely tubercle-based hairy. Lower glume lanceolate, caudate-acuminate, 4-6 x 1-1.5 mm, chartaceous, 3-nerved, densely tubercled hairy. Upper glume oblong-lanceolate, caudate-acuminate, 4-8 x 1-1.5 mm, chartaceous, 5-nerved, sparsely tubercled hairy. Lower floret male. Upper floret bisexual. First lemma oblong-lanceolate or oblong 2-3 x 1-1.5 mm, hyaline, 3-5-nerved. Palea oblong or oblong-lanceolate, 2-3 x 0.5-1 mm, delicate, hyaline, 2-keeled, 2-nerved. Stamens 3, anthers 0.5-1 mm long. Second lemma elliptic, 2-3 x 1 mm, bearded at base, subcoriaceous, faintly 3-5-nerved, awned, with 2 setae 1.5-2 mm long on either side of the awn; awn 5-8 mm long, column 2-3 mm long. Palea oblong-lanceolate, 1.5-2 x 0.5-1 mm long, delicate, hyaline, 2-keeled, 2-nerved. Stamens 3, anthers 1-2 mm long, cream with violet margins. Stigmas 1-1.5 mm long, pink.

Common along the grasslands, rocky hill-slopes, open dry grassy plateau, often associated with *Heteropogon contortus* and *Dimeria* species.

Fl. & Fr. : July - December.

Notes : This species seems to be endemic to South India. *A. mesophylla* is quite distinct by its loose panicles with spreading branches.

CANNANORE : Mugu Road, Paramba; IDUKKI : Devicolem, Peermade, Munnar; PALGHAT : Ayyappankovil, Dhoni R. F.

5. *Arundinella metzii* Hochst. ex Miq. in Verh. Konik. Nederl. Inst. 3(4): 31. 1851; Hook. f. Fl. Brit. Ind. 7: 72. 1896; Fischer in Gamble, Fl. Pres. Madr. 1801. 1934 (Repr. ed. 3: 1247. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 423. 1960; Manilal & Sivara]. Fl. Calic. 346. 1982. *A. pygmaea* Hook. f. Fl. Brit. Ind. 7: 72. 1896; Fischer in Gamble, Fl. Pres. Madr. 1801. 1934 (Repr. ed. 3: 1247. 1957). PLATE No. 68

Annuals. Culms 15-100 cm long, creeping or geniculate, rarely erect; nodes sparsely bearded or glabrous. Leaves lanceolate or linear-lanceolate, 3-15 x 0.2-1 cm, rounded or shallowly cordate at

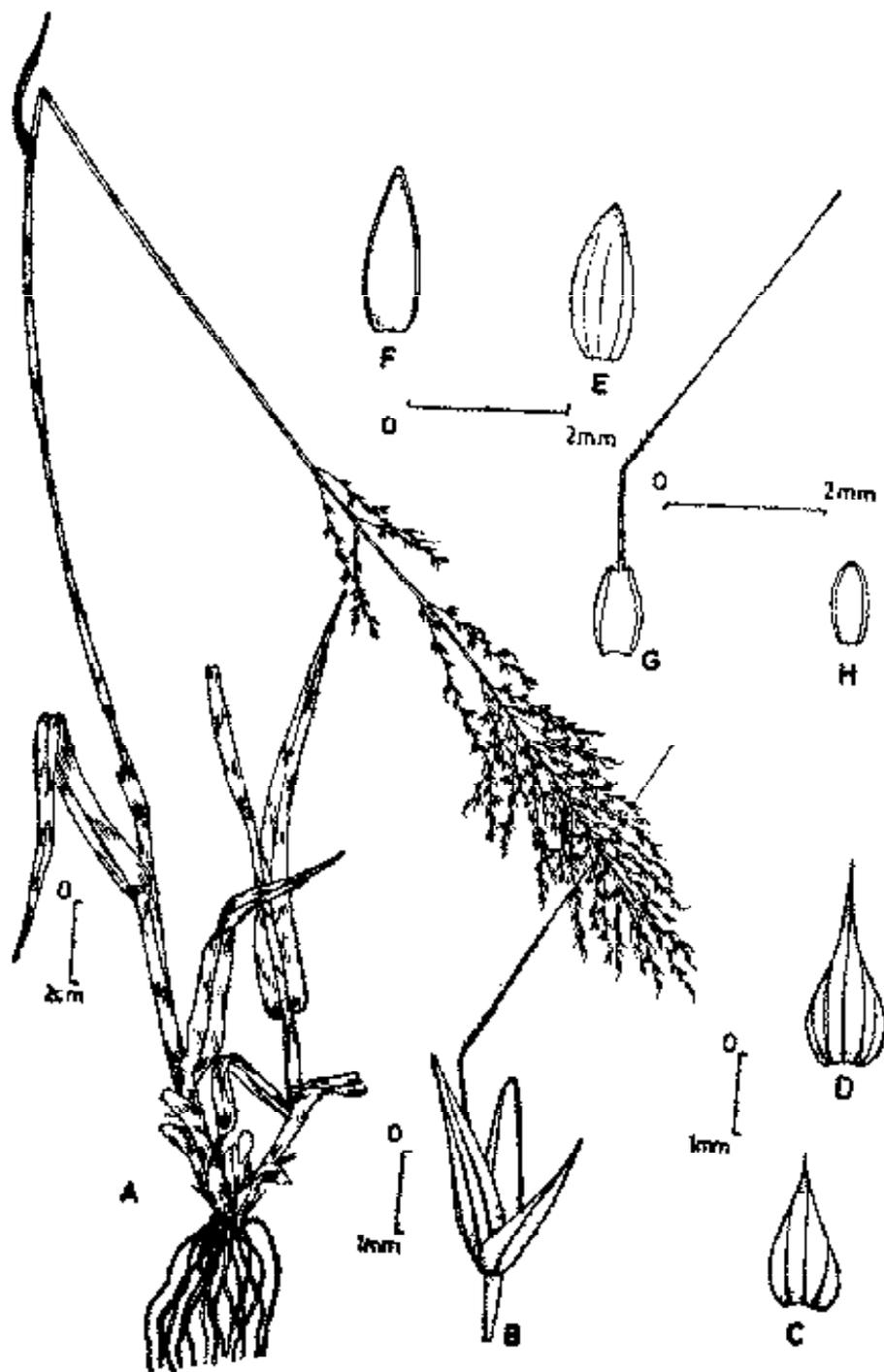


PLATE No. 68: *ARUNDINELLA METZII* Hochst.

A. Habit; B. Spikelet; C. Lower glume; D. Upper glume; E. First lemma; F. Palea of the first lemma; G. Second lemma; H. Palea of the second lemma.

base, glabrous or tubercled hairy. Sheaths slightly keeled, tubercled hairy or glabrous. Ligules membranous, truncate or lacerate. Panicles lax, 5-30 cm long. Spikelets ovate-lanceolate or elliptic-lanceolate, 2.5-3 mm long. Lower glume ovate, acute, 1.5-2 x 0.5-1 mm long, acuminate or aristate, chartaceous, 3-nerved. Upper glume ovate-lanceolate, 2-3 x 1 mm, acuminate, chartaceous, 5-nerved. Lower floret male or neuter, Upper floret bisexual. First lemma oblong-acute, 1.5-2 x 1 mm, chartaceous, 3-5-nerved. Palea elliptic, 1.5-2 x 0.5-1 mm long, delicate, hyaline, 2-keeled, 2-nerved. Second lemma ovate-elliptic, notched, awned, *c.* 1 x 0.5-1 mm, subcoriaceous; awn 4-6 mm long, column 1-2 mm long, palea elliptic, *c.* 1 x 0.5 mm. Stamens 3, anthers 1-1.5 mm long. Pistil very small.

Fairly common in open grasslands, cultivated fields, as undergrowth in cashew plantations and other moist shady places.

Fl. & Fr. : October-January.

Notes: This species is very similar to *A. leptochloa* and may often be confused with it in the field as well as in the herbarium because of its similar leaves, panicles and spikelets. But, *A. metzii* can be distinguished from the other species by its slender culms and leaves, smaller panicles and spikelets as well as the bearded base of the upper lemma. This grass also shows much variation.

CALICUT: Kanjeerakkadavu; **CANNANORE:** Bela, Mugu Road, Parappa, Payyavur, Taliparamba.

6. *Arundinella nepalensis* Trin. Gram. Pan. 92, 1826 et Spec. Gram. 3. t. 268. 1836; Fischer in Gamble, Fl. Pres. Madr. 1801, 1934 (Repr. ed. 3: 1247, 1957); Bor, Grass Bur. Cey. Ind. Pak, 423, 1960. *A. brasiliensis* auct. non Rendle 1823; Hook. f. Fl. Brit. Ind. 7: 73, 1896.

Perennials. Culms 15-80 cm or more high, erect, tufted; nodes glabrous. Leaves lanceolate or linear-lanceolate, 2-20 x 0.2-1 cm, rounded or shallowly cordate at base, leaves and sheaths tubercle-based hairy. Ligules ovate or truncate, membranous. Panicles oblong, densely spiculate, 20-40 cm long, pubescent below. Spikelets elliptic, elliptic-lanceolate or lanceolate, 3-4 mm long. Lower glume ovate-acuminate, 3-3.5 x 1.5-2 mm, chartaceous, 3-nerved, scabrid along the nerves. Upper glume ovate-lanceolate, 3.5-4 x 1.5-2 mm, acuminate, chartaceous, 5-nerved. Lower floret male. Upper floret bisexual.

ual. First lemma oblong or oblong-lanceolate, 3-3.5x1-1.5 mm, chartaceous, 3-5-nerved. Palea oblong-elliptic or elliptic, 2-2.5 x 0.5-1 mm, delicate, hyaline, 2-keeled, 2-nerved, ciliate along the keels. Stamens 3, anthers c. 1 mm long. Second lemma oblong or ovate-oblong, 1-1.5 x 1 mm, subcoriaceous, faintly 3-nerved, awned, softly hairy at base; awn 4-6 mm long, column 1-2 mm long. Palea oblong or elliptic-oblong, 1-1.5 x 0.5 mm, subcoriaceous with few wart-like growths on dorsal side. Stamens 3, anthers 1-1.5 mm long. Ovary oblong, c. 0.5 mm; styles 0.5-1 mm; stigmas 1-1.5 mm long.

Rare, in open grasslands and higher elevations.

Fl. & Fr. : July - August.

Notes : This species is very closely allied to *A. leptochloa* and may often get confused with it, but can be distinguished by the puberulous culms below the inflorescence, distinctly awned spikelets and the upper lemmas with bearded bases. It is a highly variable species; the height of the culms varies considerably and may be stout and reed-like or very slender, hairy or glabrous. The root-stock is hard and woody, creeping and sending out stout, sheathed branches.

QUILON : Ponnambalamedu.

7. *Arundinella pumila* (Hochst. ex A. Rich.) Steud. Syn. Pl. Glum. 1: 114. 1854; Fischer in Gamble, Fl. Pres. Madr. 1801. 1934 (Repr. ed. 3: 1247. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 423. 1960. *Acrotherum pumilum* Hochst. ex A. Rich. Tent. Fl. Abyss. 2: 414. t. 100. 1851. *Arundinella tenella* Nees ex Steud. Syn. Pl. Glum. 1: 115. 1854; Hook. f. Fl. Brit. Ind. 7: 71. 1896.

Annuals. Culms 10-80 cm high, tufted, slender; nodes glabrous or sparsely bearded. Leaves elliptic, elliptic-lanceolate or linear-lanceolate, 1-20 x 0.2-1.5 cm, acuminate, rounded at base, glabrous or tubercled hairy. Sheaths compressed. Ligules truncate or lacerate, membranous. Panicles pyramidal, 3-25 cm long, affuse. Spikelets elliptic, 1-2 mm long. Lower glume ovate-acute, 1-1.5 x 0.5 mm, shortly acuminate, chartaceous, 3 nerved. Upper glume ovate-lanceolate, 1.5-2 x 0.5-1 mm, acuminate, chartaceous, 5-nerved, hairy. Lower floret male or neuter. Upper floret bisexual. First lemma ovate-lanceolate, or oblong-lanceolate, 1-1.5 x 0.5-1 mm, delicate, 3-5-nerved. Palea elliptic, c. 1 x 0.5 mm, delicate, hyaline. Second

lemma elliptic, c. 1 x 0.5 mm, subcoriaceous, awned; awn 2-4 mm long, column 0.5-1 mm long. Palea oblong, 3.5-1 mm long, delicate, hyaline. Stamens 3, anthers c. 0.25 mm long.

Very common along the roadsides, hill-slopes, in humus, fringes of forests and other shady places; occasional on compound walls and roofs of old buildings.

Fl. & Fr. : July - December.

Notes : This species is quite distinct by its very slender culms and leaves and smaller spikelets.

CANNANORE : Angadimogaru, Kannoath, Kumbia, way to Kannoath; PALGHAT : bank of Kummattanthode, Mukkali forest, Valiya parathode.

8. *Arundinella purpurea* Hochst. ex Steud. Syn. Pl. Glum. 1: 115. 1854; Bur. Grass. Bur. Cey. Ind. Pak. 424, 1960. var. *purpurea*. *A. fuscata* auct. non Nees ex Buase, 1854; Hook. f. Fl. Brit. Ind. 7: 74. 1896; Fischer in Gamble, Fl. Pres. Madr. 1802, 1934 (Repr. ed. 3: 1247. 1957).

Perennials. Culms 10-80 cm high, densely tufted, erect or decumbent; nodes glabrous. Sheaths tubercled hairy. Leaves lanceolate, elliptic-lanceolate or linear-lanceolate, 1-30x0.3-1.5 cm, acuminate, rounded or shallowly cordate at base, tubercle-based hairy or rarely glabrous, bluish turning yellowish green when dry. Panicles 3-20 cm long. Spikelets elliptic or elliptic-lanceolate, 3-5 mm long. Lower glume ovate-lanceolate, 3-4 x 1-2 mm, acuminate, chartaceous, 3-nerved. Upper glume ovate-lanceolate, 4-5 x 2 mm, acuminate, chartaceous, 5-nerved. Lower floret male. Upper bisexual. First lemma oblong or ovate-oblong, 3-4 x 1-1.5 mm, chartaceous, 3-5-nerved. Palea oblong or elliptic-oblong, 2-3 x 0.5-1 mm, hyaline. Second lemma oblong-elliptic, notched, awned, 1.5-2 x 0.5-1 mm, subcoriaceous; awn 3-6 mm long, column 1-2 mm long. Palea oblong, 1-1.5 x 0.5 mm, delicate, hyaline, 2-keeled, 2-nerved. Stamens 3, anthers c. 1 mm long.

Fairly common, in open grasslands of higher altitudes, along the hill-slopes and road-cuttings, in marshes of shola-grasslands, often associated with *Arundinella vaginata* and *Eulalia phaeothrix*.

Fl. & Fr. : August-December.

Notes : This species seems to be endemic to southern India. It can be distinguished from all other species of the genus by its peculiar bluish-green leaves turning yellowish-green when dry, probably due to accumulation of Aluminium (Bor, *l.c.*).

CANNANORE : on way to Peria; IDUKKI: Anamudi slopes, Eravikulam National Park, Munnar, Patimudi, Uppupara; QUILON: Anathode.

var. *laxa* Bor in Kew Bull. 1955: 407. 1955 et Grass. Bur. Cey. Ind. Pak, 424. 1960.

This is a very distinct variety of *A. purpurea* in which the panicles are very lax, spikelets are more or less glabrous and pedicels are considerably longer. It grows in the same habitat of var. *purpurea*.

Fl. & Fr. : October-December.

(IDUKKI: Munnar; PALGHAT: Way to Valiyaparathode.

9. *Arundinella setosa* Trin. Gram. Panic. 63. 1826; Hook. f. Fl. Brit. Ind. 7: 70. 1896; Fischer in Gamble, Fl. Pres. Madr. 1801. 1934. p.p. (Repr. ed. 3: 1247. 1967), excl. syn. *A. nervosa* Nees; Bor, Grass. Bur. Cey. Ind. Pak, 424. 1960. var. *setosa*.

Annuals or perennials. Culms 15-80 cm long, erect or trailing; nodes glabrous. Leaves lanceolate or linear-lanceolate, 3-15 x 0.1-0.6 cm, acuminate, rounded at base, glaucous, sparsely villous or glabrous. Sheaths glabrous or tubercle-based hairy in the upper half. Ligules fimbriate, membranous. Panicles 5-25 cm long, lax, often drooping. Spikelets elliptic-lanceolate, 4-6 mm long. Lower glume oblong-lanceolate or lanceolate, 3-4 x 1 mm, acuminate, chartaceous, 3-nerved. Upper glume ovate-lanceolate, 4-5 x 1-1.5 mm, chartaceous, 5-nerved. Lower floret male or neuter. Upper floret bisexual. First lemma oblong or elliptic, 3-3.5 x 1-1.5 mm, chartaceous, 5-nerved. Palea elliptic-lanceolate, c. 3 x 0.5-1 mm, delicate, hyaline. Second lemma oblong-elliptic, notched, 2-2.5 x 1 mm, awned with 2 setae 0.5-1.5 mm long on either side, subcoriaceous, granular; awn 6-10 mm long, column 3-4 mm long. Palea oblong-lanceolate, 1.5-2 x 1 mm, delicate, granular, 2-keeled, 2-nerved. Stamens 3, anthers 1-1.5 mm long. Stigmas 1-1.5 mm long.

Rare, along the hill slopes, usually in drier habitats.

Fl. & Fr. : May-December.

Notes : In MH there is no collection of this species from Kerala. The occurrence of this grass in Kerala has to be confirmed. The description is based on materials from adjoining places of Tamil Nadu deposited in MH. But, there are some earlier reports of this grass from Kerala.

TAMIL NADU: Ootacamund, Pykara rivers banks.

10. *Arundinella vaginata* Bor in J. Ind. Bot. Soc. 27: 66. 1948 et Grass. Bur. Cey. Ind. Pak. 425. 1960. *A. villosa* sensu Fischer in Gamble, Fl. Pres. Madr. 1801. 1934 (Repr. ed. 3: 1247. 1957) non Arn. ex Steud. 1854. *A. villosa* Arn. ex Steud. var. *heynei* Hook. f. Fl. Brit. Ind. 7: 73. 1896.

Tufted perennials. Culms 30-80 cm high, erect, densely tufted, villous; nodes softly bearded. Leaves linear-lanceolate or linear-acuminate, 10-40 x 0.3-0.8 cm, acuminate, densely villous. Sheaths densely tubercle-based hairy. Panicles 10-20 cm long, compact, spiciform, interrupted. Spikelets elliptic-lanceolate or lanceolate, 5-8 mm long, densely villous. Lower glume lanceolate or oblong-lanceolate, 4-5 x 1-2 mm, chartaceous, 3-5-nerved, densely glassy-bristly. Upper glume ovate-lanceolate, acuminate, 5-8 x 1.5-2 mm, chartaceous, 5-nerved, villous. Lower floret male. Upper floret bisexual First lemma elliptic-oblong or oblong-lanceolate, 4-5 x 1.5-2 mm, chartaceous, 5-nerved. Palea elliptic-lanceolate, 3-4 x 0.5-1 mm, delicate, hyaline, 2-keeled, 2-nerved. Stamens 3, anthers 1-1.5 mm long. Second lemma ovate-elliptic, 3-4 x 1-1.5 mm, subcoriaceous, faintly 5-nerved, awned; awn 3-6 mm long, column 1-2 mm long. Palea oblong-lanceolate, 3-4 x 0.5-1 mm, hyaline, 2-keeled, 2-nerved. Lodicules obovate, c. 0.5 x 0.25 mm, 2-horned at apex. Stamens 3, anthers 1.5-2 mm long. Ovary elliptic, c. 0.5 mm long; styles 0.6-1 mm long; stigmas 1.5-2 mm long.

Fairly common along the grasslands of higher elevations, usually in marshy places often associated with other grasses like *Arundinella purpurea*, *Themeda tremula* etc.

Fl. & Fr. : August-December.

Notes: This endemic species is found rarely in high altitude grasslands of Tamil Nadu and Kerala, often in marshes and along the streams of shola-grasslands. This grass can be easily distinguished from all other species of the genus by its peculiar long, villous basal sheaths and interrupted, spiciform panicles.

IDUKKI; Anamudi, Eravikulam.

2. CHANDRASEKHARANIA V. J. Nair, V. S. Ramachandran & P. V. Sreekumar

V. J. Nair, V. S. Ramachandran & P. V. Sreekumar in Proc. Ind. Acad. Sci. (Pl. Sci.) 91(2): 79. 1982.

Chandrasekharania keralensis V.J. Nair, V.S. Ramachandran & P.V. Sreekumar in Proc. Ind. Acad. Sci. (Pl.Sci.) 91(2): 79-82, 1982. PLATE No. 69

Annual grass up to 40 cm tall. Culms rooting at the lower nodes, slender, striate, smooth, glabrous. Leaves 2-4.5 x 0.5-0.8 cm, both surfaces and margins with dense or sparse tubercle based hairs. Sheaths shorter than the internodes, striate, glabrous. Inflorescence a contracted ovoid or oblong spicate raceme, 1.5-2.5 x 1-1.5 cm. Spikelets 5-6 mm long. Pedicels 0.5-1.5 mm long, scabrid. Lower glume 3.5-4 mm long, ovate, awned, awn c. 3 mm long, densely hairy on the upper half of the dorsal surface with tubercle based hairs, the median and the alternating two nerves prominent, the midrib and the awn scabrid, margins ciliolate. Upper glume 5.5-6 mm long, ovate-lanceolate, acuminate, the tip with an awn c. 3 mm long, scaberulous on the nerves, scabrid on the arista, margins ciliolate. Lemma elliptic-lanceolate, 4-5 mm long, shortly notched at apex with an awn in the sinus, coriaceous, glabrous except for the scaberulous midrib, awn scabrid, 1.5-2 mm long. Palea c. 4 mm long, delicate, hyaline, long-ciliate on the lower half of the outer surface, keels ciliate, apex bilobed, lobes acute. Gynoecium c. 2 mm long; ovary c. 0.5 mm long, oblong. Anthers c. 1.25 mm long, filaments c. 0.25 mm long. Lodicules cuneate and shallowly notched at apex. Grains ellipsoid, c. 1 mm long, brown coloured with a black spot at the distal end.

Fl. & Fr.: February-March.

Notes: Superficially the plant looks like *Jansenella*, but here all the awns of the lemma are almost straight as against the twisted geniculate median one of *Jansenella*.

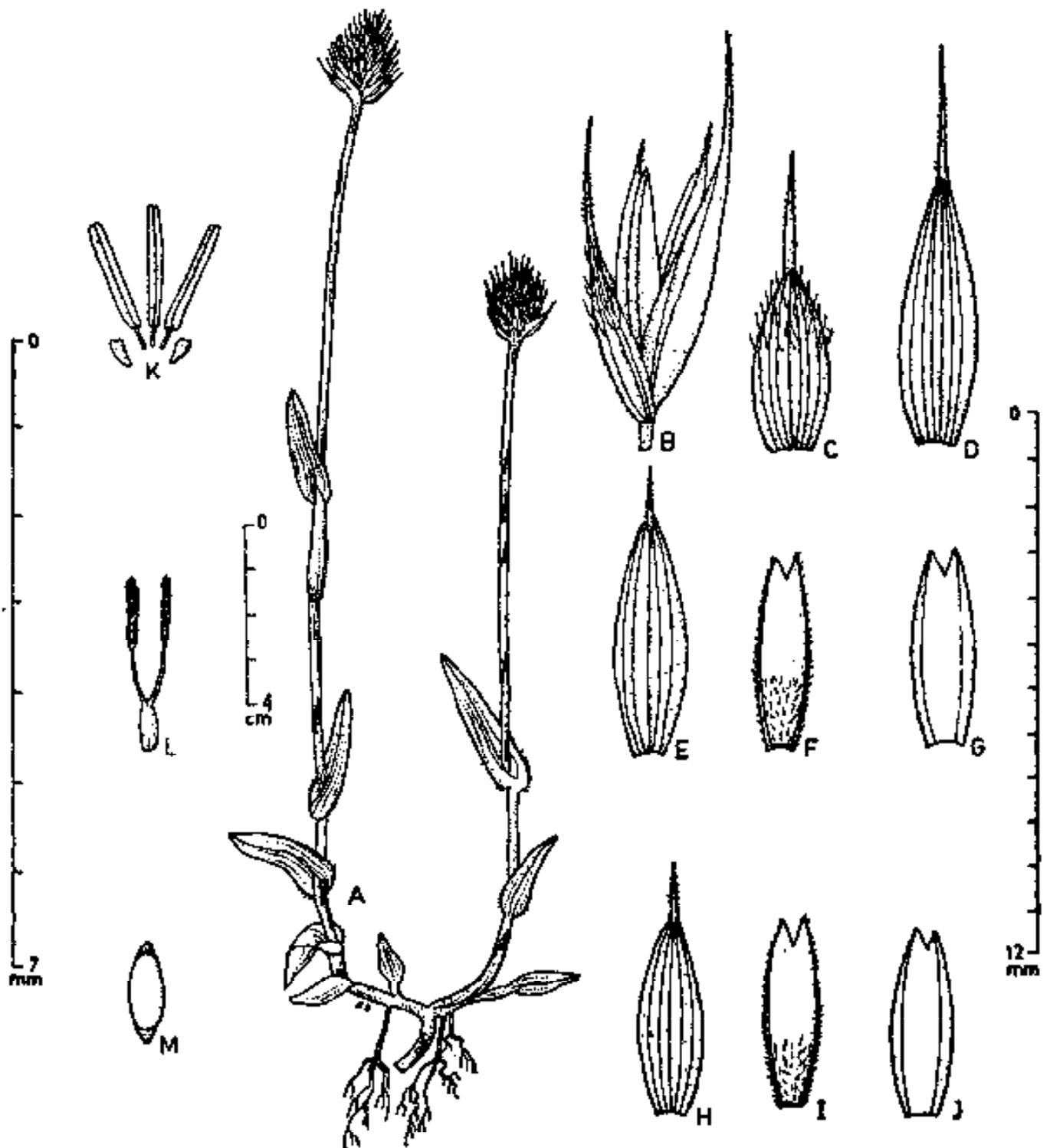


PLATE No. 89: *CHANDRASEKHARANIA KERALENSIS* V. J. Natr, V. S. Ramachandran & P. V. Sreekumar

A. Habit; B. Spikelet; C. Lower glume; D. Upper glume; E. Lower lemma; F. Lower palea-dorsal view; G. Same-ventral view; H. Upper lemma; I. Upper palea-dorsal view; J. Same-ventral view; K. Lodicules and stamens; L. Gynoecium; M. Grain.

CANNANORE: Kannoth.

3. JANSENELLA Bor

Bor in Kew Bull. 1955: 98, 1965 et Grass. Bur. Cey. Ind. Pak. 426, 1960.

Jansenella griffithiana (C. Muell.) Bor in Kew Bull. 1955: 98, 1965 et Grass. Bur. Cey. Ind. Pak. 426, t. 45, 1960. *Danthonia griffithiana* C. Muell. in Bot. 2 14: 347. 1856. *Arundinella avenacea* Munro ex Thw. Enum. Pl. Zeyl. 362, 1864; Hook. f. Fl. Brit. Ind. 7: 69. 1896; Fischer in Gamble, Fl. Pres. Madr. 1801. 1934 (Repr. ed. 3: 1246. 1957).

Annuals. Culms 3-35 cm long, erect or creeping and geniculate, nodes glabrous. Leaves elliptic, elliptic-lanceolate or lanceolate, 0.3-10 x 0.1-1.2 cm, acuminate, cordate or amplexicaul at base, glabrous or sparsely villous. Ligules ovate, thin, membranous. Sheaths slightly keeled, tubercled hairy. Panicles capitate or ovate, densely compact, 0.5-8 cm long. Spikelets elliptic-lanceolate or lanceolate, 5-8 mm long. Lower glume lanceolate, 4-5 x 1 mm, acuminate, chartaceous, 3-nerved, tubercle-based hairy. Upper glume oblong-lanceolate, caudate-acuminate, 5-8 x 1 mm, chartaceous, 3-5-nerved. Lower floret male. Upper floret bisexual. First lemma oblong-lanceolate, 4-6 x 1-2 mm, acuminate, chartaceous, faintly 5-nerved. Palea oblong, c. 3 x 1 mm, delicate, notched, hyaline, 2-keeled, 2-nerved. Stamens 3, anthers 0.5-1 mm long. Second lemma oblong-lanceolate, 3-4 x 1 mm, notched, 2-aristate, awned, with tufted hairs on either side; awn 6-12 mm long, column 3-4 mm long. Palea linear-oblong, 2-3 x 0.5 mm, notched, 2-keeled, 2-nerved, hairy on dorsal side. Stamens 3, anthers c. 1 mm long. Ovary c. 0.5 mm long; styles 0.5-1 mm long; stigmas 0.5-1 mm long.

Very common, along the road-cuttings of hilly places, as an undergrowth among tall grasses of open grasslands. In moist rocky places, banks of rivers and swampy fields.

Fl. & Fr. : October-December.

Notes : This plant has some resemblance to the newly described genus *Chandrasekharania*, but here the median awn of the lemma is twisted and geniculate.

IDUKKI: Eravikulam National Park, Peermade; QUILON: Anathode.

POOIDEAE - AVENEAE

AVENEAE Dumort.

Dumort. in Obs. Gram, 82: 120, 1823.

Key to the genera

- 1a. Lower floret male or neuter; spikelets 6-8 mm long; panicles contracted, 5-12 cm long *Anthoxanthum* 1
- 1b. Lower floret bisexual; spikelets 10-12 mm long; panicles lax, 10-20 cm long *Helleotrichon* 2

1. ANTHOXANTHUM Linn.

Linn. Gen. Pl. ed. 5. 17. 1754 et Sp. Pl. 1: 28. 1753; Hook. f. Fl. Brit. Ind. 7: 221. 1896; Fischer in Gamble, Fl. Pres. Madr. 1846. 1934 (Repr. ed. 3: 1277. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 431. 1960; Jain & Pal in J. Bomb. Nat. Hist. Soc. 72 (1): 90. 1965.

A genus of about 50 species distributed in almost all continents, particularly in Europe of which about 6 species occur in India and one in Kerala.

The genus *Anthoxanthum* Linn. was formerly included in the tribe Phalarideae, but now it is placed in Aveneae.

The occurrence of *A. odoratum* in the area is to be confirmed.

Anthoxanthum borii Jain & Pal in J. Bomb. Nat. Hist. Soc. 72 (1): 92. 1965. *Anthoxanthum* Sp. Bor, Grass. Bur. Cey. Ind. Pak. 432. 1960. PLATE No. 70

Perennials. Culms 30-120 cm high, rhizomatous; nodes glabrous. Leaves linear-lanceolate or linear-acuminate, 5-35 x 0.4-1.2 cm, rounded or shallowly cordate, sparsely villous or glabrous. Sheaths glabrous or sparsely tubercle-based hairy. Ligules ovate, acute, membranous, fimbriate. Panicles oblong or oblong-lanceolate, 5-12 cm long, congested. Spikelets oblong-lanceolate, 6-8 mm long, golden-yellow, shining. Lower glume ovate-lanceolate, 4.5-5 x 2 mm, sharply acute, chartaceous, keeled, 1-nerved. Upper glume ovate-lanceolate or oblong-lanceolate, 6-8 x 2-3 mm, acuminate, chartaceous, keeled, 3-nerved. Lower floret male. Middle floret neuter. Upper floret bisexual. First lemma oblong or linear-oblong, bifid, awned in between, 5-6 x 1.5-2 mm; awn 3-4 mm long, straight.

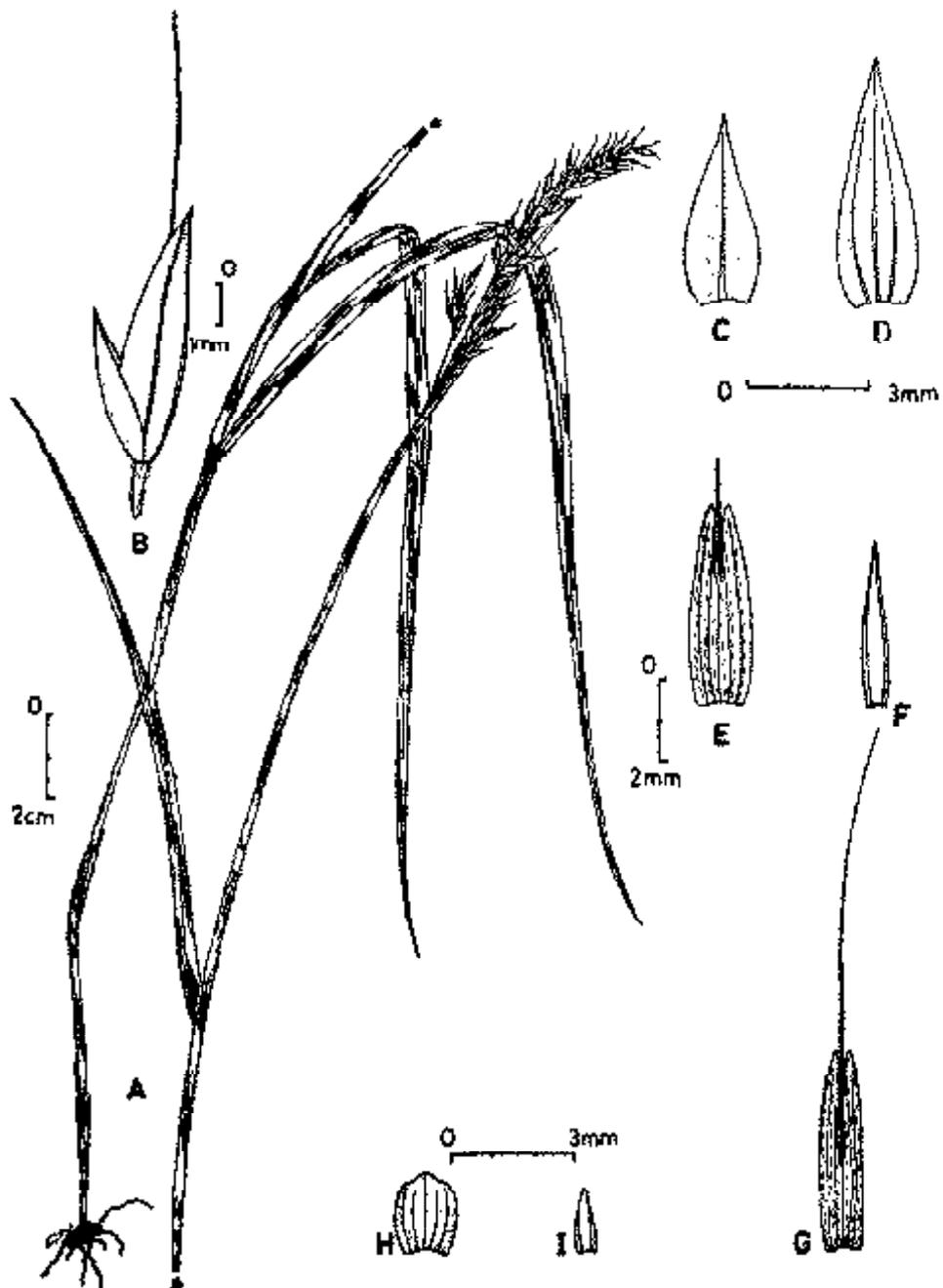


PLATE No. 70: *ANTHOXANTHUM BORII* S.K. Jain & D.C. Pal

A. Habit; B. Spikelet; C. Lower glume; D. Upper glume; E. First lemma; F. Palea of the first lemma; G. Second lemma; H. Third lemma; I. Palea of the third lemma.

Palea linear-lanceolate, 4-5 x 0.5-1 mm, delicate, hyaline, 2-keeled, 2-nerved. Stamens 2 or 3, anthers 2-3 mm long. Second lemma empty, oblong or linear-oblong, 5-6 x 1-1.5 mm, deeply bifid, awned, chartaceous, faintly 5-nerved, villous. Third lemma ovate-oblong or rotund, 2-3 x 1.5-2 mm, obtuse, delicate, hyaline, faintly 3-7-nerved. Palea elliptic-lanceolate or lanceolate 1.5-2 x 0.5 mm, delicate, hyaline, 2-keeled, 2 nerved. Stamens 2 or 3, anthers 2-4 mm long. Ovary oblong, c. 0.5 mm long; styles 1.5-2 mm long; stigmas 2-3 mm long, golden-yellow or cream.

Occasional along the streams and canals, in high altitude grasslands.

Fl. & Fr. : August-December.

IDUKKI : Anamudi, Eravikulam National Park, Umaiyyamala,

2. HELICTOTRICHON Besser ex Roem. & Schult.

Besser ex Roem. & Schult. Syst. Veg. 2, addit. 582, 1827; Bor, Grass. Bur. Cey. Ind. Pak. 438, 1960; Cope in Nasir & Ali, Fl. Pak. 143; 500, 1982. *Avena* sensu Hook. f. Fl. Brit. Ind. 7; 274, 1896, p.p. *Avenastrum* Jess. Deutschl. Grass. 214, 1863; Fischer in Gamble, Fl. Pres. Madr. 1802, 1934 (Repr. ed. 3: 1247, 1957).

A genus of about 60 species distributed mainly in the temperate regions of the World, of which about 6 species occur in India and one in Kerala.

This genus is similar to *Avena* but the latter are annuals with larger drooping spikelets and 7-11-nerved glumes. *Helictotrichon* can be distinguished from *Trisetum* by its larger spikelets and hairy ovary.

Helictotrichon virescens (Nees ex Steud.) Henr. in Blumea 3: 425, 1940; Bor, Grass. Bur. Cey. Ind. Pak. 439, 1960; Cope in Nasir & Ali, Fl. Pak. 143; 503, 1982. *Trisetum virescens* Nees ex Steud. Syn. Pl. Glum. 1: 226, 1854. *Helictotrichon asperum* (Munro ex Thw.) Bor in Ind. For. Rec. ser. 4, 5(1): Bot. 68, 1938; Bor, Grass. Bur. Cey. Ind. Pak. 438, 1960. *Avena aspera* Munro ex Thw. Enum. Pl. Zeyl. 372, 1864; Hook. f. Fl. Brit. Ind. 7: 277, 1896. *Avenastrum asperum* (Munro ex Thw.) Fischer in Gamble, Fl. Pres. Madr. 1802, 1934 (Repr. ed. 3: 1248, 1957). PLATE No. 71

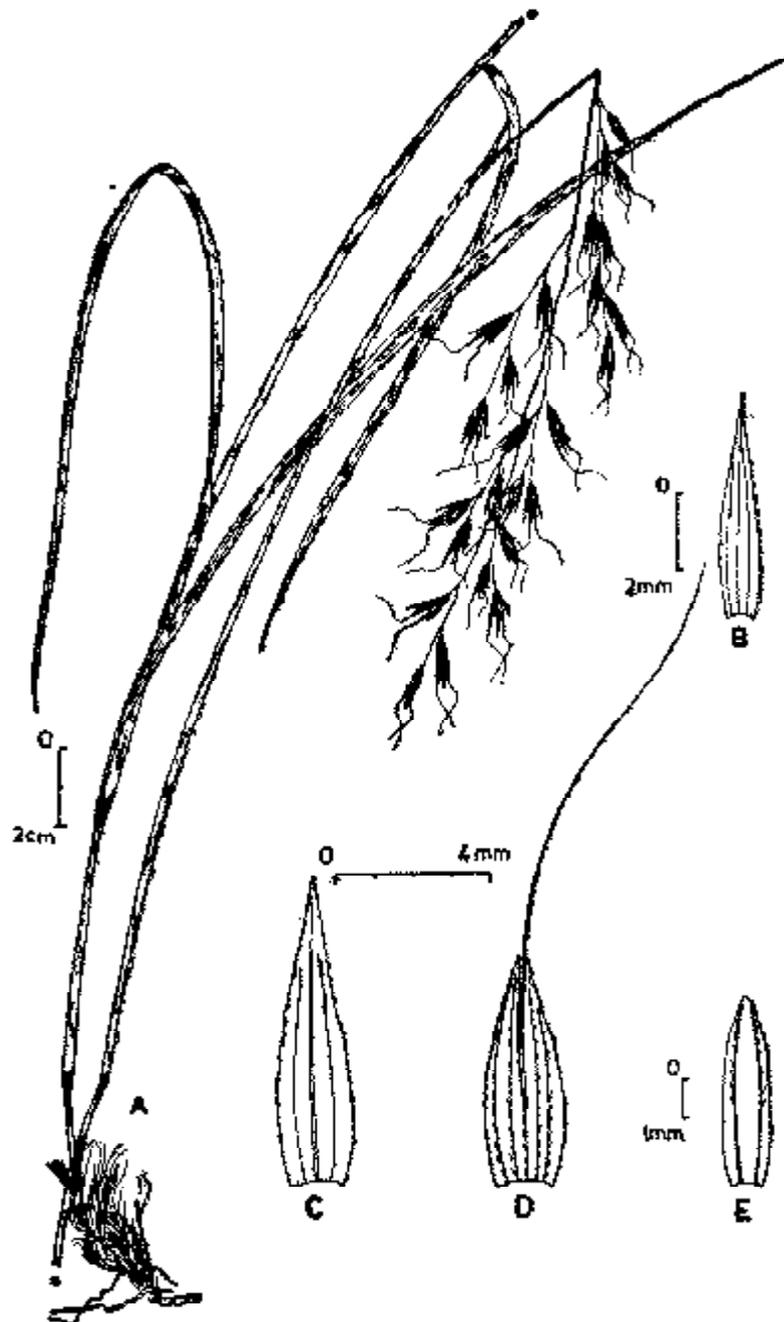


PLATE No. 71: *HELICTOTRICHON VIRESCENS* (Nees ex Steud.) Henr.
 A. Habit; B. Lower glume; C. Upper glume; D. Lemma; E. Palea.

Perennials. Culms tufted, 50-150 cm high; nodes glabrous or softly bearded. Leaves linear-acuminate, 10-30 x 0.2-0.6 cm, sparsely villous or glabrous. Sheath villous in the upper half. Ligules ovate, truncate or acute, membranous. Panicles 10-20 cm long, effuse. Spikelets elliptic-oblong or oblong-lanceolate, 10-12 x 3-4 mm, 2-3-flowered, greenish-yellow or purplish. Lower glume lanceolate, 6-8 x 1-1.5 mm, acuminate, chartaceous, 3-nerved. Upper glume oblong-lanceolate or elliptic-lanceolate, 8-10 x 2-3 mm, chartaceous, 3-5-nerved. Lemmas ovate-lanceolate, 6-10 x 2-3 mm, notched, awned, coriaceous, 5-7-nerved; lobes acuminate; awns often recurved, 10-15 mm long, column 5-6 mm long. Paleae oblong or linear-oblong, 5-6 x 1-1.5 mm, delicate, hyaline, 2-keeled, 2-nerved; keels pectinately ciliate in the upper half. Stamens 3, anthers 2-3 mm long. Ovary ovoid, densely hirsute on tip.

Fairly common in high altitude grasslands in association with other grasses like *Agrostis pilosula*, *Andropogon lividus*, *Chrysopogon zeylanicus* etc.

Fl. & Fr.: September-December.

IDUKKI: Eravikulam National Park, Umsiyamala.

POOIDEAE - CENTOTHECEAE

CENTOTHECEAE Ridley

Ridley, *Mat. Fl. Malay. Pen.* 3: 122, 1907; *Bor. Grass. Bur. Cey. Ind. Pak.* 457, 1960.

Key to the genera

- 1a. Lemmas awned or atleast mucronate, often glabrous; upper lemmas reduced to a pencil of retrorsely barbed awns *Lophatherum* 2
- 1b. Lemmas not awned, often with reflexed, tubercle based bristles along the margins; upper lemmas often well-developed *Centotheca* 1

1. CENTOTHECA Desv.

Desv. in *Nouv. Bull. Soc. Philom.* 2: 189, 1810; Hook. f. *Fl. Brit. Ind.* 7: 331, 1896; Fischer in Gamble, *Fl. Pres. Madr.* 1847, 1934 (Repr. ed. 3: 1278, 1957); *Bor. Grass. Bur. Cey. Ind. Pak.* 457, 1960.

A genus of about 3 species distributed in the tropics and subtropics of the World, of which one species occurs in India and Kerala.

Centotheca lappacea (Linn.) Desv. in *Nouv. Bull. Soc. Philom.* 2: 189. 1810; Hook. f. *Fl. Brit. Ind.* 7: 332. 1896; Fischer in Gamble, *Fl. Pres. Madr.* 1848. 1934 (Repr. ed. 3: 1279. 1957); Bor, *Grass. Bur. Cey. Ind. Pak.* 457. t. 50. 1960. *Cenchrus lappaceus* Linn. *Sp. Pl.* ed. 2. 1488. 1763.

Perennials. Culms tufted, erect, 15-120 cm high; nodes glabrous. Leaves ovate-elliptic or elliptic-lanceolate, 2-25 x 0.5-3.5 cm, acute or acuminate, oblique at base, glabrous or with projections of false reticulate veins on lower side. Sheaths sparsely hairy or glabrous, ciliate along the margins. Ligules ovate or truncate, membranous. Panicles pyramidal, 5-30 cm long, lax. Spikelets oblong, elliptic-oblong or elliptic, 4-8 mm long, 2-3-flowered. Lower glume ovate-acute or ovate-lanceolate, 2-3 x 1-1.5 mm, chartaceous, 5-nerved. Lemmas ovate-oblong or oblong, 3-4 x 1-2 mm, chartaceous, 5-7-nerved, glabrous or the upper ones with reflexed, tubercle-based bristles along the margins. Paleas elliptic or oblong-elliptic, 3-3.5 x 1 mm, chartaceous, 2-keeled, scabrid towards apex. Stamens 2-3, anthers linear. Stigmas pink.

Fairly common along the margins of forests or in shades of trees and bushes; a true forest grass.

Fl. & Fr.: October-February.

CALICUT: Chedalet, Kuppadi, Peruvannamuzhi, Pokkunnamala, Thoovakkadavu; CANNANORE: Elimata, Kannothe R.F., Mettanur, Payyavur; IDUKKI: way to Sebarimala; MALAPPURAM: Mancheri; PALGHAT: Karappara, Panthanthode; QUILOM: Kodumon, Pamba; TRICHUR: Adirapally, Kaladi, Parambikulam; TRIVANDRUM: way to Agasthyamala; WYNAD: Chandanathode.

LOPHATHERUM Brongn.

Brongn. in *Duper. Voy. Coq. Bot.* 49. t. 1831; Hook. f. *Fl. Brit. Ind.* 7: 331. 1896; Fischer in Gamble, *Fl. Pres. Madr.* 1847. 1934 (Repr. ed. 3: 1278. 1957); Bor, *Grass. Bur. Cey. Ind. Pak.* 459. 1960.

A small genus of about 2 species distributed in Tropical Asia and Australia, of which one species occurs in India and Kerala.

Lophatherum gracile Brongn. in *Duper. Voy. Coq. Bot.* 50. t. 8. 1831; Hook. f. *Fl. Brit. Ind.* 7: 331. 1896; Fischer in Gamble, *Fl. Pres. Madr.* 1847. 1934 (Repr. ed. 3: 1278. 1957); Bor, *Grass. Bur. Cey. Ind. Pak.* 460. 1960. PLATE No. 72

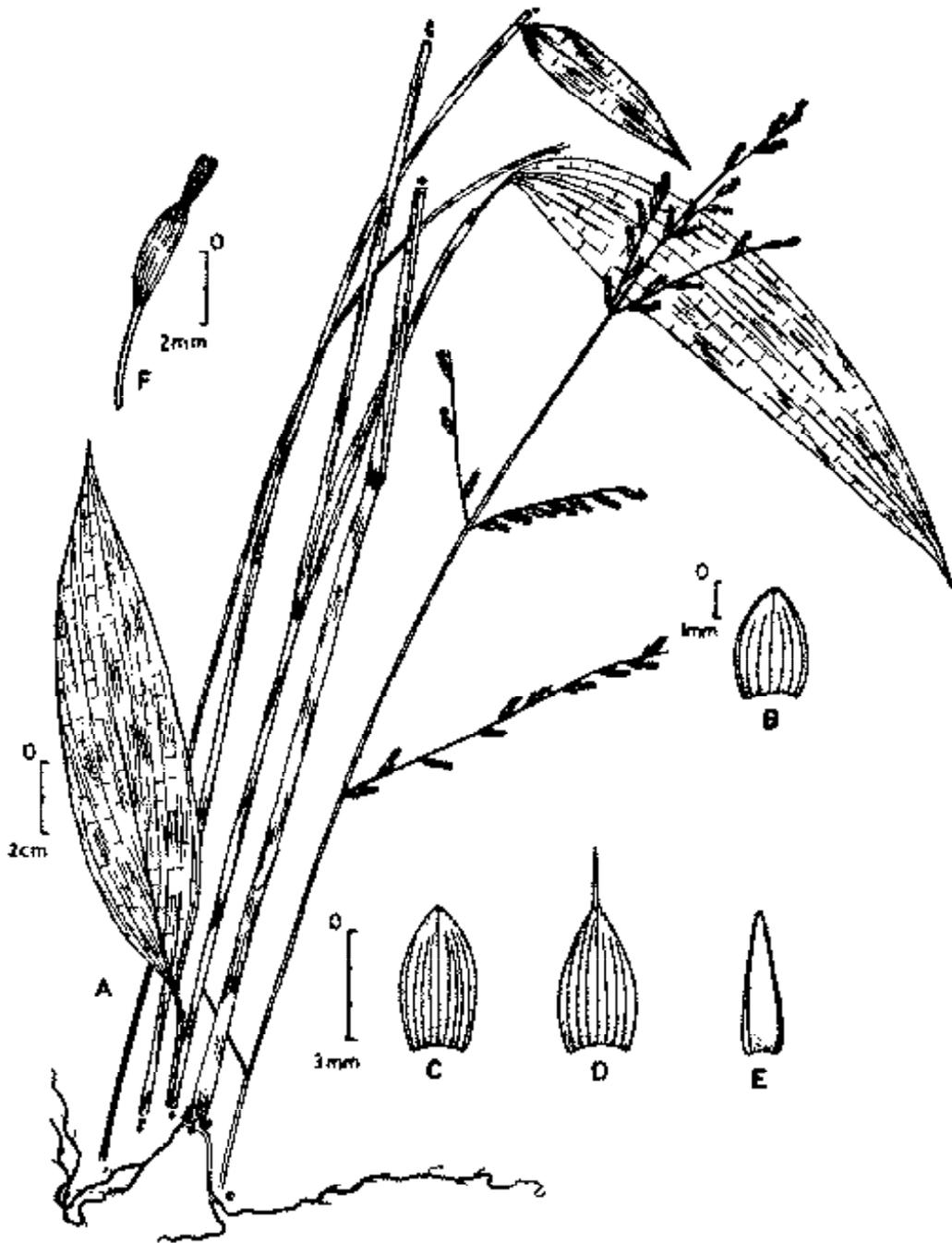


PLATE No. 72: *LOPHATHERUM GRACILE* Brongn.

A. Habit; B. Lower glume; C. Upper glume; D. Fertile lemma; E. Palea of fertile lemma; F. Sterile lemma.

Perennials. Culms loosely tufted, 30-150 cm high, erect or willowy; roots fleshy; nodes glabrous. Leaves oblong-lanceolate or lanceolate, 5-25 x 1.5-5 cm, acuminate, rounded at base with false petioles 0.2-2 cm long. Lower surfaces with projections of false reticulate veins. Sheaths keeled, glabrous or sparsely hairy. Ligules narrow, fimbriate, membranous. Panicles lax, 10-60 cm long, composed of a few distant or clustered branches. Spikelets lanceolate or elliptic-lanceolate, 5-10 x 1-2 mm, green. Lower glume ovate-oblong, 3-4 x 2-2.5 mm, chartaceous, or subcoriaceous, 5-7-nerved, margins scarious or hyaline. Upper glume ovate-oblong, 4-6 x 2-3 mm, subcoriaceous, 7-9-nerved, fertile lemmas ovate or elliptic, 4-6 x 2-3 mm, cuspidate, 7-9-nerved, arista 1-2 mm long. Paleas elliptic-lanceolate, 4-6 x 1-1.5 mm, hyaline, 2-keeled, keels narrowly winged. Sterile lemmas 4-6 together on a stalk of 2-4 mm long, elliptic-lanceolate, 2-3 mm long, tip with retrorsely scabrid awn 1-2 mm long. Stamens 3; anthers c. 2 mm long.

Occasional in the shades of trees, in wet evergreen forests.

Fl. & Fr. : August-December.

Notes: This grass can be distinguished from *Centotheca lappacea* by its pseudo-petiolate leaves and sterile awned lemmas of the spikelets. *Lophatherum gracile* also possesses broad leaves with false reticulate veins on the lower surfaces in *Centotheca*. It is a highly variable species.

IDUKKI: way to Karimala; TRIVANDRUM: Bonaccord, Ponmudi.

POOIDEAE - CHLORIDEAE

CHLORIDEAE Agardh

Agardh, Aphor. Bot. 150. 1823; Bor, Grass. Bur. Cey. Ind. Pak. 461. 1960.

Key to the genera

- | | | |
|-----|--|------------------|
| 1a. | Spikelets with awns; florets dissimilar, lower one or more fertile, with a few sterile florets above | <i>Chloris</i> 1 |
| 1b. | Spikelets without awns; florets similar, fertile | <i>Cynodon</i> 2 |

1. *CHLORIS* Sw.

Sw. Prod. Veg. Ind. Occ. 25, 1788; Hook. f. Fl. Brit. Ind. 7: 289, 1896, p.p.; Fischer in Gamble, Fl. Pres. Madr. 1836, 1934 (Repr. ed. 3: 1270, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 464, 1960.

A genus of about 40 species distributed in the tropical and warm temperate regions of the World, of which about 10 species occur in India and 2 in Kerala.

Key to the species

- 1a. Spikes up to 30 cm long, flexuous; spikelets lanceolate, narrow, 2-flowered; sterile lemmas reduced to awns; awns up to 15 cm long *C. dolichostachya* 2
- 1b. Spikes up to 10 cm long; spikelets broad, obovate, 3-flowered; sterile lemmas well developed, obovate; awns at the most 10 mm long *C. barbata* 1

1. *Chloris barbata* Sw. Fl. Ind. Occ. 1: 200, 1797; Hook. f. Fl. Brit. Ind. 7: 292, 1896; Rang. & Tad. Handb. S. Ind. Grass. 264, t. 199-201, 1921; Fischer in Gamble, Fl. Pres. Madr. 1838, 1934 (Repr. ed. 3: 1272, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 465, 1960; Manilat & Sivaraj, Fl. Calic. 338, 1982.

Annuals or short-lived perennials. Culms tufted, erect, 10-80 cm high; nodes glabrous. Leaves linear-lanceolate or linear, 2-20 x 0.1-0.6 cm, acuminate, rounded at base. Sheaths keeled. Ligules truncate, c. 0.5 mm long, membranous. Spikes 3-16, digitate, each 1-8 cm long, densely spiculate. Spikelets sessile, 2-seriate, obovate, 2-3 mm long, 2-3-flowered. Lower glume lanceolate, 1-2 mm long, hyaline, 1-nerved, keeled, scabrid along the keel. Upper glume lanceolate, 2-3 mm, hyaline, 1-nerved, scabrid along the keel. Fertile lemmas ovate or ovate-elliptic, 2-3 mm long, awned, coriaceous, 3-nerved, with sub-marginal fringes of white hairs, awn 4-8 mm long, scabrid. Paleas elliptic or oblong-elliptic, 2-2.5 x 1 mm, hyaline, 2-keeled, 2-nerved. Sterile lemmas 1-2 on a stalk, 0.5-1 mm long, obovate, 1-2 mm long, truncate or emarginate, coriaceous, 3-nerved, awned; awn 4-8 mm long. Stamens 3. Grains trigonous.

Very common, along the roadsides and in disturbed sites, as a weed in cultivated fields and wetlands.

Fl. & Fr. : March-December.

ALLEPPEY : Thanneermukkam; ERNAKULAM : Cochin;
KOTTAYAM : Kudamaloor; QUILON : Paravur; TRIVANDRUM :
Sreekariyam, Veltayani.

2. *Chloris dolichostachya* Lagasca, Gen. Sp. Pl. 5. 1816; Bdr, Grass. Bur. Cey. Ind. Pak. 466. 1960; Cope in Nasir & Ali, Fl. Pak. 143: 120. 1982; *C. incompleta* Roth, Nov. Pl. Sp. 60. 1821; Hook. f. Fl. Brit. Ind. 7: 290. 1896; Rang. & Tad. Handb. S. Ind. Grass. 258. t. 196. 1921; Fischer in Gamble, Fl. Pres. Madr. 1938, 1934 (Repr. ed. 3: 1272. 1957).

Perennials. Culms erect or willowy, 30-150 cm long; nodes glabrous. Leaves linear-lanceolate or linear, 5-30 x 0.1-0.8 cm, acuminate, rounded at base, flat or convolute, glaucous, midrib prominent. Ligules truncate, narrow, membranous. Spikes 2-8, digitate, 5-30 cm long, densely spiculate. Spikelets 2-flowered, lanceolate or oblong-lanceolate, 4-6 mm long; subsessile, 2-seriate; callus bearded. Lower glume lanceolate or linear-lanceolate, 1-2 mm long, chartaceous, keeled, 1-nerved. Upper glume lanceolate, 4-6 x 0.5-1 mm, acuminate, chartaceous, keeled, 1-nerved, shortly aristate. Fertile lemmas oblong-lanceolate or lanceolate, 4-6 x 1-1.5 mm, chartaceous, awn 6-15 mm long. Paleas lanceolate or oblong-lanceolate, 4-5 x 1 mm, delicate, 2-keeled, 2-nerved. Sterile lemmas reduced to awns, 6-8 mm long with scaly base. Grains oblong or linear-oblong, 2-3 x 1 mm.

Frequent along the hilly tracks and forest margins.

Fl. & Fr. : November-December.

Notes : This forest grass can be distinguished from all other species of the genus by its stout culms, long racemes and narrow lanceolate spikelets with extremely longer awns.

Cope (*l.c.*) says that he is not completely convinced about the inclusion of this species in the genus *Chloris*. The related genus *Enteropogon* is usually distinguished from *Chloris* by its solitary spikes, with a few exceptions. But the spikelets of *Enteropogon* are dorsally compressed and the fertile lemma is narrowly elliptic. *C. dolichostachya* shows a combination of characters of *Chloris* and *Enteropogon*. Lazerides (1972) includes this species under *Enteropogon*.

IDUKKI: way to Sabarimala; TRICHUR: Parambikulam.

2. CYNODON Rich.

Rich. in Pers. Syn. Pl. 1: 85, 1805; Hook. f. Fl. Brit. Ind. 7: 288, 1896; Fischer in Gamble, Fl. Pres. Madr. 1834, 1834 (Repr. ed. 3: 1270, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 468, 1960; Jain in Bull. Bot. Surv. Ind. 9: 138, 1967.

A genus of about 8 species distributed in tropical and warm temperate regions of the World, of which 4 occur in India and 2 in Kerala.

Key to the species

- 1a. Racemes 3-6, up to 6 cm long; leaves up to 8 cm long; plant rhizomatous; hairs on the lemmas not clavate; anthers 1-1.5 mm long *C. dactylon* 2
- 1b. Racemes usually more than 6, up to 10 cm long; leaves up to 16 cm long; plant not rhizomatous; hairs on the lemmas clavate; anthers c. 0.5 mm long *C. arcuatus* 1

1. *Cynodon arcuatus* J. S. Presl ex C. B. Presl, Rel. Haenk. 1: 290, 1830; Bor, Grass. Bur. Cey. Ind. Pak. 468, 1960; Jain in Bull. Bot. Surv. Ind. 9: 145, 1967. *C. dactylon* Pers. var. *intermedius* (Rang. & Tad.) Fischer in Gamble, Fl. Pres. Madr. 1835, 1834 (Repr. ed. 3: 1270, 1957). *C. intermedius* Rang. & Tad. in J. Bomb. Nat. Hist. Soc. 26: 304, 1918 et Handb. S. Ind. Grass. 252. t. 192-193, 1921.

Stoloniferous perennials. Culms creeping and geniculate, without rhizomes, 20-50 cm high, rooting at the nodes; nodes glabrous. Leaves lanceolate, linear-lanceolate or linear, 1-15 x 0.1-0.5 cm, rounded or shallowly cordate at base, glaucous. Sheaths slightly keeled. Ligules fimbriate, membranous. Racemes 4-8, digitate, 5-10 cm long, flexuous. Spikelets elliptic-lanceolate or lanceolate, 2-3 mm long. Lower glume lanceolate, 1-1.5 x 0.5 mm, chartaceous, 1-nerved. Upper glume lanceolate, 1.5-2 x 0.5-1 mm, chartaceous, 1-nerved. Lemma boat-shaped or ovate-lanceolate when spread, 2-3 x 1.5-2 mm, subcoriaceous, pubescent with clavate hairs. Palea oblong-lanceolate, chartaceous, keeled, 1-2-nerved. Stamens 3, anthers c. 0.5 mm long, purplish, stigmas pink. Grain oblong, c. 1 x 0.3 mm.

Occasional along the banks of rivers and streams and rarely along the roadsides and margins of the forests.

Fl. & Fr. : March-September.

Notes : This species is closely allied to and often confused with *C. dactylon*, from which it differs by the absence of rhizomes, possession of longer leaves and racemes and the lemmas with clavate hairs.

CANNANORE: Alakode, Baveli, Taliparamba.

2. *Cynodon dactylon* (Linn.) Pers. Syn. Pl. 1: 85. 1805; Hook. f. Fl. Brit. Ind. 7: 288. 1896; Rang. & Tad. Handb. S. Ind. Grass. 250. t. 190-191, 1921; Fischer in Gamble, Fl. Pres. Madr. 1835. 1934 (Repr. ed. 3: 1270. 1957), excl. var. *intermedius*; Bor. Grass. Bur. Cey. Ind. Pak. 469 t. 52. 1960; Jain in Bull. Bot. Surv. Ind. 9: 139. 1967; Manilal & Sivaraj. Fl. Calic. 339. 1982. *Panicum dactylon* Linn. Sp. Pl. 58. 1753.

Stoloniferous, creeping perennials. Culms slender, 10-50 cm high, with slender rhizomes; nodes glabrous. Leaves lanceolate or linear-lanceolate, 0.5-8 x 0.1-0.5 cm, acuminate, glaucous, sparsely hairy or glabrous. Sheaths keeled. Ligules fimbriate, membranous. Racemes 3-6, digitate, 1-6 cm long; rachis flat, scabrid along the margins. Spikelets oblong-lanceolate or elliptic-lanceolate, 2-3 mm long. Lower glume lanceolate, 1.5-2 x 0.25-0.5 mm, chartaceous, keeled, 1-nerved. Upper glume lanceolate, 1.75-2 x 0.5-0.75 mm, chartaceous, keeled, 1-nerved. Lemma boat-shaped, ovate-oblong or oblong when spread, 2-3 x 1.5-2 mm, subcoriaceous, keeled, silky-pubescent along the keels, hairs simple. Palea boat-shaped or oblong when spread, 2-2.5 x 0.5-1 mm, chartaceous, keeled, 1-2-nerved. Stamens 3, anthers 1-1.5 mm long, dirty-white. Ovary oblong, 0.25-0.5 mm; styles 0.25-0.5 mm long; stigmas 0.5-1 mm long, pink.

Fairly common along the banks of backwaters, streams and canals, roadsides, bunds of paddy fields and often in wastelands.

Fl. & Fr. : March-October.

Notes : This cosmopolitan species differs from *C. arcuatus* by having underground rhizomes and shorter racemes and lemmas without clavate hairs. 'Dog's-tooth' or 'Bermuda Grass' is considered a very good lawn grass, an excellent fodder and an effective sand-binder. Locally this grass is used for certain religious ceremonies and rituals, and hence locally known as 'Bali-Karuka'

ALLEPPEY: Alleppey town, Ambalapuzha, Kuppapuram, Nedumudi, Pallana, Thakazhy, Thanneermukkam, Thottappally, Thrikkunnappuzha; CANNANORE: Ambayathode, Karimbam; IDUKKI: Munnar; PALGHAT: Walayar.

POOIDEAE-DANTHONIEAE

DANTHONIEAE Nevski

Nevski in Act. Inst. Bot. Acad. Sci. U. R. S. S. ser. fasc. 4: 223. 1937.

Key to the genera

- 1a. Spikelets with one floret; lemma awned; rachilla produced into a spatulate structure *Danthonidium* 1
 1b. Spikelets with 2 florets; lemmas without awns; rachilla not produced *Zenkeria* 2

1. DANTHONIDIUM C. E. Hubb.

C. E. Hubb. in Hook. Ic. Pl. t. 3331. 1937; Bor, Grass, Bur. Cey. Ind. Pak. 479. 1960.

A monotypic genus confined to Peninsular India.

Danthonidium gammiei (Bhide) C. E. Hubb. in Hook. Ic. Pl. subtab. 3331. 1937; Bor, Grass, Bur. Cey. Ind. Pak. 479, t. 53, 1960; Singh et al. in Bull. Bot. Surv. Ind. 18 (1-4): 137. 1976. *Danthonia gammiei* Bhide in Proc. Asiat. Soc. Beng. n.s. 7: 513, t. 6. 1912.

PLATE No. 73

Annuals. Culms tufted, 5-50 cm high; nodes glabrous. Leaves linear or aciculate, filiform, 1-5 x 0.1-0.2 cm. Ligules a rim of hairs. Inflorescences spiciform, ovate-oblong or oblong, 1-8 cm long, peduncles puberulous below. Spikelets lanceolate or oblong-lanceolate, 10-15 mm long; callus sharply acute, hairs 2-3 mm long. Lower glume lanceolate, 8-10 x 1.5-2 mm, acuminate or aristate, chartaceous, 3-nerved; arista 4-6 mm long. Upper glume oblong-lanceolate or lanceolate, 10-15 x 2-3 mm, acuminate or aristate, chartaceous, 5-nerved; arista 2-6 mm long. Lemmas oblong, 3-4 x 1-2 mm, coriaceous, notched, awned, with 2 setae and tuft of hairs on either side of the awn; setae 4-6 mm long; awn 10-20 mm long, geniculate; column 6-8 mm long, brownish. Palea oblong-lanceolate, 2.5-3 x 1 mm, notched at apex, keeled, keel produced into spatulate rachilla 1-1.5 mm long, ciliate along the margins; margins delicate. Stamens 3, anthers 1.5-2 mm long. Ovary oblong, 0.5-1 mm long; styles 1.5-2 mm long; stigmas 1-1.5 mm long, violet.

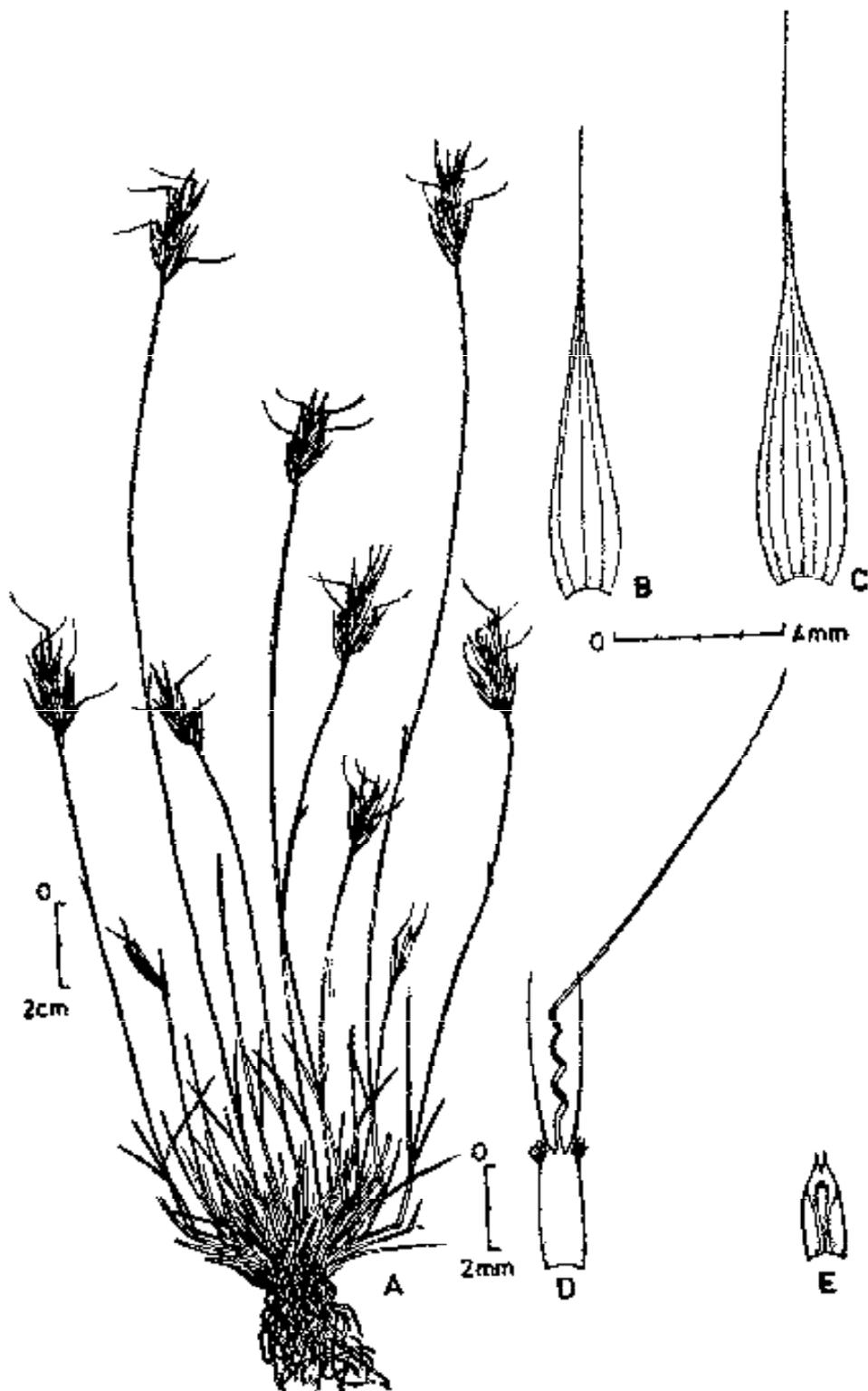


PLATE No. 73 : *DANTHONIDIUM GAMMIEI* (Bhida) C. E. Hubb.
 A. Habit: B. Lower glume: C. Upper glume: D. Lemma: E. Palea.

Rare in open grasslands, dry rocky places and in lateritic soil; often grows in the crevices of rocks.

Fl. & Fr.: September-December.

CANNANORE: Paramba; KASARAGOD: Kasaragod.

2. ZENKERIA Trin.

Trin. in *Linnaea* 11: 150. 1837; Hook. f. *Fl. Brit. Ind.* 7: 270. 1896; Fischer in Gamble, *Fl. Pres. Madr.* 1805. 1934 (Repr. ed. 3: 1249. 1957); Bor. *Grass. Bur. Cey. Ind. Pak.* 481. 1960.

A genus of about 4 species, restricted to South India and Sri Lanka of which 3 occur in India and also in Kerala.

Key to the species

- 1a. Leaves elliptic or ovate-elliptic, rigid, up to 20 cm long; culms up to 50 mm high *Z. sebastinei* 3
- 1b. Leaves linear or linear-lanceolate, not rigid; culms often much longer:
 - 2a. Spikelets 3-4 mm long; lemmas entire, acuminate; panicles up to 30 cm long; glumes often shorter than half the length of the lemmas *Z. elegans* 1
 - 2b. Spikelets 5-6.5 mm long; lemmas notched at apex; panicles up to 20 cm long; glumes about half the length of the lemmas or more *Z. jainii* 2

1. *Zenkeria elegans* Trin. in *Linnaea* 11: 150. t. 3. 1837; Hook. f. *Fl. Brit. Ind.* 7: 270. 1896; Fischer in Gamble, *Fl. Pres. Madr.* 1805. 1934 (Repr. ed. 3: 1250. 1957); Bor. *Grass. Bur. Cey. Ind. Pak.* 482. 1960.

Perennials. Culms 20-80 cm high, densely tufted; nodes bearded or glabrous. Leaves linear-lanceolate, 5-50 x 0.3-0.8 cm, flat or convolute, rounded at base, glabrous or sparsely villous or glabrous. Sheaths sparsely villous or glabrous. Ligules tuft of hairs. Panicles pyramidal, 5-30 cm long, densely spiculate, lax. Spikelets elliptic-lanceolate or lanceolate, 3-4 mm long, 2-flowered. Lower glume ovate-lanceolate, 1-1.5 x 0.5 mm, chartaceous, 1-nerved. Upper glume ovate-lanceolate, 1.5-2 x 0.5-1 mm, chartaceous, 1-nerved. Lemmas ovate-lanceolate, 3-4 x 1-1.5 mm acuminate, chartaceous, 5-nerved, villous. Paleas

elliptic-lanceolate, 2.5-3 x 1 mm, delicate, hyaline, 2-keeled, 2-nerved. Stamens 3; anthers c. 2 mm long. Ovary ovate-oblong, 0.25-0.5 mm; styles 0.5-1 mm long; stigmas 0.5-1 mm.

Fairly common along the hill slopes, often in the crevices of rocks.

Fl. & Fr. : May-December.

KOTTAYAM : Kurisumala.

2. *Zenkeria jainii* N.C. Nair, P.V. Sreekumar & V.J. Nair in J. Bomb. Nat. Hist. Soc. 78(2) : 352. 1981. PLATE No. 74

Perennial herbs. Culms 45-60 cm long, erect from a decumbent rooting base; nodes glabrous; internodes 5-14 cm long. Leaf blades 15-50 x 0.8-1.6 cm, chartaceous, linear-lanceolate, tapering at both ends, sparsely villous on the upper surface; sheaths 8-16 cm long, chartaceous, glabrous, sparsely villous, basal ones breaking up into fibres; ligule a tuft of short hairs. Panicles 14-18 cm long, densely flowered with capillary, villous spreading branches. Spikelets 5-5.5 mm long, all alike, each 2-flowered, bisexual. Pedicels 0.2-1.5 cm long, villous; rachilla short, bearded, disarticulating above the glumes. Glumes subequal, c. 3 x 1 mm, ovate-lanceolate to lanceolate, acute or shortly acuminate, hyaline, glabrous, 1-nerved, keeled, persistent, spreading. Lemmas c. 5 x 1.2 mm, lanceolate, acuminate, 5-nerved, coriaceous, long ciliate below the middle. Paleas c. 4 x 1.1 mm, ovate-lanceolate, notched at apex, 2-keeled, 2-nerved, hyaline, long ciliate along the keels except at the upper quarter. Lodicules 2, each c. 0.7 x 0.4 mm, without nerves, obovate, retuse at apex. Stamens 3; anthers 2-2.5 mm long, narrow, purple; filaments 1.5-3.5 mm long, slender. Ovary c. 0.8 x 0.4 mm, ovate, glabrous; styles 2, each c. 0.2 mm long, stout; stigmas c. 1 cm long, feathery, white. Grains not seen.

Zenkeria jainii grows in clumps in the crevices of moist rocks.

Fl. & Fr. : August-December.

IDUKKI : Eravikulam Sanctuary.

3. *Zenkeria sebastinei* Henry & Chandrab. in Bull. Bot. Surv. Ind. 15 (1&2) : 142. 1973.

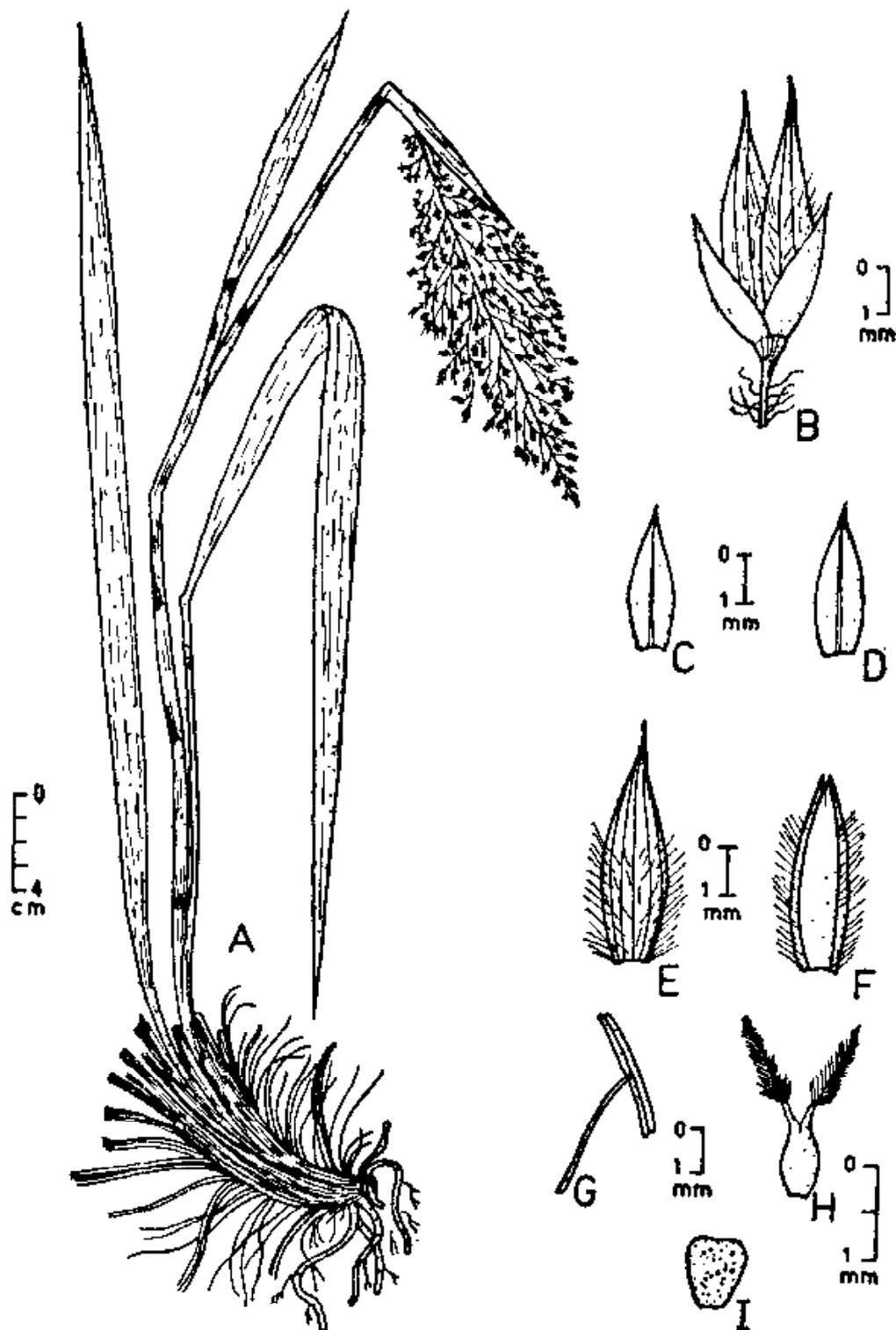


PLATE No. 74 : *ZENKERIA JAINII* N. C. Nair, P. V. Sreekumar & V. J. Nair

A. Plant; B. Spikelet; C. Lower glume; D. Upper glume; E. Lemma; F. Palea; G. Stamen; H. Pistil; I. Lodicule.

Perennials. Culms tufted, 15-50 cm high, erect or decumbent; nodes bearded. Leaves elliptic or ovate-elliptic, 4-20 x 0.5-2 cm, tapering at both ends, rigid, coriaceous or chartaceous, sparsely villous towards apex. Sheaths glabrous, basal ones breaking up into fibres. Ligules tuft of hairs. Panicles pyramidal, 5-15 cm long. Spikelets elliptic-lanceolate, 4-5 mm long. 2-flowered. Lower glumes ovate-lanceolate, 2.3 x 1 mm, chartaceous, 1-nerved. Upper glume ovate-lanceolate or oblong-lanceolate, 3.4 x 1-1.5 mm, chartaceous, 3-nerved. Lemmas ovate-lanceolate or oblong-lanceolate, 4-5 x 1-1.5 mm, chartaceous, 5-7-nerved, densely villous. Paleas lanceolate or oblong-lanceolate, 2-3 x 0.5-1 mm, delicate, hyaline, 2-keeled, 2-nerved, ciliate along the keels. Lodicules 2, obovate, c. 0.8x0.5mm. Stamens 3; anthers 2-2.5 mm long. Ovary elliptic, c. 0.5 mm long; styles c. 0.5 mm long; stigmas 0.5-1 mm long.

Frequent in the crevices of moist rocks, at higher elevations.

Fl. & Fr. : August - December.

POOIDEAE ERAGROSTEAE

ERAGROSTEAE Stapf

Stapf in Dyer, Fl. Cap. 7: 316. 1898; Bor, Grass. Bur. Cey. Ind. Pak. 485. 1960.

Key to the genera

- 1a. Inflorescence a solitary, or 2 to many digitate or subdigitate spikes:
 - 2a. Spikes digitate or subdigitate:
 - 3a. Lemmas aristate or awned; axis of the spikes ending in a sharp point *Dactyloctenium* 1
 - 3b. Lemmas not aristate; axis of the spikes ending in a spikelet *Elyusine* 3
 - 2b. Spikes solitary, secund, rarely branched, but then cylindrical, but never digitate or subdigitate:
 - 4a. Spikelets in dense, globose clusters; spikes dense, cylindrical, often lobed at base *Elytrophorus* 4
 - 4b. Spikelets in loose terminal, solitary secund spikes; spikes never lobed:
 - 5a. Lemmas 2-4-lobed at the apex, often awned *Tripogon* 9
 - 5b. Lemmas entire at the apex, acute or acuminate, but never awned *Eragrostiella* 5

1b. Inflorescence a panicle:

- 6a. Lemmas awned; callus densely bearded *Silentvalleya* 8
- 6b. Lemmas not awned; callus not as above:
- 7a. Nerves on the lemmas hairy; lemmas often lobed or toothed
- 8a. Spikelets linear-oblong, sub-terete, 4-8 mm long; lemmas more or less rounded on the back; racemes loosely spiculate *Diplachne* 2
- 8b. Spikelets oblong, laterally compressed, 2-6 mm long; lemmas keeled on the back; racemes densely spiculate *Leptochloa* 7
- 7b. Nerves on the lemmas glabrous; lemmas entire; never lobed or toothed *Eragrostis* 9

1. DACTYLOCTENIUM Willd.

Willd. Enum. Hort. Berol. 1029. 1809; Fischer in Gamble, Fl. Pres. Madr. 1840, 1934 (Repr. ed. 3: 1273, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 488. 1960, *Eleusine* Gaertn. subgen. *Dactyloctenium* Hook. f. Fl. Brit. Ind. 7: 293, 1896.

A genus of about 13 species distributed in tropical, subtropical and warm temperate regions of the World, mainly Africa to India, of which about 4 species occur in India and one in Kerala.

Dactyloctenium aegyptium (Linn.) P. Beauv. Ess. Agrost. Expl. Pl. 15. 1812; Fischer in Gamble, Fl. Pres. Madr. 1840, 1934 (Repr. ed. 3: 1273, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 489, t. 54. 1960; Manilal & Sivaraj. Fl. Calic. 337. 1982. *Cynosurus aegyptius* Linn. Sp. Pl. 72. 1753. *Eleusine aegyptia* (Linn.) Desf. Fl. Atlant. 1: 85. 1798; Hook. f. Fl. Brit. Ind. 7: 295, 1896; Rang. & Tad. Handb. S. Ind. Grass. 276, t. 208-209. 1921.

Annuals. Culms creeping or geniculately ascending, 10-60 cm high, rooting at the nodes; nodes glabrous. Leaves oblong-lanceolate, lanceolate or linear, 1-25 x 0.1-0.6 cm, acuminate, rounded or shallowly cordate at base, hispid or glabrous. Sheaths keeled. Ligules ovate, fimbriate, membranous. Spikes digitate, 1-6, each 1-6 cm long. Spikelets ovate or oblong, 2-4 mm long, 3-4-flowered. Lower glume boat-shaped or ovate-acute when spread, 1.5-2x1-1.5 mm, keeled; keel minutely winged, scabrid. Upper glume ovate-elliptic or obovate,

1.5-2 x 1-1.5 mm, aristate, chartaceous, keeled; keel scabrid; arista geniculate, 1-1.5 mm long. Lemmas ovate or ovate-lanceolate, 1.5-2 x 1-1.5 mm, aristate, keeled, chartaceous; arista c. 1 mm long. Palea ovate-lanceolate, 1-1.5 x 1 mm, acuminate, chartaceous, keeled. Stamens 3; anthers 0.25-0.5 mm long. Grain obovate or triangular, c. 1 mm long, transversely rugose.

Very common along the bunds of paddy fields, banks of streams and canals, wet-lands, roadsides and as a weed in tapioca plots and rubber estates.

Fl. & Fr. : Throughout the year.

Notes : It is an exceedingly variable annual weed, with typical shortly stoloniferous, geniculate ascending culms and linear or oblanceolate spikes radiating in a star-like manner. The number of spikes varies considerably.

ALLEPPEY : Muhamma, Palfana, Pallathuruthy; CALICUT : Kuttiyadi; CANNANORE : Aralam, Manjeswar, Nileswar, Talliparamba, Tellicherry; ERNAKULAM : Chellanum, Cochin; KOTTAYAM : Kottayam, Kudamaloor; QUILON : way to Nilamel; TRICHUR : Thunakkadevu; TRIVANDRUM : Pulimath.

2. DIPLACHNE P. Beauv.

P. Beauv. Ess. Agrost. 80. t. 16/9. 1812; Hook. f. Fl. Brit. Ind. 7: 328. 1896; Fischer in Gamble, Fl. Pres. Madr. 1828. 1934 (Repr. ed. 3: 1266. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 492. 1960.

A genus of about 18 species distributed in the tropics and subtropics of the World, of which one species occurs in India and Kerala.

Diplachne fusca (Linn.) P. Beauv. ex Roem. & Schult. Syst. Veg. 2: 615. 1817; Hook. f. Fl. Brit. Ind. 7: 329. 1896; Fischer in Gamble, Fl. Pres. Madr. 1828. 1934 (Repr. ed. 3: 1266. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 492. 1960; Cope in Nasir & Ali, Fl. Pak. 143: 72. 1982. *Festuca fusca* Linn. Sp. Pl. ed. 2. 109. 1762.

PLATE No. 75

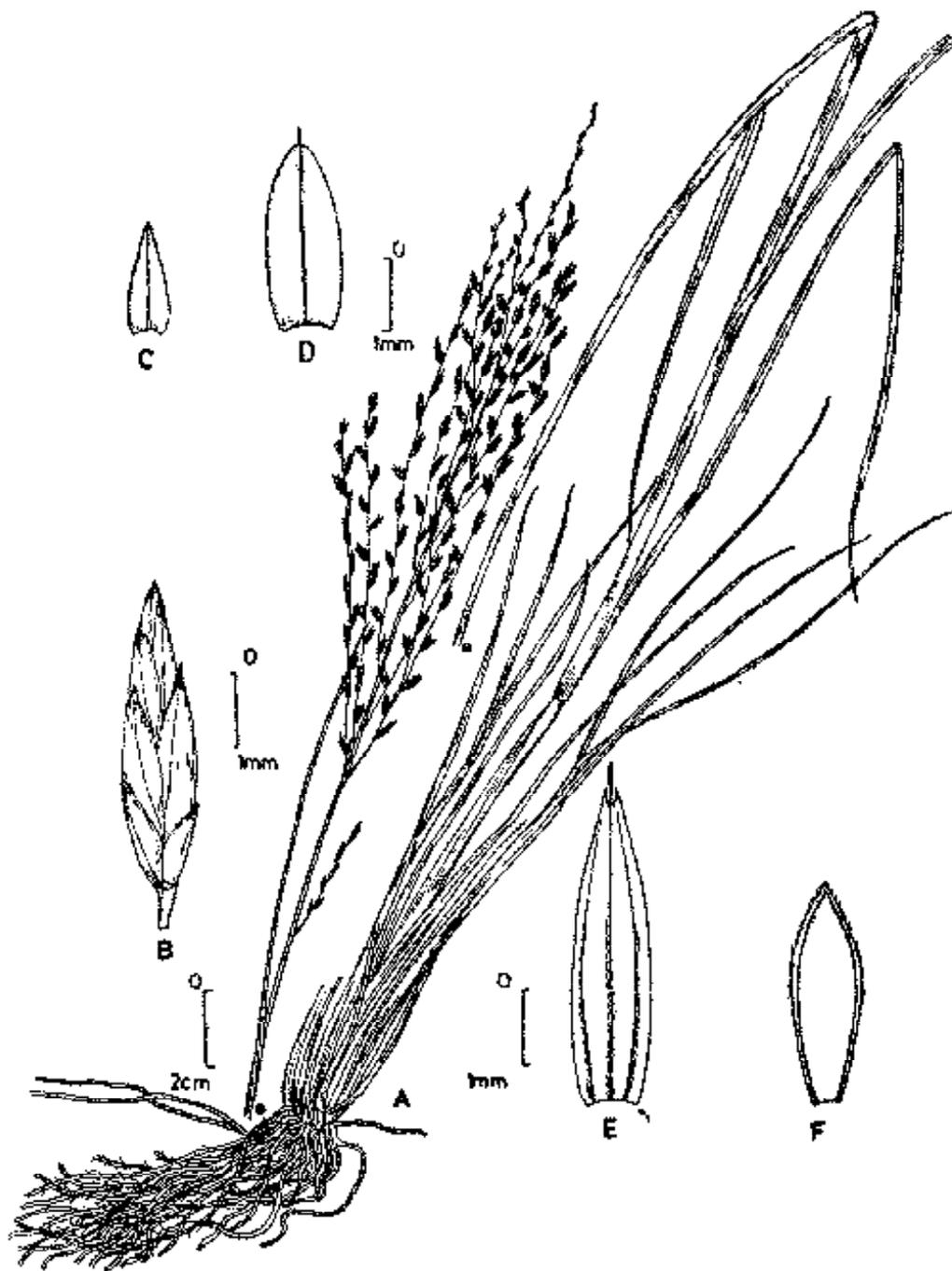


PLATE No. 75 : *DIPLACHNE FUSCA* (Linn.) P. Beauv.

A. Habit; B. Spikelet; C. Lower glume; D. Upper glume; E. Lemma; F. Palea.

Aquatic or semi-aquatic perennials. Culms tufted, erect 30-100 cm high, rooting and branching from the lower nodes. Leaves linear-lanceolate or linear-acuminate, 8-35 x 0.2-0.6 cm, rounded at base, glaucous. Sheaths keeled. Ligules ovate, acute, 5-6 mm long, membranous. Panicles 10-30 cm long, densely spiculate. Spikelets linear-oblong or oblong-lanceolate, 4-8 x 1-1.5 mm, 4-6-flowered. Lower glume oblong or oblong-lanceolate, 1.5-2 x 0.5-1 mm, chartaceous, 1-nerved. Upper glume oblong or elliptic-oblong, 2.5-3 x 1 mm, mucronate, chartaceous, 1-nerved. Lemmas oblong or linear-oblong, 4-5 x 1-1.5 mm, 3-lobed, mucicous, chartaceous, 3-nerved, villous along the nerves in the lower half. Paleas oblong or elliptic-oblong, 2-3 x 1 mm, delicate, 2-keeled, 2-nerved, scabrid along the keels. Stamens 3; anthers c. 1 mm long. Ovary oblanceolate, 0.25-0.5 mm long; styles 0.5-1 mm long; stigmas 1-2 mm long.

Fairly common in salt-marshes, muddy wastelands, highly acidic paddy fields, and fallow fields.

Fl. & Fr. : December - March.

Notes : This grass is very similar to some species of *Eragrostis* but can be distinguished by the loose, grey panicles, larger spikelets and lobed as well as awned lemmas with villous nerves.

ALLEPPEY : Thottappally; ERNAKULAM : Cochin.

3. ELEUSINE Gaertn.

Gaertn. *Fruct. Sem. Pl.* 1: 7. 1788; Hook. f. *Fl. Brit. Ind.* 7: 293. 1896, p.p.; Fischer in Gamble, *Fl. Pres. Madr.* 1838. 1934 (Repr. ed. 3: 1272. 1957), p.p.; Boř, *Grass-Bur. Cey. Ind. Pak.* 492. 1960.

A genus of about 9 species distributed in tropical and subtropical regions of the World, of which about 3 species occur in India and 2 in Kerala.

Key to the species

- 1a. Spikes 3-7 mm wide; ligule truncate, membranous; grains never exposed
E. indica 2
- 1b. Spikes 9-15 mm wide; ligule a row of hairs; grains often exposed
E. coracana 1

1. **Eleusine coracana** (Linn.) Gaertn. *Fruct.* 1: 8. t. 1. f. 11. 1789; Hook. f. *Fl. Brit. Ind.* 7: 299. 1896; Fischer in

Gamble, Fl. Pres. Madr. 1839. 1934 (Repr. ed. 3: 1273. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 492. 1960; Manilal & Sivaraj. Fl. Calic. 339. 1982. *Cynosurus corecanus* Linn. Syst. Nat. ed. 10. 2: 875. 1759.

Annuals or perennials. Culms erect, 25-60 cm high; nodes glabrous. Leaves linear, 10-80 x 0.3-1 cm, acute or acuminate, rounded or shallowly cordate at base. Sheaths strongly keeled, compressed. Ligules row of hairs. Spikes digitate, 3-8 in number, 2-8 cm long, compact, densely spiculate. Spikelets ovate, 4-6 mm long, 4-6-flowered. Lower glume ovate-oblong, 2-3 x 1.5-3 mm, chartaceous, 3-nerved, keeled, keel scabrid. Upper glume ovate-lanceolate, 3-4 x 1.5-3 mm, chartaceous, 5-nerved, keeled; keel scabrid. Lemmas ovate-acute, 2-4 x 2-3 mm, chartaceous, 3-nerved. Paleas ovate-oblong, 2-3 x 1.5-3 mm, chartaceous, 2-keeled; keels winged, scabrid. Stamens 3; anthers 1-1.5 mm long. Grain orbicular or globose, dark-brown, exposed.

'Finger millet' is often cultivated in the plains and lower hills for its grain, sometimes runs wild.

Fl. & Fr. : December-March.

Notes: A kind of porridge as well as an alcoholic beverage is often prepared from the grains and consumed by the local people.

ALLEPPEY : Alleppey, Thakazhy.

2. *Eleusine indica* (Linn.) Gaertn. Fruct. 1: 8. 1789; Hook. f. Fl. Brit. Ind. 7: 293. 1896; Rang. & Tad. Handb. S. Ind. Grass. 273, t. 206. 1921; Fischer in Gamble, Fl. Pres. Madr. 1839. 1934 (Repr. ed. 3: 1273. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 493. 1960; Manilal & Sivaraj. Fl. Calic. 340. 1982. *Cynosurus indicus* Linn. Sp. Pl. 72. 1753.

Annuals. Culms tufted, erect, 5-80 cm high; nodes glabrous. Leaves lanceolate, linear-lanceolate or linear, 1-40 x 0.1-0.8 cm, blunt at tip, rounded or shallowly cordate, often folded. Sheaths keeled. Ligules truncate, narrow, membranous. Spikes digitate or subdigitate, 1-15, each 1-15 cm long. Spikelets ovate-oblong or oblong-lanceolate, 4-6 mm long, 3-6-flowered. Lower glume oblong, 1.5-2 x 0.5-1 mm, keeled, chartaceous, 3-nerved, scabrid along the keels. Upper glume oblong, 2-3 x 1-1.5 mm, keeled, chartaceous, 5-nerved, margins hyaline. Lemmas ovate-oblong,

2.3 x 1.5-2 mm, chartaceous, 3-nerved. Paleas oblong-elliptic, 2-2.5 x 0.5-1 mm, delicate, 2-keeled, 2-nerved. Stamens 3; anthers c. 0.5 mm long, dirty-yellow. Ovary elliptic, 0.25-0.5 mm long; styles 0.25-0.5 mm long; stigmas c. 0.5 mm long, violet.

Very common along the roadsides, wastelands, margins of streams and rivers and as a weed in cultivated fields.

Fl. & Fr. : Throughout the year.

Notes : 'Crab Grass' or 'Crawfoot Grass'. This can be distinguished from the other species of the genus by its loosely packed subdigitate spikes and unexposed grains. It is a cosmopolitan weed and also a good fodder.

ALLEPPEY: Alleppey, Ambalapuzha, Haripad, Kumarakam, Pallathuruthy, R. Block; CANNANORE: Aralem, Cannanore, Hosdurg, Taliparamba; IDUKKI: Mangala Devi Temple, Munnar, Vandiperiyar; KOTTAYAM: Kudamaloor, Mudurapalai; PALGHAT: Karivara, Malleswaram, Mukkali, Silent Valley; PATHANAMTHITTA: Achencoil, Kumplampoika, Pfacherry; QUILON: Kallipara; TRICHUR: Thumbermuzzi; TRIVANDRUM: Attingal, Kazhakkuttam, Ponmudi, Sreekariyam; WYNAD: Chandanathode.

4. ELYTROPHORUS P. Beauv.

P. Beauv. Ess. Agrost. 67: t. 14, f. 2. 1812; Hook. f. Fl. Brit. Ind. 7: 306. 1896; Fischer in Gamble, Fl. Pres. Madr. 1843, 1934 (Repr. ed. 3: 1275. 1957); Bor. Grass. Bur. Cey. Ind. Pak. 493. 1960.

A genus of about 2 species distributed in the tropics of the Old World, of which 1 species occurs in India and also in Kerala.

Elytrophorus spicatus (Willd.) A. Camus in Lecomte, Fl. Gen. de l'Indo-Chine 7: 547. 1923; Fischer in Gamble, Fl. Pres. Madr. 1843, 1934. (Repr. ed. 3: 1275. 1957); Bor. Grass. Bur. Cey. Ind. Pak. 493. 1960. *Dactylis spicata* Willd. in Ges. Naturf. Freunde Berlin Neue Schrift 3: 416. 1801. *Elytrophorus articulatus* P. Beauv. Ess. Agrost. 67. t. 14, f. 2. 1812; Hook. f. Fl. Brit. Ind. 7: 306. 1896.

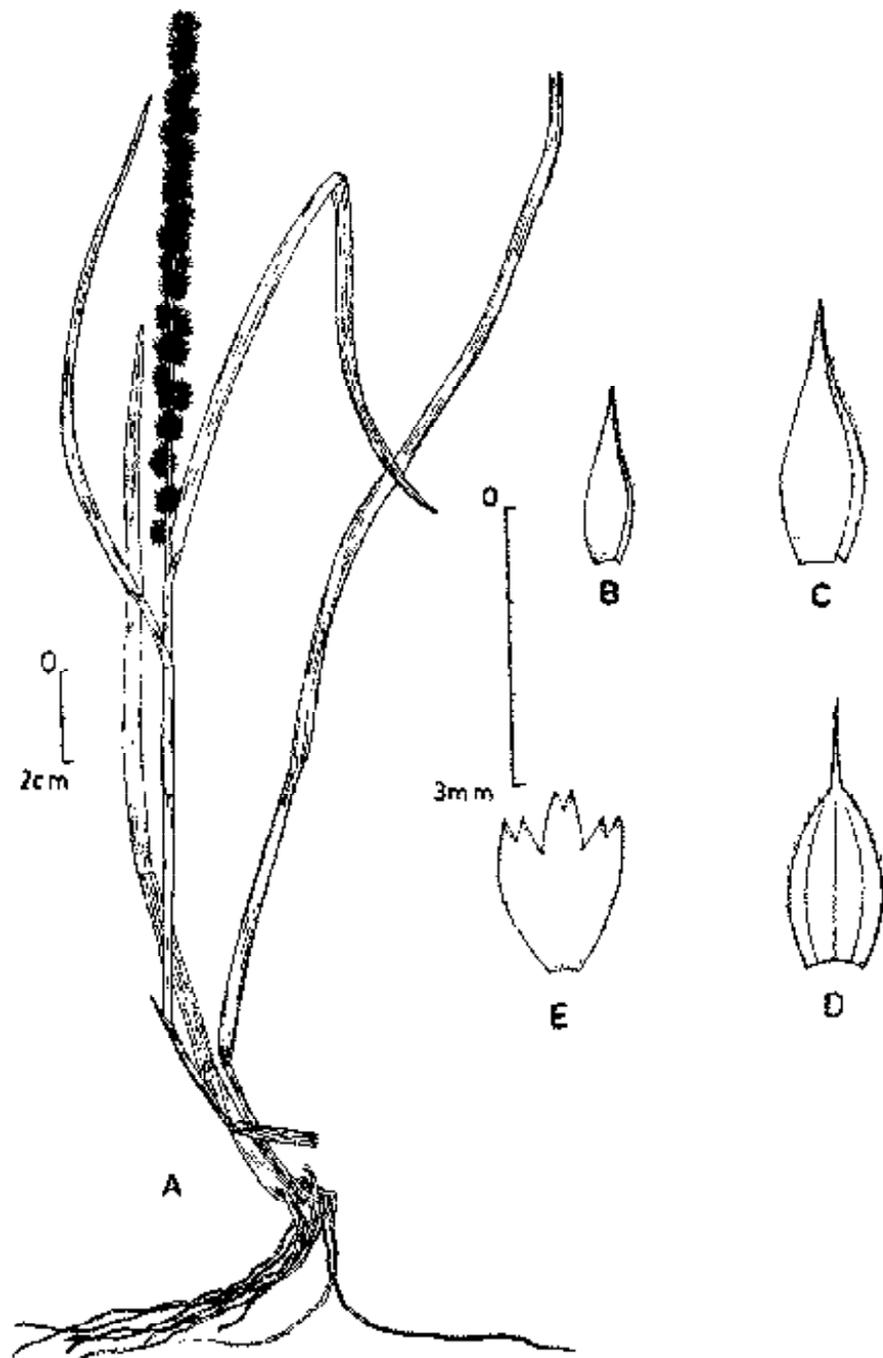


PLATE No. 76 : *ELYTROPHORUS SPICATUS* (Willd.) A. Camus
 A. Habit; B. Lower glume; C. Upper glume; D. Lemma; E. Palea.

Annuals. Culms creeping, stoloniferous, 2-25 cm high, erect, or geniculate; nodes glabrous. Leaves lanceolate or linear-lanceolate, 0.5-20 x 0.1-0.5 cm, rounded at base. Sheaths slightly keeled. Ligules ovate, membranous. Spikes narrow, cylindrical, 0.5-15 cm long. Spikelets ovate or ovate-oblong, 4-6-flowered. Lower glume elliptic-lanceolate, 1-2 x 0.5-1 mm, acuminate, keeled, 1-nerved, chartaceous, margins ciliate. Upper glume elliptic-lanceolate, 2-3 x 1-1.5 mm long, acuminate, chartaceous, keeled, 1-nerved; keels ciliate. Lemmas ovate-lanceolate, 2-3 x 1-1.5 mm, caudate-acuminate, chartaceous, 3-nerved. Paleas obovate, 1.5-2.5 x 1-1.5 mm, 3-6-lobed at apex, delicate, hyaline. Stamens 3; anthers 0.25-0.6 mm long. Grains elliptic or ellipsoid.

Occasional in harvested paddy fields, ditches and wetlands.

Fl. & Fr. : December-February.

CANNANORE: Arunappara.

5. ERAGROSTIELLA Bor

Bor, In Ind. For. 6: 269. 1940.

A genus of about 7 species distributed in the tropics and subtropics of the World, of which about 5 species occur in India and one in Kerala.

Eragrostiella bifaria (Vahl) Bor in Ind. For. 66: 270. 1940; Bor, Grass. Bur. Cey. Ind. Pak. 494. 1960. *Poa bifaria* Vahl, Sym. Bot. 2: 19. 1791; *Eragrostis coromandeliana* (Koen. ex Rottl.) Trin. in Mem. Acad. Sci. Petersb. Ser. 6, 1: 415. 1830; Hook. f. Fl. Brit. Ind. 7: 326. 1896 '*coromandelina*' *Poa coromandeliana* Koen. ex Rottl. in Ges. Natur. Freunde Berlin, Neu Schrift 4: 191. 1803. *Eragrostis bifaria* (Vahl) Wight ex Steud. Nom. Bot. ed. 2, 1: 562. 1840; Hook. f. Fl. Brit. Ind. 7: 325. 1896; Rang. & Tad. Handb. S. Ind. Grass. 307, t. 227. 1921; Fischer in Gamble, Fl. Pres. Madr. 1828. 1934 (Repr. ed. 3: 1265. 1957).

Perennials. Culms tufted, 15-80 cm high, erect; nodes glabrous. Leaves acicular or linear-lanceolate, 2-15 x 0.1-0.3 cm, often rolled. Sheaths villous or glabrous. Ligules fimbriate, membranous. Spikes 5-30 cm long, lax, leaden-grey. Spikelets ovate-acute, ovate-lanceolate or oblong-lanceolate, 2-3 mm wide, 8-36-flowered, greyish.

Lower glume lanceolate, 2-3 x 0.5-1 mm, chartaceous, keeled, 1-nerved; keel scabrid. Upper glume ovate-lanceolate, 2-2.5 x 0.5-1 mm, chartaceous, 1-nerved. Lemmas ovate-acute, 2-3 x 2-2.5 mm, chartaceous, faintly 3-nerved. Paleas ovate-elliptic, 2-2.5 x 1-1.25 mm, delicate, 2-keeled; keels winged, ciliate. Stamens 3; anthers c 0.1 mm long. Ovary ovate-oblong or ellipsoid, c. 0.25 mm long; styles 0.25-0.5 mm long; stigmas 0.5-1 mm long.

Occasional in open grasslands, on bunds of paddy fields and in wastelands.

Fl. & Fr. : September-December.

Notes : This grass can be recognised by its grey, loosely spiculate spikes and filiform leaves.

PALGHAT: Attapady Block.

6. ERAGROSTIS Wolf

Wolf, Gen. Pl. Vocab. Char. def. 23. 1776; Stapf in Hook. f. Fl. Brit. Ind. 7: 312. 1896, p.p.; Fischer in Gamble, Fl. Pres. Madr. 1820, 1934 (Repr. ed. 3: 1261. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 495. 1960; Cope in Nasir & Ali, Fl. Pak. 143. 82. 1982.

A genus of about 300 species distributed all over the World, mainly in the tropics and subtropics, of which about 35 species occur in India and 18 species in Kerala.

Out of 18 species included here, 2, viz. *E. cumingii* and *E. subsecunda* are new records for India. Occurrence of *E. aspera* and *E. coarctata* in Kerala is not certain.

Cope (*l.c.*) says that *Eragrostis* is a very large genus and difficult to name. The name *Eragrostis* is generally ascribed to P. Beauv. (Ess. Agrost. 70. 1812), but Ross (in Acta Bot. Neerl. 15: 147-161, 1966) argues that Wolf's earlier name is validly published.

Key to the species

- 1a. Spikelets breaking up at maturity :
 - 2a. Spikelets breaking up from above downwards :
 - 3a. Keels of the paleas ciliate; panicles up to 20 cm long :

- 4a. Panicles effuse:
- 5a. Culms just below the inflorescence viscous, often with sticky sand grains; panicles narrow, up to 10 cm long *E. viscosa* 17
- 5b. Culms not viscous; panicles lax, up to 20 cm long *E. tenella* 13
- 4b. Panicles contracted, spiciform *E. riparia* 10
- 3b. Keels of the paleas smooth or scabrid, but never ciliate; panicles often larger, up to 50 cm or more long, interrupted, spiciform *E. japonica* 5
- 2b. Spikelets breaking up from below upwards:
- 6a. Lemmas up to 1.5 mm long:
- 7a. Spikelets linear-oblong or lanceolate, 0.5-1.25 mm wide; lemmas often with a purple spot at the tip; culms slender, glandular below the panicles *E. pilosa* 9
- 7b. Spikelets ovate-oblong, 1.5-2.5 mm wide; lemmas without purple spots; culms not glandular:
- 8a. Spikelets 10-80 or more flowered, pale green or purplish; pedicels often 5 mm or more long *E. tremula* 15
- 8b. Spikelets 3-20-flowered, leaden-grey; pedicels up to 3 mm long:
- 9a. Panicles contracted, spiciform, up to 10 cm long; paleas persistent *E. nutans* 8
- 9b. Panicles lax, not spiciform, up to 15 cm long; paleas deciduous *E. gangetica* 4
- 6b. Lemmas over 1.5 mm long:
- 10a. Spikelets leaden-grey or black:
- 11a. Pedicels of the spikelets with glandular bands; spikelets with apparently serrate margins due to the gaping lemmas; panicles up to 6 cm wide *E. tenuifolia* 14
- 11b. Pedicels without glandular bands; spikelets not as above; panicles often lax:
- 12a. Spikelets often black, oblong-lanceolate, 0.5-2 mm wide; leaves green *E. nigra* 7
- 12b. Spikelets leaden-grey, ovate or ovate-oblong, 2-3 mm wide; leaves glaucous *E. arrovirens* 1

- 10b. Spikelets purplish or olive-green :
- 13a. Spikelets broadly ovate, ovate-oblong or oblong-obtuse, 1.5-4 mm wide :
- 14a. Paleas persistent; lemmas olive-green or pale grey; plants glandular :
- 15a. Spikelets linear or narrowly oblong, 1.5-2.5 mm wide; pedicels with crateriform glands *E. minor* 6
- 15b. Spikelets ovate or ovate-oblong, 2-4 mm wide; pedicels often without glands *E. cillianensis* 2
- 14b. Paleas deciduous; lemmas purplish; plants not glandular *E. unioloides* 16
- 13b. Spikelets oblong-lanceolate or lanceolate, acute, 1-2 mm wide :
- 16a. Panicles up to 25 cm long, loosely spiculate; spikelets subsecund, at the most 10 mm long, seated on long pedicels; culms up to 80 cm long *E. subsecunda* 11
- 16b. Panicles up to 15 cm long, densely spiculate; spikelets often crowded, 15-25 mm long; pedicels at the most 3 mm long; culms up to 30 cm long :
- 17a. Spikelets 10-60-flowered; lemmas 2-2.5 mm long, acuminate; basal leaves flat *E. zeylanica* 18
- 17b. Spikelets 5-20-flowered; lemmas 1.5-2 mm long, acute; basal leaves filiform *E. cumingii* 3
- 1b. Spikelets not breaking up at maturity; panicles narrow, loosely spiculate, up to 15 cm long; spikelets oblong or oblong-lanceolate *E. tet* 12
1. *Eragrostis atrovirens* (Desv.) Trin. ex Steud. Nom. Bot. ed. 2, 1: 562. 1840; Bor, Grass. Bur. Cey. Ind. Pak. 503. 1960. *Poa atrovirens* Desf. Fl. atlant. 1: 73. t. 14. 1798. PLATE No. 77

Perennials. Culms 15-100 cm high, densely tufted; nodes glabrous. Leaves lanceolate, linear-lanceolate or linear-acuminate, 2-30 x 0.1-0.5 cm, rounded or shallowly cordate at base, flat or rolled, glaucous. Sheaths slightly keeled. Ligules truncate, narrow, membranous. Panicles ovate or oblong, 5-30 cm long, lax. Spikelets ovate or ovate-oblong, 2-3 mm wide, 5-40-flowered, grey. Lower glume ovate-lanceolate or lanceolate, 1-2 x 0.5-1 mm, chartaceous, 1-nerved. Upper glume ovate-lanceolate, 1-2.5 x 0.5-1 mm, chartaceous, 1-nerved. Lemmas broadly ovate, 2-2.5 x 1-1.5 mm, acute,

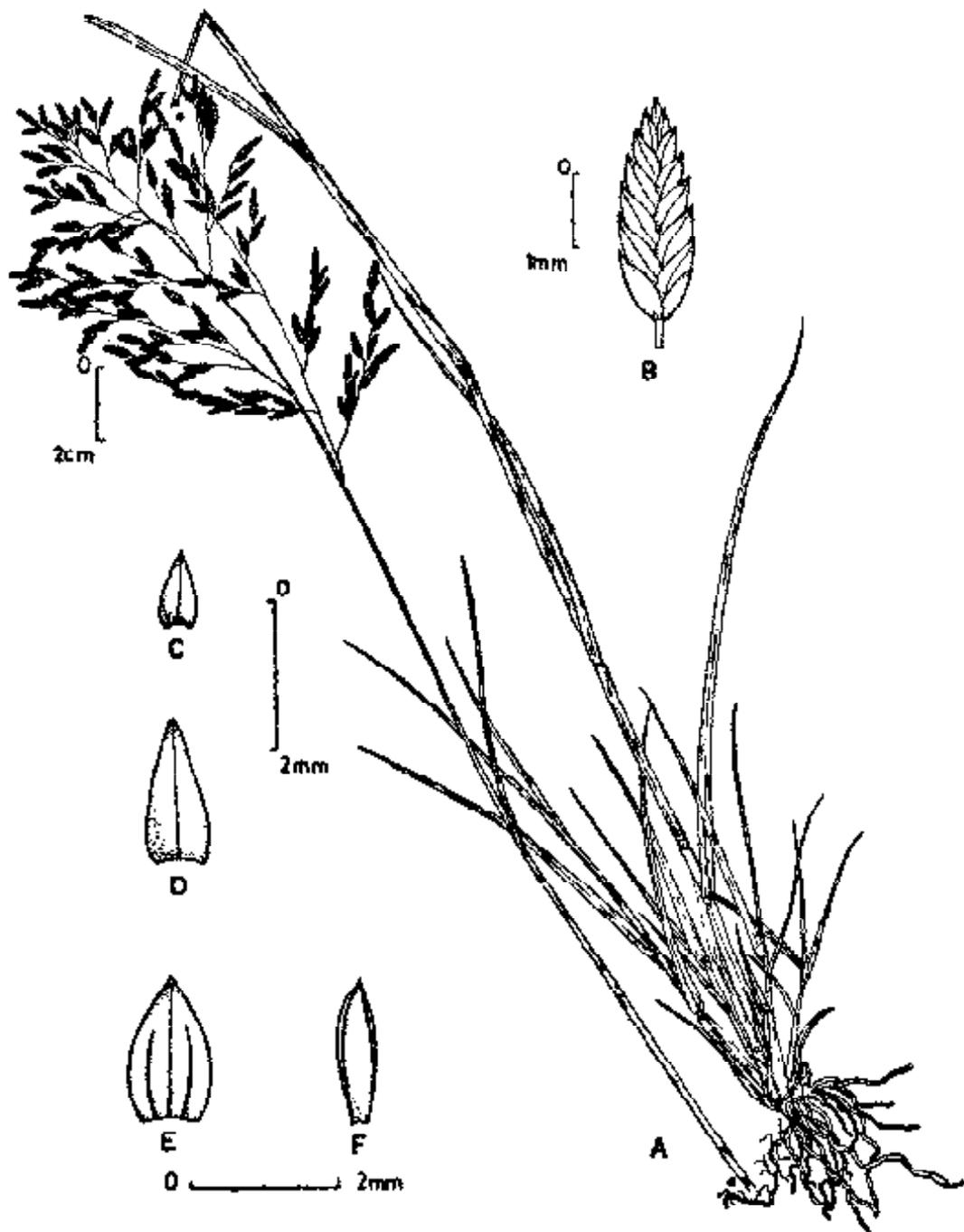


PLATE No. 77 : *ERAGROSTIS ATRIVIRENS* (Dest.) Trin.

A. Habit; B. Spikelet; C. Lower glume; D. Upper glume; E. Lemma;
F. Palea.

chartaceous, 3-nerved. Paleas elliptic-lanceolate, *c.* 2 x 0.5 mm, deciduous, 2-keeled, keels ciliolate. Stamens 3; anthers 0.5-1 mm long. Ovary oblong, *c.* 0.5 mm; styles 0.5-1 mm long; stigmas 0.5-1 mm long. Grains ellipsoid, 0.5-0.75 mm long.

Very common along the banks of backwaters, rivers, streams and canals, in wetlands and puddles, as a weed in tea and rubber plantations.

Fl. & Fr. : Throughout the year.

ALLEPPEY: Kumarakam, Laxmithop, Nedumudy, Pallana, R. Block, Thrikkunnappuzha; CALICUT: Chedaletth; CANNANORE: Aralam; IDUKKI: Edapalayam, Mullakudy, Munnar, Thekkady, Thenkanchi, way to Mangaladevi Temple; PALGHAT: Chindaki Forest; Vetrilachofa; QUILON: Thenmala; TRICHUR: Near Kandasankadavu, Thunakkadavu; TRIVANDRUM: Klamala R.F.; Neyyar, western slopes of Agastyamala; WYNAD: Chandanathode, Meppadi, Tirunelli.

2. *Eragrostis cilianensis* (All.) Lut. ex F.T. Hubb. in Philipp. J. Sci. Bot. 8: 159. 1913; Cope in nasir & Ali, Fl. Pak. 143: 93. 1982; Fischer in Gamble, Fl. Pres. Madr. 1827. 1934 (Repr. ed. 3: 1264. 1957); Bor. Grass. Bur. Cey. Ind. Pak. 503. 1960; *Poa cilianensis* All. Fl. Pedem. 2: 246. t. 81/2. 1785. *Eragrostis major* (Linn.) Host Gram. Austr. 4: 14. t. 24. 1809; Stapf in Hook. f. Fl. Brit. Ind. 7: 320. 1896; Rang. & Tad. Handb. S. Ind. Grass. 300. t. 221-222. 1921. *Briza eragrostis* Linn. Sp. Pl. 70. 1753.

Annuals. Culms tufted, 15-60 cm high; nodes glabrous. Leaves lanceolate or linear-lanceolate, 5-20 x 0.2-1 cm, acuminate, rounded or shallowly cordate at base. Ligules tuft or hairs. Panicles ovate, 6-25 cm long, lax, olive-green or pale grey. Spikelets ovate, or ovate-oblong, 2-4 mm wide, 5-40-flowered, olive green. Lower glume ovate-lanceolate, 1-2 x 0.5-1 mm, chartaceous, 1-nerved. Upper glume ovate-lanceolate, or ovate-acute, 1.5-2 x 0.5-1 mm, chartaceous, 3-nerved. Lemmas broadly ovate, ovate-oblong, 1.5-2 x 1-1.5 mm, chartaceous, 3-nerved, glandular on the keel. Paleas elliptic-oblong, 1.5-2 x 1 mm, 2-keeled, 2-nerved, ciliate along the keels. Stamens 3; anthers *c.* 0.25 mm long. Ovary *c.* 0.25 mm long; styles 0.25-0.5 mm long; stigmas *c.* 0.5 mm long. Grains orbicular, *c.* 0.5 x 0.5 mm.

Occasional along the margins of forests and hill slopes.

Fl. & Fr.: August-December.

Notes: 'Stink grass'; has a characteristic disagreeable odour.

PALGHAT: Panthanthode; TRICHUR: Parambikulam.

3. *Eragrostis cumingii* Steud. Syn. Pl. Glum. 1: 266. 1854; Bor, Grass. Bur. Cey. Ind. Pak. 507. 1960; Mohanan & Sreekumar in J. Econ. Tax. Bot. 3: 447. 1982.

PLATE No. 78

Annuals. Culms 10-20 cm tall, erect, slender; nodes glabrous. Leaves 3-8 x 0.1-0.2 cm, linear-lanceolate, acuminate, basal ones filiform, sparsely villous on upper surfaces. Sheaths 1-4 cm, much longer than the inter nodes, striate, glabrous, bearded at the mouth with long silky hairs. Ligule a ring of short silky hairs. Panicles 5-12 cm long, widely spreading, effuse; branches 2-3 cm long, alternate, with 2-8 spikelets in each, angular, sparsely villous and scabrid; rachis angular, densely villous in the axils of the branches, covered with sparse tubercle based hairs all over; pedicels 0.5-1.5 mm, very short and scaberulous. Spikelets 2-10 x 1-2 mm, oblong-lanceolate, 10-20-flowered, greenish, tinged with purple. Glumes 1-1.5 x 0.5 mm, ovate-lanceolate, acute, 1-nerved, scabrid along the nerves. Upper glumes 1.5-2 x 0.05-0.75 mm, ovate-lanceolate, acute, 1-nerved, scabrid along the nerves. Lemmas c. 1.8 x 1.5 mm, broadly ovate, acute, 3-nerved, coriaceous, scabrid on the dorsal surface. Paleas c. 1.25 x 0.25 mm, oblanceolate, obtuse at apex, slightly curved, 2-keeled, 2-nerved, minutely ciliate along the keels, persistent. Lodicules 2, each c. 0.15 mm long, obovate. Stamens 2; anthers c. 0.1 mm long, filaments c. 0.25 mm long. Ovary c. 0.15 mm long, ovate, glabrous; styles c. 0.25 mm long, slender, stigmas c. 0.4 mm long. Grain c. 0.5 x 0.3 mm, ovate or orbicular.

Fl. & Fr.: July-February.

TRIVANDRUM: Trivandrum, Veli.

4. *Eragrostis gangetica* (Roxb.) Steud. Syn. Pl. Glum. 1: 266. 1854; Fischer in Gamble, Fl. Pres. Madr. 1826. 1934 (Repr. ed. 3: 1264. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 508. 1960; *Poa gangetica* Roxb. Fl. Ind. 1:

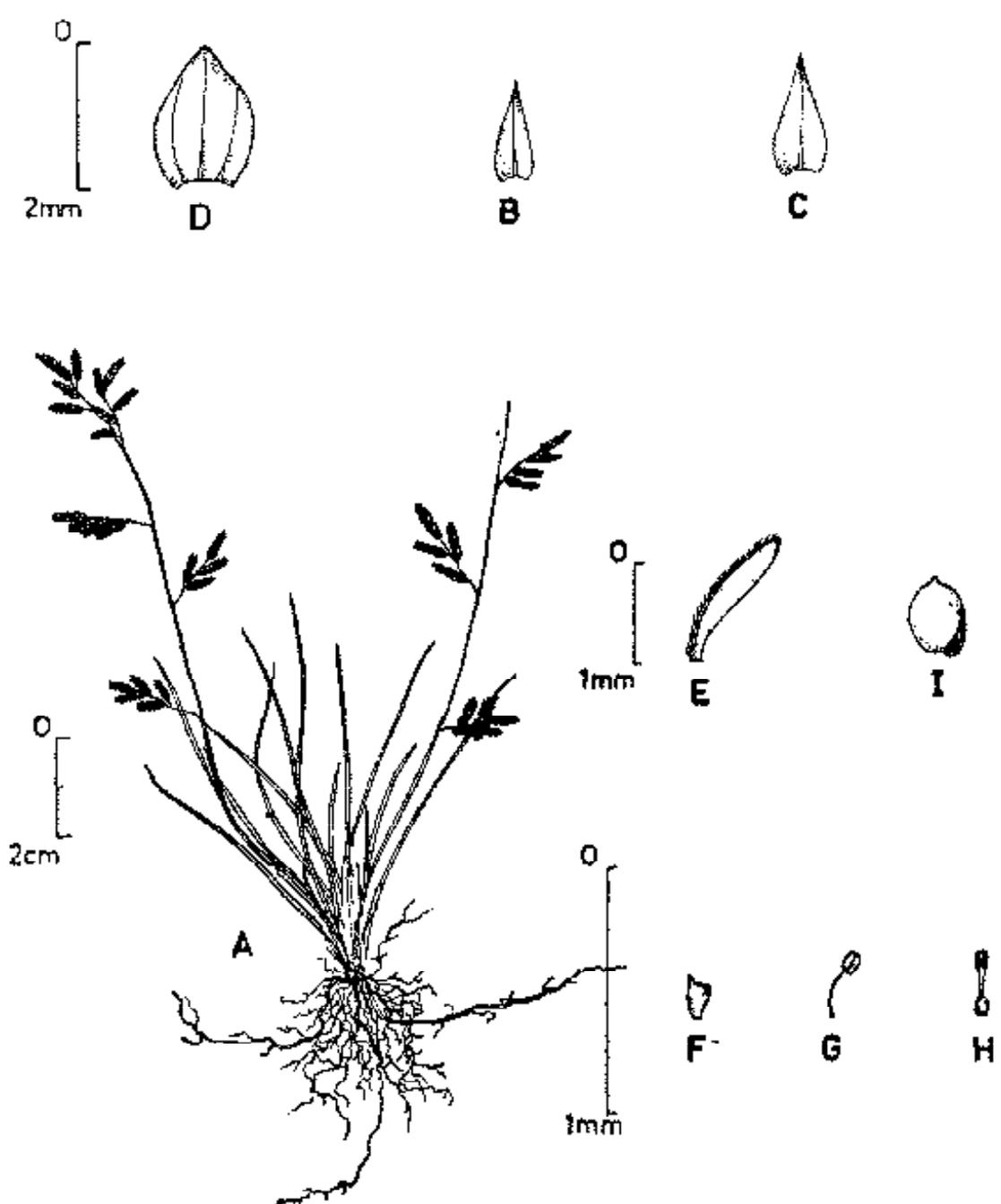


PLATE No. 78 : *ERAGROSTIS CUMINGII* Steud.

A. Habit; B. Lower glume; C. Upper glume; D. Lemma; E. Palea;
 F. Lodicule; G. Stamen; H. Pistil; I. Grain

341. 1820. *Eragrostis stenophylla* Hochst. ex Miq. in Verh. Konink. -Nederl. Inst. 3, 4, 39, 1851, p.p.

Annuals. Culms tufted, slender, 10-60 cm high, erect; nodes glabrous. Leaves lanceolate or linear-lanceolate, 2-15 x 0.1-0.5 cm, acute or acuminate, rounded or shallowly cordate at base, green or glaucous. Ligules truncate, fimbriate, membranous. Panicles ovate-oblong or elliptic, 4-15 cm long, lax, grey. Spikelets ovate-oblong or oblong-lanceolate, 0.5-1.25 mm wide, 5-20-flowered, grey. Lower glume ovate-lanceolate, 0.5-1 x 0.5 mm, chartaceous, 1-nerved. Upper glume ovate-lanceolate, 1-1.25 x 0.5-1 mm long, chartaceous, 1-nerved. Lemmas ovate-lanceolate, 1-1.5x0.5-1 mm, chartaceous, 3-nerved. Paleas elliptic-lanceolate, c. 1 x 0.5 mm, 2-keeled, 2-nerved; keels scabrid. Stamens 3 or 2; anthers 0.1-0.25 mm long, violet with white connectives. Stigmas white. Grains orbicular, 0.25-0.5 x 0.25 mm.

Fairly common in damp places, river-beds, margins of streams, harvested paddy fields and in wetlands.

Fl. & Fr. : June-December.

Notes : This species is closely allied to *E. atrovirens*, but differs by its annual habit, slender culms, and smaller lemmas. It is also similar to *E. nutans* from which it differs by the effuse panicles. *E. gangetica* shows certain resemblances with *E. pilosa*, but differs by its broader spikelets and grey lemmas without purple spots.

ALLEPPEY: Kumarakam, Pallana; CALICUT: Kakkodi; CANNANORE: Paramba; TRICHUR: Vellanikkara; TRIVANDRUM: Veli.

5. *Eragrostis japonica* (Thunb.) Trin. in Mem. Acad. Sci. Petersb. ser. 6. 1: 405. 1830; Rang. & Tad. Handb. S. Ind. Grass, 294, t. 217, 1921; Bor. Grass. Bur. Cey. Ind. Pak. 509. 1960; Cope in Nasir & Ali, Fl. Pak. 143: 88. 1982; Manilal & Sivaraj. Fl. Calic. 348. 1982. *Poa japonica* Thunb. Fl. Japon. 51. 1784. *Eragrostis diarrhena* (Schult.) Steud. Syn. Pl. Glum. 1: 266. 1854; Fischer in Gamble, Fl. Pres. Madr. 1826, 1934 (Repr. ed 3: 1264. 1957), incl. var. *koenigii* Fischer; Bor. Grass. Bur. Cey. Ind. Pak. 507. 1960. *Poa diarrhena* Schult. Syst. Veg. 2. Mant. 616. 1824. *Eragrostis interrupta* auct. non P. Beauv. 1812; Stapf in Hook. f. Fl. Brit. Ind. 7: 316. 1896, incl. var. *koenigii*, *diarr-*

hena, *diplachnoides* & *tenuisissima*).

Annuals or perennials. Culms tufted, 15-120 cm high; nodes glabrous. Leaves linear or linear-lanceolate, 5-40 x 0.2-0.6 cm, rounded or shallowly cordate at base, flat, green or glaucous. Sheaths keeled. Ligules truncate, membranous, rarely fimbriate. Panicles linear or linear-lanceolate, 10-60 cm long, interrupted, spiciform; branches often verticillate or subverticillate. Spikelets ovate-oblong or oblong-lanceolate, 5-12-flowered. Lower glume ovate c. 0.5-0.25 mm, chartaceous, 1-nerved. Upper glume ovate-acute, 0.5-1 x 0.25-1 mm, chartaceous, 1-nerved. Lemmas broadly ovate, c. 1 x 0.5 mm, chartaceous, 3-nerved. Paleas oblong-lanceolate, 0.5-1 x 0.25 mm, 2-keeled, 2-nerved; keels scabrid. Stamens 2; anthers 0.1-0.25 mm long. Grains ellipsoid, 0.3-0.5 mm long.

Occasional along the banks of streams, rivers and other wet places, as a weed in cultivated fields.

Fl. & Fr. : November - May.

E. japonica is a highly polymorphic species with three main sources of variations like spikelet size, nature of panicles and keels of the paleas. The size and shape of panicles as well as spikelets vary continuously. Similarly the keels of the paleas may either be smooth or scabrid. It is considered a very good fodder grass.

PALGHAT : Mukkali; TRICHUR : Chalakkudi; WYNAD. Tirunelli.

6. *Eragrostis minor* Host. Gram. Austr. 4: 15. 1809; Stapf in Hook. f. Fl. Brit. Ind. 7: 327. 1896; Cope in Nasir & Ali, Fl. Pak. 143: 95. 1982. *E. poaeoides* P. Beauv. Ess. Agrost. 162. 1812; Fischer in Gamble, Fl. Pres. Madr. 1827. 1934 (Repr. ed. 3: 1264. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 512. 1960.

Annuals. Culms loosely tufted, 10-60 cm high, erect or geniculately ascending; nodes glabrous. Leaves linear, 5-12 x 0.2-0.5 cm, flat or convolute, glabrous or pilose on upper surface. Sheaths compressed. Ligules rim of hairs. Panicles ovate-oblong or oblong, 5-25 cm long, dense. Spikelets linear or narrowly oblong, 5-15-flowered, olive green or yellowish, pedicels with glands.

Lower glume ovate-lanceolate, 1-2 x 1 mm, chartaceous, 1-nerved. Upper glume ovate-lanceolate, 1.5-2.5 x 1-1.5 mm, chartaceous, 1-3-nerved. Lemmas ovate, 1.5-2 x 1-1.5 mm, chartaceous, 3-nerved. Paleas elliptic, 1-2 x 1 mm, scabrid on the keels. Stamens 3; anthers c. 0.3 mm long. Grains globose, 0.5-0.7 mm long.

Occasional, in open grasslands and as a weed in gardens, cultivated fields and irrigated lands.

Fl. & Fr. : May-September.

Notes : This 'Little Love Grass' is closely allied to *E. cilianensis* from which it differs by the narrower spikelets and glandular pedicels.

There are collections of this grass from areas very close to the border of the State. The description is based on these specimens.

7. *Eragrostis nigra* Nees ex Steud. Syn. Pl. Glum. 1: 267. 1854; Stapf in Hook. f. Fl. Brit. Ind. 7: 324. 1896; Fischer in Gamble, Fl. Pres. Madr. 1827. 1934 (Repr. ed. 3: 1265. 1957); Bor. Grass. Bur. Cey. Ind. Pak. 511. 1960.

Perennials. Culms 30-80 cm high, erect; nodes glabrous. Leaves linear or linear-lanceolate, 5-40 x 0.2-0.6 cm, acuminate, narrow or rounded at base. Sheaths keeled. Ligules fimbriate, thin, membranous. Panicles ovate, 15-35 cm long, very lax, loosely spiculate, black. Spikelets oblong-lanceolate or lanceolate, 0.5-2 mm wide, 4-8-flowered, black. Lower glume oblong-lanceolate, 1-1.5 x 0.6 mm, chartaceous, 1-nerved. Upper glume ovate-lanceolate, 1.5-2 x 0.5-1 mm, chartaceous, faintly 1-3-nerved. Lemmas ovate-lanceolate, 2-2.5 x 1-1.5 mm, chartaceous, 3-nerved. Paleas elliptic, 1-1.5 x 0.6 mm, 2-keeled, 2-nerved, keels smooth, glabrous. Stamens 3; anthers c. 0.5 mm long, cream or violet. Ovary oblong-elliptic, c. 0.25 mm; styles 0.25-0.5 mm long; stigmas c. 0.5 mm long, cream.

Frequent along roadsides, at higher elevations, as a weed in Tea estates.

Fl. & Fr. : July-September.

IDUKKI: Munnar, Upper Vagavurrai, Vagavurrai.

8. *Eragrostis nutans* (Retz.) Nees ex Steud. Nom. Bot. ed. 2. 563. 1840; Fischer in Gamble, Fl. Pres. Madr. 1826. 1934 (Repr. ed. 3: 1264. 1957); Bor. Grass. Bur. Cey. Ind. Pak. 511. 1960. *Poa nutans* Retz. Obs. Bot. 4: 19. 1786. *Eragrostis elegantula* Nees ex Steud. Syn. Pl. Glum. 1: 266. 1854, non Nees 1841; Stapf in Hook. f. Fl. Brit. Ind. 7: 318. 1896. *E. stenophylla* auct. non Hochst. ex Miq. 1851; Stapf in Hook. f. Fl. Brit. Ind. *l.c.*, p.p.

Perennials. Culms tufted, 10-50 cm high; nodes glabrous. Leaves acicular or lanceolate, 1-8 x 0.1-0.3 cm, narrow or rounded at base. Sheaths with tuft of hairs at mouth. Ligules row of hairs. Panicles spiciform, contracted, 2-10 cm long, grey. Spikelets oblong or oblong-lanceolate, 6-15-flowered, grey. Lower glume ovate, c. 0.5 x 0.25 mm, chartaceous, 1-nerved. Upper glume ovate-oblong, 0.5-0.75 x 0.5 mm, acute, chartaceous, 1-3-nerved. Lemmas ovate-acute, 1-1.25 x 0.75-1 mm, chartaceous, 3-nerved. Paleas oblong, curved, c. 1 x 0.5 mm, 2-keeled, 2-nerved, scabrid along the keels. Stamens 3; anthers c. 0.25 mm long. Ovary ovate, c. 0.1 mm; styles c. 0.25 mm long; stigmas c. 0.2 mm long.

Occasional along the bunds of paddy fields and margins of scrub jungles.

Fl. & Fr. : April-June.

QUILON: Quilon; TRIVANDRUM: Kottur R.F.

9. *Eragrostis pilosa* (Linn.) P. Beauv. Ess. Agrost. 162. 175. 1812; Stapf in Hook. f. Fl. Brit. Ind. 7: 323. 1896; Rang. & Tad. Handb. S. Ind. Grass. 305. t. 225. 1921; Fischer in Gamble, Fl. Pres. Madr. 1827. 1934 (Repr. ed. 3: 1265. 1957); Bor. Grass. Bur. Cey. Ind. Pak. 512. 1960; Manilal & Sivaraj. Fl. Calic. 348. 1982. *Poa pilosa* Linn. Sp. Pl. 68. 1753.

Annuals. Culms loosely tufted, slender, 10-100 cm long; nodes glabrous. Leaves linear-acuminate, 2-20 x 0.1-0.4 cm, rounded at base. Sheaths keeled. Ligules fimbriate, membranous. Panicles oblong-lanceolate or lanceolate, 5-30 cm long, dark grey or black, axils long pilose. Spikelets lanceolate or oblong-lanceolate, 0.5-1.25 mm wide, 3-12-flowered, leaden-grey or black. Lower glume lanceolate, c. 0.5 x 0.25 mm, chartaceous, nerveless. Upper glume lanceo-

late or oblong-lanceolate, 0.5-1 x 0.5 mm, chartaceous, 1-nerved. Lemmas ovate-lanceolate, 1-1.5 x 1 mm, chartaceous, 3-nerved. Paleas oblong-lanceolate, 1-1.25 x 0.5-1 mm, 2-keeled, 2-nerved, scabrid along the keels. Stamens 3; anthers c. 0.25 mm long. Ovary 0.25-0.5 mm long; styles c. 0.5 mm long; stigmas c. 0.5 mm long. Grains obovate, 0.5-0.75 mm, cuneate at base.

Fairly common along the ditches, margins of ponds, channels and other water logged areas.

Fl. & Fr. : May-August.

IDUKKI: Munnar; PALGHAT: Panthanhode; PATHANAMTHITTA: Upper Moozhiyar; TRIVANDRUM: Trivandrum.

10. *Eragrostis riparia* (Willd.) Nees, *Agrost. Bras.* 512, 1829; Fischer in Gamble, *Fl. Pres. Mèdr.* 1825, 1934 (Repr. ed. 3: 1263, 1957); Bor, *Grass. Bur. Cey. Ind. Pak.* 513, 1960; Manilal & Sivaraj, *Fl. Calic.* 347, 1982. *Poa riparia* Willd. in *Ges. Natur. Freunde Berlin, Neuschrift.* 4: 185, 1803. *Eragrostis tenella* sensu Stapf var. *riparia* Stapf in Hook. f. *Fl. Brit. Ind.* 7: 315, 1896.

Perennials. Culms densely tufted, 10-15 cm high; nodes glabrous. Leaves lanceolate or linear-lanceolate, 1-10 x 0.1-0.3 cm, acuminate, rounded at base. Sheaths slightly keeled. Ligules row of hairs. Panicles contracted, spiciform, 0.5-8 cm long. Spikelets oblong, 1-2 mm wide, 3-8-flowered. Lower glume ovate-lanceolate, c. 1 x 0.5 mm, chartaceous, 1-nerved. Upper glume more or less similar to the lower. Lemmas ovate-oblong, rounded at apex, 1-1.25 x 0.5-1 mm, chartaceous, 3-nerved. Paleas obovate or oblanceolate, 1-1.25 x 0.5 mm, 2-keeled, 2-nerved, chartaceous, long ciliate along the keels. Stamens 3; anthers c. 0.25 mm long. Ovary c. 0.25 mm; styles c. 0.5 mm long; stigmas c. 0.5 mm long.

Fairly common in dry, sandy localities along the coast especially near backwaters and in wastelands and roadsides.

Fl. & Fr. : December-June.

ALLEPPEY: Pallana, Thottappally, Thrikkunnappuzha; QUILON: Quilon.

11. *Eragrostis subsecunda* (Lam.) Four. *Mex. Pl.* 2: 118, 1886. *Poa subsecunda* Lam. *Tab. Encycl.* 1: 184, 1791.

PLATE No. 79

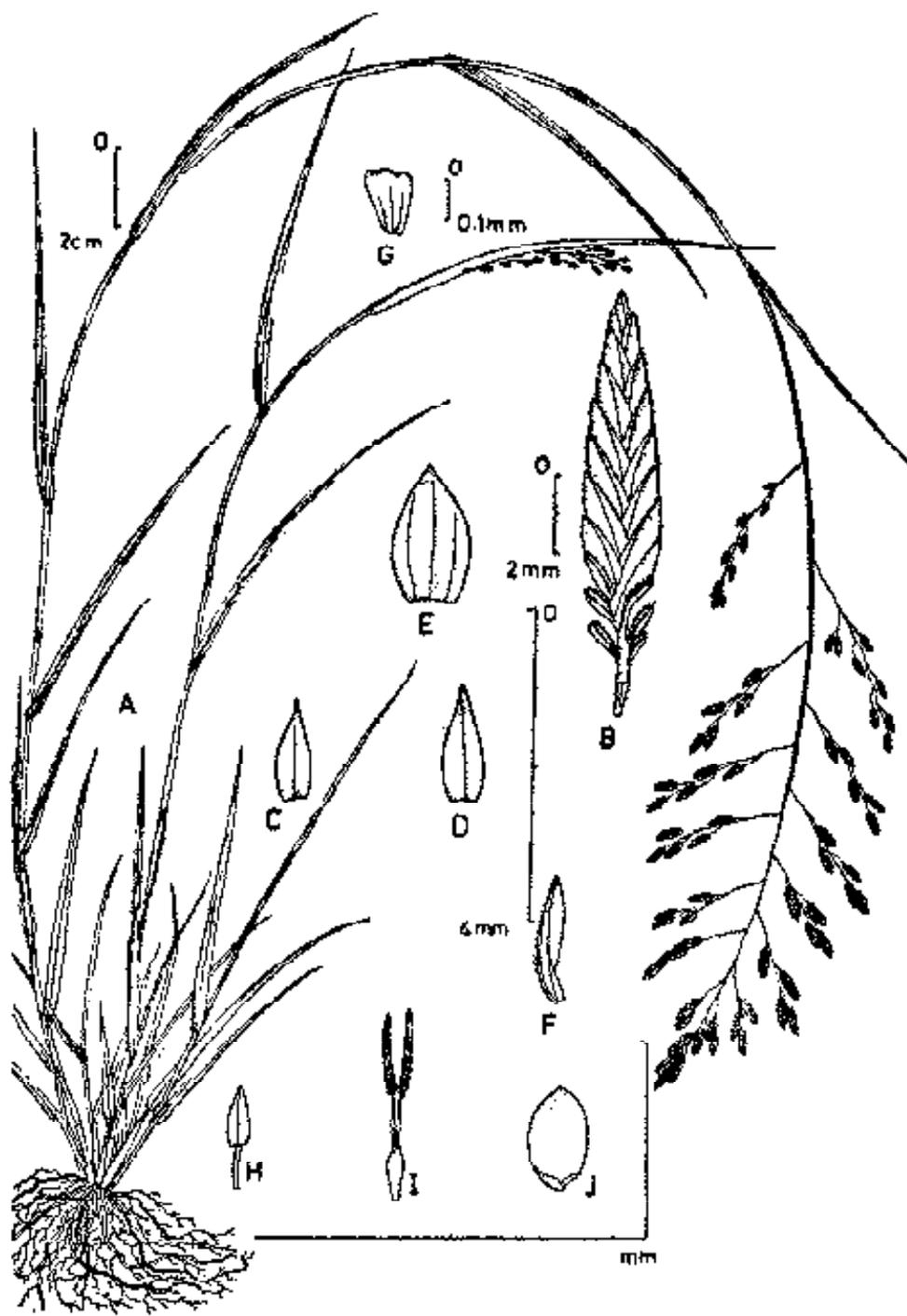


PLATE No. 79: *ERAGROSTIS SUBSECUNDA* (Lam.) Fourn.

A. Habit; B. Spikelet; C. Lower glume; D. Upper glume; E. Lemma;
 F. Palea; G. Lodicule; H. Stamen; I. Pistil; J. Grain.

Perennials. Culms willowy, 20-80 cm long; nodes glabrous. Leaves lanceolate or linear-lanceolate, 1-15 x 0.1-0.3 cm, rounded at base. Sheaths slightly keeled. Ligules obscure. Panicles 3-25 cm long, lax, loosely spiculate, subsecund. Spikelets oblong or oblong-lanceolate, 10-16 or more flowered, purplish-green. Lower glume lanceolate, 1-2 x 0.5 mm, chartaceous, 1-nerved. Upper glume ovate-lanceolate, 2-2.5 x 0.5-1 mm, chartaceous, 1-nerved. Lemmas broadly ovate, 2-2.5 x 1-1.5 mm, acute, chartaceous, 3-nerved. Paleas elliptic-lanceolate or oblong-lanceolate, 1.5-2 x 1 mm, 2-keeled; keels ciliolate. Lodicules 2, obovate, c. 0.1 mm long, wavy at apex, faintly 3-nerved. Stamens 3, anthers 0.25-0.5 mm long; violet. Ovary oblong, 0.25-0.5 mm long; styles c. 0.5 mm long, white. Grains ovate, 0.5-1 mm long.

Occasional, along the banks of backwaters, streams and canals.

Fl. & Fr.: March-September.

Notes: This rare species is reported here for the first time from India. According to T.A. Cope and M. Lazarides (pers. comm.) this species was missed by Bor when he wrote his 'Grasses of Burma, Ceylon, India & Pakistan'. There are a few collections of this species from Sylhet, Haflong, Chittagong and Sri Lanka deposited at Kew Herbarium. M. Lazarides (pers. comm.) says that the type specimens of this species is a collection from East China by Sonnerat, of which the holotype is in Herbarium Lamarck, at Paris and a photo is kept in Kew.

ALLEPPEY: Kumarakodi, Palfana; QUILON: Neendakara.

12. *Eragrostis tef* (Zucc.) Trotter in Bull. Soc. Bot. Ital. 62. 1918; Bor, Grass. Bur. Cey. Ind. Pak. 513, 1960. *Poa tef* Zucc. Diss. Ist. Planta Panizz. Abiss. 1774.

PLATE No. 80

Annuals. Culms slender, 15-40 cm high; nodes glabrous. Leaves linear-lanceolate or linear, acuminate, 3-25 x 0.2-0.4 cm, narrow or rounded at base. Ligules tufts of hairs. Panicles contracted, 10-15 cm long. Spikelets oblong or oblong-lanceolate, 4-8-flowered. Lower glume lanceolate, c. 0.5 x 0.25 mm, chartaceous, 1-nerved. Upper glume ovate-lanceolate, c. 1 x 0.5 mm, chartaceous, 1-nerved. Lemmas ovate-oblong or oblong, 1-1.5 x 0.5-1 mm, chartaceous, 3-nerved. Paleas oblong or elliptic-oblong, c. 1 x 0.25 mm, hyaline, keels scabrid. Stamens 3; anthers 0.25-0.5 mm long.

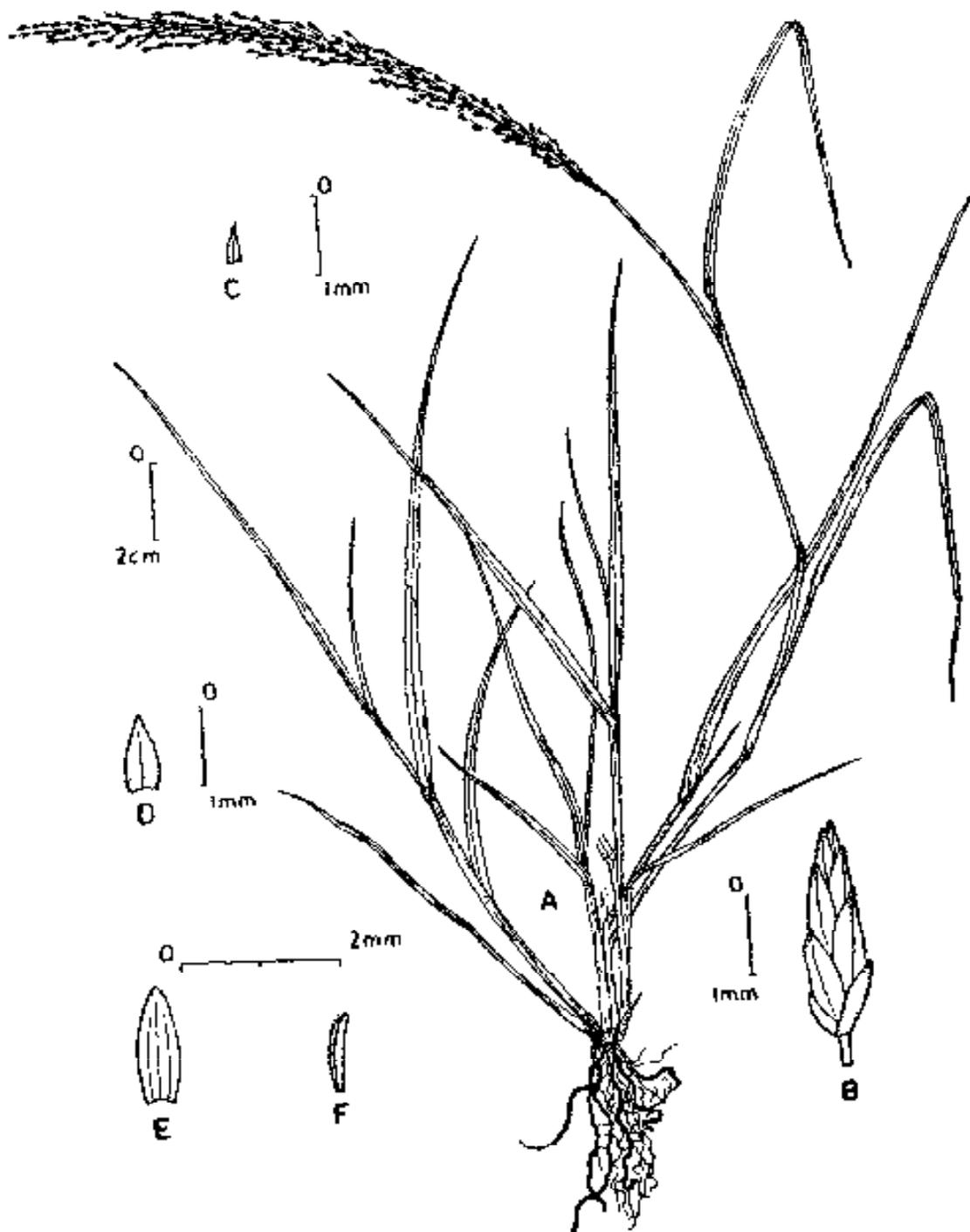


PLATE No. 80: *ERAGROSTIS YEF* (Zucc.) Trotter

A. Habit; B. Spikelet; C. Lower glume; D. Upper glume; E. Lemma;
F. Palea.

Occasional along the roadsides, and banks of backwaters.

Fl. & Fr. : September-December.

Notes : This species is quite distinct from all other species of the genus by its spikelets not breaking up at maturity. *E. tet* was not included by Hooker (1896) or Fischer (1934) in their Floras. Eventhough Bor (*f.c.*) mentions its occurrence in Nilgiris, there is not even a single collection of this grass represented in MH. This grass is a native of north-eastern parts of Africa. Jain (1968) has reported it, as occurring natural in Rajasthan. The present collection from Alleppey, Kerala forms a new distribution record. M. Lazarides (pers. comm.) has confirmed the identity of our specimens.

ALLEPPEY : Thottappally.

13. *Eragrostis tenella* (Linn.) P. Beauv. ex Roem. & Schult. Syst. Veg. 2: 576, 1817; Bor, Grass. Bur. Cey. Ind. Pak. 513. 1960; Manilal & Sivaraj. Fl. Calic. 348. 1982. *Poa tenella* Linn. Sp. Pl. 69. 1753. *Eragrostis plumosa* (Retz.) Link, Hort. Berol. 1: 192, 1827; Fischer in Gamble, Fl. Pres. Madr. 1826. 1934 (Repr. ed. 3: 1264. 1957). *Poa plumosa* Retz. Obs. Bot. 4: 20. 1786. *Eragrostis tenella* (Linn.) P. Beauv. ex Roem. & Schult. var. *plumosa* (Retz.) Stapf in Hook. f. Fl. Brit. Ind. 7: 315. 1896.

Annuals. Culms slender, 10-60 cm long, tufted; nodes glabrous. Leaves linear-lanceolate or lanceolate, acuminate, 1-15 x 0.1-0.5 cm, rounded at base, flat. Sheaths with tuft of hairs at mouth. Ligules fimbriate, thin, membranous. Panicles elliptic or pyramidal, 3-20 cm long, lax or contracted, loosely spiculate, hairy in the axils or not. Spikelets ovate or oblong-ovate, 0.5-1 mm wide, 4-8 or more flowered. Lower glume ovate-lanceolate, 0.5-1 x 0.5 mm, chartaceous, 1-nerved. Upper glume oblong-lanceolate, or ovate-lanceolate, 1-1.25 x 0.5 mm, chartaceous, 1-nerved. Lemmas ovate-oblong, 1-1.25 x 0.5 mm, chartaceous, 3-nerved. Paleas oblong-lanceolate or elliptic-lanceolate, c. 1 x 0.5 mm, 2-keeled, 2-nerved; keels long ciliate. Stamens 3, anthers 0.1-0.25 mm long. Stigmas cream. Grains elliptic or ovate-elliptic, 0.25-0.5 x 0.2 mm.

Very common, along the roadsides, bunds of paddy fields, waste places, hill slopes, as a weed in Tapioca plots and Rubber Plantations.

Fl. & Fr. : March-December.

Notes : This cosmopolitan weed can be easily distinguished from all other species of the genus by its smaller spikelets and lemmas. It is allied to *E. viscosa* but differs by not having viscous culms. There are two varieties under this species, such as var. *tenella* and var. *insularis*. The latter variety can be distinguished from the former by its contracted panicles and glabrous axis. It is a fodder grass. The grains of *E. tenella* is said to be very nutritious.

ALLEPPEY : Ambalapuzha, Champakkulam, Kumarakam, Kupapuram, Nedumudy, Pallana, Pallathuruthy, Thanneermukkam, Thottappally; CANNANORE: Muzhappilangad, Tellicherry; ERN-AKULAM: Chellanam; KOTTAYAM: Kottayam town; QUILON: Ayiramthengu; TRIVANDRUM: Pulimath, Trivandrum.

14. *Eragrostis tenuifolia* (A. Rich.) Hochst. ex Steud. Syn. Pl. Glum. 1: 268. 1854; Stapf in Hook. f. Fl. Brit. Ind. 7: 322. 1896; Fischer in Gamble, Fl. Pres. Madr. 1827. 1934 (Repr. ed. 3: 1265. 1957); Bor, Grass. Bur. Cey. Ind. Pak 514. 1960. *Poa tenuifolia* A. Rich. Tent. Fl. Abyss. 2: 425. 1851.

Annuals or perennials. Culms tufted, 15-60 cm high, nodes glabrous. Leaves lanceolate or linear-lanceolate, acuminate, 2-25 x 0.2-0.6 cm, rounded or shallowly cordate at base, convolute, glaucous. Sheaths keeled. Ligules row of hairs. Panicles lax, 5-20 cm long, leaden-grey to black, pedicels with glandular bands. Spikelets linear-oblong or oblong-lanceolate, 1-1.75mm wide, 4-14-flowered, greyish or black. Lower glume ovate, 0.25-0.5 x 0.25 mm, chartaceous, lobed. Upper glume ovate-oblong, 0.5-1 x 0.5 mm, 2-3-lobed at apex, chartaceous, 1-nerved. Lemmas ovate-elliptic or obovate, c. 2 x 1.5 mm, chartaceous, 3-nerved. Paleas oblanceolate or elliptic-lanceolate, c. 1 x 0.5 mm, 2-keeled, 2-nerved, keels scabrid. Stamens 3, anthers c. 1 mm long, cream or purplish. Ovary ovate, 0.25-0.5 mm, styles 0.25-0.5 mm long, stigmas c. 0.5 mm long, white.

Frequent, along the roadsides in higher altitudes, wastelands and rarely in grasslands.

Fl. & Fr. : March September.

Notes : This species is quite distinct by the apparently serrate appearance of the margins of the spikelets. It is allied to *E. nigra*, where the panicles are very lax and pedicels are without glandular bands.

IDUKKI : Munnar, Valanchakkanam; PALGHAT : Aruvampara; PATHANAMTHITTA : Moozhiyar; QUILON : Gavi, Pampa Dam site; TRIVANDRUM : Ponmudi; WYNAD : Brahmagiri, Tolpetty.

15. *Eragrostis tremula* (Lam.) Hochst. ex Steud. Syn. Pl. Glum. 1: 269. 1854; Stapf in Hook.f. Fl. Brit. Ind. 7: 320. 1896; Rang. & Tad. Handb. S. Ind. Grass. 297. t. 219-220. 1921; Fischer in Gamble, Fl. Pres. Madr. 1827. 1934 (Repr. ed. 3: 1264. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 514. 1960; Manilal & Sivaraj. Fl. Calic. 347. 1982; Ramach. & Nair in J. Econ. Tax. Bot. 3: 66. 1982. *Poa tremula* Lam. Tab. Encycl. Meth. Bot. 1: 185. 1791.

Annuals or perennials. Culms loosely tufted, 30-80 cm high, erect or ascending; nodes glabrous. Leaves lanceolate or linear-lanceolate, 3-20 x 0.2-0.5 cm, flat, rounded or shallowly cordate at base. Ligules row of hairs. Panicles ovate, 10-40 cm long, very lax, loosely spiculate, rarely bearded at axils, pedicels long. Spikelets oblong or linear-oblong or crescent-shaped, 1-2 mm wide, 10-40 or more flowered. Lower glume ovate-lanceolate, c. 1x0.5 mm, chartaceous, 1-nerved. Upper glume more or less similar to the lower. Lemmas ovate-oblong or broadly ovate, 1-1.5 x 1 mm, chartaceous, 3-nerved. Paleas elliptic oblong, persistent, 1-1.5 x 0.5-1 mm, 2-keeled, 2-nerved, scabrid on the keels. Stamens 3, anthers 0.25-0.5 mm. Grains subglobose or orbicular, 0.3-0.5 mm long.

Occasional, as a weed in irrigated fields and along the margins of wetlands.

Fl. & Fr. : August-December.

CANNANORE: Muzhappilangad.

16. *Eragrostis unioloides* (Retz.) Nees ex Steud. Syn. Pl. Glum. 1: 264. 1854; Fischer in Gamble, Fl. Pres. Madr. 1826. 1934 (Repr. ed. 3: 1264. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 515. 1960; Manilal & Sivaraj. Fl. Calic. 347. 1982. *Poa unioloides* Retz. Obs. Bot. 5: 19. 1789. *Eragrostis amabilis* auct. non Wight & Arn. ex Nees 1838;

Stapf in Hook.f. Fl. Brit. Ind. 7: 317, 1896; Rang. & Tad. Handb. S. Ind. Grass. 295, t. 218, 1921.

Annuals or perennials. Culms tufted, 5-80 cm high, erect or geniculate; nodes glabrous. Leaves lanceolate or linear-lanceolate, 0.5-25 x 0.1-0.8 cm, rounded or shallowly cordate at base. Ligules narrow rim or thin membrane. Panicles narrowly oblong to broadly ovate, 2-30 cm long, lax. Spikelets ovate-oblong, 2-4 mm wide, 6-40-flowered, green or purplish. Lower glume oblong-lanceolate, 1-1.5 x 0.5 mm, chartaceous, 1-nerved. Upper glume ovate-lanceolate, 1-2 x 0.5-0.75 mm, chartaceous, 1-nerved. Lemmas broadly ovate or ovate-lanceolate, 1-2.5 x 0.75-1.5 mm, chartaceous, 3-nerved. Paleas elliptic, 1-2 x 1 mm, 2-keeled, 2-nerved, keels scabrid. Stamens 3, anthers 0.25-0.75 mm long, violet. Styles 0.25-0.5 mm long; stigmas 0.5-1 mm long, white. Grains obovoid ellipsoid, c. 0.75 x 0.5 mm, reddish brown.

Very common along the roadsides, bunds of paddy fields, banks of backwaters, streams and rivers, in wastelands, sea-shores and cultivated fields.

Fl. & Fr.: Throughout the year.

Notes: This cosmopolitan weed can easily be recognised by its lax, purplish panicles and ovate spikelets. It is similar to *E. ciliaris* where the spikelets are olive-green and the paleas are deciduous.

It is a highly polymorphic species. Plants show considerable variation in their habit, habitat, colour, size and shape of the spikelets and in the number of florets.

ALLEPPEY: Karthikapally, Nedumudy; CALICUT: Chedalet, Kutiyadi; CANNANORE: Beckal, Cannanore, Hosdurg, Taliparamba; IDUKKI: Devicolem; Munnar, Pachakkanam, Eravikulam; PALGHAT: Aruvampara, Mukali, Welayar; PATHANAMTHITTA: Kodumon, Konni; QUILON: Anathode, Punalur; TRICHUR: Chalakkudi, Vellanikkara; TRIVANDRUM: Nilamel, Ponmudi; WYNAD: Tirunelli.

17. *Eragrostis viscosa* (Retz.) Trin. in Mem. Acad. Sci. Petersb. ser. 6. 1: 397, 1830; Fischer in Gamble, Fl. Pres. Madr. 1826, 1934 (Repr. ed. 3: 1264, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 515, 1960. *Poa viscosa* Retz. Obs. Bot. 4: 20, 1786. *Eragrostis tenella* (Linn.) P. Beauv. ex Roem. & Schult. var. *viscosa* (Retz.) Stapf.

in Hook. f. Fl. Brit. Ind. 7: 315, 1896.

Annuals or perennials. Culms 10-50 cm long, erect or geniculate; nodes glabrous. Leaves lanceolate, 1-6 x 0.1-0.3 cm, acuminate, rounded or shallowly cordate at base. Ligules fimbriate, membranous. Panicles ovate-oblong or oblong, 1-10 cm long, culms viscous just below. Spikelets oblong or oblong-lanceolate, 1-1.5 mm wide, 4-10-flowered. Lower glume ovate-lanceolate, 0.5-1 x 0.5 mm, chartaceous, 1-nerved. Upper glume more or less similar to the lower. Lemmas ovate-oblong, 1-1.25 x 0.5-0.75 mm, rounded at apex, chartaceous, 3-nerved. Paleas falcate, c. 1 x 0.5 mm, 2-keeled, ciliate along the keels. Stamens 3, anthers 0.1-0.25 mm long. Grains ellipsoid, 0.5-0.75 mm long.

Frequent along roadsides and wastelands, often in drier habitats.

Fl. & Fr. : Throughout the year.

ALLEPPEY : Edathwa, Pallana; CALICUT : Calicut; CANNANORE : Niteswar; ERNAKULAM : Cochin; KOTTAYAM : Kudamalur; PATHANAMTHITTA : Kodumon, Upper Moozhiyar; QUILON : Chavara, Paravur; TRIVANDRUM : Kazhakkuttom.

18. *Eragrostis zeylanica* Nees & Mey. in Nov. Act. Nat. Cur. 19, Suppl. 1: 204, 1843; Bor, Grass. Bur. Cey. Ind. Pak. 515, 1960; Nair & Ramach. in Bull. Bot. Surv. Ind. 22: 193, 1980 (1982). *E. elongata* sensu Stapf in Hook. f. Fl. Brit. Ind. 7: 319, 1896, non Jacq. 1813.

Annuals or perennials. Culms tufted, 5-25 cm high, erect or trailing or decumbent; nodes glabrous. Leaves lanceolate, 2-6 x 0.1-0.2 cm, rounded at base. Ligules fimbriate, thin, membranous. Panicles oblong or ovate-oblong, 3-15 cm long, spreading. Spikelets oblong-lanceolate, lanceolate or linear-lanceolate, 2-3 mm wide, sharply acute, 10-60 flowered. Lower glume lanceolate, 1-1.5 x 0.5 mm, chartaceous, keeled, 1-nerved. Upper glume ovate-lanceolate, 1.5-2 x 0.5-2 mm, chartaceous, keeled, 1-nerved. Lemmas ovate-lanceolate, 1.5-2.5 x 1-1.5 mm, chartaceous, 3-nerved. Paleas elliptic-oblong, 1-1.6 x 0.5-1 mm, 2-keeled, 2-nerved, ciliate along the keels. Stamens 3, anthers c. 0.25 mm long. Grains ovate or orbicular, c. 0.5 x 0.5 mm.

Occasional along the roadsides, banks of streams and backwaters.

Fl. & Fr. : December - January.

Notes : This species is closely allied to and often confused with *E. cumingii*, but it differs from *E. cumingii* by the broader spikelets with numerous florets and acuminate lemmas. Nair & Ramachandran (*l. c.*) reported its occurrence in India.

CANNANORE : Hosdurg.

7. LEPTOCHLOA P. Beauv.

P. Beauv. Ess. Agrost. 71, t. 15/1. 1812; Hook. f. Fl. Brit. Ind. 7: 297. 1896; Fischer in Gamble, Fl. Pres. Madr. 1819. 1934 (Repr. ed. 3: 1260. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 616. 1960.

A genus of about 27 species distributed in the tropical and warm temperate regions of the World, of which about 5 species occur in India and 2 in Kerala.

Key to the species

- 1a. Spikelets 1-flowered; leaves oblong or ovate-elliptic, up to 10 cm long
L. uniflora 2
- 1b. Spikelets 3-8-flowered; leaves linear, often much longer
L. chinensis 1

1. *Leptochloa chinensis* (Linn.) Nees in Syll. Ratisb. 1: 4. 1824; Hook. f. Fl. Brit. Ind. 7: 299. 1896; Fischer in Gamble, Fl. Pres. Madr. 1820. 1934 (Repr. ed. 3: 1260. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 616. 1960. *Poa chinensis* Linn. Sp. Pl. 69. 1753.

Annuals. Culms 10-80 cm high, erect or geniculate; nodes glabrous. Leaves linear, 5-25 x 0.3-0.6 cm, acuminate, rounded at base. Sheaths keeled. Ligules membranous, lacerate. Panicles oblong or ovate-oblong, 10-40 cm long. Spikelets oblong or lanceolate, 2-6 mm long, 3-6-flowered. Lower glume oblong-lanceolate or lanceolate, 1-1.5 mm long, chartaceous, 1-nerved. Upper glume oblong or oblong-lanceolate, 1.25-1.6 mm long, chartaceous, 1-nerved. Lemmas ovate-lanceolate, 1.5-2 x 1-1.5 mm, chartaceous, 3-nerved. Paleas oblong, 1-1.5 x 0.5-1 mm, 2-keeled, 2-nerved, ciliolate along the keels. Stamens 3; anthers 0.25-0.5 mm long. Grains oblong or elliptic-oblong, c. 1 mm long.

Occasional in wetlands and fallow fields and as a weed in sugarcane fields.

Fl. & Fr. : May - December.

PALGHAT; Walayar.

2. *Leptochloa uniflora* Hochst. ex A. Rich. Tent. Ft. Abyss. 2: 409. 1851; Hook.f. Fl. Brit. Ind. 7: 297. 1896; Fischer in Gamble, Fl. Pres. Madr. 1820. 1934 (Repr. ed. 3: 1260. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 517. 1960.

Annuals. Culms slender, creeping or geniculate, 10-60 cm long; nodes glabrous. Leaves ovate-acute or elliptic or elliptic-lanceolate, 0.5-6 x 0.3-1.2 cm, acuminate, rounded at base. Sheaths slightly keeled. Ligules ovate, acute, membranous. Panicles 5-25 cm long, lax. Spikelets oblong, 2-4 mm long, 1-flowered. Lower glume 0.5-1.5 mm long, oblong-lanceolate, chartaceous, 1-nerved. Upper glume 1-1.5 x 1 mm, oblong-lanceolate, or lanceolate, chartaceous, 3-nerved. Palea elliptic or oblong-elliptic, 1-2 x 0.5-1 mm, hyaline, 2-keeled, 2-nerved, ciliolate along the keels. Stamens 3, anthers 0.25-0.5 mm long.

Occasional along roadsides and bunds of paddy fields.

Fl. & Fr. : October-December.

PALGHAT; Palghat.

B. SILENTVALLEYA V.J. Nair,

P. V. Sreekumar, E. Vajravelu & P. Bhargavan

V.J. Nair, P.V. Sreekumar, E. Vajravelu & P. Bhargavan in J. Bomb. Nat. Hist. Soc. 79(3): 654. 1983.

Silentvalleya nairii V. J. Nair et al. In J. Bomb. Nat. Hist. Soc. 79(3): 654-657, 1983. PLATE No. 81

Tufted perennial grasses. Culms 40-100 cm high, erect; nodes glabrous. Leaves 40-60 cm long, 0.4-0.6 cm wide, linear with filiform tips, tough, glaucous, villous towards mouth and scabrid or glabrous elsewhere. Sheaths closely fitting, rigid, coriaceous, rough and scabrid. Ligule a narrow truncate membrane. Inflorescence a panicle, 15-30 cm long, with 6-10 racemes

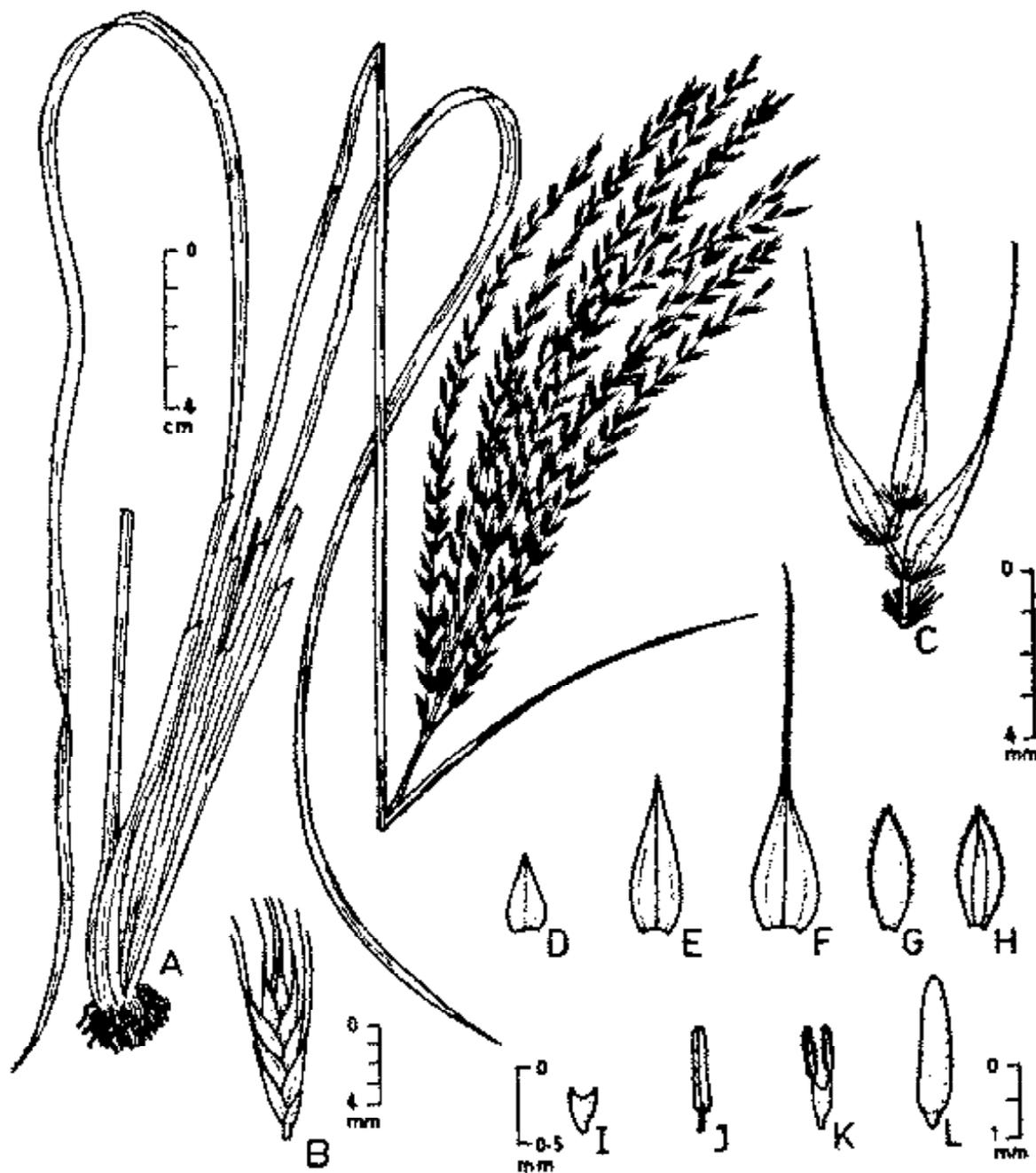


PLATE No. 81: *SILENTVALLEYA NAIRII* V. J. Nair *et al.*

A. Plant. B. Spikelet; C. Florets split apart to expose callus (semi diagrammatic); D. Lower glume; E. Upper glume; F. Lemma; G. & H. Palearia, dorsal and ventral views; I. Lodicule; J. Stamen; K. Pistil; L. Grain.

scattered along a central axis, each 8-20 cm long. Spikelets c. 8 x 2 mm, oblong-lanceolate, 6-10-flowered with a terminal reduced floret, at times purplish. Lower glumes c. 2 x 1 mm, ovate, acute, faintly 1-nerved and glabrous. Upper glumes c. 4 x 1.25 mm, lanceolate, acuminate, 3-nerved, lateral nerves faint and visible only in the lower half. Lemmas c. 4 x 1.75 mm, ovate-lanceolate, 3-nerved, lateral nerves faint, tip ending in an awn 3-5 mm long which is scabrid. Paleas c. 3 x 1 mm, elliptic, 2-keeled, keels minutely winged and shortly ciliate, delicate, glabrous. Lodicules 2, each c. 0.3 x 0.15 mm, obovate, 2-horned at apex. Stamens 3; anthers c. 1.25 mm long, filaments short. Ovary c. 0.4 x 0.25 mm, oblanceolate and shortly stalked. Styles c. 0.3 mm long, stigmas c. 0.5 mm long, plumose. Grain c. 2 x 0.4 mm, oblong-lanceolate, stalked.

Grass in the crevices of rocks and other similar rocky areas.

Fl. & Fr. : October-March.

PALGHAT : Aruvampara, Silent Valley.

TRIPOGON Roem. & Schult.

Roem. & Schult. Syst. Veg. 2: 34, 1817; Hook. f. Fl. Brit. Ind. 7: 265, 1896; Fischer in Gamble, Fl. Pres. Madr. 1832, 1934 (Repr. ed. 3: 1268, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 519, 1960.

A genus of about 30 species distributed in the tropics and subtropics of the World, of which about 12 occur in India and 4 in Kerala. Out of the 4 species described here from Kerala 2 are new to Science.

Key to the species

- 1a. Lemmas cleft into 2 lobes; awns several times as long as the lemmas, capillary, flexuous *T. capillatus* 3
- 1b. Lemmas cleft into 4 lobes; awns not more than twice as long as the lemmas:
- 2a. Ligules thin, membranous; keels of the paleas ciliate; leaves glabrous or hairy:
- 3a. Leaves hairy, 1.5-2.5 mm wide; culms up to 20 cm high; lateral awns of the lemmas less than half the length of the median; median lobes of the lemmas acute *T. narayani* 4

3b. Leaves glabrous, 1-2 mm wide; culms up to 50 cm high; awns almost equal in length; median lobes of the lemmas acuminate
T. anantaswamianus 1

2b. Ligules inconspicuous; keels of the paleas scabrid; leaves hairy
T. bromoides 2

1. *Tripogon anantaswamianus* P.V. Sreekumar, V.J. Nair & N.C. Nair in Bull. Bot. Surv. Ind. 25(1-4): 185, 1983.

PLATE No. 82

Densely tufted perennial herb. Culms 30-50 cm long, nodes glabrous. Leaves 25-40 cm long and 1-2 mm broad, linear, convolute, glabrous or very sparsely villous; upper surface glaucous; midrib conspicuous. Ligule a fine membrane. Sheaths smooth, glabrous. Racemes 15-20 cm long, contracted. Rachis smooth, glabrous. Spikelets 8-15 mm long, leaden grey coloured, with 7-10 florets. Callus hairy. Lower glumes 4-5 mm long, ovate-lanceolate, acuminate, shortly awned, 1-nerved, lobed on one side. Upper glume 7-8 mm long, lanceolate, notched at apex with a small awn in between. Lemma 7-8 mm long (including awns), c. 2.5 mm broad, coriaceous, 6-lobed at apex, three awned. Lobes on either side of median awn long acuminate, lateral lobes scabrid. Palea 3-4 x 1-1.4 mm, elliptic, 2-nerved, 2-keeled; keels ciliate. Lodicules 2, c. 0.5 mm long. Stamens 3, 1.5-2 mm long, narrow, yellow, filaments short. Ovary c. 0.5 mm long, obovate, cuneate at base. Styles 2, each c. 1.2 mm long, slender. Stigma c. 0.7 mm long, feathery, white. Grains not seen.

Allied to *Tripogon bromoides* Roem. & Schult. and is often growing along with it in the type locality.

Fl. & Fr. : November-December.

IDUKKI: Eravikulam Sanctuary.

2. *Tripogon bromoides* Roem. & Schult, Syst. Veg. 600. 1817; Hook. f. Fl. Brit. Ind. 7: 287, 1896; Fischer in Gamble, Fl. Pres. Madr. 1834, 1934 (Repr. ed. 3: 1269, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 521, 1960.

Perennials. Culms tufted, 10-50 cm high; nodes glabrous. Leaves linear, 5-30 x 0.15-0.3 cm, acuminate, hairy. Sheaths hairy, basal ones breaking up into fibres. Ligules obscure. Racemes 4-25 cm long, spikelets 5-15-flowered. Lower glume

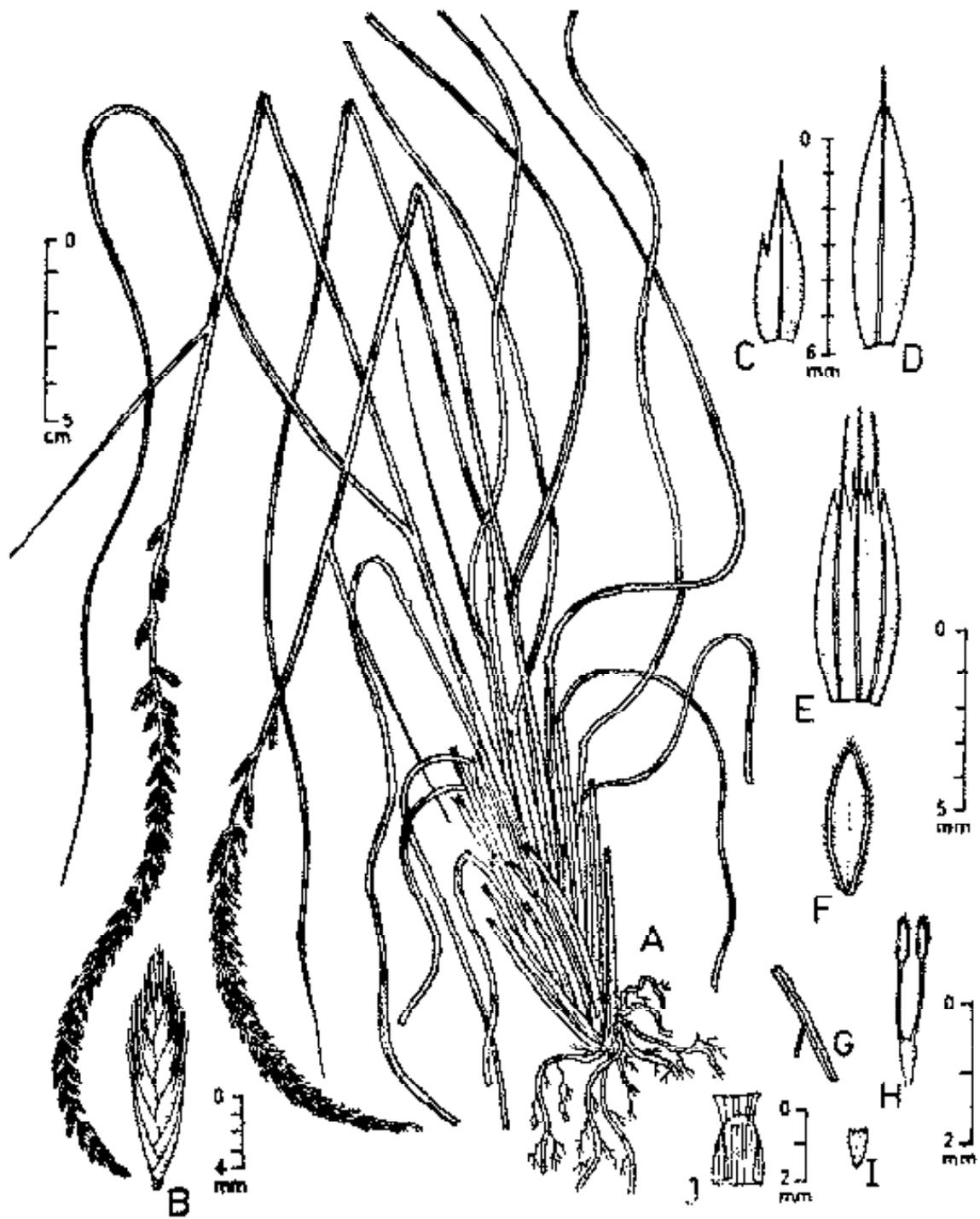


PLATE No. 82: *TRIPSOGON ANANTASWAMIANUS* Sreekumar, V. J. Nair & N. C. Nair

A. Habit; B. Spikelet; C. Lower glume; D. Upper glume; E. Lemma; F. Palea; G. Stamen; H. Pistil; I. Lodicule; J. Ligule.

oblong, 2-2.5 x 1 mm, notched at apex, chartaceous, 1-nerved. Upper glume ovate-oblong, 3-4 x 1-1.5 mm, notched at apex, 1-nerved. Lemmas ovate-oblong, 6-8 mm long, bearded at the base, lobed at apex, chartaceous, 3-nerved. Paleas elliptic or elliptic-oblong, 2.5-3 x 1 mm, 2-keeled, 2-nerved. Stamens 3, anthers 1-1.25 mm long.

Fairly common in high altitude grasslands, hill slopes, forest margins and along the roadsides.

Fl. & Fr.: August-March.

IDUKKI: Anamudi slopes, Lockhart gap, Peermade; PALGHAT: Dhoni R.F., Silent Valley, Sispara.

3. *Tripogon capillatus* Jaub. & Spach, Ill. Fl. Or. 4: 47, t. 332, 1851; Hook. f. Fl. Brit. Ind. 7: 285, 1896; Fischer in Gamble, Fl. Pres. Madr. 1833, 1934 (Repr. ed. 3: 1269, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 521, 1960.

PLATE NO. 83

Annuals. Culms slender, erect or geniculate, 10-25 cm high; nodes glabrous. Leaves linear, filiform, 2-10 x 0.25-0.1 cm, glabrous. Ligules ovate, membranous. Racemes filiform, slender, 10-20 cm long. Spikelets oblong, 3-4-flowered. Lower glume lanceolate, 2-3 x 1-1.5 mm, 3-lobed, awned, chartaceous, 3-nerved; awns slender, 10-25 mm long. Paleas elliptic, 2-2.5 x 0.5-1 mm, 2-keeled, 2-nerved. Stamens 3, anthers 0.5-1 mm long. Ovary oblong, c. 0.5 x 0.2 mm; styles 0.5-1 mm long; stigmas 0.5-1 mm long.

Rare in dry rocky places.

Fl. & Fr.: November-December.

WYNAD (Beddome s.n.).

4. *Tripogon narayani* P. V. Sreekumar, V. J. Nair & N. C. Nair in J. Bomb. Nat. Hist. Soc. 80(1): 196, 1983.

PLATE No. 84

Densely tufted perennial herbs. Culms 10-20 cm high, nodes glabrous. Leaves 10-25 x 0.15-0.25 cm, linear, flat, densely villous on upper surface and sparsely villous below, midrib inconspicuous. Ligule a thin membrane. Sheaths villous, basal

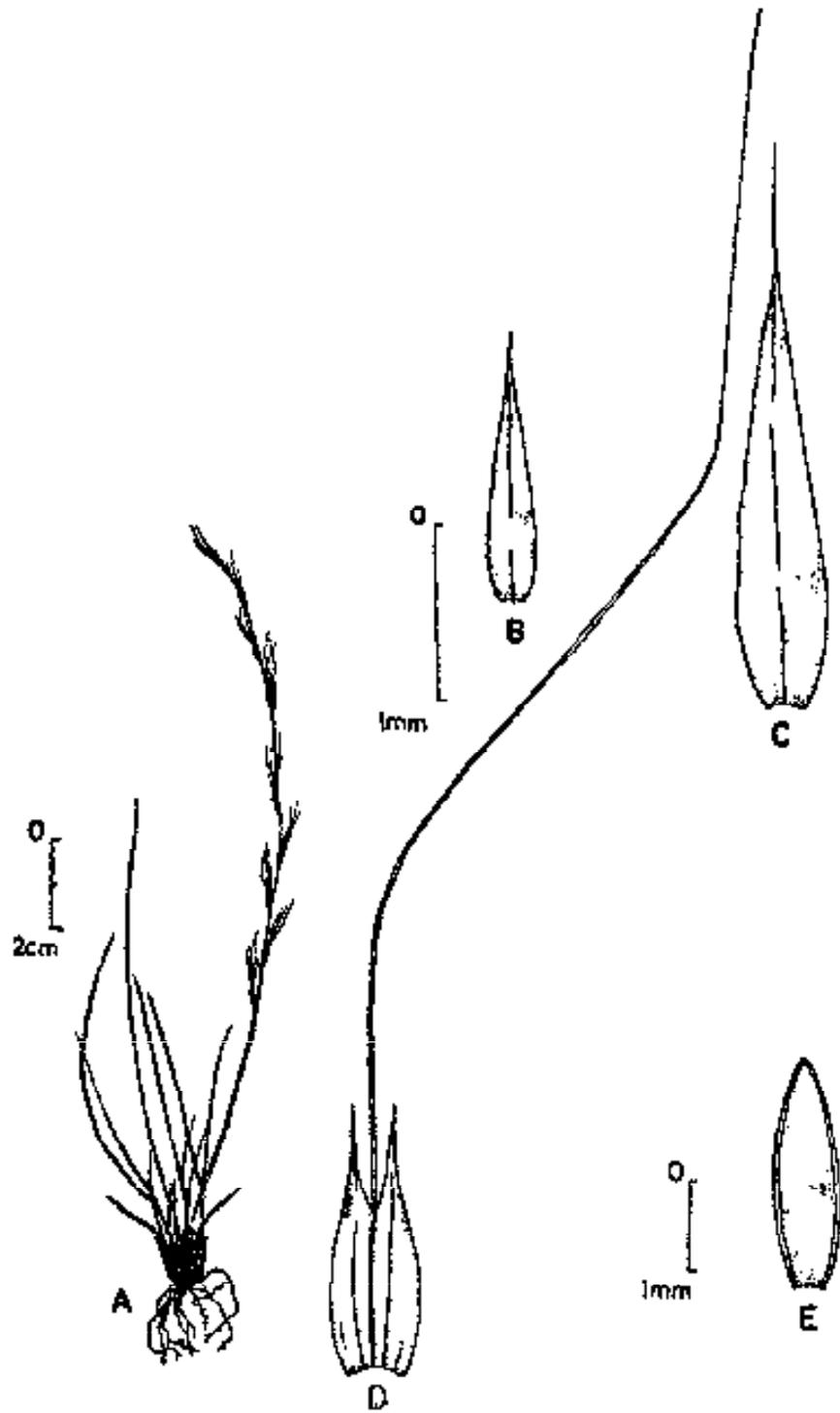


PLATE No. 63 : *TRIOGON CAPILLATUS* Jaub. & Spach

A. Habit; B. Lower glume; C. Upper glume; D. Lemma; E. Palea.

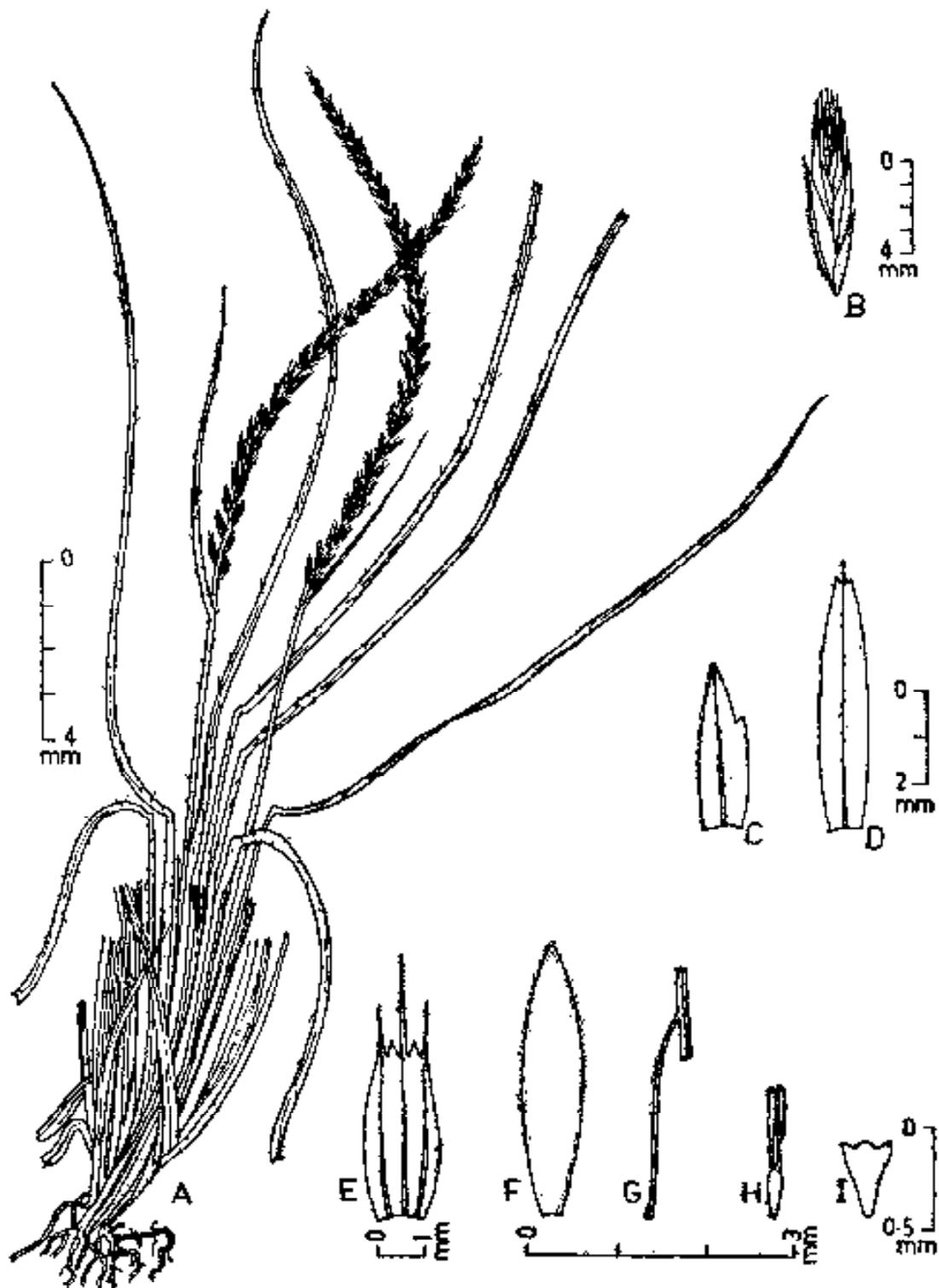


PLATE No. 84 : *TRIOGON NARAYANII* P. V. Sreekumar, V. J. Nair & N. C. Nair :

A. Plant; B. Spikelet; C. Lower glume; D. Upper glume; E. Lemma; F. Palea G. Stamen; H. Pistil; I. Lodicule.

ones breaking up into fibres. Racemes 6-12 cm long, contracted. Rhachis smooth, glabrous. Spikelets 5-10 mm long, greenish-yellow when fresh and cream-white when dried, with 4-6 florets. Callus bearded. Lower glumes c. 3.5 x 1 mm, ovate-lanceolate, 1-nerved, shallowly notched on one side. Upper glume c. 5.5 x 1 mm, lanceolate, 1-nerved, notched at apex with a very short mucra of c. 0.5 mm. Lemmas c. 4 x 1.75 mm (excluding awns), coriaceous, 3-nerved and 3-awned; lobes on either side of median awn short, acute. Awns unequal, median awn c. 2.5 mm long, lateral ones c. 1 mm long, scabrid. Palea c. 3 x 0.5 mm, elliptic, rounded at apex, 2-nerved, 2-keeled; keels ciliate along the upper halves, glabrous elsewhere. Lodicules 2, c. 0.25 x 0.15 mm, obovate, 3-lobed at apex. Stamens 3, anthers c. 1 mm long, narrow, purple coloured; filaments c. 2.5 mm long. Ovary c. 0.5 mm long, obovate. Styles 2, each c. 0.4 mm long, slender. Stigmas c. 0.6 mm long, feathery.

IDUKKI: Eravikulam National Park.

Fl. & Fr.: August-September.

IDUKKI: Eravikulam National Park.

POOIDEAE FESTUCEAE

FESTUCEAE Dumort.

Dumort. Obs. Gram. Belg. 82: 85. 1823; Bor. Grass. Bur. Cey. Ind. Pak. 525. 1960.

Key to the genera

- | | |
|---|-----------------|
| 1a. Inflorescence a spike; lemmas aristate or awned | <i>Lolium</i> 1 |
| 1b. Inflorescence a panicle; lemmas not awned | <i>Poa</i> 2 |

1. LOLIUM Linn.

Linn. Sp. Pl. 1: 83. 1753; Hook. f. Fl. Brit. Ind. 7: 364. 1896; Bor. Grass. Bur. Cey. Ind. Pak. 544. 1960.

A genus of about 10 species in temperate regions of the World, of which about 4 species occur in India and one in Kerala.

1. *Lolium temulentum* Linn. Sp. Pl. 83. 1753; Hook. f. Fl. Brit. Ind. 7: 364. 1896; Bor. Grass. Bur. Cey. Ind. Pak. 546. 1960. PLATE No. 85

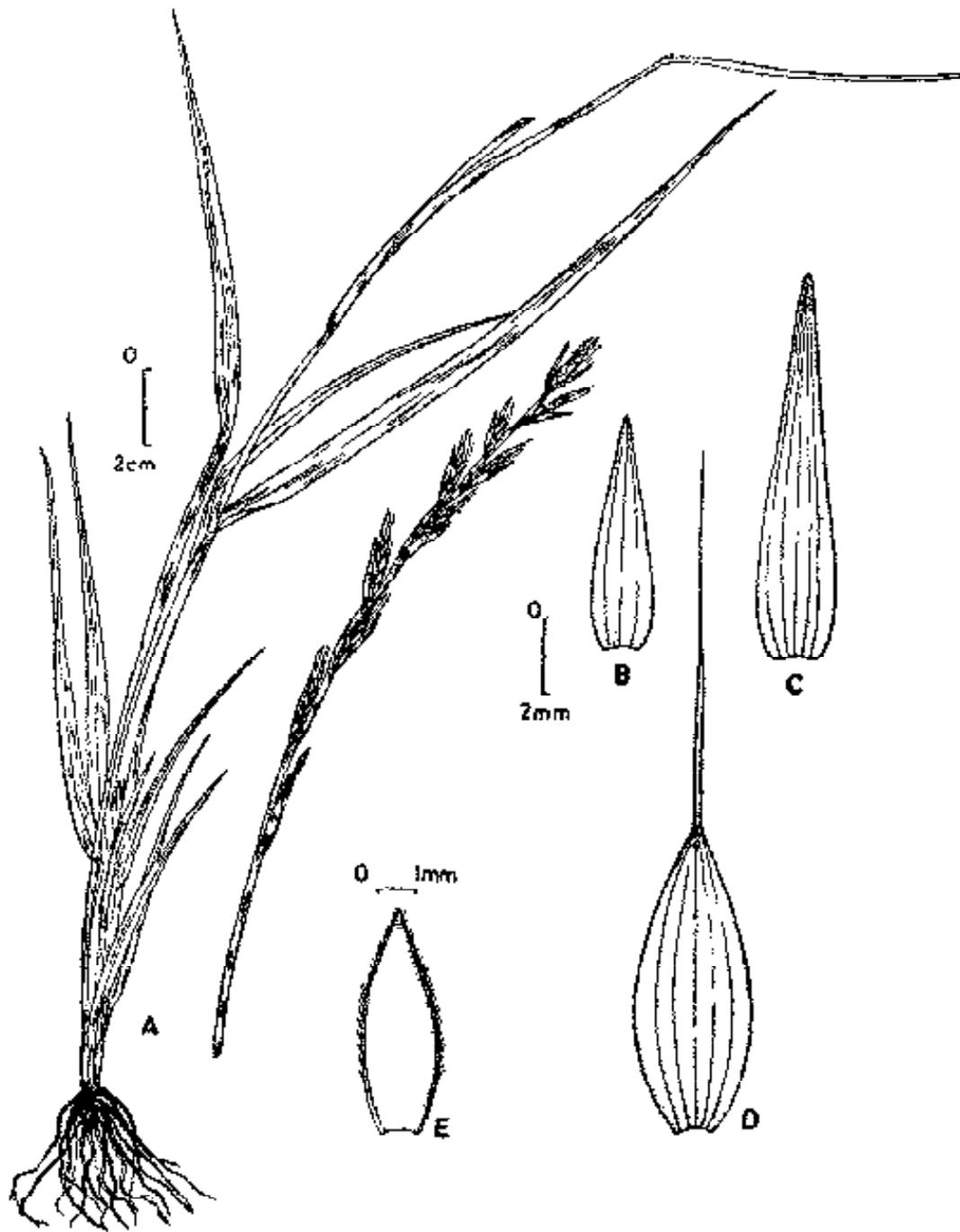


PLATE No. 85 : *LOLIUM TEMULENTUM* Linn.

A. Habit; B. Lower glume; C. Upper glume; D. Lemma; E. Palea.

Annuals or perennials. Culms 10-50 cm high, tufted, erect or geniculate; nodes glabrous. Leaves linear, lanceolate or linear-lanceolate, 5-20 x 0.3-0.6 cm, rounded or shallowly cordate at base. Ligules narrow, membranous. Spikes narrow, interrupted, 6-20 cm long. Spikelets oblong, 10-20 mm long, 5-10-flowered. Lower glume oblong-lanceolate, 5-6 x 1-1.5 mm, leafy, chartaceous, 3-5-nerved. Upper glume oblong-lanceolate, leafy, 5-8 x 1-2 mm, chartaceous, 5-7-nerved. Lemmas elliptic, 4-8 x 2-3 mm, caudate-acuminate or aristate, chartaceous, 5-nerved; arista 5-15 mm long. Paleas elliptic, 4-6 x 1.5-2 mm, chartaceous, 2-keeled, 2-nerved, ciliate along the keels. Stamens 2 or 3; anthers c. 2 mm long.

Grows occasionally as a weed in cultivated fields.

Fl. & Fr. : June - August.

IDUKKI; Kannan Devan Hills.

2. POA Linn.

Linn. Sp. Pl. 67, 1753 et Gen. Pl. ed. 5. 31, 1754; Stapf in Hook. f. Fl. Brit. Ind. 7: 337, 1896; Fischer in Gamble, Fl. Pres. Madr. 1849, 1934 (Repr. ed. 3: 1280, 1957); Bor, Grass, Bur. Cey. Ind. Pak, 547, 1960.

A genus of about 200 species, cosmopolitan, mainly in temperate regions, of which about 40 species in India and one in Kerala.

Poa annua Linn. Sp. Pl. 68, 1753; Hook. f. Fl. Brit. Ind. 7: 345, 1896; Fischer in Gamble, Fl. Pres. Madr. 1850, 1934 (Repr. ed. 3: 1280, 1957); Bor, Grass, Bur. Cey. Ind. Pak, 555, 1960. PLATE No. 86

Annuals. Culms tufted, erect, 5-25 cm high; nodes glabrous. Leaves oblong or oblong-lanceolate, 1-8 x 0.1-0.5 cm, rounded at base. Sheaths compressed, keeled. Ligules membranous, 2-5 mm long. Panicles ovate or pyramidal, 2-8 cm long, lax. Spikelets ovate-oblong or oblong-lanceolate, 3-8 mm long, 3-6-flowered. Lower glume lanceolate, 1.5-2 x 0.5-1 mm, chartaceous, 1-nerved. Upper glume elliptic or oblong, 2-3 x 1-1.5 mm, chartaceous, 3-nerved. Lemmas elliptic or oblong-elliptic, 2.5-3 x 1 mm, chartaceous, ciliate along the keels and nerves. Paleas oblong-lanceolate, 2-3 x 0.5 mm, delicate, 2-keeled, ciliate along the keels. Stamens 3, anthers 0.5-1 mm long, pale-yellow. Stigmas white.

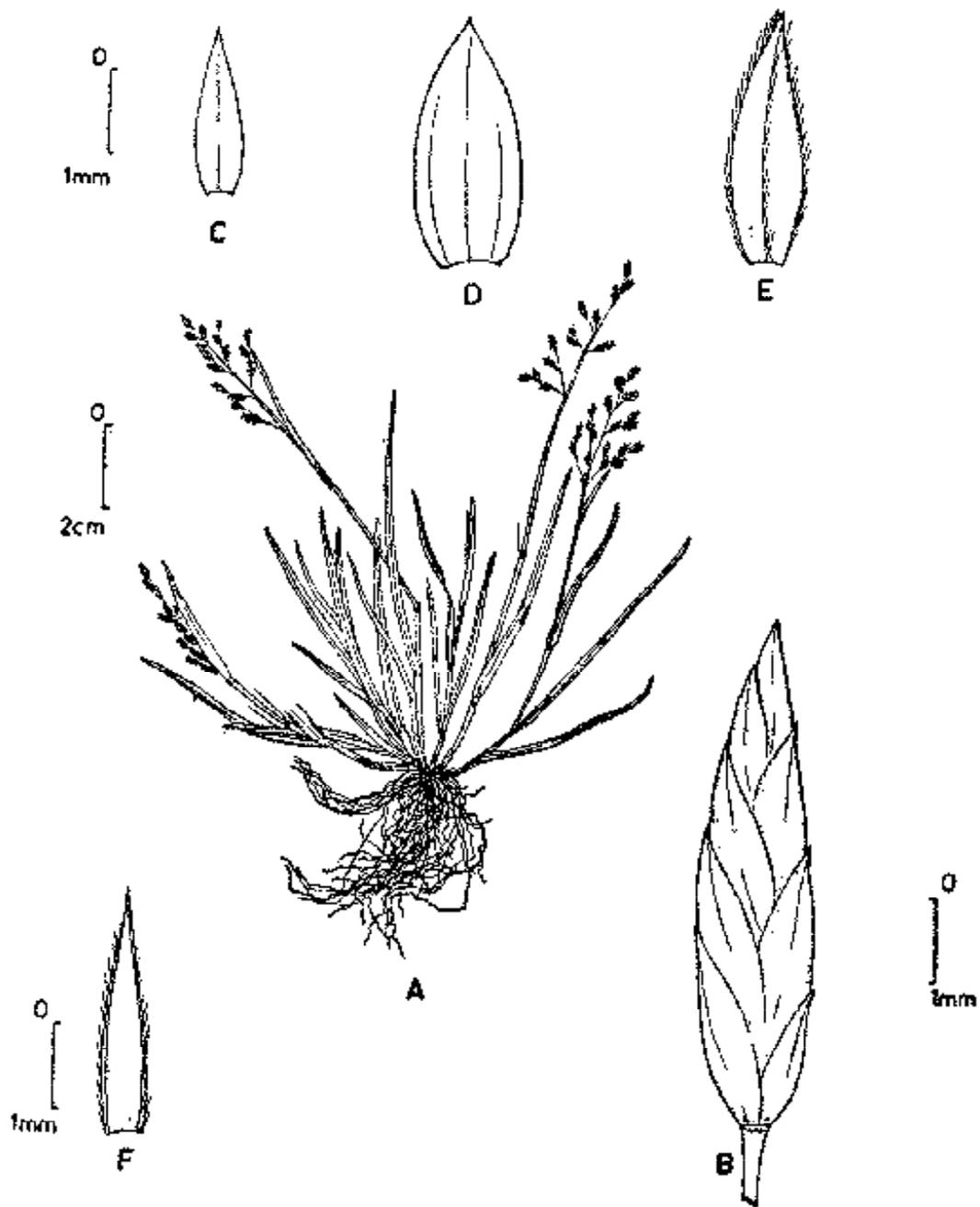


PLATE No. 88 : *POA ANNUA* Linn.

A. Habit; B. Spikelet; C. Lower glume; D. Upper glume; E. Lemma; F. Palea.

Occasional as a weed in tea estates and also along the roadsides at higher elevations.

Fl. & Fr. : July - September,

IDUKKI ; Munnar, Vagavurrai.

POOIDEAE - GARNOTIEAE

GARNOTIEAE Tateoka

Tateoka in J. Jap. Bot. 32: 277. 1957; Bor, Grass. Bur. Cey. Ind. Pak. 565. 1960; Ved Prakash & Jain in Fasc. Fl. Ind. 3: 3. 1979.

1. GARNOTIA Brongn.

Brongn. in Duperrey, Voy. Coquille, Bot. 2: 132. t. 21 1832; Hook. f. Fl. Brit. Ind. 7: 241 1896; Fischer in Gamble, Fl. Pres. Madras 1911. 1934 (Repr. ed. 3: 1255. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 565. 1960; Ved Prakash & Jain in Fasc. Fl. India 3: 3. 1979.

A genus of about 32 species distributed mainly in Asiatic and Pacific regions of the World, of which about 12 species occur in India and 6 in Kerala. Occurrence of *G. schmidii* in Kerala is to be confirmed. *G. puchiparensis* is represented only by its type collection from Silent Valley.

Key to the species

- 1a. Spikelets awnless, 4-6 mm long; leaves oblanceolate, flat, rigid, 10-40 cm long
G. exaristata 4
- 1b. Spikelets awned; leaves not as above:
 - 2a. Leaf-blades broadly lanceolate, acuminate with a filiform tip, up to 20 cm long, 3 cm wide, rounded or sub-cordate at base
G. arundinacea 1
 - 2b. Leaf-blades narrowly linear, without filiform tips, up to 1.5 cm wide:
 - 3a. Robust perennials; leaf-blades and sheaths mostly collected at the base of the culms; panicles 20-40 cm long, lax; spikelets 3-6 mm long
G. elata 3
 - 3b. Slender annuals; leaf blades not basal, often articulated on the sheaths, arranged all along the culms; panicles 2-30 cm long, often contracted.

- 4a. Lower glume longer than the upper one, aristate; panicles 5-30 cm long; spikelets 2-5 mm long *G. zonella* 6
- 4b. Lower glume shorter than the upper one, acute; panicles up to 10 cm long:
- 5a. Axis of the panicles and branches very broad, flat or convex at back, branches shorter, closely crowded at nodes; culms densely tufted, stiff *G. puchiperensis* 5
- 5b. Axis of the panicles and branches narrow, slender, branches rather long, reflexed or drooping; culms loosely tufted, weak *G. courtallensis* 2

1. *Garnotia arundinacea* Hook.f. Fl. Brit. Ind. 7: 243. 1897; Fischer in Gamble, Fl. Pres. Madr. 1812. 1934 (Repr. ed. 3: 1255. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 567. 1960; Ved Prakash & Jain in Fasc. Fl. Ind. 3: 7. 1979.

Perennials. Culms 50-150 cm long, erect or trailing; nodes bearded. Leaves oblong-lanceolate or lanceolate, 5-20 x 1-3 cm, acuminate, rounded or shallowly cordate at base, ciliate along the margins. Sheaths hairy. Ligules truncate, membranous. Panicles lax, 10-30 cm long. Spikelets oblong lanceolate or lanceolate, 2.5-4 mm long. Lower glume oblong-lanceolate or lanceolate, 2-3 x 1 mm, chartaceous. Upper glume oblong-lanceolate or lanceolate, 2.5-4 x 1-1.5 mm, chartaceous. Lemma equal to the upper glume, awned; awn 5-12 mm long.

Occasional along the forest margins and hill slopes.

Fl. & Fr.: October February.

CANNANORE: on way to Peria; PALGHAT: Karappara, Silent Valley; WYNAD: Manantoddy, Meppadi.

2. *Garnotia courtallensis* (Arn. & Nees) Thw. Enum. Pl. Zeyl, 363. 1864; Hook.f. Fl. Brit. Ind. 7: 244. 1896; Fischer in Gamble, Fl. Pres. Madr. 1812. 1934 (Repr. ed. 3: 1255. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 567. 1960; Ved Prakash & Jain in Fasc. Fl. Ind. 3: 7. 1979. *Miquelia courtallensis* Arn. & Nees in Nov. Act. Nat. Cur. 19. Suppl. 1: 179. 1843.

Annuals. Culms erect, creeping or decumbent, 10-80 cm or more long; nodes villous. Leaves lanceolate or oblong-lanceolate, 2-10 x 0.1-1 cm, glabrous or hispid, acuminate, rounded or sha-

llowly cordate at base. Sheaths slightly keeled. Panicles lax or congested, 2-15 cm long; rhachis occasionally flattened. Spikelets lanceolate or oblong-lanceolate, 2.5-3.5 mm long. Lower glume lanceolate or oblong-lanceolate, 2-3 mm long; chartaceous. Upper glume lanceolate, or oblong-lanceolate, 2.5-3.5 mm long, chartaceous. Lemmas ovate-lanceolate or oblong-lanceolate, 2-3.5 mm long awned; awn 2.5-8.0 mm long.

Fairly common in moist places, wet compound walls, along the raised bunds, banks of streams and moist road-cuttings.

Fl. & Fr.: November-December.

IDUKKI: Munnar, on way to Eravikulam.

3. *Garnotia elata* (Arn. ex Miq.) Janowsky in Fedd. Rep. Sp. Nov. 17: 86. 1921; Bor, Grass. Bur. Cey. Ind. Pak. 567. 1960; Ved Prakash & Jain in Fasc. Fl. Ind. 3: 8. 1979. *Berghausia elata* Arn. ex Miq. Verh. Konink. Nederl. Inst. 3: 4. 32. 1851. *Garnotia tenuiglumis* Stapf ex Hook. f. Fl. Brit. Ind. 7: 242. 1896. *G. scoparia* Stapf ex Hook. f. Fl. Brit. Ind. 7: 242. 1896, non Thw. 1864; Fischer in Gamble, Fl. Pres. Madr. 1812. 1934 (Repr. ed. 3: 1254. 1957).

Perennials. Culms 40-120 cm high; nodes glabrous. Leaves lanceolate or linear-acuminate, 5-30 x 0.2-0.8 cm, glabrous or sparsely hairy. Sheaths keeled. Panicles 20-40 cm long, lax or congested. Spikelets lanceolate, 3-6 mm long. Lower glume lanceolate, 3-6 mm long, acuminate to aristate. Upper glume lanceolate or oblong-lanceolate, 2.5-4.5 mm long, acuminate. Lemmas oblong-lanceolate, 2-3.5 mm long, notched at apex, awned.

Rare along rocky hill slopes.

Fl. & Fr.: November-December.

Notes: Appears to be very rare in the study area.

TRIVANDRUM: Trivandrum-Nagercoil border.

4. *Garnotia exaristata* Gould in Kew Bull. 27: 558. 1972; Ved Prakash & Jain in Fasc. Fl. Ind. 3: 8. 1979. *G. tectorum* Hook f. Fl. Brit. Ind. 7: 242. 1896, quod descr., nom.

illegit.; Fischer in Gamble, Fl. Pres. Madr. 1812, 1934 (Repr. ed. 3: 1255, 1957). *G. mutica* sensu Bor, Grass. Bur. Cey. Ind. Pak. 568. 1960, p.p. PLATE No. 87

Perennials. Culms 20-120 cm high, erect, tufted; nodes glabrous or softly villous. Leaves oblanceolate or elliptic-lanceolate, 10-40 x 0.6-2.0 cm, rigid, villous, narrowed at base. Sheaths keeled. Panicles oblong-lanceolate, 10-40 cm long, congested. Spikelets lanceolate, 4-6 mm long. Lower glume lanceolate or oblong-lanceolate, 4-5 x 1 mm, acuminate, chartaceous, 3-nerved. Upper glume oblong-lanceolate, 4-5 x 1 mm, chartaceous, 3-5-nerved. Lemmas oblong-lanceolate, 4-5 x 1 mm, subcoriaceous, faintly 3-5-nerved. Paleas lanceolate, 3-4 x 0.5-1 mm, delicate, 2-keeled, 2-nerved, ciliate along the margins. Stamens 3; anthers 1-2 mm long. Ovary 0.25-0.5 mm; styles 1-1.5 mm; long; stigmas 1-2 mm long.

Occasional along the streams in high altitude grasslands and in marshy places.

Fl. & Fr. : August-December.

IDUKKI : Eravikulam, Umaiyyamala.

5. *Garnotia puchiparensis* Bor in Ind. For. Rec. (n.s.) Bot. II, 4: 234-236, 1941; Ved Prakash & Jain in Fasc. Fl. Ind. 3: 11. 1979.

Annuals. Culms up to 35 cm high, prostrate or geniculate, rooting at nodes; nodes bearded. Leaves lanceolate, 2-5 x 0.3-1.0 cm, acute, hirsute. Sheaths softly hairy. Panicles up to 10 cm long. Spikelets lanceolate, 3-3.5 mm long. Lower glume lanceolate, 2.5-3 mm long, chartaceous. Upper glume oblong-lanceolate, 3-3.5 mm long, chartaceous. Lemmas oblong-lanceolate, 2.8-3.5 mm long, awned; awn 4-6 mm long.

Occasional along rocky hill slopes.

Fl. & Fr. : September - December.

Notes : This grass is endemic to South India. Bor (*l.c.*) stated that *G. puchiparensis* described by him in 1941 should probably be included in *G. stricta* Brongn. This grass conceived here by Bor as *G. stricta* is actually *G. tenella*. Gould (Kew Bull. 27: 531. 1972) treated *G. puchiparensis* as a synonym of *G. courtallensis*.

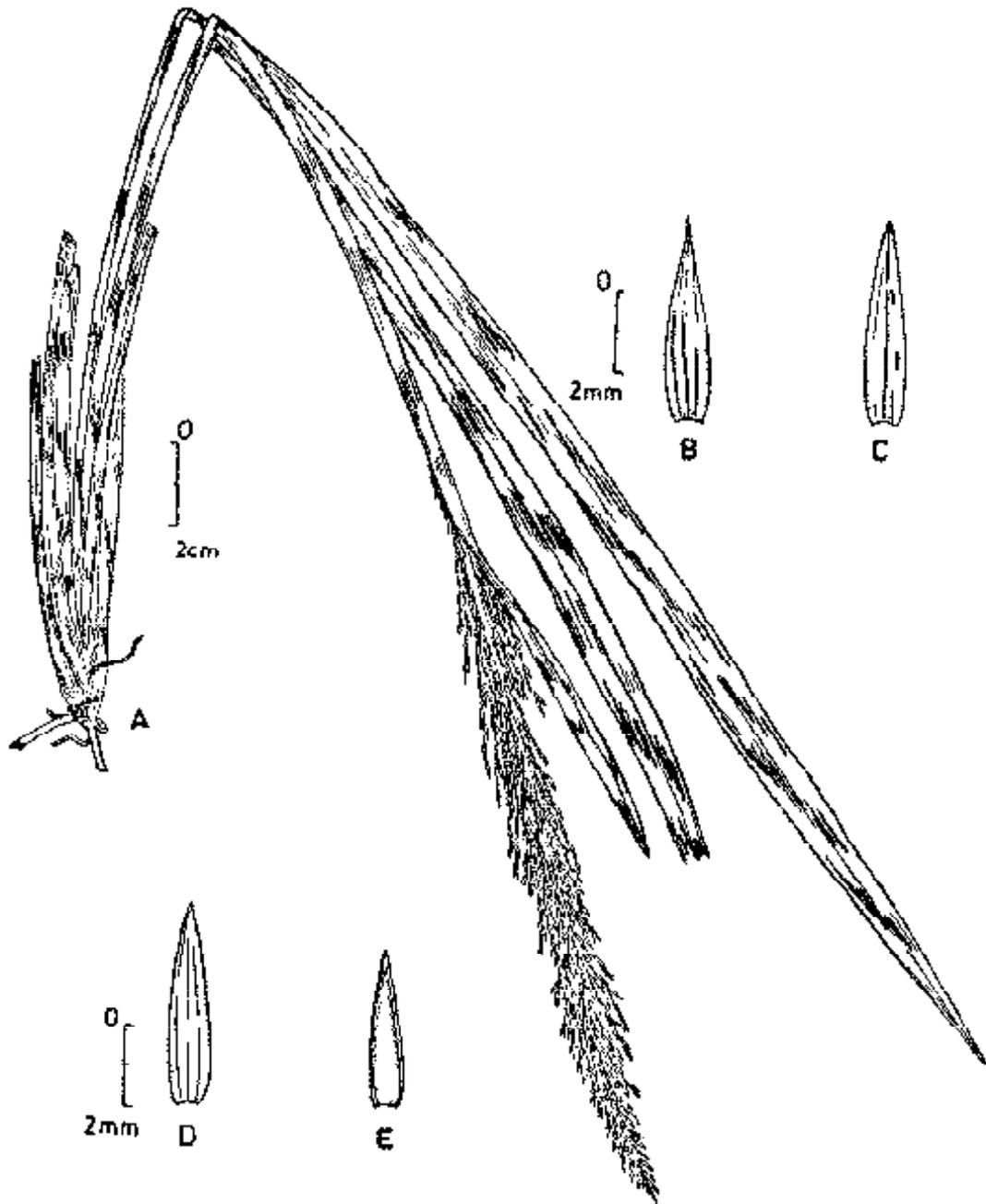


PLATE No. 87 *GARNOTIA EXARISTATA* Gould

A. Habit; B. Lower glume; C. Upper glume; D. Lemma; E. Palea.

Ved Prakash & Jain (*l.c.*) in their revision of the genus treated this as a distinct species.

This rare and endemic grass is represented only by its type collection. It has now been considered one of the very rare and endangered or extinct species. (Ved Prakash & Jain, *l.c.*)

9. *Garnotia tenella* (Arn. ex Miq.) Janowsky in Fedd. Rep. Sp. Nov. 17: 86. 1921; Santos in Nat. Appl. Sci. Bull. 10: 113. 1950; Gould in Kew Bull. 27: 528. 1972; Ved Prakash & Jain in Fasc. Fl. Ind. 3: 13. 1979. *Berghausia tenella* Arn. ex Miq. in Verh. Konink. Nederl. Inst. III, 4: 34. 1851. *Garnotia stricta* auct. non Brongn. 1832; Hook. f. Fl. Brit. Ind. 7: 243. 1896; Fischer in Gambie, Fl. Pres. Madr. 1812. 1934 (Repr. ed. 3: 1255. 1957); Bor. Grass. Bur. Cey. Ind. Pak. 569. 1960, p.p.

Annuals. Culms slender, 5-80 cm long, erect or geniculate; nodes villous. Leaves lanceolate, or linear-lanceolate, 1-20 x 0.2-1.5 cm, acuminate, narrow or rounded at base. Sheaths slightly keeled, membranous. Ligules fimbriate. Panicles lax, 5-30 cm long, lax or contracted. Spikelets lanceolate, 2-5 mm long. Lower glume lanceolate, 2-5 x 1-1.5 mm, aristate, chartaceous, 3-nerved. Upper glume lanceolate, 2-4 x 1-1.5 mm, aristate, chartaceous, 3-nerved. Lemma lanceolate, 1.5-3.5 mm long, awned; awn 5-15 mm long. Palea elliptic-lanceolate, 1.5-3.5 mm long, delicate, hyaline. Stamens 3; anthers 1.5 mm long, cream coloured, stigmas pink.

Fairly common along the moist, rocky places, roadsides, margins of forests and occasional in the crevices of moist rocks and also on the wet compound walls.

Fl. & Fr.: May-December.

Notes: It is a highly polymorphic species, showing much qualitative and quantitative variations. Santos (*l.c.*) divided this into several species, varieties and formae based on minor differences. Later on Gould (*l.c.*) reduced all these taxa. Ved Prakash & Jain (*l.c.*) also follow Gould's view. This species complex was largely referred to as *G. stricta* in Indian herbaria and literature.

CANNANORE: Elimala; IDUKKI: Mundakkayam, Munnar, Peermade, Pullupara; PALGHAT: Dhoni R. F., Pothundy PATHANAMTHITTA: Konni R. F., Plapalli.

POOIDEAE - ISACHNEAE

ISACHNEAE Benth.

Benth. in Linn. Soc. (Bot.) 19, 30, 92, 1881, p.p.; Bor, Grass. Bur. Cey, Ind, Pak, 574, 1960; Ved Prakash & Jain in Fasc. Fl. Ind. 14: 1, 1984.

Key to the genera

- 1a. Inflorescence a solitary spike or raceme; slender aquatic grasses; culms often floating; rachis flattened *Limnopoa* 3
- 1b. Inflorescence an open panicle, rarely spikeform, but then the culms not floating; rachis not flattened:
- 2a. Upper lemma coriaceous, situated on a minute rachilla; glumes longer or subequal to spikelets, deciduous *Isachne* 2
- 2b. Upper lemma membranous or hyaline, situated on a long rachilla; glumes shorter than the spikelets, persistent *Coelachne* 1

1. COELACHNE R. Br.

R. Br. Prodr. Fl. Nov. Holl. 187, 1810; Benth. & Hook. f. Gen. Pl. 3: 1156, 1883; Hook. f. Fl. Brit. Ind. 7: 270, 1896; Fischer in Gamble, Fl. Pres. Madr. 1803, 1934 (Repr. ed. 3: 1249, 1957); Bor, Grass. Bur. Cey. Ind, Pak, 574, 1960; Ved Prakash & Jain in Fasc. Fl. Ind. 14: 3, 1984.

A genus of about 10 species distributed in the tropics and subtropics of the World, of which 3 species occur in India and 2 in Kerala.

Key to the species

- 1a. Panicles contracted, spikeform, interrupted; spikelets 1.5-2.5 mm long; florets glabrous at base; glumes orbicular, 1-1.5 mm long. *C. simpliciuscula* 2
- 1b. Panicles lax, with spreading branches; spikelets 2.5-4 mm long; florets densely bearded at base, glumes ovate-oblong, 1.25-2 mm long. *C. perpusilla* 1

1. *Coelachne perpusilla* (Arn. ex Steud.) Thw. Enum. Pl. Zeyl. 373, 1864; Fischer in Gamble, Fl. Pres. Madr. 1804, 1934 (Repr. ed. 3: 1249, 1957); Bor, Grass. Bur. Cey. Ind, Pak, 576, t. 618, 1960; Ved Prakash & Jain in Fasc. Fl. Ind. 14: 5, 1984, var. *perpusilla*, *Panicum perpusillum*

Arn. ex Steud. Syn. Pl. Glum. 1: 96. 1854. *C. pulchella* sensu Hook. f. var. *gracillima* Hook. f. Fl. Brit. Ind. 7: 271. 1896.

Annuals or perennials. Culms densely tufted, 10-40 cm high, erect or geniculate; nodes glabrous. Leaves linear-lanceolate, flat, 0.5-3.5 x 0.1-0.3 cm, filiform, involute. Panicles lax, ovate, 1-8 cm long, with spreading branches. Spikelets ovate-oblong or obovoid, 2.5-4 mm long. Glumes lanceolate, 1-2 x 1 mm, chartaceous. First lemma ovate-lanceolate, 2-3 mm long, coriaceous, sparsely hairy. Palea elliptic, 1.5-2 x 1 mm, delicate, 2-nerved, 2-keeled. Second lemma 1.5-2.5 x 1-1.5 mm, chartaceous. Palea elliptic, 1.5-2 x 1 mm, delicate, 2-keeled, 2-nerved. Stamens 3, anthers 0.5-1.5 mm long.

Very rare; grows along moist grasslands and wet places of higher elevations.

Fl. & Fr.: July-November.

Notes: This species can easily be distinguished from the other species of this genus by its lax panicles with spreading branches.

There is no representative collection of this grass from Kerala, at MH. The present report is based on a specimen brought for identification from Eravikulam National Park, Idukki district. Earlier Indian reports are only from Tamil Nadu.

2. *Coelachne simpliciuscula* (Wight & Arn. ex Steud.) Benth. in J. Linn. Soc. (Bot.) 19: 93, 1881; Bor, Grass. Bur. Cey. Ind. Pak. 576, t. 61a. 1960; Ved Prakash & Jain in Fasc. Fl. Ind. 14: 6. 1984. *Panicum simpliciusculum* Wight & Arn. ex Steud. Syn. Pl. Glum. 1: 96. 1854. *Coelachne pulchella* acut. non R. Br. 1810; Hook. f. Fl. Brit. Ind. 7: 270. 1896, p.p.

Annuals. Culms slender, tufted, 5-40 cm long, erect, creeping or geniculate; nodes bearded. Leaves oblong, oblong-lanceolate, or lanceolate, 0.5-5 x 0.2-0.5 cm. Ligules rim of hairs. Panicles spiciform, 5-10 cm long, interrupted. Spikelets ovate-oblong, or oblong-lanceolate, 1.5-2.5 mm long. Lower glume ovate-oblong, 0.5-1 mm, chartaceous, 3-nerved. Upper glume oblong, 1-1.5 mm long, chartaceous, 5-6-nerved. First lemma ovate-oblong or oblong-lanceolate, 1.5-2.5 mm long, chartaceous. Palea oblong-

elliptic, 1.5-2 mm long, delicate. Second lemma oblong-lanceolate, 1-2 mm long, 2-keeled, hairy along the keels. Palea elliptic-oblong, 1-2 mm long, 2-keeled. Stamens 3, anthers 0.25-0.5 mm long, cream with violet margins. Stigmas violet.

Fairy common in marshes and paddy fields, ditches and other wetlands.

Fl. & Fr. : December-March.

Notes: This species can be distinguished from *Coelachne perpusilla* by its narrowly contracted, spiciform panicles and broader leaves. It shows considerable variation in the size of plants, spikelets and nature of panicles.

IDUKKI: Munnar; QUILON: Pamba; TRIVANDRUM: Merchiston; WYNAD: Manantoddy, Turunalli, Vayitri.

2. ISACHNE R. Br.

R. Br. Prodr. Fl. Nov. Holl. 196. 1812; Benth. & Hook. f. Gen. Pl. 3: 1100 1883; Hook.f. Fl. Brit. Ind. 7: 21, 1896; Fischer in Gamble. Fl. Pres. Madr. 1794. 1934 (Repr. ed. 3: 1242. 1957); Bor. Grass. Bur. Cey. Ind. Pak 576. 1960; Ved Prakash & Jain in Fasc. Fl. Ind. 14: 7. 1984.

A genus of about 110 species distributed in the tropics and subtropics of the World, of which about 29 species occur in India and 8 species in Kerala. About 18 species are endemic to India and one species, *I. fischeri* is endemic to Kerala.

- 1a. Spikelets up to 1 mm long; culms very slender; leaves elliptic
I. gracilis 4
- 1b. Spikelets 1.5-4.5 mm long; culms and leaves not as above:
- 2a. Inflorescence a raceme; culms up to 5 cm high, dwarf plants
I. fischeri 2
- 2b. Inflorescence a panicle; plants much taller than above:
- 3a. Spikelets 3-5 mm long:
- 4a. Leaves up to 20 cm long, 2.5 cm wide; panicles up to 30 cm long, lax, few-flowered; pedicels with glandular bands; spikelets 3.5-4.5 mm long
I. walkeri 0
- 4b. Leaves up to 5 cm long, 1.5 cm wide; panicles up to 15 cm long, many-flowered; pedicels without glandular

- bands: spikelets 3-4 mm long *I. bourneora* 1
- 3b. Spikelets 1.5-3.5 mm long:
- 5a. Glumes ovate-lanceolate, caudate-acuminate, setose with tubercle-based hairs; spikelets 2-3 mm long, leaves ovate-elliptic or ovate-lanceolate
I. setosa 7
- 5b. Glumes ovate-oblong or ovate-lanceolate, but never caudate-acuminate, sparsely hairy or glabrous:
- 6a. Florets almost equal in size and of same texture, barge-shaped; glumes longer than the florets; spikelets 2-3.5 mm long.
I. kunthiana 5
- 6b. Florets unequal in size and of different texture; lower ones twice as long as the upper ones, delicate; glumes equal to or shorter than the florets:
- 7a. Leaves up to 10 cm long, mostly with thickened cartilaginous margins; nodes glabrous; spikelets 1.5-3.0 mm long, pedicels often with glandular bands. *I. globosa* 3
- 7b. Leaves up to 5 cm long, mostly without cartilaginous margins; nodes bearded; spikelets 1.5-2 mm long; pedicels without glandular bands. *I. miliacea* 8

1. *Isachne bourneora* Fischer in Kew Bull. 1932: 324, 1932, Fischer in Gamble, Fl. Pres. Madr. 1796, 1934 (Repr. ed. 3: 1244, 1957); Bor, Grass, Bur. Cey. Ind. Pak. 579, 1960; Ved Prakash & Jain in Fasc. Fl. Ind. 14: 15, 1984. *I. kunthiana* sensu Fyson, Nilg. Pul. Hill-tops. 1: 448, 1915, non Wight & Arn. ex Thw. 1864.

PLATE No. 88

Perennials. Culms 10-80 cm high, erect or ascending with profusely branched rhizomatous base; nodes sparsely bearded or glabrous. Leaves ovate-elliptic, elliptic or lanceolate, 1-6 x 0.2-1.2 cm, rounded at base, glabrous or sparsely hairy, margins coriaceous, thickened. Sheaths tubercled hairy. Ligules row of hairs. Panicles spreading, 2-12 cm long. Spikelets obovoid or ovate-lanceolate, 3-4 mm long. Lower glume ovate-lanceolate, 3-4 x 1 mm, acuminate, chartaceous, 7-9-nerved. Upper glume ovate-lanceolate, 3.5-4 x 1-1.5 mm, acuminate, chartaceous, 5-7-nerved, sparsely tubercled hairy especially along the margins. First lemma ovate-oblong, 2-2.5 x 1-1.5 mm, chartaceous, faintly 5-nerved. Palea ovate-elliptic or ovate-acute, 2-2.5 x 1-1.5 mm, delicate, 2-keeled, 2-nerved. Stamens 3; anthers 1-2 mm long, violet with white connectives. Second lemma broadly ovate, 1-1.5 x 1 mm, coriaceous,

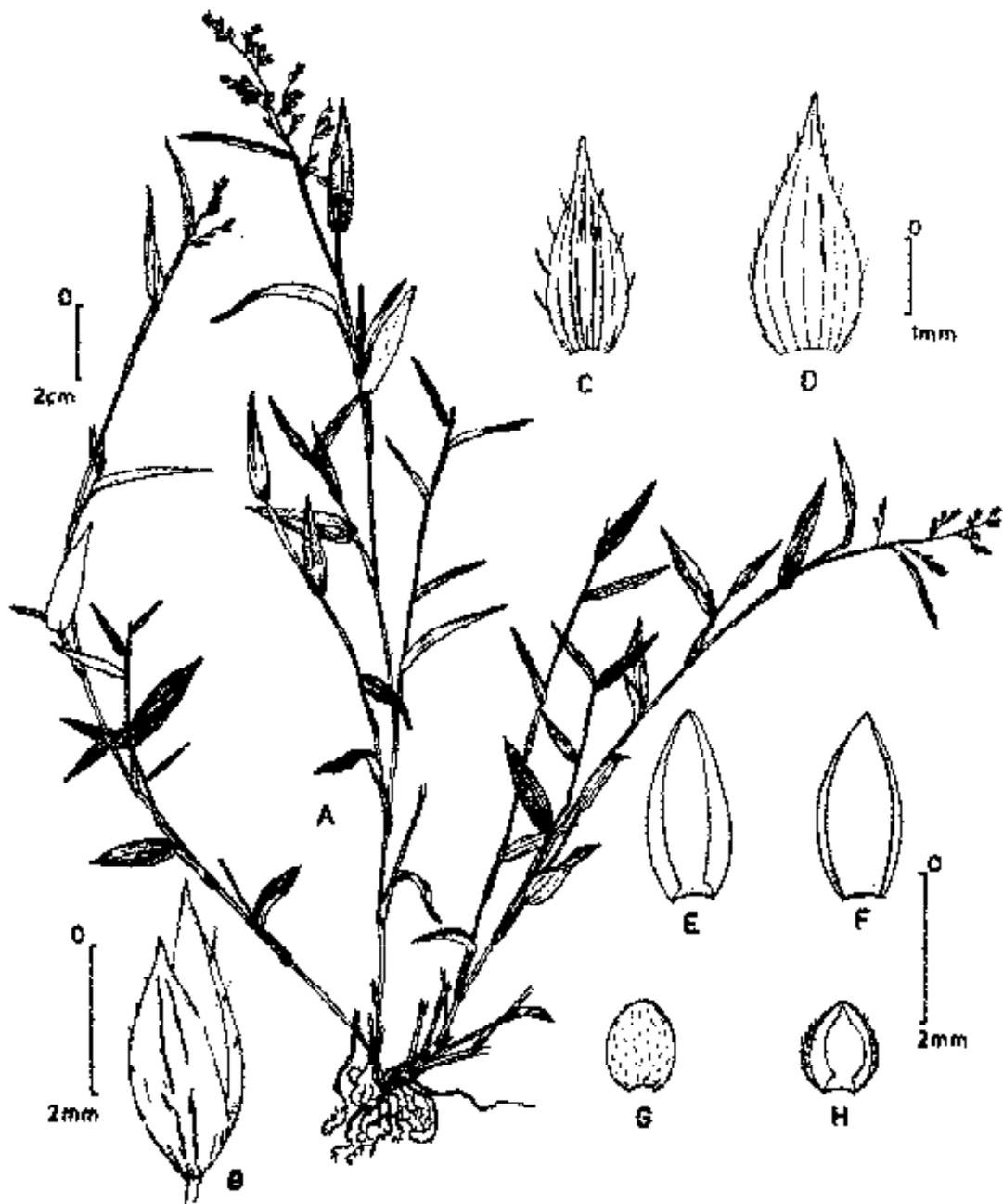


PLATE No. 88 : *ISACHNE BOURNEGRA* C. E. C. Fischer

**A. Habit; B. Spikelet; C. Lower glume; D. Upper glume; E. First lemma;
 F. Palea of the first lemma; G. Second lemma; H. Palea of the second
 lemma.**

softly hairy. Palea broadly ovate, 1-1.25 x 1 mm, coriaceous, softly hairy on dorsal side. Stigmas pink.

Occasional in high altitude grasslands, along the waterfalls and in moist places of higher elevations.

Fl. & Fr. : July-December.

Notes: This rare grass is confined to Tamil Nadu and Kerala. It may sometimes be confused with *I. setosa* where the spikelets are smaller and culms and leaves are slender. At a glance, it looks like *I. kunthiana* but differs by the unequal florets with differently textured lemmas and paleas.

{DUKKI}: Eravikulam, Umaiyamala, on way to Eravikulam;
QUILON: Pamba Dam site.

2. *Isachne fischeri* Bor in Kew Bull. 1949: 69, 1949; Bor, Grass, Bur. Cey. Ind. Pak. 580. 1960; Ved Prakash & Jain in Fasc. Fl. Ind. 14: 20, 1984. *I. kunthiana* Wight & Arn. ex Thw. var. *nana* Fischer in Gamble, Fl. Pres. Madr. 10: 1796. 1934. PLATE No. 89

Annuals. Culms 3-5 cm high, erect or ascending. Leaves lanceolate or elliptic, 5-8 x 1-3.5 mm, hirsute on both sides. Sheaths sparsely tubercled-hairy. Inflorescence racemose or at times paniculate, 1-1.5 cm long, lax, few-flowered. Spikelets obovoid or elliptic or ovate-elliptic, 2-3 x 1-2 mm, tubercled hairy. Lower glume ovate-lanceolate, chartaceous, 5-nerved. Upper glume ovate-lanceolate, 2-3 x 1-1.5 mm, chartaceous, 5-7-nerved. First lemma ovate-oblong, 2-2.5 x 1-1.6 mm, chartaceous, faintly 3-5-nerved. Palea oblong, 2-2.5 x 1-1.5 mm, delicate. Second lemma ovate-elliptic, 1-2 x 1 mm, coriaceous, softly hairy. Palea elliptic, 1-1.5 x 1 mm, coriaceous, softly hairy. Stamens 3, anthers c. 1 mm long.

Rarely found along the moist grassy hill slopes of higher elevations, often on moist rocks in association with mosses.

Fl. & Fr. : September-November.

Notes: This rare and endemic grass was earlier collected only once after the type. Recently the author could locate it from Eravikulam, an area adjacent to its type locality.

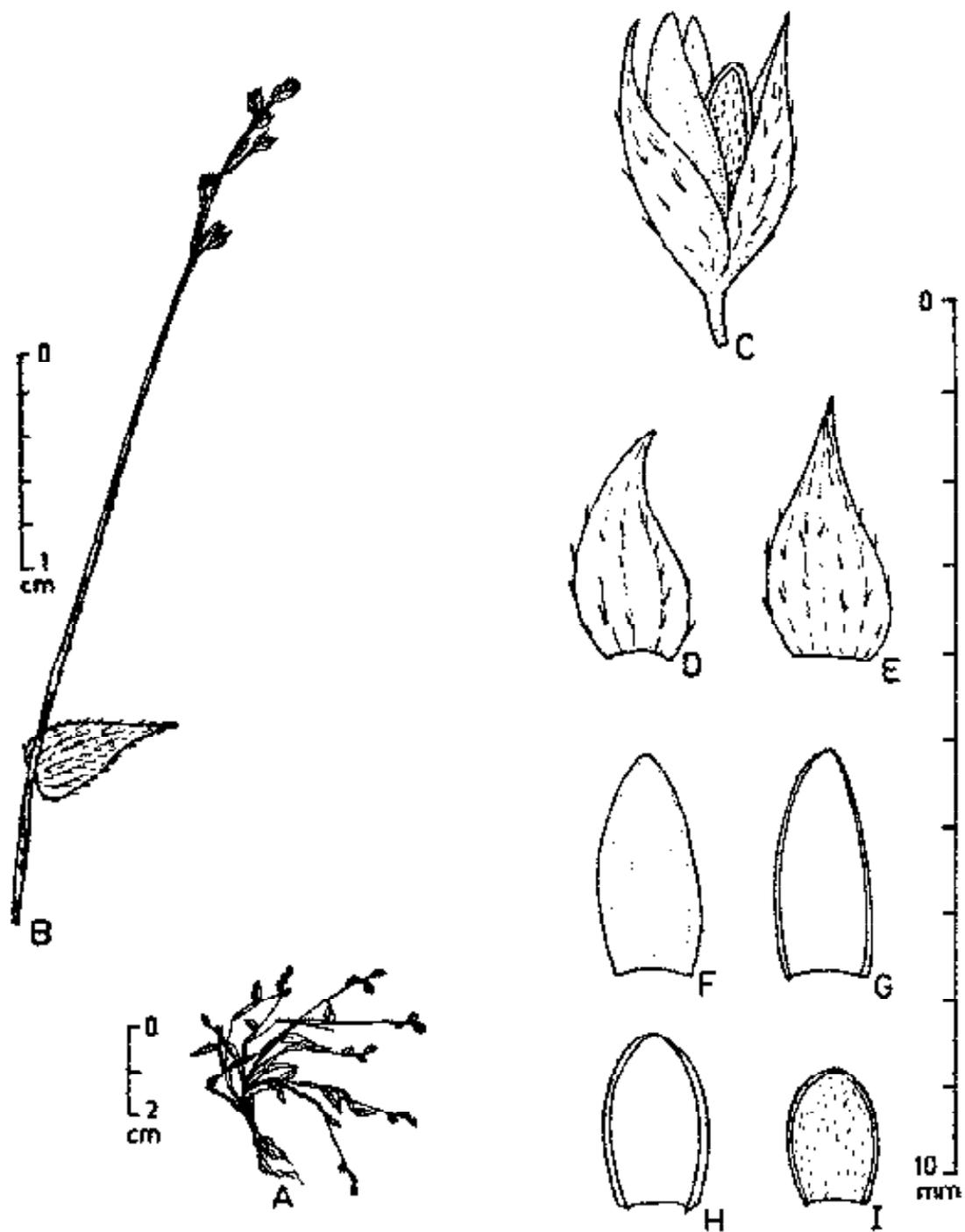


PLATE No. 99: *ISACHNE FISCHERI* Boer

A. Habit (natural size); B. Same (a portion enlarged); C. Spikelet;
 D. Lower glume; E. Upper glume; F. First lemma; G. Palea of the first
 lemma; H. Second lemma; I. Palea of the second lemma.

Bor (*l.c.*) described this species based on a collection by Barnes in September 1933, *Isachne fischeri*, which is so far known to be endemic to Idukki district, Kerala.

IDUKKI: Anamala summit, Eravikulam National Park.

3. *Isachne globosa* (Thunb.) O. Kuntze, Rev. Gen. Pl. 2: 778. 1891; Henrard in Blumea 3: 463. 1940; Bor, Grass. Bur. Cey. Ind. Pak. 580. 1960; Ved Prakash & Jain in Fasc. Fl. Ind. 14: 22. 1984. *Milium globosum* Thunb. Fl. Japon. 49. 1784. *Isachne australis* R. Br. Prodr. Fl. Nov. Holl. 1: 196. 1810; Hook. f. Fl. Brit. Ind. 7: 24. 1896. *I. globosa* (Thunb.) O. Kuntze var. *effusa* Trim. ex Hook. f. Fl. Brit. Ind. 7: 25. 1896.

Annuals or perennials. Culms erect or creeping or geniculate, 10-60 cm or more long; nodes glabrous or bearded. Leaves oblong-lanceolate, ovate-lanceolate or lanceolate, 1-10 x 0.2-1 cm, rounded or shallowly cordate at base. Ligule a row of hairs. Panicles compact or effuse, 1-15 cm long. Spikelets globose or globose-obovoid, 1.5-3 mm. Lower glume ovate-oblong, 1.5-2 x 1 mm, chartaceous, setosely hirsute. Upper glume ovate, oblong, 2-2.5 x 1-1.5 mm, chartaceous, setosely hirsute. First lemma elliptic, 2.5-3 x 1-1.5 mm, chartaceous, 5-7-nerved. Palea oblong-elliptic, 2.5-3 x 1 mm, 2-keeled, 2-nerved. Second lemma ovate-elliptic, 1.6-2 x 1 mm, coriaceous, pubescent on backside. Anthers dirty-yellow or violet. Stigmas violet.

Fairly common and grows gregariously in marshy wetlands, paddy fields and also along the margins of streams.

Fl. & Fr.: Throughout the year.

Notes: This species is quite distinct by having glandular bands on the pedicels.

I. globosa has a wide distribution from sea level to 2000 m altitude. It is a polymorphic species showing much qualitative and quantitative variations. Ved Prakash & Jain (*l.c.*) state that this widespread species is a complex and it is not possible to segregate this into more than one species due to intergradation of characters among the populations.

This species is regarded as a good fodder grass. It is said to be ploughed in as a green manure and tender buds are reported to be eaten in Java.

CANNANDORE: Taliparamba; IDUKKI: Munnar; MALAPPURAM: Mancheri; PALGHAT: Watayar.

4. *Isachne gracilis* C.E. Hubb. in Kew Bull. 1927: 77. 1927; Fischer in Gamble, Fl. Pres. Madr. 1796. 1934 (Repr. ed. 3: 1244. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 581. 1960; Ved Prakash & Jain in Fasc. Fl. Ind. 14: 25. 1984. PLATE No. 90

Annuals. Culms slender, 5-25 cm high, erect or geniculate; nodes glabrous. Leaves oblong-elliptic, elliptic or elliptic-lanceolate, 1-3 x 0.2-1.5 cm, sparsely villous. Ligules membranous or obscure. Panicles lax, 1-10 cm long. Spikelets globose, 0.5-1 mm long. Lower glume oblong, c. 0.5 x 0.25 mm, chartaceous, faintly 5-7-nerved, softly hairy. Upper glumes oblong or ovate-oblong, 0.5-1 x 0.5 mm, chartaceous, faintly 7-9-nerved, sparsely hairy. First lemma ovate-oblong, 0.6-1 x 0.5 mm, chartaceous. Palea oblong, 0.5-1 x 0.6 mm, delicate. Second lemma obovate or orbicular, c. 0.5 x 0.5 mm, coriaceous, softly hairy. Palea obovate or orbicular, c. 0.5 x 0.5 mm, coriaceous, softly hairy. Anthers 0.25-0.5 mm long.

Rare, along the moist rocks and hillslopes of higher elevations, often in deep shades.

Fl. & Fr.: August-December.

Notes: This species is distinct by its very slender culms and broadly elliptic, slender leaves and minute spikelets. *I. gracilis* is endemic to peninsular India.

PALGHAT: Silent Valley

5. *Isachne kunthiana* (Wight & Arn. ex Steud.) Wight & Arn. ex Thw. Enum. Pl. Zeyl. 362. 1864; Hook.f. Fl. Brit. Ind. 7: 21. 1896; Fischer in Gamble, Fl. Pres. Madr. 1796. 1934. (Repr. ed. 3: 1244. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 581. 1960; Ved Prakash & Jain in Fasc. Fl. 14: 29. 1984. *Panicum kunthianum* Wight & Arn. ex Steud. Syn. Pl. Glum. 1: 96. 1854, excl. Syn. *I. elatior* Hook.f. Fl. Brit. Ind. 7: 22. 1896, *I. kunthiana* var. *latifolia* Hook.f. Fl. Brit. Ind. 7: 22. 1896.

Perennials. Culms 10-60 cm or more long, erect or geniculate; nodes villous. Leaves ovate-lanceolate or oblong-lanceolate or

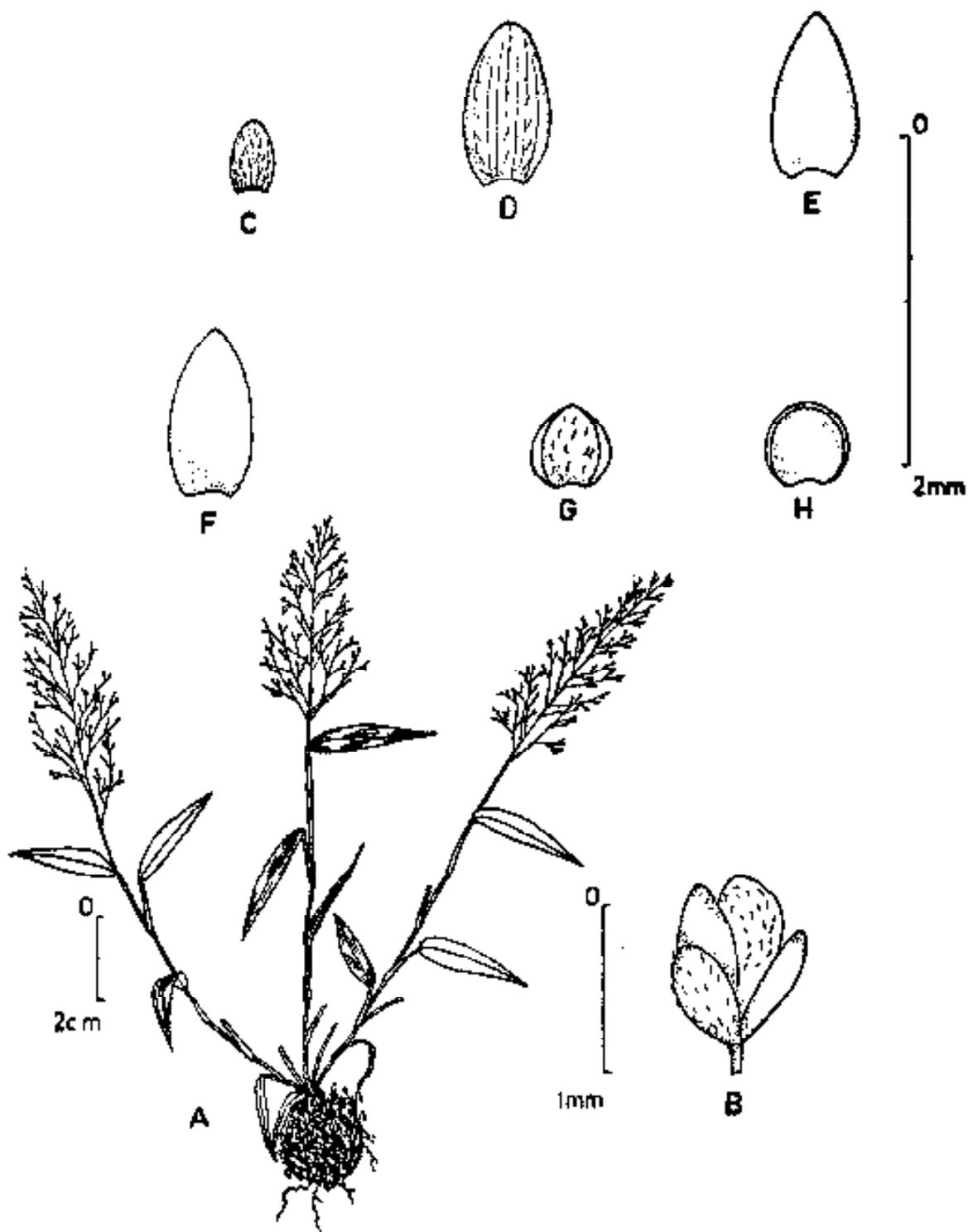


PLATE No. 90: *ISACHNE GRACILIS* C. E. Hubb.

A. Habit; B. Spikelet; C. Lower glume; D. Upper glume; E. First lemma;
 F. Palea of the first lemma; G. Second lemma; H. Palea of the second
 lemma.

elliptic-lanceolate, 1-6 x 0.3-1.5 cm, acute or acuminate, sparsely tubercle-based hairy. Sheaths tubercle-based hairy, ciliate along the margins. Ligule a row of hairs. Panicles ovate or ovate-oblong, 2-10 cm long, lax. Spikelets obovoid-elliptic, 2-3.5 mm long. Lower glume ovate-lanceolate, 2-3 x 1 mm, acuminate, chartaceous, setose in the upper half. Upper glume ovate-lanceolate, 2-3.5 x 1-1.6 mm, caudate-acuminate, chartaceous, setose in the upper half. First lemma ovate-lanceolate, 2.5-3.5 x 1-2 mm, acuminate, chartaceous. Palea oblong-lanceolate, 2-3 x 1 mm, chartaceous. Second lemma and palea almost similar to that of first lemma and its palea.

Fairly common along the hillslopes and moist rocky places.

Fl. & Fr. : September-October.

IDUKKI: Devicolam.

6. *Isachne miliacea* Roth ex Roem. & Schult. Syst. Veg. 2: 476. 1817; Hook. f. Fl. Brit. Ind. 7: 26. 1896; Henrard in Blumea 3: 467. 1940; Fischer in Gamble, Fl. Pres. Madr. 1797. 1934 (Repr. ed. 3: 1244. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 582. 1960; Ved Prakash & Jain in Fasc. Fl. Ind. 14: 31. 1984. *I. dispar* auct. non Trin. 1828; Bor, Grass. Bur. Cey. Ind. Pak. 580. 1960, p.p. *I. dispar* var. *villosa* Fischer in Gamble, Fl. Pres. Madr. 1797. 1934 (Repr. ed. 3: 1244. 1957).

Annuals or perennials. Culms erect or geniculate, 10-50 cm long; nodes bearded. Leaves ovate-lanceolate, oblong-lanceolate, or lanceolate, 1-5 x 0.5-2.0 cm, rounded or shallowly cordate at base. Sheaths tubercle based hairy, ciliate along the margins. Ligules row of hairs. Panicles lax, 1-10 cm long. Spikelets obovoid, 1.5-2 mm long. Lower glume oblong or orbicular, 1.5-2 x 1 mm, chartaceous, faintly many nerved. Upper glume oblong, 1-1.5 x 1 mm, chartaceous, faintly several nerved. First lemma ovate-oblong, 1.5-2 x 1 mm. Palea oblong or elliptic-oblong, c. 1.5 x 1 mm, delicate. Second lemma ovate or orbicular 1-1.5 x 1 mm, coriaceous. Stamens 3, anthers cream with violet margins or dirty-yellow. Stigmas violet or pink.

Very common in marshy fields, wetlands, along the streams and also in paddy fields,

Fl. & Fr. : Throughout the year.

Notes : This species is closely allied to *I. globosa* (Thunb.) O. Kuntze and is very difficult to differentiate from it. Both are widespread species and show qualitative and quantitative variations. Ved Prakash & Jain (*l.c*) on scrutiny of the protologue, illustrations and type of *I. dispar*, state that it is very close to *I. globosa* and *I. miliacea* in structure of spikelets, but differs from the latter by a different type of leaf-blade with a cartilaginous thickening on undulate margins. This type of leaf blades, according to them, are not found in Indian plants and the specimens which were assigned to *I. dispar* in Indian herbaria and floras actually belong either to *I. globosa* or *I. miliacea*.

ALLEPPEY: Karthikapally, Nedumudi, Pallana, Pallathuruthy, Vandanam; CALICUT: Pannikottur, Vengeri; CANNANORE: Kumbala, Paramba; IDUKKI: Peermade, Valanchakkanam; PATHANAMTHITTA: Moozhiyar; TRICHUR: Peechi; TRIVANDRUM: Sreekariyam; WYNAD: Chandanathode,

7. *Isachne setosa* Fischer in Kew Bull. 1932: 247. 1932 et in Gamble, Fl. Pres. Madr. 1797. 1934 (Repr. ed. 3: 1244. 1957); Bor. Grass. Bur. Cey. Ind. Pak. 582, 1960; Ved Prakash & Jain in Fasc. Fl. Ind. 14: 35. 1984.

Annuals. Culms 5-30 cm high, erect or geniculate, slender; nodes sparsely bearded. Leaves ovate, ovate-elliptic or ovate-lanceolate, 0.3-2.5 x 0.1-1.2 cm, rounded or cordate at base, hairy. Sheaths tubercle-based hairy. Ligules row of hairs. Panicles lax, 0.5-5 cm long. Spikelets obovoid-elliptic, 2-3 mm long. Lower glume ovate-lanceolate, 2-3 x 1-1.5 mm, caudate-acuminate, setose, with tubercle-based hairs. Upper glume ovate-lanceolate, 2-3 x 1-2 mm, caudate acuminate, tubercle-based hairy. First lemma ovate-oblong, 1.5-2.5 x 1 mm, chartaceous. Palea oblong-elliptic, 1-2 x 1 mm, delicate. Second lemma orbicular, 0.5-1.5 x 1 mm, coriaceous, softly hairy. Palea orbicular or ovate-elliptic, 0.5-1 x 1 mm, coriaceous.

Frequent in moist places, along hillslopes, moist rocky places often in higher elevations.

Fl & Fr. : October-December.

IDUKKI: Eravikulam, Devicolam, Munnar.

8. *Isachne walkeri* (Arn. ex Steud.) Wight & Arn. ex Thw. Enum. Pl. Zeyl. 361. 1864; Hook.f. Fl. Brit. Ind. 7: 26. 1896; Fischer in Gamble, Fl. Pres. Madr. 1797, 1934 (Repr. ed. 3: 1244. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 582. 1960; Ved Prakash & Jain in Fasc. Fl. Ind. 14: 37. 1984. *Panicum walkeri* Arn. ex Steud, Syn. Fl. Glum. 1: 97. 1854.

Perennials. Culms erect or trailing, 30-150 cm long; nodes glabrous. Leaves lanceolate, linear-lanceolate, 3.5-20 x 0.5-2.5 cm, acuminate, rounded or shallowly cordate at base. Sheaths ciliate along the margins. Ligules tuft of hairs. Panicles 5-35 cm long, lax, few-flowered. Spikelets obovoid, 3.5-4.5 mm long. Lower glume ovate-lanceolate, 3-4 x 1-2 mm, chartaceous, sparsely hairy. Upper glume ovate-lanceolate, 3-4.5 x 1-2 mm, chartaceous, sparsely hairy. First lemma oblong-lanceolate, 3-4.5 x 1-2 mm, chartaceous, sparsely hairy. First lemma oblong-lanceolate, 3-3.5 x 1-2 mm, chartaceous. Palea elliptic or oblong-elliptic, 3-3.6 x 1-1.5 mm, delicate, 2-keeled, 2-nerved. Second lemma ovate or obovate, 3-3.5 x 1-1.5 mm, coriaceous, softly hairy. Palea ovate or orbiculate, 3-3.5 x 1 mm, coriaceous.

Occasional along the hill slopes and forest margins, often in shades.

Fl. & Fr.: August-March.

IDUKKI: Devicolam; TRIVANDRUM: On way to Agastyar-kudam.

3. LIMNOPOA C. E. Hubb.

C. E. Hubb. in Hook. Ic. Pl. t. 3432. 1943; Bor, Grass. Bur. Cey. Ind. Pak. 583. 1960; Ved Prakash & Jain in Fasc. Fl. Ind. 14: 37. 1984.

A monotypic genus, endemic to Kerala.

Limnopoa meeboldii (Fischer) C. E. Hubb. in Hook, Ic. Pl. t. 3432. 1943; Bor, Grass. Bur. Cey. Ind. Pak. 583. t. 62. 1960; Nair et al. in J. Econ. Tax. Bot. 7(1): 210. 1985. *Coelachne meeboldii* Fischer in Kew Bull. 1934: 169. 1934 et in Gamble, Fl. Pres. Madr. 1804, 1934 (Repr. ed. 3: 1249. 1957), PLATE No. 91

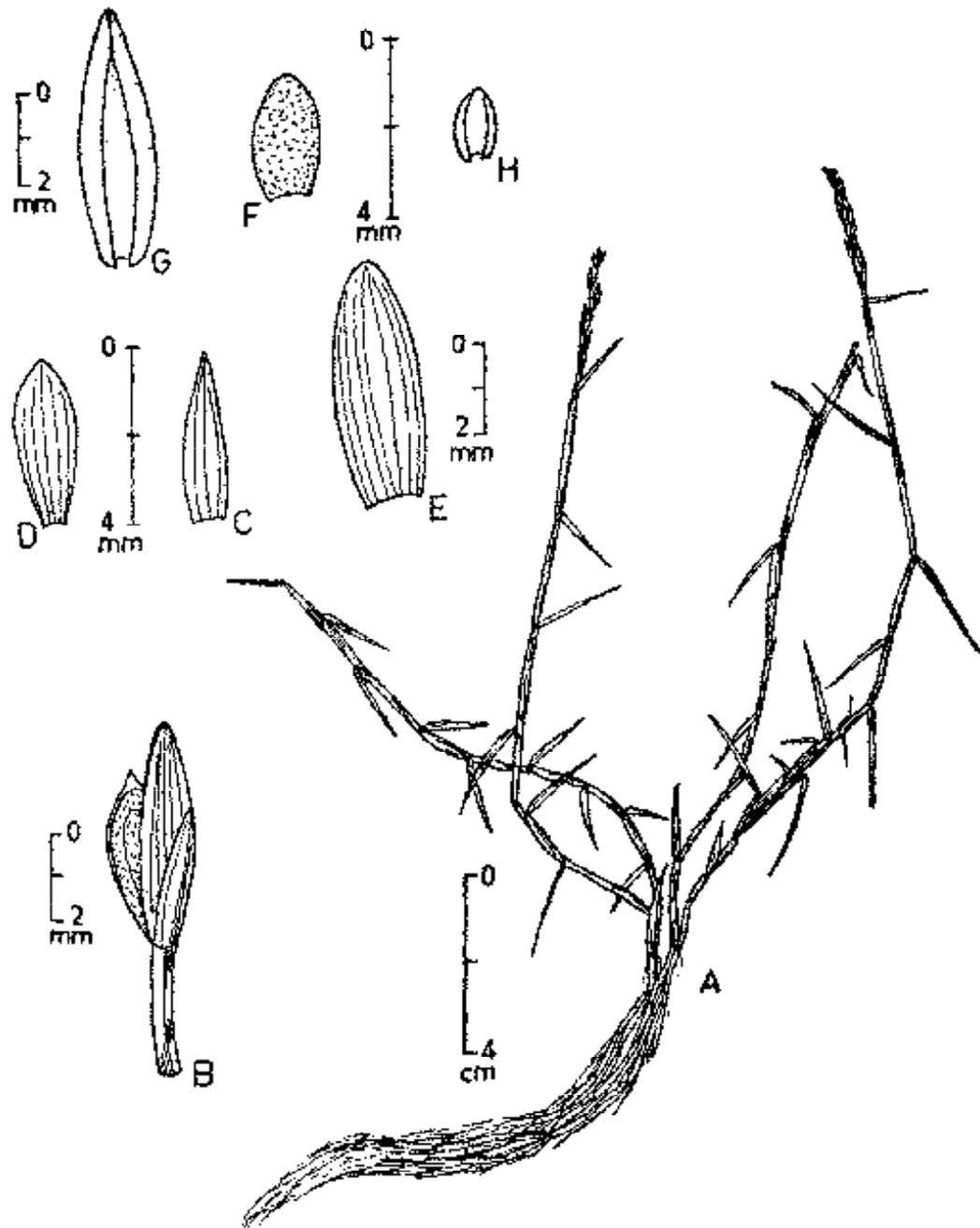


PLATE No. 91: *LIMNOPOIA MEEBOLDII* (Fischer) C. E. Hubb.

A. Habit; B. Spikelet; C. Lower glume; D. Upper glume; E. First lemma; F. Second lemma; G. Palea of the first lemma; H. Palea of the second lemma.

Aquatic annuals. Culms delicate, 10-50 cm long, creeping; nodes glabrous. Leaves acicular or lanceolate, 0.5-3 cm long, 0.5-2 mm broad, acuminate, rounded or narrow at base, glaucous; sheaths glabrous; ligule a row of hairs. Spikes 2-3 cm long, hardly exerted from the sheath. Spikelets in pairs, one sessile, the other pedicelled, ovate-oblong or oblong-lanceolate, 4-6 mm long; pedicels up to 3 mm long, flat. Lower glume oblong-lanceolate, 3-4 mm long, 1-1.5 mm broad, chartaceous, 3-nerved; upper glume obovate or spatulate, 3-4 mm long, 1-1.5 mm broad, chartaceous, 3-5-nerved. Lower lemma oblong or ovate-oblong, 4-6 mm long, 1.5-2 mm broad, chartaceous, 7-nerved; upper lemma ovate or ovate-oblong, 2-3 mm long, 1-1.5 mm broad, chartaceous or subcoriaceous, softly hairy. Lower palea oblong, 4-6 mm long, 1.5-2 mm broad, delicate, 2-keeled, 2-nerved; upper palea ovate-oblong, c. 1.5 mm long, c. 1 mm broad, coriaceous, softly hairy.

Grows apparently in tanks, water-logged marshes and paddy fields, often forming thick masses on the surface of water, in association with *Sacciolepis interrupta*, *Nymphoides indicum* etc.

Fl. & Fr.: September-November.

Notes: According to Ved Prakash & Jain (*l.c.*) this species is endemic to Ernakulam district, Kerala. This strange aquatic grass was known only from the type collection made by A. Meebold from a tank in Chalakudi during the year 1910, until Dr. Cook relocated it at Chottanikkara in 1973 and 1979. The isotype deposited in CAL, was the only specimen of it available in Indian herbaria. Henry *et al.* (1979) included it in their list of endangered plants of Southern India and Karthikeyan (1983) considers it to be an indeterminate species. Recently it could be located from Kasaragod, the northernmost district of Kerala (Nair *et al.*, *l.c.*).

ERNAKULAM: Chalakudi, Chottanikkara; KASARAGOD: Payyanur.

POOIDEAE-ORYZAE

ORYZAE Dumort.

Dumort. Obs. Gram. Belg. 83: 135. 1823; Bor. Grass. Bur. Cey. Ind. Pak. 597. 1960.

Key to the genera

- 1a. Leaf-blades ovate-oblong or ovate-lanceolate with inflated sheath; lemma awned; floating grasses *Hygroryza* 1
- 1b. Leaf-blades linear, sheaths not inflated; lemmas awned or not; grasses not floating:
- 2a. Fertile lemma supported by two empty scales; tip of pedicel with two obscure lips *Oryza* 3
- 2b. Fertile lemma solitary; tip of pedicel without lips *Leersia* 2

HYGRORYZA Nees

Nees in Edinb. New Phil. J. 15: 380, 1833; Hook. f. Fl. Brit. Ind. 7: 94, 1896; Fischer in Gamble, Fl. Pres. Madr. 1845, 1934 (Repr. ed. 3: 1277, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 597, 1960.

A monotypic genus of South east Asia and Malaya.

Hygroryza aristata (Retz.) Nees ex Wight & Arn. in Edinb. New Phil. J. 15: 380, 1833; Hook. f. Fl. Brit. Ind. 7: 95, 1896; Fischer in Gamble, Fl. Pres. Madr. 1845, 1934 (Repr. ed. 3: 1277, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 597, t. 67, 1960. *Pharus aristatus* Retz. Obs. Bot. 5: 23, 1789.

Annuals or perennials. Culms creeping or trailing and forming mat on the surface of water 5-20 cm or more long, spongy, rarely geniculate; nodes bearded. Leaves ovate-oblong, ovate-lanceolate or lanceolate, cordate at base, 1-8 x 0.3-1.8 cm, glaucous beneath. Sheaths expanded, spongy, forming floats. Panicles ovate or triangular, lax, 3-8 mm long; pedicels with a red band below the middle. Spikelets lanceolate, 6-8 mm long, 1-flowered. Glumes wanting. Lemma lanceolate, 6-8 x 1-3 mm, acuminate, chartaceous, 5-nerved, hairy between the nerves, awned; awns 6-8 mm long, scabrid. Palea elliptic-lanceolate or lanceolate, 6-8 x 1-1.5 mm, chartaceous, 3-nerved, keels scabrid or ciliate. Stamens 6. Grain oblong.

Fairly common in fallow fields, margins of paddy fields and along the sides of streams, canals and backwaters, often associated with *Ipomoea repens*.

Fl. & Fr.: October-February.

ALLEPPEY: Champakkulam; PALGHAT: Olavakkot; QUILON: Quilon; TRICHUR: Koratti; TRIVANDRUM: Ponmudi, Pulimath,

2. LEERSIA Soland. ex Sw.

Sw. Prodr. Veg. Ind. Occ. 21, 1788; Hook. f. Fl. Brit. Ind. 7: 94, 1896; Fischer in Gamble, Fl. Pres. Madr. 1845, 1934 (Repr. ed. 3: 1276, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 599, 1960.

A genus of about 20 species distributed in tropical and temperate regions of the World, of which 2 species occur in India and one in Kerala.

Leersia hexandra Sw. Prodr. Veg. Ind. Occ. 21, 1788; Hook. f. Fl. Brit. Ind. 7: 94, 1896; Fischer in Gamble, Fl. Pres. Madr. 1845, 1934 (Repr. ed. 3: 1277, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 599, t. 68, 1960.

Perennials. Culms 50-150 cm long, erect or trailing; elegant; nodes bearded. Leaves lanceolate or linear-lanceolate, 5-15 x 0.2-1 cm, acuminate, rounded or shallowly cordate at base. Ligules, ovate, membranous. Panicles lax, 3-10 cm long, with flexuous branches. Spikelets oblong or ovate-oblong, 3-4 mm long, compressed, cream-yellow. Glumes reduced to a rim. Lemma oblong, 3-4 x 1-2 mm, coriaceous, 5-nerved, laterally compressed, keeled, spinulose along the keels, scabrid along the lateral nerves. Palea linear-oblong; 2-3 x 1 mm, coriaceous, 3-nerved, ciliate along the keels. Stamens 6. Anthers and stigmas golden-yellow or cream-coloured.

Very common along the streams, backwaters, canals and in low fields, wetlands and marshes.

Fl. & Fr.: August-June.

Notes: This grass superficially looks like some species of *Oryza*, but here spikelets are smaller and the culms are slender.

ALLEPPEY: Champakkulam, Nedumudy, Pallana; CALICUT: Chelannur; IDUKKI: on way to Mlappara; TRICHUR: Chalakudi, Kodungallur.

3. ORYZA Linn.

Linn. Sp. Pl. 333, 1753 et Gen. Pl. ed. 5, 155, 1754; Hook. f. Fl. Brit. Ind. 7: 92, 1896; Fischer in Gamble,

Fl. Pres. Madr. 1844, 1934 (Repr. ed. 3: 1276, 1957); Bor, Grass. Bur. Cey. Ind. Pak. 601, 1960; Tateoka in Bot. Mag. Tokyo 76: 165, 1963.

A genus of about 23 species distributed in the tropics and subtropics of the World, of which about 10 species occur in India, 2 species and 2 subspecies in Kerala.

Nair *et al.* (1964) reported the occurrence of *O. perennis* subsp. *balunga* from Kerala. It could not be located during the present study.

Key to the species and subspecies

- 1a. Ligules of the lower leaves 10-50 mm long:
- 2a. Spikelets persistent; cultivated rice *O. sativa* 4
 - 2b. Spikelets deciduous; wild rice *O. rufipogon* 3
- 1b. Ligules of the lower leaves mostly less than 6 mm long:
- 3a. Panicles spiciform, without spreading branches, 3-10 cm long; surface of the fertile lemma and palea granulate *O. meyeriana* subsp. *granulata* 5
 - 3b. Panicles lax with spreading branches, 10-30 cm long; surface of the fertile lemma and palea not granulate *O. officinalis* subsp. *malampuzhaensis* 2

1. *Oryza meyeriana* (Zoll. & Mor. ex Steud.) Baill. subsp. *granulata* (Nees & Arn. ex Watt) Tateoka in Bot. Mag. Tokyo 75: 460, 1962. *O. granulata* Nees et Arn. ex Watt, Dic. Econ. Prod. Ind. 5: 500, 1891; Hook. f. Fl. Brit. Ind. 7: 93, 1896; Bor, Grass. Bur. Cey. Ind. Pak. 604, 1960. *O. meyeriana* Baill. Hist. Pl. 12: 166, 1894; Fischer in Gamble, Fl. Pres. Madr. 1845, 1934 (Repr. ed. 3: 1276, 1957).

Perennials. Culms densely tufted, 30-100 cm high, nodes glabrous. Leaves oblong-lanceolate, lanceolate or linear-lanceolate, 5-25x 0.5-2 cm, rounded or sub-cordate, glaucous. Sheaths slightly keeled. Ligules ovate, narrow, membranous with a tuft of hairs on collar. Inflorescence spiciform or racemose, 3-10 cm long. Spikelets ovate-oblong, 4-6 mm long, seated on short pedicels, awnless. Glumes reduced to two expanded projections on the top of the pedicels. First lemma absent or minute, lanceolate, c. 1 mm long, empty. Second

lemma boat-shaped, 5-6 mm long, coriaceous, granulate, awnless. Paleas elliptic or oblong-elliptic. Stamens 6.

Fairly common in scrub jungles and along the margins of forests, often in association with *Strabilanthes* spp.

Fl. & Fr. : July-February.

CALICUT: Pavagada; IDUKKI: Mangaladevi Temple; MALAPPURAM: Mancheri; PALGHAT: Patakayam; TRICHUR: Thunakadavu; TRIVANDRUM: Kallar.

2. *Oryza officinalis* Wall. ex Watt subsp. *malampuzhaensis* (Krishnasw. & Chandrasek.) Tateoka in Bot. Mag. Tokyo 75: 422. 1962. *O. malampuzhaensis* Krishnasw. & Chandrasek. in Madr. Agr. J. 45: 471. 1958.

Perennials. Culms 50-120 cm long, erect or trailing, rhizomatous; nodes glabrous. Leaves lanceolate or linear-lanceolate, 5-40 x 0.5-2 cm, rounded or shallowly cordate. Sheaths keeled. Ligules ovate, membranous, with a fringe of hairs, 0.2-1 cm long. Panicles lax, 10-30 cm long. Spikelets broadly oblong, deciduous, 5-6 mm long, awned; awns 1-4 mm long, mature ones black coloured. Sterile lemma oblong-acute, 1.5-2 mm long, coriaceous. Grains brownish white.

This grass grows along the margins of forest rivers and rivulets of hilly areas.

Fl. & Fr. : July-February.

MALAPPURAM: Poolakkapara; PALGHAT: Kanjirampuzha; TRICHUR: Parambikulam.

3. *Oryza rufipogon* Griff. Notul. 3: 5. 1851; Bot. Grass. Bur. Cey. Ind. Pak. 605. 1960. *O. sativa* sensu Hook.f. Fl. Brit. Ind. 7: 92. 1896. p.p.

Annuals. Culms tufted, 40-130 cm high, erect; nodes glabrous. Leaves lanceolate or linear-lanceolate, 10-40 x 0.8-1.5 cm, acuminate, rounded or shallowly cordate at base, flat. Sheaths compressed, keeled. Ligules ovate, membranous, truncate or erose, 10-25 mm long. Panicles oblong, 10-30 cm long, lax. Pedicels dilated at apex. Spikelets oblong, compressed, 6-10 mm long, deciduous. Glumes ovate-oblong, unequal, 2-3 mm long, chartaceous, 1-nerved. Lemmas

ovate-oblong, 8-10 mm long, laterally compressed, chartaceous, 3-nerved, awned, ciliate on the nerves; awns 5-8 mm long. Palea oblong, 6-10 mm long, apiculate. Lodicules 2, oblong, c. 1 mm long. Stamens 6; anthers 2-3 mm long, pale yellow. Stigmas cream-coloured. Grains elliptic or oblong, 5-6 mm long.

Fairly common, along the margins of ponds, pools, tanks and other water courses, often grows as a weed in paddy fields.

Fl. & Fr. : September-March.

Notes : This species closely resembles *O. sativa*, the common cultivated rice, but can be distinguished by its long awned readily falling, reddish-brown spikelets. The growth of this 'commonest wild rice' (Raizada & Jain 1983) is very vigorous and it competes with and damages rice crops. It is considered a very good fodder grass. Grains are said to be used for consumption at times of scarcity.

ALLEPPEY: Nedumudy; PALGHAT: Thenkara.

4. *Oryza sativa* Linn. Sp. Pl. 333. 1753; Hook. f. Fl. Brit. Ind. 7: 92. 1896, p.p.; Fischer in Gamble, Fl. Pres. Madr. 1844. 1934 (Repr. ed. 3: 1276. 1957). p.p.; Bor, Grass. Bur. Cey. Ind. Pak. 605, 1960.

Annuals. Culms 80-150 cm high, tufted, erect, rooting at the nodes; nodes glabrous. Leaves linear-lanceolate or linear, 20-60 x 0.5-1 cm, acuminate, scabrid. Sheaths ciliate along the margins. Ligules lanceolate, membranous, 1.5-4 cm long. Panicles lax, 10-30 cm long. Spikelets ovate-oblong or oblong, 5-12 mm long, awned or not. Glumes reduced. First lemma oblong-lanceolate, acute, entire or toothed, chartaceous, empty. Second lemma oblong-lanceolate, 5-10 mm long, acute, chartaceous, granulate, fertile. Palea oblong-lanceolate, acuminate, chartaceous. Grains oblong, tightly enclosed by the lemma and palea.

Cultivated all over India in a number of varieties and forms, for the grain. Occasionally runs wild.

Fl. & Fr. : September-June.

ALLEPPEY: Nedumudy, R. Block; PALGHAT: Olavakot, Peringottukara, Silent Valley.

POOIDEAE - PEROTIDEAE
PEROTIDEAE C.E. Hubb.

C.E. Hubb. in Bor, Grass. Bur. Cey. Ind. Pak. 686. 1960.

PEROTIS Ait.

Ait. in Hort. Kew 1: 85. 1782; Hook.f. Fl. Brit. Ind. 7: 98. 1896; Fischer in Gamble, Fl. Pres. Madr. 1814. 1934 (Repr. ed. 3: 1256. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 611. 1960.

A genus of about 10 species distributed in the tropics of the world of which 2 species occur in India and one in Kerala.

Perotis indica (Linn.) O. Kuntze, Rev. Pl. 2: 787. 1891; Fischer in Gamble, Fl. Pres. Madr. 1814. 1934. (Repr. ed. 3: 1256. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 611. t. 72. 1960.

Annuals. Culms erect or geniculate, 10-80 cm high; nodes glabrous. Leaves oblong or oblong-lanceolate, 0.5-5 x 0.2-1 cm, rounded or cordate at base, glabrous, wavy and scabrid along the margins. Sheaths slightly keeled. Ligules truncate, membranous. Racemes 5-20 cm long, cream or purplish. Spikelets linear or lanceolate, 2-3 mm long (excluding awns), purplish. Glumes linear-lanceolate, subequal, 2-3 mm long, chartaceous, 1-nerved, keeled, ciliate along the keels, produced into capillary awns 5-19 mm long. Lemmas linear-lanceolate, c. 1 mm long, chartaceous. Palea linear-lanceolate, 2-nerved. Stamens 3, anthers 0.25-0.5 mm long. Grains linear, terete, 2-2.5 mm long.

Fairly common along the roadsides, in wastelands, as a weed in cultivated fields, often in dry areas.

Fl. & Fr.: Throughout the year.

ALLEPPEY: Kumarakam, Thottappally; **CANNANORE**: Hosdurg, Muzhappilangad, Nileswar; **PALGHAT**: Makkali; **PATHANAMTHITTA**: Kodumon; **QUILON**: Thenmala; **TRICHUR**: Chalakudi.

POOIDEAE - PHAREAE
PHAREAE Stapf

Stapf in Dyer, Fl. Cap. 7: 319. 1898; Bor, Grass. Bur. Cey. Ind. Pak. 617. 1960.

LEPTASPIS R. Br.

R. Br. Prodr. Fl. Nov. Holl. 211. 1810; Hook.f. Fl. Brit. Ind. 7: 95. 1896; Bor, Grass. Bur. Cey. Ind. Pak. 617. 1960.

A genus of about 5 species distributed mainly in the tropics and subtropics of the world, of which one species occurs in India and Kerala.

Leptaspis urceolata (Roxb.) R. Br. in Benn. Pl. Jav. Rar. 23. t. 6. 1838; Hook.f. Fl. Brit. Ind. 7: 95. 1896; Rao in Curr. Sci. 33: 120. 1964, *Pharus urceolatus* Roxb. Fl. Ind. ed. 2, 3: 611. 1832. PLATE No. 92

Perennials. Culms tufted, erect, 20-60 cm high; nodes glabrous. Leaves ovate-elliptic, elliptic or elliptic-lanceolate, 5-20 x 2-5 cm, acuminate, narrowed at base, pseudo-petiolate, surfaces with projections of false reticulate veins. Sheaths compressed, keeled, bases brownish to black. Ligules obscure. Panicles very lax, 5-20 cm long, 10-30 cm wide, loosely spiculate; peduncles hairy. Utricles pyriform or obovate, 4-8 mm long, pores open at the top enclosing the ovary. Palea linear slightly exerted. Lodicules truncate. Styles 3, very long. Grains free from the inflated utricle.

Occasional in deep shades of evergreen forests.

Fl. & Fr.: September-December.

QUILON: Thenmala.

POOIDEAE SPOROBOLEAE
SPOROBOLEAE Stapf

Stapf in Dyer, Fl. Cap 7: 315. 1898; Bor, Grass. Bur. Cey. Ind. Pak. 622. 1960.

SPOROBOLUS R. Br.

R. Br. Prodr. 169. 1810; Hook.f. Fl. Brit. Ind. 7: 247. 1896; Fischer in Gamble, Fl. Pres. Madr. 1815. 1934 (Repr. ed. 3: 1257. 1957); Bor, Grass. Bur. Cey. Ind. Pak. 623. 1960.

A genus of about 150 species distributed mainly in the tropics and subtropics of the World, of which about 20 species occur in India and 5 in Kerala. The common 'Dropseeds'

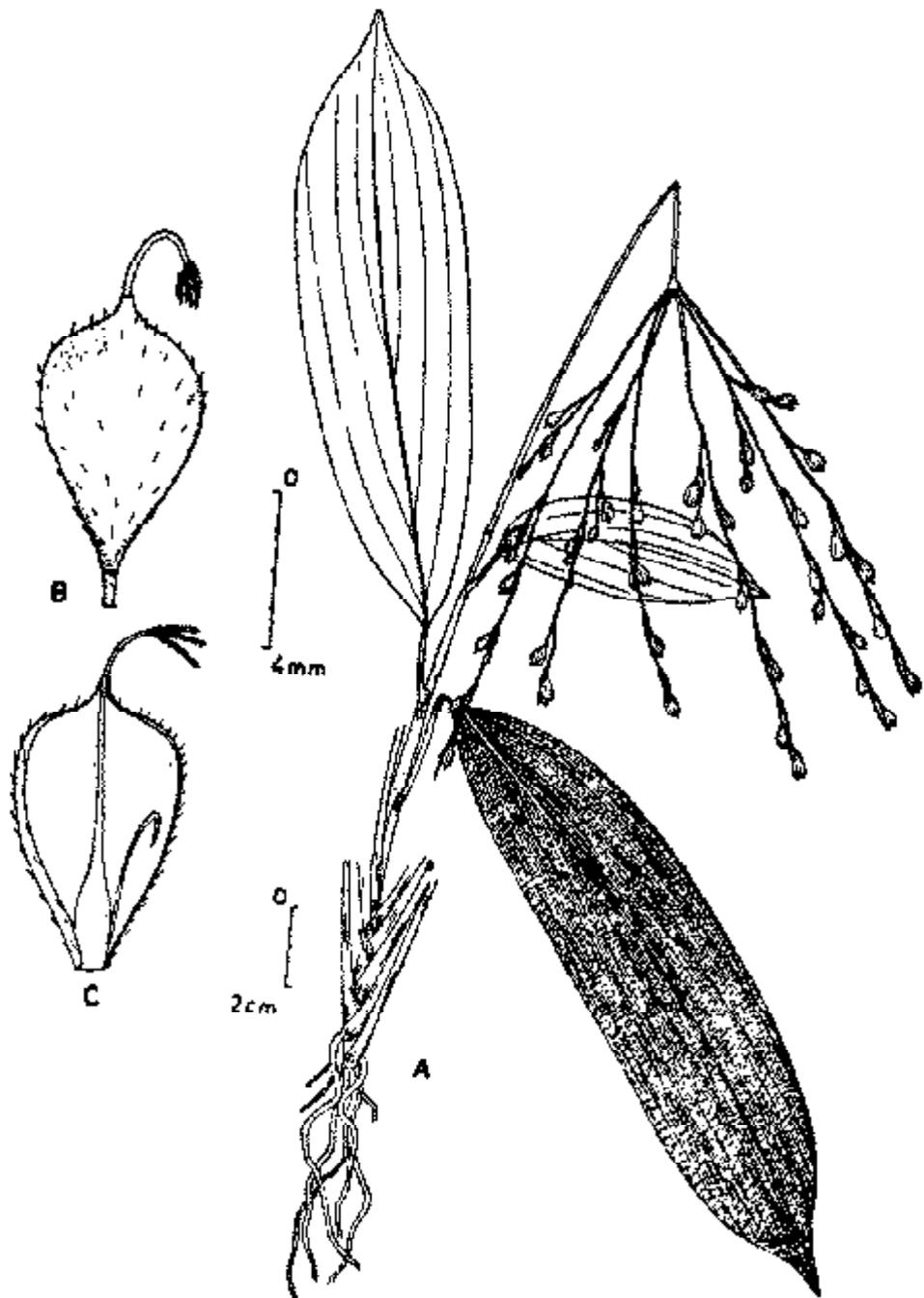


PLATE No. 92: *LEPTASPIS URCEOLATA* (Roxb.) R. Br.
A. Habit; B. Utricle; C. L. S. of utricle.

Key to the species

- 1a. Lower glume almost as long as the spikelet or at least three-fourth of its length; spikelets lanceolate, 1.5-2.5 mm long; basal leaves pungent
S. virginicus 5
- 1b. Lower glume much shorter than the spikelet, not more than two-third of its length; spikelets oblong or ovate-oblong; leaves not as above:
- 2a. Culms 5-30 cm high; panicles spiciform, contracted, up to 10 cm long; spikelets 1-2 mm long. *S. piliferus* 3
- 2b. Culms often much taller, up to 120 cm high; panicles usually effuse, rarely contracted but then longer, up to 40 cm long:
- 3a. Stamens 2; lower glume truncate; panicles up to 40 cm long, spikelets 1.5-2 mm long, crowded, slatey grey. *S. indicus* var. *diander* 1
- 3b. Stamens 3; lower glume not truncate:
- 4a. Lemmas 1.5-2.5 mm long; panicles contracted, 16-35 cm long; spikelets 1.5-2.5 mm long, perennials
S. indicus var. *fertilis* 2
- 4b. Lemmas 0.5-1.5 mm long; panicles effuse, 5-30 cm long, spikelets 1-1.5 mm long; annuals *S. tenuissimus* 4

1. *Sporobolus indicus* (L.) R. Br. var. *diander* (Retz.) Jovet & Guedes in *Taxon* 22: 163. 1973. *Agrostis diandra* Retz. *Obs. Bot.* 6: 19. 1789. *Sporobolus diander* (Retz.) P. Beauv. *Ess. Agrost.* 26: 147, 178. 1812; Hook. f. *Fl. Brit. Ind.* 7: 247. 1896; Fischer in *Gambie, Fl. Pres. Madr.* 1817. 1934 (Repr. ed. 3: 258. 1957); Bor. *Grass. Bur. Cey. Ind. Pak.* 629. 1960; Cope in Nasir & Ali, *Fl. Pak.* 143; 136. 1982.

Perennials. Culms tufted, erect, 20-100 cm high, nodes glabrous. Leaves linear-lanceolate, or linear-acuminate, 3-30 x 0.1-0.6 cm, glaucous. Ligules fimbriate, membranous. Panicles effuse, oblong or pyramidal, 5-40 cm long, dark-grey coloured. Spikelets obovoid, 1.5-2 mm long, greyish. Lower glume oblong or lanceolate, 0.2-0.5 mm long, truncate or lanceolate, chartaceous. Upper glume ovate or ovate-lanceolate, 0.5-1 mm long, chartaceous, 1-nerved. Lemma ovate-lanceolate, 1.5-2 mm long, chartaceous, 1-nerved. Palea elliptic, 1-1.5 mm long, 2-nerved. Stamens 2, anthers 0.25-0.6 mm long. Grain oblong or elliptic-oblong, 0.5-1 mm long, truncate at the tip.

Very common in open grasslands, wastelands, along water-courses, margins of forests, banks of backwaters, roadsides and also as a weed in tapioca plots.

Fl. & Fr. : March-September.

Notes : This grass is considered a very good fodder.

ALLEPPEY: Champakkulam, Nedumudy; CANNANORE: Tellicherry; KOTTAYAM: Kudamaloor; PATHANAMTHITTA: Kufathupuzha, Moozhiyar, Ranni; QUILON: Adoor, Pamba; TRICHUR: Vellanikkara; TRIVANDRUM: Pulimath.

2. *Sporobolus indicus* (L.) R. Br. var. *fertilis* (Steud.) Jovet & Guedes in *Taxon* 22: 163. 1973. *Agrostis fertilis* Steud. *Syn. Pl. Glum.* 1: 170. 1854. *Sporobolus fertilis* (Steud.) W. D. Clayton in *Kew Bull.* 19: 291. 1965. *S. indicus* sensu Hook. f. *Fl. Pres. Madr.* 1817. 1934 (Repr. ed. 3: 1288. 1957); *Bot. Grass. Bur. Cey. Ind. Pak.* 630, t. 76. 1960.

Perennials. Culms tufted, erect, 60-120 cm high; nodes glabrous. Leaves linear or linear-acuminate, 10-40 x 0.2 - 0.8 cm, rounded or shallowly cordate at base. Ligules truncate, membranous or row of hairs. Panicles contracted, spiciform, 15-35 cm long. Spikelets obovoid, 1.5-2.5 mm long, greyish. Lower glume, oblong, chartaceous, obtuse or rounded at apex. Upper glume ovate, 0.5-1 mm long, chartaceous, 1-nerved. Lemma ovate, 1.5-2.25 mm long, acute, chartaceous, 1-nerved. Palea elliptic, 1.5-2 mm, delicate, 2-nerved. Stamens 3; anthers c. 0.5 mm long, cream with violet margins. Stigmas cream. Grains oblong, 0.5-1 mm long.

Occasional as a weed in Tea plantations, in wetlands and along the margins of backwaters and ponds.

Fl. & Fr. : June-December.

CALICUT: Pavagada; IDUKKI: Munnar.

3. *Sporobolu spififerus* (Trin.) Kunth, *Enum. Pl.* 1: 211. 1833; Hook.f. *Fl. Brit. Ind.* 7: 251. 1896; Fischer in Gamble, *Fl. Pres. Madr.* 1817. 1934 (Repr. ed. 3: 1258. 1957); *Bot. Grass. Bur. Cey. Ind. Pak.* 632. 1960. *Villa pilifera* Trin. *Diss. Bot.* 157. 1824.

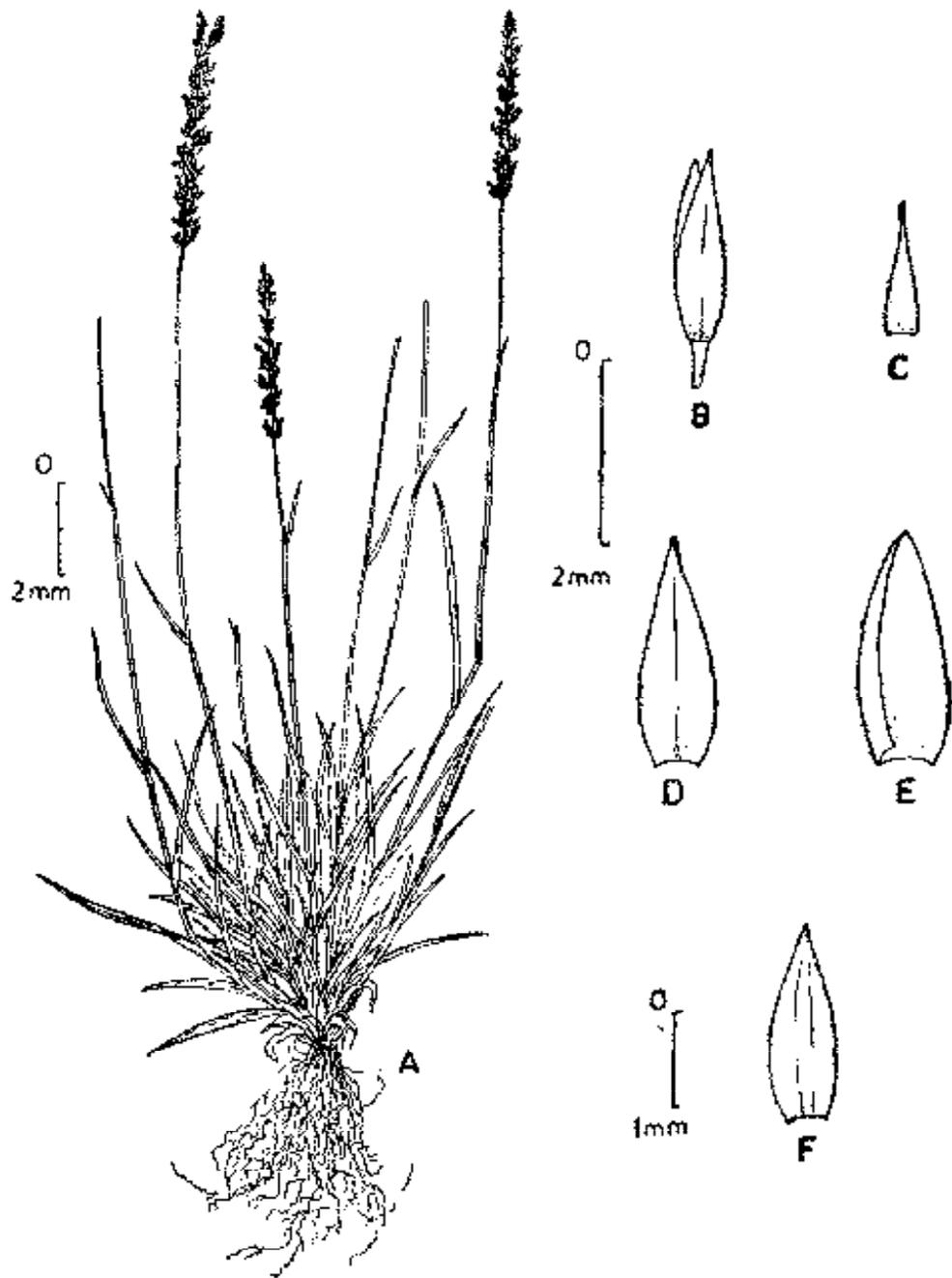


PLATE No. 93: *SPOROBOLUS PILIFERUS* (Trin.) Kunth

A. Habit; B. Spikelet; C. Lower glume; D. Upper glume; E. Lemma;
F. Palea,

Annuals. Culms densely tufted, erect or geniculate, 5-30 cm high; nodes glabrous. Leaves linear, tapering, 2-15 x 0.3 cm, flat or convolute. Ligules ring of hairs. Panicles spikeiform, interrupted, 2-10 cm long. Spikelets elliptic-lanceolate or lanceolate, 1-2 mm long, golden yellow. Lower glume lanceolate, 1-1.5 x 0.5 mm, chartaceous. Upper glume oblong-lanceolate or ovate-lanceolate, 2-2.5 x 0.5-1 mm, chartaceous, 1-nerved. Lemma ovate-lanceolate, 2-2.5 x 1 mm, chartaceous, 1-nerved. Palea oblong-lanceolate, 1.5-2 x 1 mm, delicate, 2-nerved. Stamens 2. Grains ovate, apiculate, c. 1 mm long.

Frequent along the roadsides and bunds, on moist walls, often in wet localities at higher elevations.

Fl. & Fr.: September-December.

CALICUT: Kalarimala; IDUKKI: Munnar, Preemada; PALGHAT: Aruvampara, Karasurymala.

4. *Sporobolus tenuissimus* (Schrank) O. Kuntze, Rev. Pl. 3: 369, 1893; Bor, Grass. Bur. Cey. Ind. Pak. 633, 1950; Manilal & Sivaraj, Fl. Calic. 350, 1982. *Panicum tenuissimum* Schrank in Denkschr. Bot. Ges. Regensb. 2: 26, 1822. *Sporobolus minutiflorus* (Trin.) Link, Hort. Berol. 1: 88, 1827; Hook.f. Fl. Brit. Ind. 7: 248, 1896; Fischer in Gamble Fl. Pres. Madr. 1816, 1934 (Repr. ed. 3: 1258, 1957).

Annuals. Culms 20-100 cm high; nodes glabrous. Leaves linear or linear-lanceolate 5-25 x 0.3-0.6 cm, acuminate. Ligules truncate, membranous with rim of hairs. Panicles effuse, 5-30 cm long, oblong or lanceolate, 1-1.5 mm long, greyish. Lower glume oblong, 1-1.5 mm long, greyish. Lower glume oblong, 0.2-0.3 mm long, acute, hyaline. Upper glume ovate-oblong, 0.5-0.75 mm long, acute, hyaline, 1-nerved. Lemma ovate-oblong, 0.5-1.25 mm, chartaceous, 1-nerved. Palea elliptic or oblong-elliptic, 0.5-1 mm long, delicate, 2-nerved. Stamens 3, anthers c. 0.25 mm long, violet. Occasional along the water courses and in wastelands.

Fl. & Fr.: September-December.

ALLEPPEY: Munnar; CALICUT: Vengeri.

5. *Sporobolus virgincus* (Linn.) Kunth, Rev. Gram. 1: 67, 1829; Hook.f. Fl. Brit. Ind. 7: 249, 1896; Fischer in Gamble Fl. Pres. Madr. 1818, 1934 (Repr. ed. 3: 1259, 1957)

Bor, Grass. Bur, Cey. Ind. Pak. 634. 1960. *Agrostis virginica* Linn. Sp. Pl. 63. 1753. PLATE No. 94

Perennials. Culms stoloniferous, creeping and spreading by long, slender rhizomes, 10-50 cm long; nodes glabrous. Leaves lanceolate, 1-15 x 0.2-0.6 cm, rounded or cordate at base, convolute. Ligule row of hairs. Panicles 3-10 mm long, contracted, spikelets lanceolate, 1.5-2.5 mm long. Lower glume lanceolate, 1-2 mm long, chartaceous. Upper glume ovate-lanceolate, 1.5-2.5 mm long, chartaceous. Palea elliptic, 1-2 mm long, delicate. Stamens 3, anthers 1-1.5 mm long, brownish with white connective zones. Stigmas white.

Occasional along the sea-shores, banks of backwaters, often in wet saline soils.

Fl. & Fr.: July-September.

CANNANORE: Tellicherry; QUILON: Ayiramthengu.

POOIDEAE - STREPTOGYNEAE

STREPTOGYNEAE C. E. Hubb.

STREPTOGYNA P. Beauv.

P. Beauv. Ess. Agrost. 80. t. 16. f. 8. 1812; Hook. f. Fl. Brit. Ind. 7: 332. 1896; Fischer in Gamble, Fl. Pres. Madr. 1854, 1934 (Repr. ed. 3: 1283, 1967); Bor, Grass. Bur, Cey. Ind, Pak. 649. 1960.

A monotypic genus distributed in South India, Sri Lanka and Tropical Africa.

Streptogyna crinita P. Beauv. Ess. Agrost. 80. t. 16. 1812; Hook.f. Fl. Brit. Ind. 7: 333. 1896; Bor, Grass. Bur, Cey. Ind. Pak. 649. 1960. *S. gerontogaea* Hook. f. in Trim. Handb. Fl. Cey. 5: 301. 1900; Fischer in Gamble, Fl. Pres. Madr. 1854, 1934 (Repr. ed. 3: 1283. 1957).
PLATE No. 95

Perennials. Culms tufted, stoloniferous, 30-100 cm long, erect, trailing or geniculate; nodes bearded. Leaves lanceolate or oblong or oblong-lanceolate, 10-30 x 0.6-2.5 cm, acuminate, narrowed and pseudopetiolate, surfaces with false reticulate veins. Ligules ovate, membranous. Panicles contracted, spiciform, 10-25 cm long. Spikelets oblong-lanceolate, 1-6-flowered. Lower glume oblong or oblong-

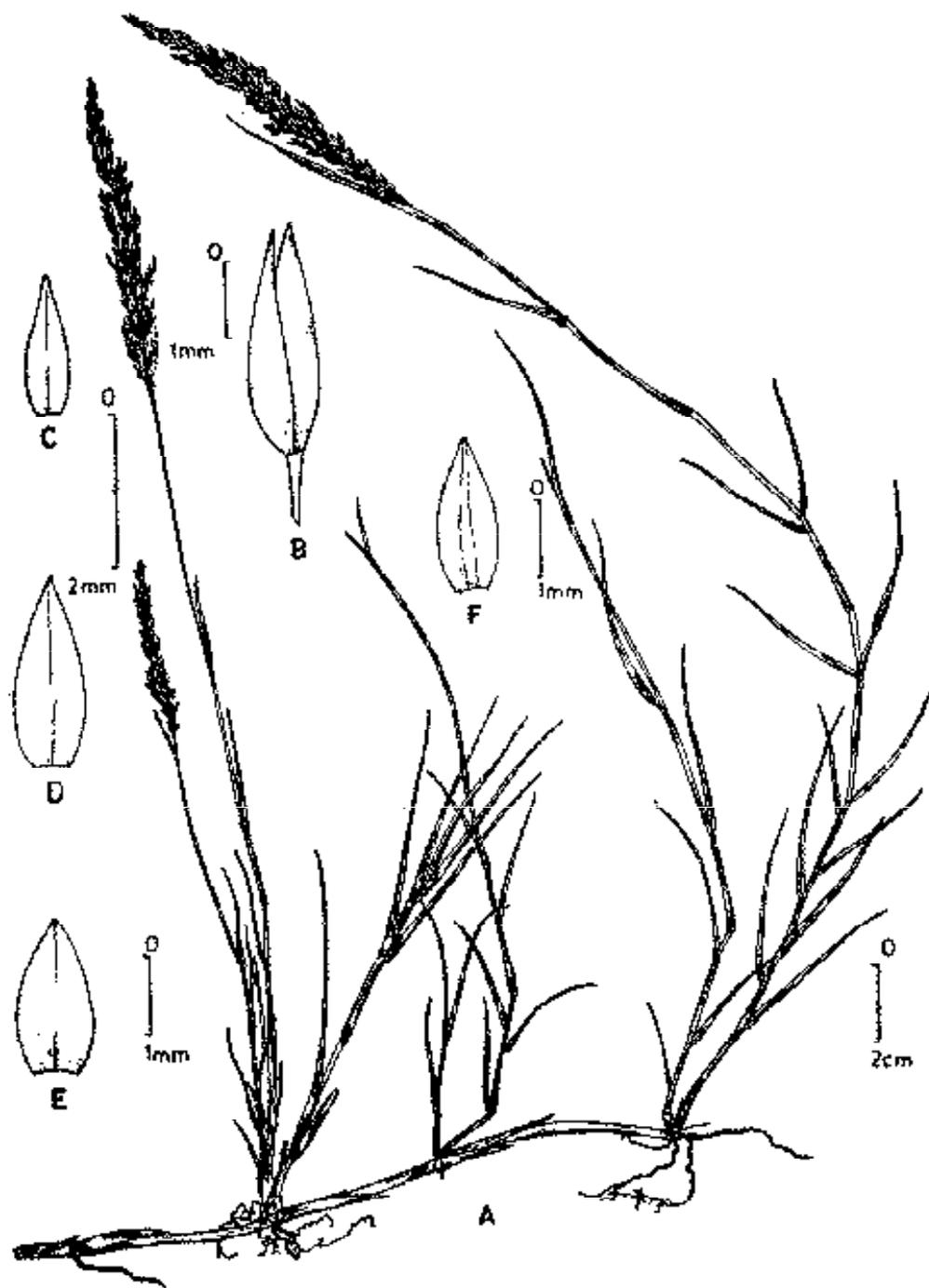


PLATE No. 94 : *SPOROBOLUS VIRGINICUS* (Linn.) Kunth

A. Habit; B. Spikelet; C. Lower glume; D. Upper glume; E. Lemma;
F. Palea.

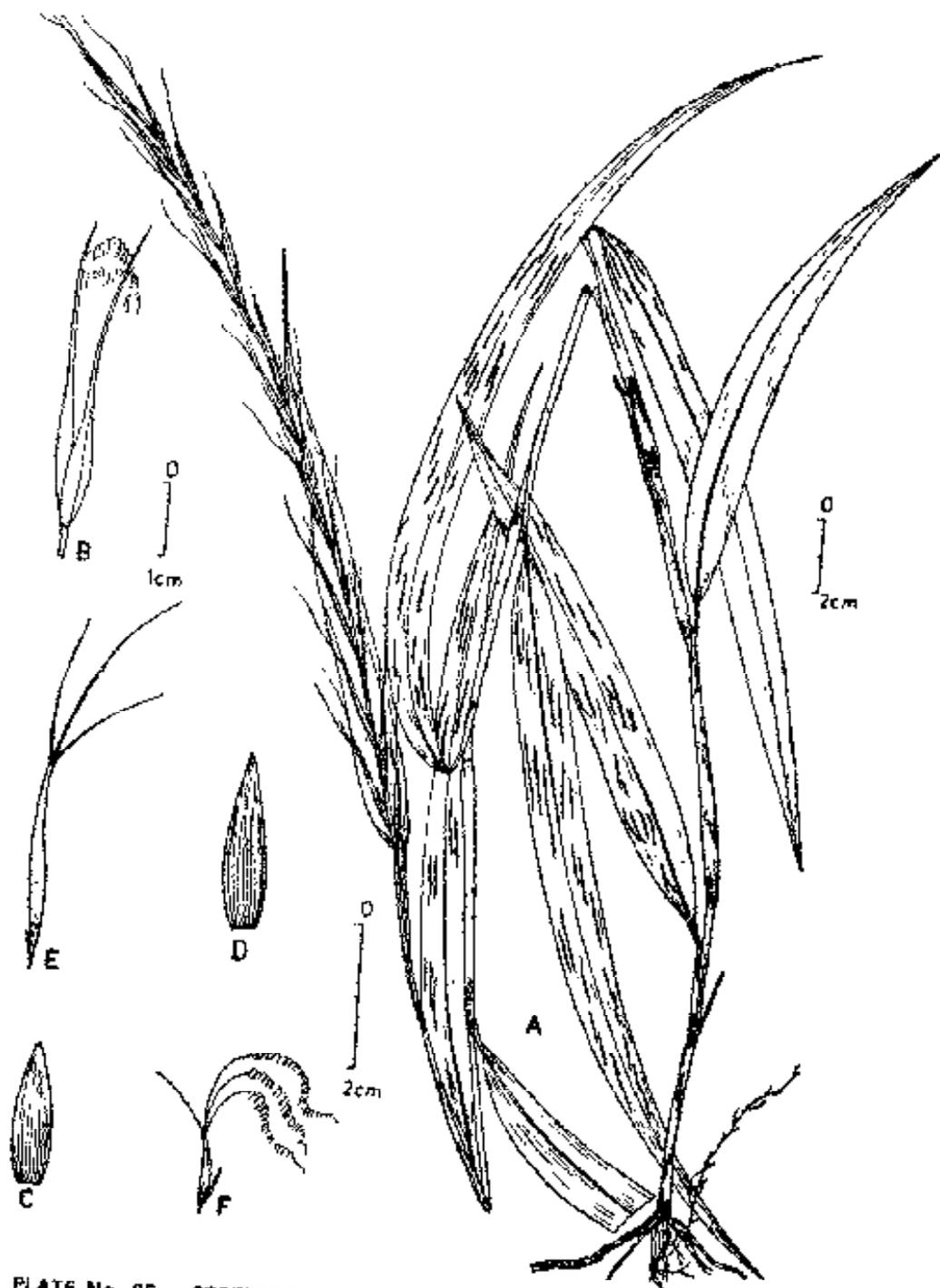


PLATE No. 95: *STREPTOGYNA CRINITA* P. Beauv.

A. Habit; B. Spikelet; C. Lower glume; D. Upper glume; E. Lemma;
 F. Palea & Pistil.

lanceolate, 10-20 x 3-5 mm, chartaceous, 7-9-nerved. Upper glume oblong or elliptic-oblong, 15-25 x 5-6 mm, acuminate, chartaceous, 11-13-nerved. Lemmas linear, narrow, 1-30 mm long, convolute, chartaceous, 3-nerved, bifid at apex, awned; awns 10-20 mm long. Lemmas 2-nerved. Lodicules 3, oblong. Stamens 2 or 3. Style single, long, spirally twisted, retrorsely barbed.

Rare, along the forest margins, often associated with *Centotheca lappacea*, *Lophatherum gracile* etc., usually in shades.

Fl. & Fr.: August-December.

IDUKKI: Koruthod, on way to Karimala.

POOIDEAE - THYSANOLAENEAE

THYSANOLAENEAE C.E. Hubb.

C.E. Hubb. in Hutch. *Fam. Flow. Pl.* 2: 222. 1934; *Bor. Grass. Bur. Cey. Ind. Pak.* 650. 1960.

THYSANOLAENA Nees

Nees in *Edinb. New Phil. J.* 18: 180. 1835.

A monotypic genus distributed in the tropics and subtropics of the world.

Thysanolaena maxima (Roxb.) O. Kuntze, *Rev. Gen. Pl.* 2: 794. 1891; Fischer in Gamble, *Fl. Pres. Madt.* 1854. 1934 (*Repr. ed.* 3: 1244. 1957); *Bor. Grass. Bur. Cey. Ind. Pak.* 650. 1960. *Agrostis maxima* Roxb. *Fl. Ind.* 1: 319. 1820. *Thysanolaena agrostis* Nees in *Edinb. New Phil. J.* 18: 180. 1835; Hook.f. *Fl. Brit. Ind.* 7: 61. 1896.

Perennials. Culms 100-300 cm high, erect; nodes glabrous. Leaves lanceolate, 20-50 x 3-8 cm, acuminate, subcordate or subamplexicaul at base, glaucous. Ligules truncate, membranous with a row of hairs behind. Panicles 20-60 cm long, drooping. Spikelets ovate-lanceolate or lanceolate, 1-2 mm long, 2-flowered. Lower glume ovate, acute, 0.5-1 mm long, chartaceous, 1-nerved. Upper glume more or less similar to the lower one. Lower floret neuter. Upper floret bisexual. First lemma lanceolate, 1-1.5 mm long, subhyaline, with a few setose hairs, epaleate. Second lemma lanceolate, 1-1.5

mm long, hyaline, 3-nerved. Palea oblong-lanceolate, 0.5-1 mm long, hyaline, 2-nerved. Stamens 2 or 3; anthers c. 0.5 mm long.

Occasional along the water-courses and the margins of forests

Fl. & Fr.: September-December.

Notes: The inflorescence of this 'Tiger Grass' is extensively used for making brooms. Leaves are said to be of very great fodder value.

KOTTAYAM: Kidangara.

POOIDEAE - ZOYSIEAE

ZOYSIEAE Miq.

Miq. *Fl. Ind. Bat.* 3: 365, 1857, emend. Stapf in Dyer, *Fl. Cap.* 7: 315, 1898; Bor, *Grass. Bur. Cey. Ind. Pak.* 684, 1960.

ZOYSIA Willd.

Willd. in Neul. *Schr. Ges. Naturf. Fr. Berlin* 3: 440, 1801; Hook.f. *Fl. Brit. Ind.* 7: 99, 1896; Fischer in Gamble, *Fl. Pres. Madr.* 1815, 1934 (Repr. ed. 3: 1257, 1957); Bor, *Grass. Bur. Cey. Ind. Pak.* 684, 1960.

A genus of about 10 species distributed in the tropics and subtropics of the world of which about 3 species occur in India and one in Kerala.

Zoysia matrella (Linn.) Merr. in Philipp. *J. Sci. Bot.* 7: 230, 1912; Fischer in Gamble, *Fl. Pres. Madr.* 1815, 1934 (Repr. ed. 3: 1257, 1957); Bor, *Grass. Bur. Cey. Ind. Pak.* 684, 1960. *Agrostis matrella* Linn. *Mant. Pl.* 2: 185, 1771. *Zoysia pungens* Willd. in Gest. *Naturf. Freunde Berlin Neue Schr.* 3: 441, 1801; Hook.f. *Fl. Brit. Ind.* 7: 99, 1896. PLATE No. 96

Perennials. Culms tufted, rigid, erect or geniculate, 5-30 cm high; rhizomatous or stoloniferous, forming mats; nodes glabrous. Leaves acicular, lanceolate or linear-lanceolate, 1-8 x 0.1-0.3 cm, convolute, rigid. Ligules membranous, fimbriate. Racemes spiciform, 1-5 cm long, purplish. Spikelets oblong or oblong-lanceolate, 2-3 mm long, 1-flowered, shortly pedicelled. Glumes oblong or oblong-lanceolate,

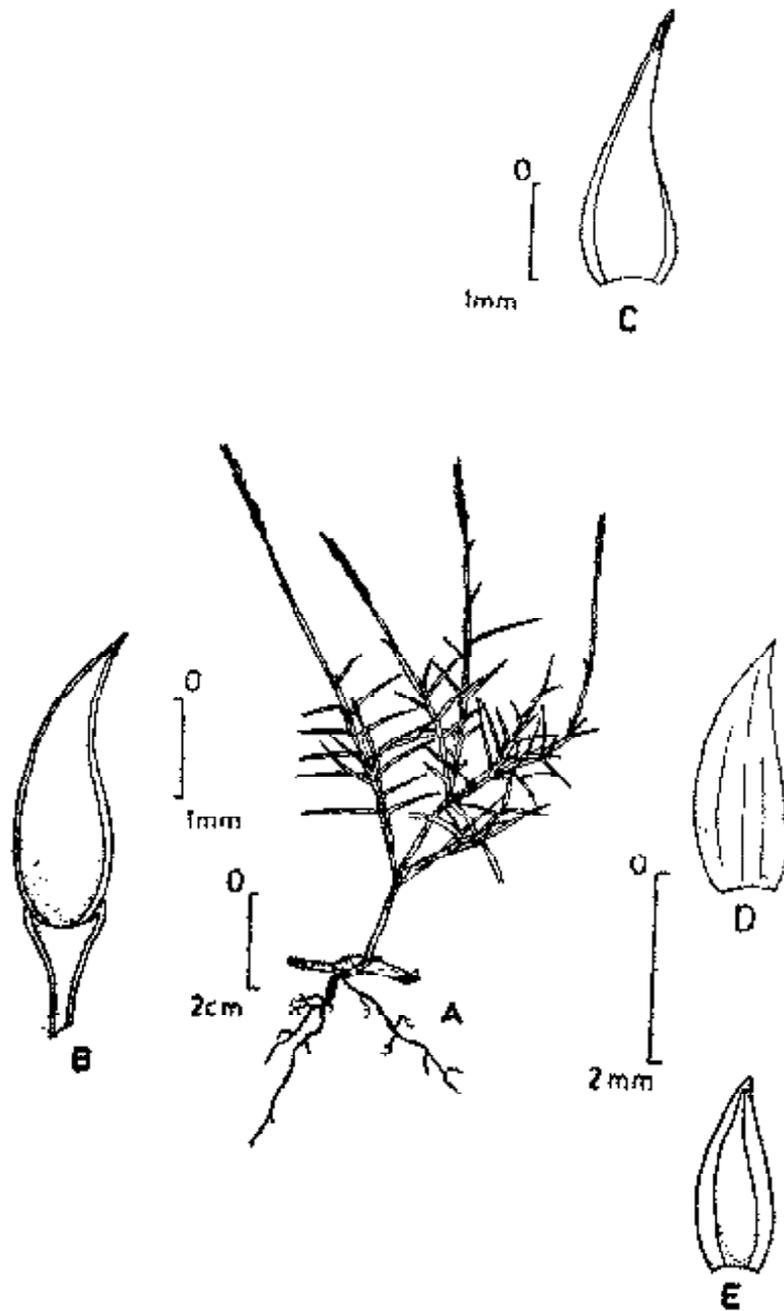


PLATE No. 98 : *ZOYSIA MATRELLA* (Linn.) Merr.

A, Habit; B, Spikelet; C, Upper glume; D, Lemma; E, Palea.

2-3 x 0.5-1 mm, coriaceous, Lemma ovate-lanceolate, 2-2.5 x 1 mm, chartaceous, faintly 3-nerved. Palea oblong-lanceolate, c. 2 x 1 mm, delicate, 2-keeled, 2-nerved. Stamens 3, anthers yellow with reddish margins. Stigmas cream coloured.

Fairly common along the banks of backwaters, streams, lakes forming mats along the seashores and other similar sandy belts.

Fl. & Fr. : March-September.

Notes : This species is considered a very effective sand binder and a good lawn-grass.

ALLEPPEY: Pallana; CANNANORE: Beckal; ERNAKULAM: Cochin; QUILON: Ayiramthengu; TRIVANDRUM: Sreekariyam, Veli.

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CORRIGENDA

Page 134

For

Ischaemum elimalayanum P.V. Sreekumar, V.J. Nair & N.C. Nair in J. Bomb. Nat. Hist. Soc. (in ed.)

Read

Ischaemum elimalayanum P.V. Sreekumar, V.J. Nair & N.C. Nair sp. nov.

Ischaemum molle Hook.f. affinis sed articulis racemorum plus quam 1/2 spicularum (ca 3mm) lineariter clavatis dorso aliquantum carinatis, glumis inferarum spicularum sessilium ovato-oblongis acutis crustaceis glabris vel sparse villosis profunde et irregulariter rugosis, nodulis lateralium interconnexis, pedicellis multo margis 1/3 spicularum sessilium (2.5-3 mm), alis glumarum inferarum spicularum sessilium auriformibus, antheris longioribus differt.

Holotypus KERALA: Cannanore Dist., Elimala, + 300 m, 20 Oct. 1981, P. V. Sreekumar 71773 (CAL). *Isotypi* in K, MH.

Page 157

For

Ischaemum raii P.V. Sreekumar, V.J. Nair & N.C. Nair in J. Bomb. Nat. Hist. Soc. (in ed.)

Read

Ischaemum raii P.V. Sreekumar, V.J. Nair & N.C. Nair sp. nov.

Ischaemum molle Hook.f. affinis sed plantis annuis, culmis brevioribus geniculatis, foliis brevioribus (ca 3 cm), ovato-lanceolatis vel triangularibus, basibus foliorum cordatis, carina glumarum superarum numquam alatis differt.

Holotypus KERALA: Cannanore Dist., Muguroad, + 150 m, 17 Oct. 1981, P. V. Sreekumar 71747 (CAL). *Isotypi* in K, MH.

This species is named after Dr. M.A. Rau, former Deputy Director, Botanical Survey of India in recognition of his valuable contribution to Indian Botany.

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| 8 | 12 | types | type |
| 13 | 5 | Chandrasekharania | Chandrasekharania |
| 14 | 4 | Arthaxon | Arthraxon |
| 140 | 6 | Ischaemnw | Ischaemum |
| 163 | 4 | thomsonianm | thomsonianum |
| 167 | 10 | Ischaemnm | Ischaemum |
| 285 | 35 | dilatam | dilatatum |
| 289 | 6 | hohenackeri | hohenackeri |
| 305 | 29 | 2-3 1-1.5 | 2-3 x 1-1.5 |
| 366 | 28 | <i>Eleusine</i> | <i>Eleusine</i> |
| 379 | 22 | <i>Eragrostis</i> | <i>Eragrostis</i> |
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