

GRASSES OF MADHYA PRADESH

BOTANICAL SURVEY
OF INDIA

GRASSES OF MADHYA PRADESH



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GRASSES OF MADHYA PRADESH

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सत्यमेव जयते

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FOREWORD

Grasses are, economically, the most important group of plants; they provide major and minor cereals, fodders and raw material for paper, other fibres, medicines, drugs, etc.

Also, Poaceae is the largest family of flowering plants in our country. It is represented by over 1200 species, Bor's work on grasses of Indian sub-continent published in 1960 still remains the only consolidated account of the grasses of our country. Detailed and illustrated accounts of grasses of different states or smaller regions are urgently needed for better utilization and conservation of grasses. Scientists of Botanical Survey have already made several contributions in this direction.

Similarly, critical revisionary accounts of various sub-families, tribes or genera are needed for better understanding of the taxonomy, nomenclature and distribution of taxa. The Botanical Survey of India has recently published the accounts of *Garnotieae*, *Isachneae* and the genus *Dichanthium*. Some other genera are under study.

The only notable work on grasses of Madhya Pradesh so far was an enumeration by Tewari about 20 years ago. The present work is the first detailed and illustrated account of grasses of that state. The work is based primarily on authors own field work for the last five years supplemented with data from published literature and herbaria.

To facilitate identification, dichotomous keys for genera and species have been provided. Botanical name, original citation and references to selected synonyms are given. These are followed by local names (where available), description, selected exsiccatae and economic uses.

This publication should help in balanced utilization of this important natural resource and should be very useful to botanists, agriculturists and foresters not only of Madhya Pradesh but our whole country.

Botanical Survey of India
Howrah
Apr. 1 1984

S. K. JAIN
Director

P R E F A C E

The State of Madhya Pradesh occupies the central part of India, surrounded in north-west by Rajasthan, north-east by Uttar Pradesh, east by Bihar, south-east by Orissa, south by Andhra Pradesh and south-west by Maharashtra and lies between 17°48' N to 26°52' N latitudes and 74°2' E to 84°24' E longitudes. Nature has gifted this state with rich soil, extensive minerals and forest resources, perennial rivers and various flora and fauna. Tiwari (1977) and Roy & Shukla (1983) have given more details on these aspects.

Botanical exploration and publication of check-lists of plants for Madhya Pradesh area have been done by several earlier workers. Tiwari (1954, 1963, 1965); Bor (1960); Shukla and Panigrahi (1967); Oommachan (1977) have made fairly good contribution to the grass flora of Madhya Pradesh. However, much work has to be done as no floristic work is complete or covers the entire state.

So far there has been no full account of grasses of this state with keys and descriptions of plants. Therefore, field workers, research scholars, teachers and forest officers expressed their desire that a grass book with simple key and brief descriptions of species was really needed for Madhya Pradesh. Since the author was working on the project "Grasses of M. P." allotted by the Director, Botanical Survey of India, the opportunity was availed by requesting the Director for permission to write the present book. Dr. S. K. Jain, Director, Botanical Survey of India was glad to accord his kind permission and helped me in many ways in the field work, writing and correcting the manuscript, particularly the introductory chapter. The consistent encouragement given by Dr. R. K. Chakraverty, Deputy Director, Botanical Survey of India is gratefully acknowledged.

Dr. N. P. Balakrishnan, Deputy Director, Central Circle, Allahabad has gone through the final manuscript very carefully. His suggestions and corrections have improved the text and pattern. His tremendous patience and constructive criticism deserve special thanks. Author is also thankful to Dr. D. M. Verma for corrections and suggestions to improve the manuscript. Without the help of Dr. V. S. Agarwal, Editor for Publications, BSI, it would not have been possible to bring the book for publication.

Present work is the outcome of the author's and his students' collections, field experience plus the collections of several botanists, particularly the plant specimens deposited in the herbarium of Botanical Survey of India, Central Circle, Allahabad (BSA).

GRASSES OF MADHYA PRADESH

INTRODUCTION

The *Gramineae* (*Poaceae*) is the most widely distributed and is in greater abundance than any other group of flowering plants. Species belonging to this family are usually known as grasses. Grasses are distributed in various climates, soils and elevations on the surface of the globe. They have been recorded in marshes, deserts, prairies and woodland, on sand, rock and fertile, alkline and saline soils from tropics to the polar regions and from sea level to altitudes of perpetual snow.

The Gramineae is one of the largest families of flowering plants. The number of genera is a matter of diverse opinion. It may be 620 genera (Hutchinson, 1959) and about 10,000 species in the world (Hubbard, 1954). About 240 genera are represented in India (Bor, 1960). About 1,200 species are supposed to be occurring in India (Jain, Doli Das & Banerjee, 1972). For western India, Blatter & McCann (1935) reported 284 species. Fischer C. E. C. (1934 and 1936) published 377 species from South India. Haines (1924) recorded 201 species in East India. For Marathwada area of Maharashtra 180 species were recorded (Patunkar, 1980). Raizada, Jain & Bharadwaja (1957, 1966) have reported 286 species for the Upper Gangetic Plain. Bor (1940) included 156 genera and 424 grass species for Assam State. In the present work 257 species have been recorded. Most of the specimens were identified and checked by the author. Flora of British India and Grasses of Burma, Ceylon, India and Pakistan were consulted for each species. Therefore, these references are not repeated unless required in case of some species.

The evolution of man and his present position in the biological world has been significantly affected by grasses. The historical records suggest that most of the world's civilisations developed around the regions of grassland. It would not be unfair to say that the human population has attained its present level of civilisation and development due to abundance and widespread distribution of grasses on this earth. Further, it may be added that without grasses not only human population but even the very survival of animals also seems to be obscured.

Much earlier than the recorded history, grasses have provided food, shelter, medicine and sports for man. Domestic animals and many types of wild life are directly or indirectly dependant upon grasses and grassland for food, shelter and even for the completion of their life cycle. There are many animals who cannot exist without extensive grasslands such as deer, wild dogs, fox, jackals, rabbits, wild cow (Antelope) and also birds like peacock, wild hens, ducks, pigeon, pheasants, etc. It has been observed in the forests of Madhya Pradesh that it is hard to find any animal or bird in teak or sal forest areas. As the forests are being cut and grassland taken under cultivation, most of the wild animals and birds are moving towards the mixed forest areas or becoming extinct. Animals like lion, tiger, leopards and bear are also indirectly dependant on grasslands for food.

The first paper dealing with grasses was published in 1708 by Johann Scheuchzer, entitled *Rostographiae Heevetica Prodrumus*. This may be considered as the beginning of Agrostology, the science of grass classification. Linnaeus (1753) listed only a few genera like *Andropogon*, *Cenchrus*, *Panicum*, *Hordeum*, *Triticum* and *Phalaris*. During the 19th century, there was a general shift in the objectives of systematics to the grouping together of morphologically similar plants; this came to be known as natural classification.

Robert Brown (1810) was the first to understand the true nature of the spikelet and to recognise it as a reduced inflorescence branch. Linnaeus had interpreted the spikelet as a single flower. Brown clearly recognised the two sub-families of Gramineae, the Panicoideae and Pooideae. He described the spikelet characters of these groups very accurately and also noted the tropical and sub-tropical distribution of the former as contrasted with the temperate adaptation of the latter.

In 1812, Palisot de Beauvois described and named a large number of genera. Kunth (1833) distinguished 13 tribes without recognition of sub-families. Among the natural systems Bentham (1881) received much recognition. In his system, 13 tribes grouped into two sub-families namely Panicoideae and Pooideae were recognised, mainly based on morphological characters of the inflorescence and flower. This treatment was presented in *Genera Plantarum* by Bentham and Hooker (1883) and was followed by Hackel (1887, 1889), Stapf (1917-1934), Hitchcock (1920, 1935) and Bews (1929) with some modifications.

In 1931 the publication "Cytotaxonomic investigation in the family Gramineae" by N. P. Avdulov marked the beginning of a new era in grass systematics. In his paper 232 chromosome counts of grasses were correlated with leaf anatomy, first seedling leaf, organisation of the resting nucleus, nature of starch grains in fruit, and geographical distribution of species. Further, he subdivided Poaceae into Festuciformes and Phragmitiformes. In 1932, Prat emphasised the significance of leaf epidermis in grass classification and in 1936 he recognised three sub-families; Festucoideae, Panicoideae, and Bambusoideae. Characters correlated in grouping tribes and genera were leaf epidermis and anatomy, cytology, morphology of seedlings, embryos, fruits, inflorescence, nature of starch grains, physiology, ecology and serology. Systems by Prat and Avdulov are phylogenetic where grasses are arranged according to genetic and evolutionary relationships.

In 1948 and 1954, C. E. Hubbard published his work which supported Avdulov and Prat's views. Between 1950 and 1960 much has been accomplished regarding grass systematics, and attempts were made to collect and correlate the results leading towards the phylogenetic arrangement of the major groups of Gramineae. New sub-family groupings were proposed by Pilger (1954), Jacques-Felix (1955), Beetle (1955), Stebbins (1956) and Tateoka (1957). Position of *Danthonia* and related genera was established by de Wit (1954, 1956). Reeder (1957) reported the taxonomic significance of grass embryo. Brown (1958) made six groups of grasses based on characters of leaf anatomy. Notwithstanding all these works, a total arrangement of genera in tribes and tribes in sub-families has not yet been achieved, however much progress has been done. Most of the agrostologists accept Panicoideae, Festucoideae, Bambusoideae, Eragrostoideae (Cholorideae) as separate sub-families. Prat, Stebbins, Crapton and Parodi have recognised two more sub-families, i. e. Oryzoideae (Pharoideae) and Arundinoideae (Phragmitiformes, Phragmitoideae).

Phylogenetic consideration of Gramineae :

In general for angiosperms, and particularly for grasses the fossil records are too incomplete and inadequate to help in drawing conclusions on phylogenetic relationships. It has been predicted that grasses came into being during the mesozoic period after the flowering plants were well established and diversified. Further circumstantial evidences support that grasses were evolved in tropics. Recently, Arman Takhtajan (1969) from

Russia and Arthur Cronquist (1968) from U. S. A. have outlined their phylogenetic classification of flowering plants. Both agree that the morphological and taxonomic evidences lead to the conclusion that flowering plants had monophyletic origin. It is generally believed that angiosperms were probably derived from seed ferns and monocots from primitive dicots (Ranalian complex). However, there is no complete system dealing with all families and has gained general acceptance. Nevertheless, it is clear that within the monocots, grass flowers have got reduced during the evolutionary course. It is not a simple structure as considered by some workers earlier. Therefore, the Gramineae is a very advanced family rather than being primitive. The order Graminales includes the single family Gramineae.

Morphology of Grass Plant :

In general grasses look simple with vertical or horizontal cylindrical stem bearing nodes and internodes. Usually internodes are hollow but in many species of Andropogoneae they are solid. Leaf blades are linear, flat, their basal portion encircles the stem that is known as sheath. Phyllotaxy is two-ranked, i. e. odd numbered leaves are above one another in straight line and even numbered are opposite to each other. Inflorescence is made of one to many spikelets. These spikelets consist of glumes which enclose flowers in the axils.

The grass family has tremendous diversity of shape, size, texture, adaptation and modification of vegetative and reproductive parts. The simple floral structures of Gramineae have been modified during the course of evolution to produce numerous forms. Keen observation will reveal the fact that there are every possible permutation and combination of characters in this family and it is a very complicated and difficult family for taxonomists to deal with.

Duration :

Annual or perennial habits of grasses have been considered as important diagnostic characters though sometimes it is difficult to determine the habit from dried herbarium specimens. Some species may be annual in dry conditions and behave as perennial under moist conditions. Same is true for tropics and temperate climates. Regardless of annual or perennial habit, the flowering culms in most of the grass species die off

after fruiting. However in some species the culms persist for several years as in *Arundo*, *Phragmites*, *Imperata*, etc.

General features of Poaceae :

Annual to perennial herbs, woody shrubs or trees like bamboos; roots fibrous; rhizomes present or absent, sometimes stolons developed. Culms erect, ascending or prostrate and creeping; internodes usually hollow but solid in *Andropogoneae* and some other groups too; nodes, usually terete, sometimes compressed or angled. Leaves usually solitary at the nodes, may be crowded at the base of culms, alternate and two-rowed consisting of sheath, ligule and blade; sheaths encircle the culms, with free or over-lapping margins, frequently swollen at the base; ligule placed at the junction of the sheath and blade, membranous, chartaceous or reduced to a fringe of hairs, rarely absent; blades usually flat, linear to lanceolate, venation parallel, rarely with a constricted petiole.

Inflorescence a panicle, raceme or spike. Basic unit of grass inflorescence is a spikelet, sessile or pedicelled, with one to more sessile florets, its axis is rachilla, continuous or jointed. At the base of spikelet are two empty glumes, lower and upper. Above these glumes are florets. Each floret consists of lemma and palea called the floral bracts. In the axil of the palea the flower is enclosed, bisexual or unisexual. The highly modified and reduced perianth is represented usually by 2 lodicules, Stamens are usually 3, sometimes 2 or 6. Pistil with superior ovary, unilocular, one-ovuled, style 2, stigmas plumose. Fruit 1-seeded, indehiscent, rarely with mucilage forming perianth.

KEY TO GENERA

- 1a. Plants tall, perennial, culms woody, persistent; leaf blades flat, lanceolate to ovate; ligule scarious; lodicules usually 3; stamens 6 :
- 2a. Pericarp thin, adnate to the grain, adhering to hilum only; spikelets not in globose heads; palea keeled, ciliate or scabrid :
- 3a. Filaments free; spikelets many-flowered; palea scabrid ... *Bambusa* 11
- 3b. Filaments coherent; stamens monadelphous; spikelets 1—3-flowered; palea hairy ... *Gigantochloa* 46
- 2b. Pericarp crustaceous or fleshy, separable from the grain :
- 4a. 2—3 central florets hermaphrodite, fruit crustaceous; lodicules absent ... *Dendrocalamus* 27
- 4b. One central floret hermaphrodite, fruit fleshy; lodicules 3 ... *Cephalostachyum* 16
- 1b. Plants small, annual or perennial; culms herbaceous; leaf blades linear to lanceolate, sessile; ligule ciliate or membranous; lodicules 2 or absent, stamens 1—3 (6 in *Oryza* and *Hygroryza*) :
- 5a. Spikelets unisexual, male and female conspicuously dissimilar.
- 6a. Female spikelets completely enclosed in a metamorphosed leaf-sheath, forming spherical or cylindrical bead-like structure ... *Coix* 21
- 6b. Female spikelets not enclosed in a false involucre as above :
- 7a. Male and female spikelets in separate inflorescences; female spikelets in longitudinal rows on a very thick axis; male spikelets in a large terminal panicle ... *Zea* 102

- 7b. Male and female spikelets in same inflorescences; female spikelet single at base; upper one male ... *Chionachne* 17
- 5b. Spikelets perfect, with one perfect floret, if unisexual then male and female spikelets similar, with or without reduced florets, occasionally 2 or more perfect florets :
- 8a. Spikelets in pairs, 1 sessile, other pedicelled, rarely solitary and all alike; first glume large and firm, clasping or enclosing the florets :
- 9a. Joints of the rachis and pedicel narrow, slender, if thickened then spikelets 1-flowered and awned :
- 10a. Pairs of spikelets alike and with perfect florets (rarely in threes or the pedicelled reduced) :
- 11a. Spikelets arranged in panicle or compound racemes along a central axis; lemma awned or awnless :
- 12a. Rachis persistent or tardily breaking up; spikelets deciduous:
- 13a. Panicle narrow, contracted, silvery; glumes very delicate; callus hairs twice or more longer than glumes ... *Imperata* 52
- 13b. Panicle broader; glumes indurated, brown or reddish-brown; callus hairs very short ... *Narenga* 64
- 12b. Rachis disarticulating :
- 14a. Spikelets awnless, upper lemma not clefted ... *Saccharum* 84
- 14b. Spikelets awned, upper lemma clefted ... *Spodiopogon* 91

11b. Spikelets arranged in single or several racemes, digitate or on very short axis; spikelets in pairs or threes, rarely pedicelled spikelet reduced to pedicel (*Apocopis*):

15a. Spikelets paired, one sessile, other pedicelled, or both pedicelled:

16a. Racemes digitate, paired or scattered:

17a. Lower glume deeply furrowed, rarely villous; leaf blades mostly lanceolate ...

Microstegium 63

17b. Lower glume not furrowed or grooved, usually villous; leaf blades linear, gradually passing into sheath:

18a. Spikelets 2-flowered; lower glume 2-3-toothed ...

Eulaliopsis 45

18b. Spikelets 1-flowered; lower glume not 2—3-toothed:

19a. Lower glume dorsally flattened or shallowly concave between keels; upper lemma wider than the awn, 2-toothed; rachis fragile; perennials ...

Eulalia 44

- 19b. Lower glume dorsally convex; upper lemma stipiform; rachis persistent; annuals ... *Pseudopogonatherum* 79
- 16b. Racemes solitary; upper glume and lower lemma awned ... *Pogonatherum* 76
- 15b. Spikelets solitary, 2-flowered, sessile; pedicelled spikelet reduced to pedicel only ... *Apocopsis* 5
- 10b. Pairs of spikelets dissimilar; sessile hermaphrodite; pedicelled male or sterile :
- 20a. Racemes paired, digitate, scattered or in panicle :
- 21a. Racemes espatheate :
- 22a. Upper lemma of sessile spikelet awned from tip or sinus; leaves linear :
- 23a. Racemes arranged in panicle or in whorls on main axis :
- 24a. Pedicel without a translucent line; upper lemma awned from sinus :
- 25a. Spikelets dorsally compressed; lower glume flattened on back :
- 26a. Racemes few noded ... *Sorghum* 90
- 26b. Racemes many noded... *Pseudosorghum* 81
- 25b. Spikelets laterally compressed or terete; lower glume rounded on back :
- 27a. Racemes with many pairs of spikelets ... *Vetiveria* 101

- 27b. Racemes with 1 sessile and 2 pedicelled spikelets ... *Chrysopogon* 19
- 24b. Pedicel with a median translucent line; upper lemma awned from tip :
- 28a. Lower glume of sessile spikelets pitted; raceme solitary ... *Eremopogon* 42
- 28b. Lower glume of sessile spikelets not pitted; racemes 1—4 :
- 29a. Spikelets arranged in false panicle; racemes 1—4 : ... *Capillipedium* 14
- 29b. Spikelets arranged in false racemes along the central axis; racemes 2. ... *Pseudanthistiria* 78
- 23b. Racemes digitate, sub-digitate or scattered :
- 30a. Sessile spikelets of all pairs hermaphrodite and awned; lower glume of sessile spikelet narrow and not closely imbricate ... *Bothriochloa* 12
- 30b. Sessile spikelets of lowest 1—3 pairs male or neuter, awnless; lower glume of sessile spikelet broad and closely imbricate ... *Dichanthium* 29
- 22b. Upper lemma of sessile spikelets with basal awn; leaves lanceolate-ovate; ... *Arthraxon* 7
- 21b. Racemes spatheate :
- 31a. Plants aromatic; racemes paired in compound panicle; one pair of spikelet per raceme, homogamous ... *Cymbopogon* 23
- 31b. Plants not aromatic; racemes 2-nate or digitate; all spikelets heterogamous ... *Andropogon* 3
- 20b. Racemes solitary :
- 32a. Racemes of several pairs of spikelets evenly placed :
- 33a. Column of awn hairy; rachis tough ... *Heteropogon* 49

- 33b. Column of awn glabrous, rachis fragile :
- 34a. Pedicelled spikelet much larger than sessile; upper glume awned; joints and pedicels bucciniform... *Diectomis* 30
- 34b. Pedicelled spikelets small, often, reduced; upper glume awnless; joints and pedicels clavate, 2-toothed ... *Schizachyrium* 86
- 32b. Racemes of a few pairs of spikelets, the lower pairs male or neuter, forming a false involucre around others :
- 35a. Involucral spikelets persistent, short pedicelled or sessile, inner spikelets deciduous; callus of fertile spikelets pointed; spikelets in group of 4 ... *Themeda* 95
- 35b. Involucral spikelets deciduous with long pedicels; callus of fertile spikelets very short, truncate or obtuse ... *Iseilema* 55
- 9b. Joints of the rachis and pedicel swollen, 3-angled, rounded or flattened :
- 36a. Spikelets solitary, awned, almost sessile; inflorescence spike-like racemes ... *Dimeria* 32
- 36b. Spikelets paired, one sessile other pedicelled (rarely reduced to pedicel) :
- 37a. Sessile spikelet with a male and bisexual floret; upper lemma usually awned:
- 38a. Racemes many noded, not contained in a spathe-like sheath :
- 39a. Racemes solitary; lower glume of sessile spikelet without nodules or groove... *Sehima* 88
- 39b. Racemes 2-many; lower glume of sessile spikelet with nodules, or transverse furrows.

- 40a. Pedicelled spikelets developed; lower glume coriaceous below, transversely wrinkled, with nodules on margins ... *Ischaemum* 54
- 40b. Pedicelled spikelet reduced to a curved pedicel; lower glume coriaceous, convex, covered with transverse ridges ... *Thelepogon* 94
- 38b. Racemes 1-noded, reduced to 3 heteromorphous spikelets enclosed in a boat-shaped spathe ... *Apluda* 4
- 37b. Sessile spikelet with a hermaphrodite floret only or occasionally with a male floret below; upper lemma usually awnless :
- 41a. Sessile spikelet spherical; lower glume pitted all over; pedicelled spikelet reduced ... *Hackelochloa* 47
- 41b. Sessile spikelet not spherical;
- 42a. Spikelets similar :
- 43a. Racemes dorsally compressed; rachis very tough; joints fused with pedicel ... *Hemarthria* 48
- 43b. Racemes cylindrical; rachis fragile; joints and pedicels free. ... *Mnesithea* 62
- 42b. Spikelets dissimilar :
- 44a. Sessile spikelet strongly dorsally compressed, sunk in a cavity of joint; lower glume winged; pedicel fused with joint. ... *Manisuris* 60

- 44b. Sessile spikelet and lower glume not as above :
- 45a. Racemes covered with shaggy hairs; all sessile spikelets on one side of rachis ... *Elyonurus* 37
- 45b. Racemes mostly glabrous, spikelets not as above :
- 46a. Spikelets paired, one sessile the other pedicelled; rhizomes absent ... *Rottboellia* 83
- 46b. Spikelets solitary and sessile, the pedicelled suppressed; rhizomes extensive ... *Ophiuros* 65
- 8b. Spikelets solitary or paired, if paired then first glume not larger and firmer than lemma of fertile floret, not clasping or enclosing second glume :
- 47a. Reduced floret (male or female) always below the perfect one :
- 48a. Reduced floret 1, its lemma similar to second glume; disarticulation below the glume or glumes :
- 49a. Spikelets in involucre of bristles or subtended by solitary bristle, and falling with or without bristles at maturity :
- 50a. Upper lemma smooth, bristles disarticulate with spikelets :
- 51a. Bristles many, modified or spine-like branchlets :

- 52a. Involucre of free, naked or plumose bristles ... *Pennisetum* 72
- 52b. Involucres or bristles fused together at least at the base ... *Cenchrus* 15
- 51b. Bristle solitary, formed by prolongation of the branch beyond the terminal spikelet... *Pseudoraphis* 80
- 50b. Upper lemma transversely rugose, bristles persistent ... *Setaria* 89
- 49b. Spikelets not in involucre or subtended by bristles :
- 53a. Spikelets finely awned or mucronate from notched tip of upper glume and lower lemma : upper lemma rigidly membranous ... *Rhynchelytrium*
- 53b. Spikelets awnless, if awned then sub-sessile in false, secund, variously arranged spikes and awns from the tips of glume and lemma (*Eriochloa*, *Oplismenus*).
- 54a. Inflorescence an open or contracted panicle, sometimes spike like panicles :

- 55a. Spikelets arranged in open or contracted panicle.
- 56a. Spikelets not or slightly gibbous... *Panicum* 69
- 56b. Spikelets distinctly gibbous, laterally much compressed ... *Cyrtococcum* 25
- 55b. Spikelets arranged in cylindrical spike like panicles; upper glume inflated ... *Sacciolepis* 85
- 54b. Inflorescence onesided spikes or spike like racemes, digitate or scattered, rarely solitary :
- 57a. Lemma of the upper floret thinly cartilaginous, usually with flat, hyaline margins :
- 58a. Spikelets awnless ... *Digitaria* 31
- 58b. Spikelets awned *Alloteropsis* 2
- 57b. Lemma of the upper floret crustaceous, or coriaceous margins inrolled; palea exposed.
- 59a. Lower glume and lowest internode of the rachilla forming a swollen callus at the base of the

- spikelet; upper lemma mucronate or short awned... *Eriochloa* 43
- 59b. Lower glume and lowest internode of rachilla not forming a swollen callus at the base of the spikelet :
- 60a. Spikelets adaxial; lower glume turned towards the rachis, back of upper lemma turned away from it ... *Brachiaria* 13
- 60b. Spikelets abaxial; lower glume (if present) turned away from the rachis, back of upper lemma facing it :
- 61a. Lower glume usually absent; spikelets planoconvex... *Paspalum* 71
- 61b. Lower glume developed, sometimes minute :
- 62a. Glumes acuminate or awned :
- 63a. Leaf blades linear; racemes dense, ligule absent ... *Echinochloa* 35
- 63b. Leaf blades lanceolate to ovate; racemes, loose; ligule present *Oplismenus* 66

- 62b. Glumes awnless, if acuminate the upper lemma mucronate :
- 64a. Upper lemma acute, not mucronate ... *Paspalidium* 70
- 64b. Upper lemma obtuse mucronate or very short awned... *Urochloa* 100
- 48b. Reduced floret 1—2, its lemma dissimilar to second glume, disarticulation above the glumes :
- 65a. Glumes absent or rudimentary.
- 66a. Leaf blades ovate-oblong or ovate-lanceolate; plants floating; glumes absent ... *Hygroryza* 51
- 66b. Leaf blades linear, acute or acuminate, plants not floating; glumes present :
- 67a. Spikelets 7—10 mm long, annual, the cultivated rice ... *Oryza* 68
- 67b. Spikelets less than 6 mm long; perennial, wild grass ... *Leersia* 57
- 65b. Glumes present, at least the second well developed :
- 68a. Spikelets 3-flowered, strongly compressed, lower 2 represented by empty lemmas ... *Phalaris* 74
- 68b. Spikelets 1 or 2-flowered, not compressed.
- 69a. Spikelets 2—flowered; lower male or barren; upper bisexual :

- 70a. Lower floret empty, without palea; glumes up to half the length of spikelet; rachilla produced beyond the upper floret; spikelet falling with part of pedicel ... *Thysanolaena* 96
- 70b. Lower floret male or neuter, with apalea, upper glume, equalling the spikelet; rachilla disarticulate below upper floret and not produced beyond it; glumes persistent :
- 71a. Glumes equal, obtuse or mucronate; upper lemma awnless :
- 72a. Upper lemma indurated, glumes finally deciduous... *Isachne* 53
- 72b. Upper lemma membranous, glumes persistent ... *Coelachne* 20
- 71b. Glumes unequal, lower acute, upper acuminate, upper lemma awned :
- 73a. Lemma of the upper floret glabrous, scaberulous or scabrid, minutely 2-lobed ... *Arundinella* 8
- 73b. Lemma of the upper floret bearded dorsally, deeply bifid ... *Jansenella* 56
- 69b. Spikelets with one perfect floret, usually reduced floret absent :

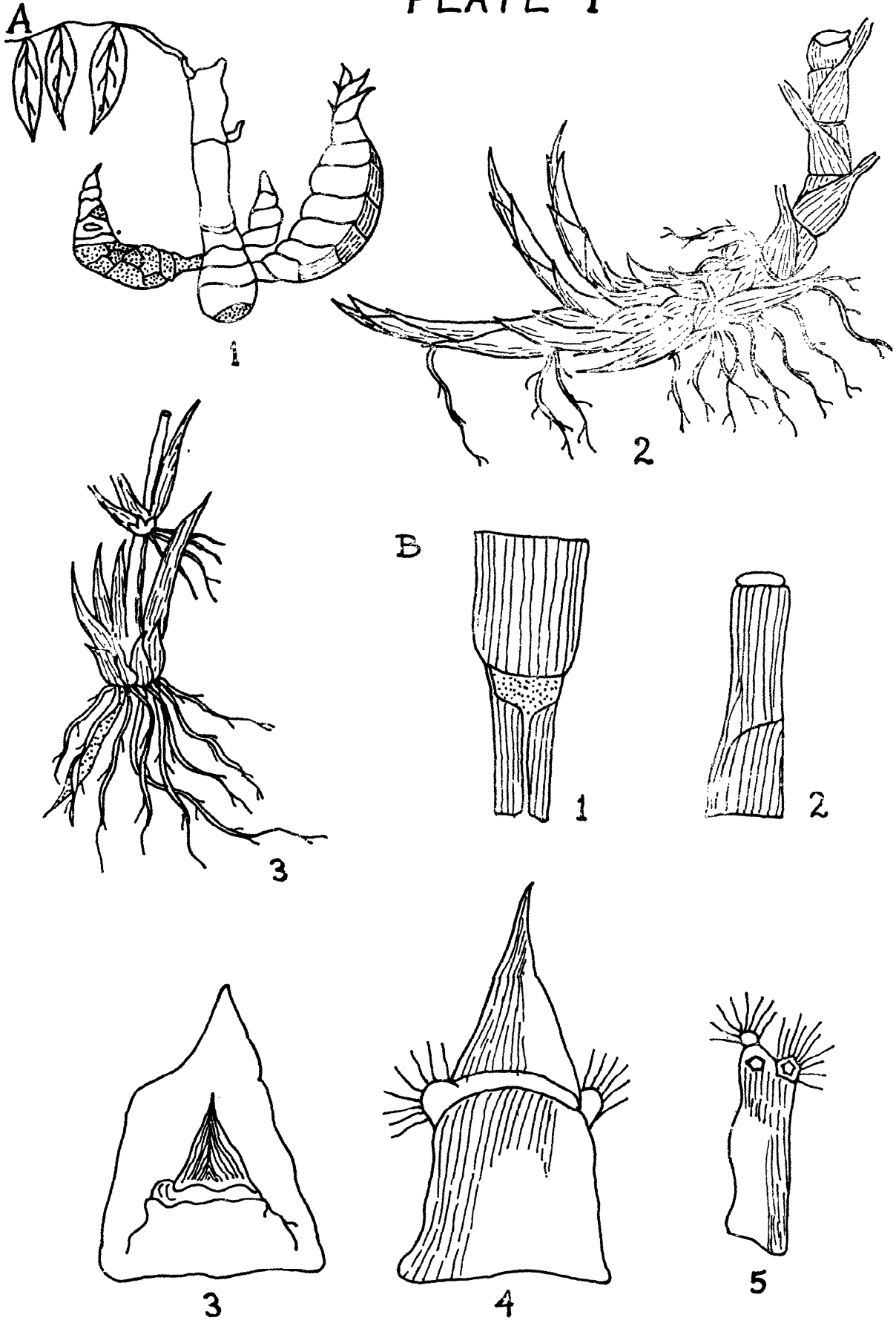
- 74a. Spikelets 3-awned; lemma indurated, rigid at maturity ... *Aristida* 6
- 74b. Spikelets not as above; lemmas hyaline or membranous.
- 75a. Glumes long awned, lemmas 3—5-nerved; caryopsis with an adhering pericarp ... *Polypogon* 77
- 75b. Glumes awnless, lemmas 1—3-nerved; caryopsis with free pericarp :
- 76a. Inflorescence spicate, subtended by an inflated sheath; culms prostrate ... *Crypsis* 22
- 76b. Inflorescence a spreading panicle, no inflated sheaths; culms erect ... *Sporbolous* 92
- 47b. Reduced florets absent, if present always above perfect one :
- 77a. Inflorescence a panicle or open raceme, primary branches spreading or contracted but not spicate :
- 78a. Plants 1.5—3.0 m tall, with stout rhizomes forming colonies :
- 79a. Lemmas villous; rachilla glabrous ... *Arundo* 9
- 79b. Lemmas glabrous; rachilla villous ... *Phargmites* 75
- 78b. Plants less than 1.5 m, not rhizomatous :
- 80a. Lemmas awnless, 3-nerved... *Eragrostis* 41
- 80b. Lemmas awned, 5-many-nerved :
- 81a. Lemmas with 9 subequal, plumose awns from the tip ... *Enneapogon* 39
- 81b. Lemmas with a single, glabrous awn :

- 82a. Glumes as long or longer than the lowest floret, lemma awned from back or sinus ... *Avena* 10
- 82b. Glumes shorter than the lowest floret; lemma awned from tip ... *Lolium* 59
- 77b. Inflorescence a spike or spicate racemes or with 2-several spicate primary branches :
- 83a. Inflorescence of 1-several unilateral spicate primary branches :
- 84a. Glumes with hooked spines; spikelets deciduous in burlike clusters (2—5) ... *Tragus* 97
- 84b. Glumes without hooked spines; spikelets not in deciduous burlike clusters :
- 85a. Spikelets with 2 or more perfect florets :
- 86a. Inflorescence branches paired, verticillate or clustered at culm apex :
- 87a. Rachis projecting in a sharp point, upper glume mucronate or awned, spikes digitate ... *Dactyloctenium* 26
- 87b. Rachis ending in a spikelet;

- 88a. Glumes and lemmas awnless tips not toothed ... *Eleusine* 36
- 88b. Glumes or lemmas awned, if awnless then the tip of lemma toothed :
- 89a. Lemma 2-toothed with a mucro from the sinus ... *Acrachne* 1
- 89b. Lemma tip entire, 2—3-awned; reduced floret awned ... *Chloris* 18
- 86b. Inflorescence branches distributed along the culm axis.
- 90a. Glumes awned or aristate-acuminate :
- 91a. Inflorescence cylindric, interrupted, spiciform panicle ... *Elytrophorus* 38
- 91b. Inflorescence not as above :
- 92a. Lower lemma awned; callus densely hairy; spikelets pedicelled ... *Tetrapogon* 93
- 92b. Lower lemma awnless; callus not hairy; spikelets imbricate, sessile ... *Dinebra* 33
- 90b. Glumes awnless, obtuse or acute :
- 93a. Culms with extensive rhizomes, emerging leaf piercing as needle; inflorescence a loose or contracted panicle ... *Desmostachya* 28
- 93b. Culms without rhizomes, emerging leaf soft; inflorescence consists of spikes or racemes :
- 94a. Racemes with a few-terete spikelets; lemmas rounded on back ... *Diplachne* 34
- 94b. Racemes with many secund spikelets, laterally compressed lemmas keeled ... *Leptochloa* 58
- 85b. Spikelets with 1 perfect floret :
- 95a. Inflorescence of solitary racemes, appears feathery due to long awns ... *Perotis* 73

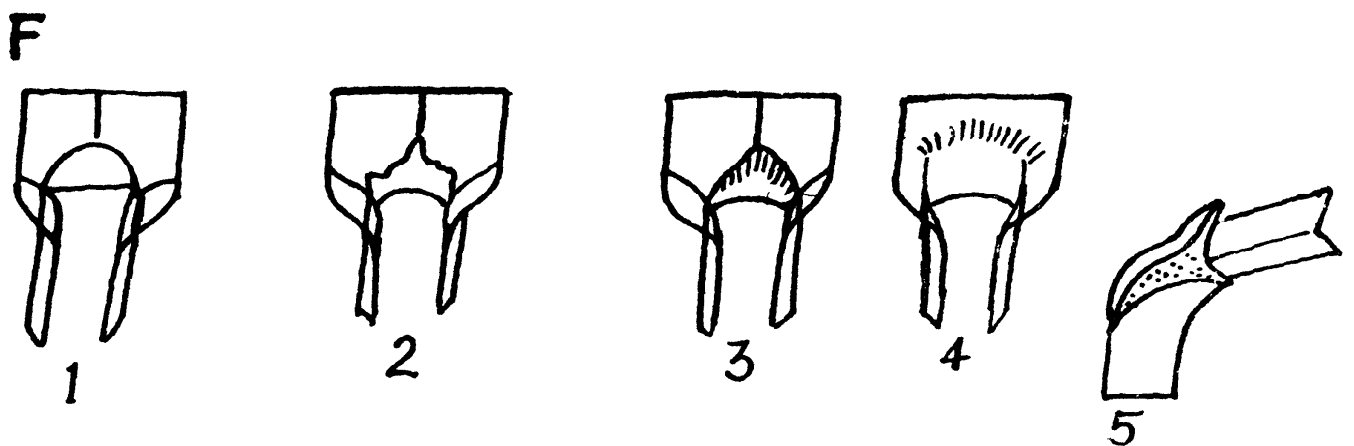
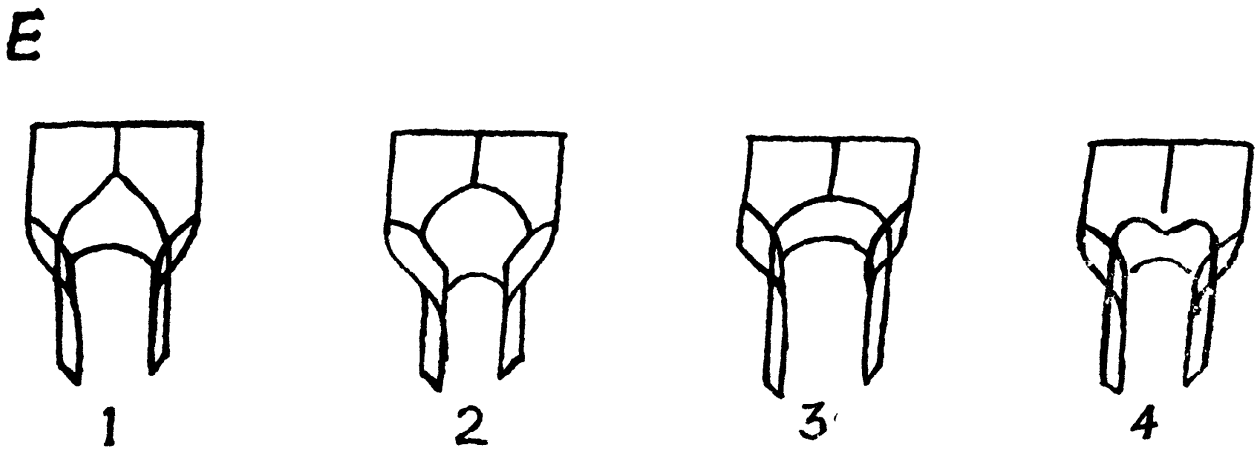
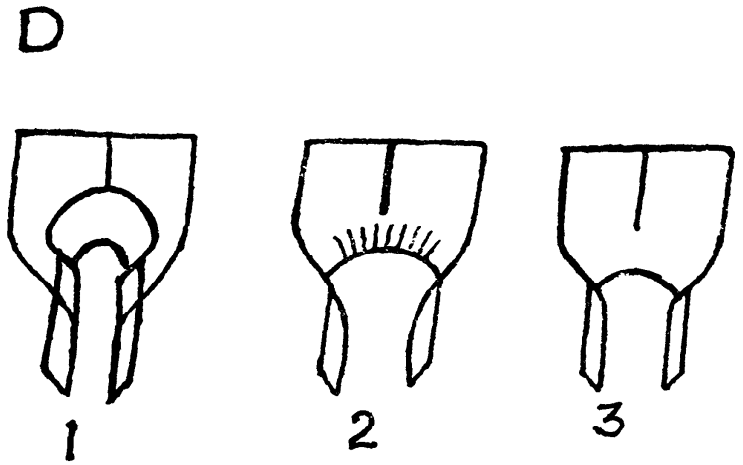
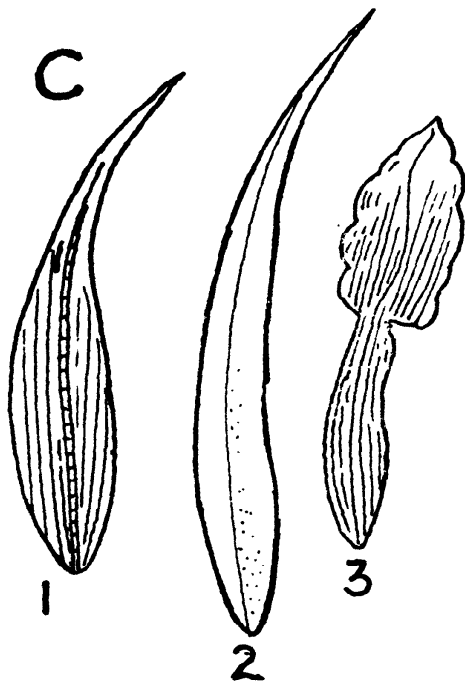
- 95b. Inflorescence of 2—6 digitate spikes; spikelets awnless ... *Cynodon* 24
- 83b. Inflorescence a terminal, bilateral spike or spicate raceme :
- 96a. Spikelets solitary at each node of the inflorescence axis :
- 97a. Spikelets awnless, arranged in 2 rows on a long, terminal, slender axis ... *Eragrostiella* 40
- 97b. Spikelets awned, not in 2 rows :
- 98a. Spikelets 8—36-flowered; lemmas bearded ... *Tripogon* 98
- 98b. Spikelets 2—6-flowered; lemmas glabrous :
- 99a. Fertile lemma shorter than glumes, minutely 2-toothed; awns 2—3 cm long ... *Schoenefeldia* 87
- 99b. Fertile lemma longer than glumes; awns less than 2 cm, tip entire, acute glumes and lemma keeled ... *Triticum* 99
- 96b. Spikelets 2—3 at each node of the inflorescence axis :
- 100a. Spikelets 2—3-flowered, ciliate; inflorescence flexous and interrupted ... *Melanocenchris* 61
- 100b. Spikelets 1-flowered, glabrous; inflorescence compact :
- 101a. Spikelets embedded in thick tough rachis, glumes lateral ... *Oropetium* 67
- 101b. Spikelets not embedded in the rachis, glumes standing in front of the spikelet ... *Hordeum* 50

PLATE 1



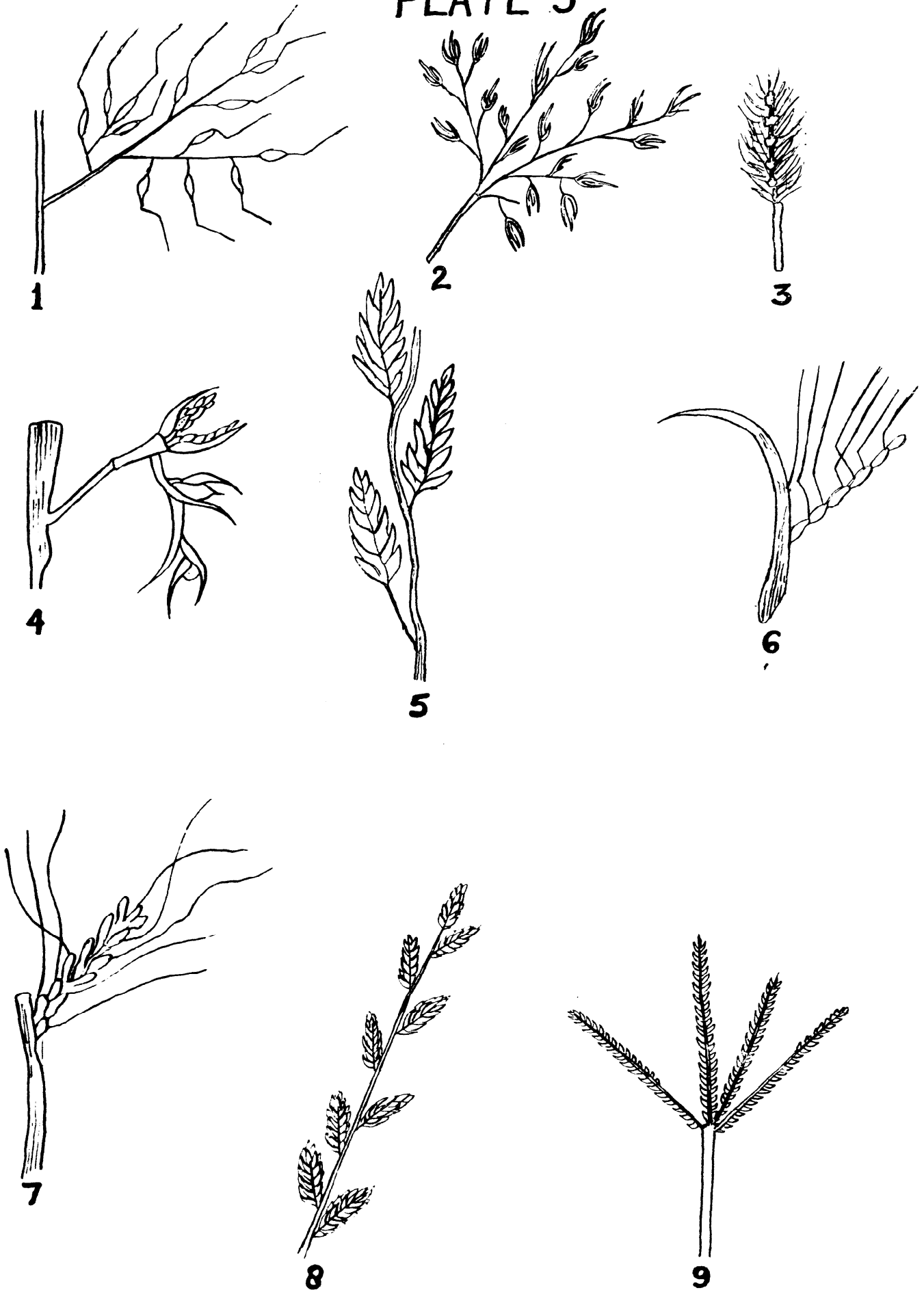
A. Culm and rhizome—1. Woody bise, culm and rhizomes of bamboo. 2. rhizome and new sheaths. 3. Culm of annual grass. B. Sheaths—1. Terete 2. Keeled. 3. & 4. Culm sheaths of bamboo. 5. Leaf sheath of bamboo.

PLATE 2



C. Leaves—1. Lanceolate. 2. Linear. 3. Oblong with spongy petiole. **D. Ligule types**—1. Membranous. 2. Fringe of hairs. 3. Absent. **E. Ligule shape**—1. Acute. 2. Obtuse. 3. Truncate. 4. Emarginate. **F. Ligule margins**—1. Entire. 2. Notched. 3. Lacerate. 4. Ciliate. 5. Pubescent on the back.

PLATE 3



G. Inflorescence types 1. Open panicle 2. Branch of plumose panicle 3. Condensed panicle 4. False panicle 5. Simple raceme 6. terminal raceme 7. Spike-like raceme 8. Spike 9. Digitate Spike.

1. ACRACHNE Wt. & Arn.

Acrachne racemosa (Heyne) Ohwi in Bull. Tokyo Sci. Mus. n. 18, 1. 1947; *Eleusine racemosa* Heyne ex. Roem. & Schult. Syst. Veg. 2: 583. 1817; Roth, Nov. Pl. Spec. 80. 1821; *E. verticillata* Roxb. Fl. Ind. 1 : 346. 1820.

Annual, erect. Culm 30—80 cm, stout or slender, soft. Leaves flat, glabrous, acuminate; sheath appressed; ligule hairy. Spikes scattered or whorled; spikelets 4—5 mm, many flowered (8—12). Glumes small, ovate, finely acuminate. Lemma 3—4 mm long, broadly ovate, 3-nerved; keel excurrent, lateral nerves ending in small teeth. Anthers 3, \pm 0.5 mm long. Caryopsis \pm 1 mm long, rugose, pericarp caducous.

Fls. & Frts. : Aug.—Nov.

Distribution : All over the state in moist open places.

2. ALLOTEROPSIS J. S. Presl.

Alloteropsis cimicina (L.) Stapf in Prain, Fl. Trop. Afr. 9 : 487. 1919; *Milium cimicinum* L. Mant. Alt. 184. 1771; *Axonopus cimicinus* (L.) P. Beauv. Ess. Agrost. 12. 1812; Hook. f. Fl. Brit. Ind. 7 : 64. 1896.

Annual. Stem. 30—60 cm, tufted, erect or decumbent, and geniculate at the base. Leaves ovate-lanceolate, hirsute with long white hairs, rarely glabrescent, base deeply cordate; ligule obsolete. Inflorescence made of 3—8 subverticillate spikes, rachis filiform, scaberulous. Spikelets 2.5—3.0 mm long, solitary or clustered, short pedicelled, dorsally compressed, pale shining. 1st glume acuminate, 2nd glume mucronate or shortly awned. Lower lemma about 3 mm long. Upper lemma 2.5—2.8 mm long, aristate. Anthers 3, purple, 1 mm long. Caryopsis 1.0—1.25 mm long, ovoid, compressed.

Fls. & Frts. : During rainy season.

Distribution : Balaghat, Damoh, Indore, Pachmari, Rajnandgaon, Rewa, Sidhi.

3. ANDROPOGON L.

Andropogon pumilus Roxb. Fl. Ind. 1 : 273. 1820; *A. pachyarthrus* Hack. in DC. Monogr. Phan. 6 : 449. 1889.

Annual. Culm 10—50 cm, suberect, geniculate. Leaves linear, acuminate, glabrous; sheath keeled, glabrous; ligule short, truncate, membranous. Inflorescence made of racemes, 1—2 cm long, arising from spathes, joints 2.5 mm, often red on the back, margins ciliate, apex cup-shaped, 2—3 toothed. Sessile spikelet 5 mm long; callus glabrous. 1st glume 5 mm, linear, membranous, keeled, awn 0.8 mm; 2nd glume of same length, narrow lanceolate, hyaline. Lower lemma 3 mm, lanceolate, hyaline. Upper lemma 2.5 mm long, linear, hyaline, cleft at apex, awned from sinus; awn 1.6 mm, geniculate, lower half brown, upper white. Anthers 3, yellow, 2 mm. Pedicelled spikelet awnless, pedicel 3 mm, with ciliate margins.

Fls. & Frts. : Aug.—Dec.

Distribution : Indore.

4. APLUDA L.

Apluda mutica L. Sp. Pl. ed. 1. 82. 1753.

Perennial, Culms 0.5—1.0 m tall, leafy. Leaf-sheath short, tight, glabrous, blades linear-lanceolate, acuminate, glabrous. Upper leaves spathiform; ligule membranous. Inflorescence is made of several racemes, each enclosed in a spathe together forming a leafy panicle. Spikelets in groups of 3, one sessile, bisexual, imperfect, reduced at the base and a terminal male or neuter, rarely bisexual. Sessile spikelet 4—5 mm long. Lower glume 11—13 nerved. Upper glume 7-nerved, boat-shaped, 2-tipped. Lower lemma folded, hyaline, 3-nerved, awned or awnless, 4 mm long. Anthers 3, yellow, 1 mm long. Upper lemma 3-nerved, notched, awned (9—10 mm), bent. Anthers 3, 2.2 mm long. Terminal spikelet pedicelled, similar to sessile but upper lemma not notched, pedicel 3 mm, only male. Caryopsis oblong with large embryo. Anthers 3, yellow, 3.0—3.2 mm long.

Fls. & Frts. : Sept.—Nov.

Distribution : Balaghat, Bastar, Betul, Bilaspur, Bori, Damoh, Gwalior, Hoshangabad, Indore, Pachmari, Raigarh, Raipur, Rewa, Satna, Sidhi.

Note : There are awned and awnless forms in this species which have puzzled many workers. Linnaeus himself felt these two forms as distinct and named awned form as *Apluda aristata*. Hackel (1889) created subspecies and varieties. But the characters used and other characters are distributed freely in intermediate forms without any correlation. A thorough biosystematic study is required to solve the problem and establish the status of various forms supported with good evidences.

5. APOCOPIS Nees

Apocopis vaginata Hack. in Ost. Bot. Z. 41 : 8. 1891; *A. wightii* Nees ex Steud. var. *vaginata* Hook. f. Fl. Brit. Ind. 7 : 143. 1896.

Annual. Culms tufted, erect, 10—18 cm tall. Leaf sheaths spathaceous, glabrous, blades with glandular base hairs; ligule membranous. Inflorescence of paired racemes enclosed in the upper sheaths, callus short bearded with brown hairs. Sessile spikelet 4.0—5.5 mm long, awned, hairy. Lower glume hairy on the back, lower half reddish, upper brownish-white, 5—7 nerved. Lower lemma 2.5—3.0 mm long, 2-dentate, awn 1.7—2.0 cm long. Anthers 3, yellow, \pm 1 mm long. Caryopsis fusiform, about 1 mm long.

Fls. & Frts. : Sept.—Dec.

Distribution : Ambikapur, Bilaspur, Sidhi.

6. ARISTIDA L.

1a. Articulation between lemma and awn absent; lower glume less than 20 mm :

2a. Lateral awns reduced, of different texture to central awn; lemma \pm 4 mm. long, passing into twisted column ...

A. redacta 5

2b. Lateral awns well-developed, of similar texture to central awn;

3a. Plants usually 5—10 cm tall; lower glume 2.5 mm; upper 3 mm; lemma 1.5 mm long. ...

A. cumingiana 2

3b. Plants and other parts much longer :

a.

- 4a. Panicle contracted :
- 5a. Awns of glumes 3—5 mm long; lower glume up to 17 mm long, upper \pm 20 mm long. *A. setacea* 7
- 5b. Awns of glumes less than 2 mm :
- 6a. Lower glume less than two-third of upper; lemma shorter than the upper glume; glume awns \pm 2 mm long *A. depressa* 4
- 6b. Lower glume more than two-third of upper; lemma longer than upper glume; glumes mucronate *A. adscensionis* 1
- 4b. Panicle effuse, almost as broad as long; spikelets purplish \pm 15 mm long; upper glume equal to spikelet. *A. cyanantha* 3
- 1b. Articulation between lemma and base of the column present: lower glume \pm 20 mm long. *A. funiculata* 5

1. *Aristida adscensionis* L. Sp. Pl. ed. 1. 82. 1753; Hook. f. Fl. Brit. India 7; 224. 1896.

Annual or perennial. Culms tufted, 20—60 cm tall, erect or decumbent. Leaves 10—30 cm long, usually glabrous; ligule a fringed membrane. Inflorescence a contracted panicle, branches filiform. Spikelets 6—9 mm long, straw-coloured or purple tinged. Lower glume 5—8 mm long, acute, membranous. Upper glume 6—9 mm long, 2-toothed at the tip. Lemma 8 mm long, linear, laterally compressed, scabrid along keel; callus 0.5 mm long, pointed, hairy at base. Awn trifid, not articulated, central one up to 15 mm long, lateral branches slightly shorter. Anthers 3, yellowish purple, \pm 1.7 mm long. Caryopsis equalling lemma, cylindrical.

Fls. & Frts. : Aug.—Dec. and Feb.—March.

Distribution : Balaghat, Bilaspur, Damoh, Durg, Gwalior, Indore, Raipur, Rewa, Sidhi.

2. *Aristida cumingiana* Trin. & Rupr. Sp. Gram. Stip. 141. 1842.

Annual. Culms 15—40 cm tall, slender. Leaves basal, filiform small; sheath loose, glabrous; ligule very minute, membranous. Inflorescence a narrow panicle, loosely branched, rachis and pedicels scabrid. Spikelets 3-awned, 2.0—2.5 mm long, without awn and articulation, central one up to 5 mm, laterals 3.0—3.5 mm, green or purple. Lower glumes 2.0—2.5 mm. Upper glume 3.0—3.5 mm long, pointed; callus very minute with small white hairs. Lemma 2.0—2.5 mm long, linear, laterally compressed. Anthers 3, 0.6—0.8 mm long, yellowish to light pink. Caryopsis 2 mm long, cylindric, deep pink to brownish.

Fls. & Frts. : Sept.—Nov.

Distribution : Bilaspur, Raigarh.

3. *A. cyanantha* Nees ex Steud. Syn. Pl. Glum. 1 : 141. 1854.

Perennial. Culms up to 1.5 m tall, stout, erect. Leaves convolute, glaucous, glabrous; sheath smooth; ligule membranous. Inflorescence an effused panicle with flexuous branches, scaberulous. Spikelets 8—13 mm long excluding awn, usually deep purple. Lower glume 6—9 mm long, smooth, awn 1—1.5 mm long. Upper glume 10—12 mm long plus 2—3 mm long awn, fimbriately toothed. Lemma up to 8—12 mm long with densely hairy callus (1 mm long), no articulation between lemma and awns. Anthers 3, yellow tinged with purple, \pm 5 mm long. Caryopsis 8—10 mm long, terete.

Fls. & Frts. : Sept.—Feb.

Distribution : Indore, Coll, No. 5698.

4. *A. depressa* Retz. Obs. Bot. 4 : 22. 1786.

Annual. Culms 30—120 cm tall. Leaves 5—30 cm long, glabrous; sheath keeled; ligule hairy. Inflorescence a contracted panicle, branches

short, glabrous. Spikelets pale or purple. Lower glume 3—5 mm, awned. Upper glume 7—9 mm, scabrid, on keel; callus 0.5—0.7 mm long, bearded. Lemma 7—11 mm long; keels scabrid, 3-awned, middle one 20—23 mm long, lateral little shorter. Anthers 3, yellow, \pm 2 mm long. Caryopsis 6—9 mm long, brown.

Fls. & Frts. : July—Dec.

Distribution : Bilaspur, Gwalior, Hoshangabad, Sidhi.

5. *Aristida funiculata* Trin. & Rupr. Sp. Gram. Stip. 159. 1842.

Annual. Culms slender, 2—70 cm tall, erect or slightly decumbent at base. Leaves convolute, sparsely hairy on upper surface; sheaths keeled; ligule hairy. Inflorescence a narrow panicle, branches capillary, usually long white hairs in the axil. Spikelets straw-coloured, 17—27 mm long. Lower and upper glume similar and equalling the spikelet. Lemma 4 mm long, smooth, awned; articulated column 2.0—4.5 cm long, laterals slightly shorter. Anthers 3, 0.7—0.8 mm long. Caryopsis cylindric, 3—4 mm long, black.

Fls. & Frts. : Aug.—Dec.

Distribution : Sidhi, Ratlam, Satana.

6. *A. redacta* Stapf in Kew Bull. 1892; 85. 1892.

Annual. Culms 20—80 cm tall, stout. Leaves convolute, glabrous, long hairs at base; sheath keeled; ligule hairy. Inflorescence an effuse panicle, branches binate, capillary. Spikelets straw-coloured or purplish, 5—6 mm long. Lower glume 3 mm long, membranous. Upper glume 5 mm long, similar to lower; callus bearded. Lemma 4—5 mm long with distinct articulation, awns very unequal. Anthers 3, 1 mm long, brownish yellow. Caryopsis cylindric, 2—3 mm long, black.

Fls. & Frts. : Aug.—Dec.

Distribution : Damoh, Indore, Raigarh.

Note : Endemic to India.

7. *A. setacea* Retz. Obs. Bot. 4 : 22. 1786; Fl. Brit. Ind. 7 : 225. 1896.

Perennial. Culms robust, tufted, 75—110 cm tall. Leaves inrolled, filiform, scaberulous; ligule a rim of stiff hairs. Inflorescence a contracted panicle, branches ascending, scabrid. Spikelets 1-flowered. Lower glume 1.25 cm long with 3 mm long awn. Upper glume 1.7 cm long, awn 3.5 mm. Lemma 1.1 cm long, convolute around palea, column indistinct; awns 3, central 3.3 cm long, laterals 2.8 cm long; callus 1.5 mm long, sharp with white silky hairs. Palea nerveless. Anthers 3, 2.5—3.0 mm long, yellow. Caryopsis 1.5 cm long, cylindric, brown.

Fls. & Frts. : Nov.—Feb.

Distribution : Ambikapur, Bilaspur, Durg, Raigarh, Raipur, Seoni.

7. ARTHRAXON P. Beauv.

1a. Stamens 2 :

2a. Pedicelled spikelets developed atleast in upper part of racems; caryopsis \pm 0.8 mm long, cylindric ... *A. lancifolius* 3

2b. Pedicelled spikelets not developed; pedicels reduced; caryopsis 1.5 mm long, linear :

3a. Pedicel reduced to a minute glabrous point; joints sparsely ciliate, 1.5—2 mm long; upper glume puberulous at the apex ... *A. quartinianus* 5

3b. Pedicel $\frac{3}{4}$ — $\frac{3}{4}$ th of sessile spikelet; joints sub-glabrous 3—5 mm long; upper glume hispid or muriculate at the apex ... *A. hispidus* 2

4a. Lower glume markedly echinulate on keels and intermediate nerves; tubercle based hairs on leaf margins present; ligule lacerate ... *A. echinatus* 1

4b. Lower glume echinulate only on keels or smooth; leaves glabrous; ligule membranous .. *A. prionodes* 4

1. **Arthraxon echinatus** (Nees) Hochst. in Fl. 39; 188, 1856. *Bathratherum echinatuma* Nees in Edinb. New phil. J. 18; 181, 1835. *Arthraxon spathaceus* Hook f. Fl. Brit. Ind. 7; 145, 1896.

Annual. Culms 20—50 cm tall, tufted, nodes glabrous leaves ovate-lanceolate, sparsely hairy, tubercled hairs at margins; sheath terete, few hairs scattered; ligule lacerate. Inflorescence with 1—5 racemes (usually solitary). Spikelets 2-nate; pedicelled spikelet well developed, joints \pm 3.5 mm long, callus glabrous. Sessile spikelets 5.5—6 mm long, lanceolate, awned. Lower glume 5—5.5 mm long, 5-nerved, 2-keeled. Upper glume equalling the lower, boat-shaped, 3-nerved, margins ciliate. Lower lemma empty, nerveless. Upper lemma 3—3.5 mm long, apex clefted, 10—12 mm long awn from sinus; palea absent. Anthers 3, yellow, \pm 2 mm long. Caryopsis linear.

Fls. & Frts. : July—Dec.

Distribution : Rewa.

2. **A. hispidus** (Thunb.) Makino in Bot. Mag. Tokyo 26; 214. 1912. *Phalaris hispida* Thunb. Fl. Jap. 44. 1784.

Annual. Culms 30—50 cm tall, densely tufted, leafy. Leaves ovate-lanceolate, sparsely hairy; sheath glabrous, striate, ciliate on one margin; ligule lacerate. Inflorescence consists of several spikes. Joints of the rachis 2.5 mm long, ciliate, curved. Spikelets \pm 3 mm long, solitary. Lower glume 3 mm long, convex on back, scabrid, upper glume similar to lower. Lower floret empty; lemma usually absent. Upper floret hermaphrodite, lemma \pm 2 mm long, awns up to 9 mm long from the base of the lemma. Anthers 2, purple, 0.75 mm long. Caryopsis linear, terete, \pm 2 mm long.

Fls. & Frts. : Sept.—Dec.

Distribution : Mandla.

3. **A. lancifolius** (Trin.) Hochst. in Flora 39; 188. 1856; *Andropogon lancifolius* Trin. in Mem. Acad. Sci. Petersb. Ser. 6, 2 : 271. 1832; *Arthraxon microphyllus* Hook. f. Fl. Brit. Ind. 7 : 147. 1896.

Annual. Culms 10—40 cm tall. Leaves ovate-lanceolate, cordate at base, usually glabrous, rarely sparse hairs; sheath glabrous; ligule

membranous. Inflorescence of 2-many racemes, rachilla hairy. Sessile spikelets 2.75—3.5 mm long, awned, Glumes subequal. Lower lemma empty, epaleate. Upper lemma 1.0—1.5 mm long, cleft at apex; awns 5—8 mm long, epaleate. Anthers 3, yellow, ± 0.5 mm long. Caryopsis ± 0.8 mm long, cylindric, light brown.

Fls. & Frts. : July—Nov.

Distribution : Balaghat, Bastar, Bilaspur, Gwalior, Hoshangabad, Raigarh, Rajnandgaon, Sagar, Sidhi.

Note : Commonly found on old walls, eroded hills and waste places during rainy season.

4. Anthraxon prionodes (Steud.) Dandy in Andrews, Fl. Pl. Sudan 3 : 399. 1956 ; *Andropogon prionodes* Steud. Syn. Pl. Glum. 1 : 383. 1854.

Perennial. Culms 40—100 cm tall, leafy, rooting at lower nodes. Leaves glabrous, lanceolate, cordate base; ligule membranous. Inflorescence of 1-several racemes. Sessile spikelets 5.5—6.0 mm long, awned from the sinus of upper lemma; awns 9—11 mm long, palea nil. Anthers 3, yellow, ± 2 mm long. Caryopsis ± 2 mm long, fusiform, light brown.

Fls. & Frts. : Aug.—Dec.

Distribution : Balaghat, Bailadilla, Indore, Rajnandgaon, Rewa, Sivpuri.

5. A. quartinianus (A. Rich.) Nash in N. Amer. Fl. 17 : 99 1912; *Alectoridia quartiniana* A. Rich. Tent. Fl. Abyss. 2 : 448. t. 99. 1851; *Arthraxon ciliaris* Beauv. Fl. Brit. Ind. 7 : 146. 1896.

Annual. Culms 20—50 cm tall, often rooting from nodes. Leaves lanceolate, cordate base, tubercle-based hairs on upper surface; ligule membranous. Inflorescence of 1—3 racemes. Sessile spikelet 3.0—3.5 mm long, awned. Lower glume 3.5 mm long, acute or 2-toothed. Upper glume 3.5 mm. Lower lemma empty, epaleate. Anthers 2—3, 0.6—0.7 mm long. Caryopsis 1.5 mm long, linear.

Fls. Frts. : Sept.—Nov.

Distribution : Balaghat, Damoh.

Note : Reported by Bor as confined to peninsular India.

8. ARUNDINELLA Raddi

- 1a. Upper lemma with 2 setae on each side of awn; spikelets over 5 mm long, central awn over 8 mm long ... *A. setosa* 5
- 1b. Upper lemma with single awn or awnless, spikelets less than 5 mm long, central awn less than 8 mm long.
- 2a. Upper lemma awnless or mucronate, base of upper lemma naked ... *A. bengalensis* 1
- 2b. Upper lemma with a geniculate awn, base of upper lemma not naked :
- 3a. Spikelets up to 2 mm long; upper lemma 1 mm long; inflorescence very effused paniced ... *A. pumila* 4
- 3b. Spikelets over 2 mm long; upper lemma over 1 mm; inflorescence usually compact :
- 4a. Lower glume longer than the lemma, glumes densely covered with bristles tubercle based ... *A. ciliata* 2
- 4b. Lower glume little shorter or equal to lemma, glumes not covered with tubercle based bristles ... *A. holcooides* 3

1. *Arundinella bengalensis* (Spreng.) Druce in Rep. Bot. Exchng. Club. Brit. Isles : 605. 1916. *Panicum bengalense* Spreng, Syst. Veg. 1 : 311. 1825. *P. strictum* Roxb. Fl. Ind. 1 : 306. 1820.

Perennial. Culms 50—100 cm tall, stout, erect, glabrous. Leaves lanceolate-acuminate, glabrous to villous, margins scabrid; sheath loose, hairy; a tuft of stiff hairs in the throat. Inflorescence an elongated panicle, branches stout rachis angled and scabrid. Spikelets 3—4 seriate, ovoid, secund. Lower glume 2.5 mm long, 3-nerved. Scabrid. Upper glume 3 mm long, 5-nerved, often hairy on nerves. Lower floret male. Upper floret hermaphrodite. Lemma 2 mm long, callus shortly bearded,

3-nerved, ovate, awn 1.5 mm long. Anthers 3, yellow, 1.5 mm long. Caryopsis not seen.

Fls. & Frts. : Oct.—Feb.

Distribution : Bastar, *Panigrahi* 8702.

2. *Arundinella ciliata* (Roxb.) Nees ex Miq. in Verh. Konink, Nederl. Inst. 3, pt. 4 : 30. 1851. *Holcus ciliatus* Roxb. Fl. Ind. 1 : 321. 1820. *Arundinella agrostoides* Hook. f., Fl. Brit. Ind. 7 : 71. 1896, non Trin. 1836.

Annual. Culms 15—50 cm tall, slender, villous or glabrous. Leaves broad, flat, glabrous or with soft hairs; sheath hairy; ligule hairy. Inflorescence a contracted panicle, branches suberect. Spikelets 2.5—3 mm long, broadly lanceolate, lower half bristly. Lower glume acuminate, 3-nerved. Upper glume equal to spikelet, 5-nerved, cuspidate. Lemma 2.5 mm long, coriaceous, 3-nerved. Upper floret female 1—1.5 mm long, awn 3—4 mm long. Anthers 3, 1—1.5 mm long. Caryopsis not seen.

Fls. & Frts. : Sept.—Nov.

Distribution : Bastar, Bailadilla, *Panigrahi* 1044. Reported by Bor 1960 as endemic to Madras.

3. *A. holcoides* (Kunth) Trin. in Bull. Acad. Sci. Petersb. 1 : 71. 1836. *Brandtia holcoides* Kunth, Rev. Gram. 2 : 511. 1831.

Annual. Culms 20—50 cm tall. Leaves narrow, flat, hairs long, soft; sheath hairy; ligule a ridge of hairs. Inflorescence a contracted panicle, branches fascicled. Spikelets 2.5—3.0 mm long, ovoid, lanceolate, lower half bristly; pedicels 3—4 mm long. Lower glume 3-nerved. Upper glume 5-nerved. Lower lemma \pm 3 mm long, ovate-lanceolate, coriaceous, paleate, 3-nerved. Upper lemma 1.5—2.0 mm long, usually female; awn 5 mm long, lower half twisted. Anthers 3, purplish, 0.5 mm long. Caryopsis 1.0—1.2 mm long, dorsally compressed, brown, awn persistent.

Fls. & Frts. : Rainy season.

Distribution : Bastar, *Panigrahi* : 1044.

4. *Arundinella pumila* (Hochst.) Steud. Syn. Pl. Glum. 1 : 144. 1854; *Acratherum pumilum* Hochst. ex A. Rich. Tent. Fl. Abyss. 2 : 414. t. 100. 1851; *Arundinella tenella* Nees ex Steud. Syn. Gram. 115. 1854; Fl. Brit. India 7 : 71. 1896.

Annual. Culms 15—40 cm tall, erect, leafy, nodes glabrous. Leaves flat, lanceolate, glabrous; sheath compressed, glabrous; ligule hairy. Panicle effuse, large, branched. Spikelets 1.5—2.0 mm long, light green. Lower glume \pm 1.5 mm long, 3-nerved. Upper glume 1.5—1.8 mm long, 5-nerved. Lower lemma empty, \pm 1.5 mm long. Upper lemma chartaceous, \pm 1 mm long, awns 3—4 mm long. Anthers 3, very small. Caryopsis less than 0.5 mm, ellipsoid.

Fls. & Frts. : Aug.—Nov.

Distribution : Ambikapur, Bastar, Balaghat, Bilaspur, Raigarh, Hoshangabad, Sidhi.

5. *A. setosa* Trin. Gram. Panic. 63. 1826; *A. capillaris* Hook. f. Fl. Brit. Ind. 7 : 74. 1896.

Perennial. Culms 40—100 cm tall from tuberous rhizomes with woolly bases of leaf sheaths. Leaves narrow, glabrous or hairy, setose hairy on the margins, near the sheath throat; ligule hairy, minute. Inflorescence a large, flexuous panicle, branches capillary, scaberulous, naked below. Spikelets 5—6 mm long, 2-flowered. Lower glume 3.8—4.2 mm long. Upper glume similar, 5—6 mm long. Lower lemma empty. Upper lemma coriaceous, \pm 2 mm long, brownish scabrid with age, callus hairy, apex 2-toothed, apical setae \pm 2 mm long, central awn 9—10 mm long, kneed, twisted, Anthers, 3, 1.6 mm long. Caryopsis 1.5 mm long, dark brown.

Fls. & Frts. : Sept.—Jan.

Distribution : Ambikapur, Bastar, Bilaspur, Indore, Damoh, Raigarh, Sidhi.

9. ARUNDO L.

Arundo donax L. Sp. Pl. ed. 1. 81. 1753.

Strongly perennial. Culms 1.5—3.0 m tall, basal part woody, nodes glabrous. Leaves flat, glabrous, amplexicaul at base, apex acuminate;

ligule hairy. Panicle large, branches ascending, scaberulous. Spikelets laterally compressed, 2—6-flowered, lanceolate, 1.0—1.5 cm long with awns. Glumes \pm 1 cm long. Lower lemma 3-nerved, 9—10 mm long, silky hairy. Upper lemma similar but shorter than lower. Anthers 3, \pm 2 mm long. Caryopsis \pm 2 mm long, oblong.

Fls. & Frts. : Aug.—Nov.

Distribution : Indore, Gwalior, Bilaspur, Mandla, Rewa.

10. AVENA L

Avena sativa L. Sp. Pl. ed. 1. 79. 1753.

Annual. Culms 40—80 cm tall, erect. Leaves linear, glabrous; ligule well developed, membranous. Panicle open, branches drooping. Spikelets 1—2-flowered, 20—25 mm long. Glumes persistent, equalling the spikelet, 7—11-nerved, papery. Lemma lanceolate, 1.5—2.0 cm long, 7—9-nerved, awned from the back. Palea minutely hairy on keels. Anthers 3, \pm 3 mm long. Caryopsis \pm 1.5 cm long, tightly enclosed by lemma & palea, hairy.

Fls. & Frts. : Nov.—March.

Distribution : Cultivated in many districts of Madhya Pradesh.

11. BAMBUSA Schreber

- 1a. Lower culm nodes with short thorny branches; spikelets \pm 2 cm long. ... *B. arundinacea* 1
- 1b. Lower culm nodes without thorny branches, spikelets over 2 cm long :
- 2a. Culm sheaths nearly glabrous, ligule white hairy; anthers penicillate. ... *B. teres* 3
- 2b. Culm sheaths densely hairy, ligule not white hairy; anthers apiculate :
- 3a. Diameter of culm internodes 3—6 cm not shining; nodes not raised; spikelets cylindric ... *B. nutans* 2

- 3b. Diameter of culm internodes 5—10 cm, shining; nodes raised with a ring of brown hairs; spikelets flattened ... *B. vulgaris* 4

1. **Bambusa arundinacea** (Retz.) Willd. Sp. Pl. 2 : 245. 1799; *Bambos arundinacea* Retz. Obs. Bot. 5 : 24. 1789.

Strongly perennial. Culms 5—20 m tall, 5—10 cm in diameter, erect, branched. Leaves 6—12 × 1.0—1.5 cm, linear-lanceolate, glabrous or hairy on back, auricles with bristles; culm sheaths 20—30 × 10 cm, upper part rounded, except the apiculate tip, dorsal side hairy; hairs dark brown; ligule truncate, long ciliate. Inflorescence a branched panicle. Spikelets ± 2 cm long, lanceolate, 3—6-flowered, rachilla hairy. Lemma ± 1 cm long, lanceolate, glabrous. Palea keels ciliate. Lodicules 3, 2.5 mm long, fringed with hairs. Anthers 5 mm long, style short, stigma 3.

Fls. & Frts. : Once in life, rare.

Distribution : Bastar, Bilaspur, Damoh, Hoshangabad.

2. **B. Nutans** Wall. apud Munro in Trans. Linn. Soc. 26. 1868; Fl. Brit. Ind. 7 : 387. 1896.

Perennial. Culms solitary from a creeping rhizome, 6—12 m tall, 3—6 cm in diameter, erect, naked below; nodes not much raised, often hairy, lower nodes rooting; internodes 30—45 cm long, not shining, white ringed below the nodes, thick walled. Culm sheath 15—20 cm long, top rounded, truncate, densely black haired on back, ring of soft deciduous hairs at base; blade of upper and lower nodes 15—20 cm, for middle nodes shorter, black hairy, margins recurved; auricles densely bristly; bristles long, curved. Leaves linear, lanceolate with pellucid glands, 15—30 × 3—5 cm, dorsally white when dry, scabrid, 7—10-nerved; sheaths ending to smooth callus and falcate auricle with long bristles; ligule long obtuse, hairy. Inflorescence a stiff panicle with spiciform branches. Lodicules 3, long, fimbriate. Spikelets in bracteate fascicles, many empty or gemmiparous, 2—3. Lower glume neuter, 3—7 fertile, all 2—3 cm long, ovate, acute, mucronate, many-nerved, puberulous within. Palea shorter, ovate, flattened. Keels overlapping, long ciliate. Anther tips long apiculate or slightly penicillate. Ovary subovoid.

Fls. & Frts. : Rare.

Distribution : M.P. : Acc. No. 12678.

3. *Bambusa teres* Ham. ex Wall. Cat. n. 5026 B; Fl. Brit. Ind. 7 : 388. 1896.

Strongly perennial. Culms 15—20 m tall, caespitose, 5—10 cm in diameter; internodes 30—40 cm long; culms sheaths 20—25 cm long and broad, top rounded, nearly glabrous; blade 10—15 cm long, triangular, cuspidate, base broad with wavy fringed auricles, hairy beneath; ligule narrow, white hairy. Leaves 30—35 × 4—6 cm, acuminate, twisted, nerves 10—16, pellucid glands many, sheath ends in a broad shining callus; ligule short. Inflorescence a large, compound panicle bearing fascicles of spikelets and chaffy bracts. Lodicules subobovate, fimbriate, many-nerved. Spikelets 2—4 cm in bracteate heads, neuter and fertile. Lower glumes empty. Flowering glumes 5—6, ovate-lanceolate, many-nerved, sometimes foliaceous. Palea ovate acute, scaberulous, 5—6-nerved between toothed keels. Anthers with narrow tips, penicillate.

Fls. & Frts. : Rare.

Distribution : Balaghat, Bilaspur.

4. *B. Vulgaris* Schrad. in Wendl. Collect. Pl. 2 : 26. t. 47. 1810.

Perennial with stout rhizomes. Culms green yellow or striped, polished, 6—15 m tall, 5—10 cm in diameter; nodes prominent with a ring of brown hairs; internodes 20—35 cm long. Culm sheath 15—25 cm long, 17—22 cm broad, densely hairy on back. Ligule toothed or fimbriate, 3 mm long. Leaf blades 15—25 cm long 2—4 cm broad, pale, petioled, scabrid; auricles prominent, 1 cm long with incurved bristles, 7 mm long. Auricles small, rounded. Ligule short ciliate. Panicle large, leafy; cluster of spikelets largest at nodes; rachis scurfy. Spikelets 2.5—3.0 cm long in bracteate clusters of 3—10, oblong, acute, bifid, empty glumes. Glumes 1 or 2 pointed, hairy. Lemma ± 1 cm long margins hairy. Palea equal to glume. Keels white ciliate. Lodicules, 3-winged ciliate hairs upto 2.5 mm long. Anthers 5—6 mm long, obtuse hairy apiculate, purple. Ovary narrow, style upto 7 mm long, stigma 3, short.

Flt. & Frts. : Rare.

Distribution : Ambikapur, Bastar, Bilaspur and other moist part of M. P.

12. BOTHRIOHLOA O. Kuntze

- 1a. Inflorescence axis longer than the lowest raceme; sessile spikelet over 5 mm long :
- 2a. Plant aromatic; panicle silky, sheath compressed; lower glume of sessile spikelet villous ... *B. odorata* 4
- 2b. Plant not aromatic; panicle not silky, sheath terete; lower glume of sessile spikelets not silky ... *B. glabra* 1
- 1b. Inflorescence axis shorter than the lower raceme, sessile spikelets less than 5 mm long :
- 3a. Lower glume of sessile spikelet not pitted; leaves mostly cauline ... *B. intermedia* 2
- 3b. Lower glume of sessile spikelet pitted; leaves mostly basal :
- 4a. Racemes 9—15, lower glume of sessile spikelet glabrous below the middle ... *B. kuntzeana* 3
- 4b. Racemes 2—8, lower glume of sessile spikelet hairy below the middle ... *B. pertusa* 5

1. *Bothriochloa glabra* (Roxb.) A. Camus in Ann. Soc. Linn. Lyon. 1930, n. s. 76 : 164. 1931; *Andropogon glaber* Roxb. Fl. Ind. 1 : 271. 1820; *A. intermedius* Hook. f. Fl. Brit. Ind. 7 : 175. 1896.

Perennial, rhizomes short. Culms tufted, 75—150 cm tall, coarse, branched. Leaves linear glaucous green, glabrous or hairy; sheaths glabrous; ligule membranous, truncate. Panicle variable oblong 10—23 cm long; racemes 3—7 cm long, simple or lower branched, joints densely hairy with a translucent groove in the centre. Sessile spikelet linear, 5.0—5.5 mm long, awned. Lower glume 4.5—5.0 mm long, 5—7-nerved, pitted or not. Upper glume linear, lanceolate, \pm 5 mm long, 3-nerved. Lower lemma empty, nerveless, epaleate. Upper

lemma reduced to a geniculate awn, 13—15 mm long. Anthers 3, yellow, \pm 2 mm long.

Fls. & Frts. : Aug.—Dec.

Distribution : Balaghat, Hoshangabad, Sidhi.

2. ***Bothriochloa intermedia*** (R. Br.) A. Camus in Ann. Soc. Lyon. n. s. 76 : 164. 1931; *Andropogon intermedius* R. Br. Prodr. 202. 1810; Fl. Brit. Ind. 7 : 175. 1896.

Perennial. Culms tufted with short rhizome, 30—90 cm tall. Leaves linear, acuminate, hairy at base, margins scabrid; sheath glabrous; ligule a shallow membrane. Inflorescence a panicle, hairy, lower branches shorter. Spikelets in pairs, sessile and pedicelled; pedicel and rachis joints flattened and longitudinally grooved, long ciliate. Sessile spikelet 2—3 mm long; callus short, hairy. Lower glume 7-nerved, pitted on back, 3.2 mm long. Upper glume 3-nerved 3.5 long. Lower lemma neuter. Upper lemma hyaline, 1-nerved with scaberulous awn, keeled at centre, 1.2 mm plus awn, 1.2 cm long. Anthers 2, yellow, 1.2—1.4 mm long. Pedicelled spikelet neuter. Caryopsis 1.2 mm long, without callus.

Fls. & Frts. : Aug.—Jan.

Distribution : Balaghat, Bastar, Gwalior, Hoshangabad, Sidhi.

3. ***B. kuntzeana*** (Hack.) Henr. in Blumea 3 : 456. 1940 ; *Andropogon kuntzeanus* Hack. Mon. Androp. 478. 1889; Fl. Brit. Ind. 7 : 175. 1896.

Perennial. Culms 50—150 cm tall, erect. Leaves narrowly linear, glabrous, margins scabrid; sheath glabrous; ligule membranous. Inflorescence of 12—15 racemes, corymbosely fasciculate, densely ciliate. Sessile spikelet 4.5—5.0 mm long. Lower glume 4.5 mm long, ovate-lanceolate, pitted on back. Upper glume \pm 5 mm long. Lower lemma 4 mm long. Upper lemma reduced to awn, 1.7 mm long. Anthers 3, yellow, 1.5 mm long. Caryopsis \pm 2 mm long.

Fls. & Frts. : Aug.—Dec.

Distribution : Balaghat, Damoh, Hoshangabad.

4. **Bothriochloa odorata** (Lisboa) A. Camus in Ann. Soc. Linn. Lyon, 1930, n. s. 76 : 165. 1931. *Andropogon odoratus* Donna Lisboa in J. Bomb. Nat. Hist. Soc. 4 : 123, 1889. Hook. f. Fl. Brit. Ind. 7 : 177. 1896.

Perennial. Culms 0.7—1.2 m tall, stout, branched, leafy, nodes villous. Leaves linear up to 75 cm long, scaberulous; sheath compressed, glabrous; ligule membranous, truncate. Inflorescence a panicle; branches filiform, densely fascicled, silky purplish; sessile spikelets 5—6 mm long, callus densely hairy. Lower glume lanceolate, 7-nerved, rarely pitted, villous. Upper glume keeled, ciliate, obtuse or truncate. Lemma shorter than upper glume, ovate, lanceolate, nerveless, awn 15—20 mm long. Pedicelled spikelet equal to sessile. Anthers 3, yellow, \pm 2 mm long. Caryopsis oblong, 3—3.5 mm long.

Fls. & Frts. : Sept.—Oct.

Note : This species is distinguished from *B. kuntzeanus* by aromatic stem and leaves, panicle of spikes, compressed sheath and villous lower glume of sessile spikelet.

Distribution : Mandla.

5. **B. pertusa** (L.) A. Camus in Ann. Soc. Linn. Lyon, n. s. 76 : 164. 1931; *Holcus pertusus* L. Mant. Alt. 301. 1771; *Andropogon pertusus* (L.) Willd. Sp. Pl. 4 : 922. 1806; Hook. f. Fl. Brit. Ind. 7 : 173. 1896.

Weak perennial, variable habit. Culms 30—80 cm tall, erect or ascending. Leaves linear, glabrous except at base; sheath hardly compressed; ligule membranous, truncate. Inflorescence a sub-digitate panicle, silky villous. Sessile spikelets 3—4 mm long, callus bearded. Lower glume 3.2 mm long, pitted on back, 5—7-nerved. Lower lemma 2 mm long. Upper lemma narrowly linear, awned, keeled and twisted, scaberulous, 10—20 mm long including stipe. Anthers 3, yellow, 1.5—2.0 mm long, sometimes 2 anthers and one staminode.

Fls. & Frts. : All round year in our area, provided moisture is available.

Distribution : Bastar, Damoh, Gwalior, Hoshangabad, Jabalpur, Raigarh, Satna, Sidhi.

13. BRACHIARIA Griseb.

- 1a. Panicle linear with erect racemes; spikelets 2—2.5 mm long, hairy; rachis hairy; lower glume 0.3 mm long minute scale ... *B. eruciformis* 2
- 1b. Panicle various; rachis glabrous or finely pubescent; lower glume developed :
- 2a. Spikelets 1.5—2 mm long, secund; pedicels with bulbous-based bristles .. *B. reptans* 4
- 2b. Spikelets 3—4.5 mm long; pedicels devoid of bulbous-based bristles :
- 3a. Rachis flat glabrous; racemes usually 3; spikelets solitary ... *B. distachya* 1
- 3b. Rachis triquetrous; pubescent; racemes more than 5; spikelets in pairs ... *B. ramosa* 3

1. *Brachiaria distachya* (L.) Stapf in Prain, Fl. Trop. Afr. 9 : 565. 1919; *Panicum distachyum* L. Mant. 1 : 138. 1767; *Brachiaria subquadripara* (Trin.) Hitch. In Lingnan. Sci. 7 : 214. 1931.

Annual or perennial. Culms 20—45 cm long, leafy decumbent or spreading; nodes pubescent. Leaf 3—15 cm long, glabrous or sparsely pilose, margins scaberulous; sheaths shorter than internodes, margins ciliate; ligule hairy. Inflorescence of 3—6 spreading racemes; rachis flattened, glabrous or sparsely hairy. Spikelets 3.5—4.0 mm long, elliptic, glabrous. Lower glume $\frac{1}{4}$ th of the spikelet. Upper glume 5—7-nerved, \pm 3 mm long. Lower lemma empty, similar to upper glume. Upper lemma transversely rugose, pale-brown, 2.2 mm long. Anthers 3, yellow, \pm 1 mm long. Caryopsis light yellow, oval, flattened, 1.6 mm long.

Fls. & Frts. : Aug.—Dec.

Distribution : Balaghat, Gwalior, sidhi.

2. *B. eruciformis* (J. E. Smith) Griseb. in Ledeb. Fl. Ross. 4 : 469. 1853; *Panicum eruciforme* J. E. Smith in Sibth. & J. E. Sm. Fl. Graeca 1 : 44. t. 59. 1806.

Annual. Culms 20—60 cm long, spreading, nodes pilose. Leaves flat, sheath glabrous; ligule hairy. Racemes 2—8, erect, appressed to the rachis, 1.0—2.5 cm long. Spikelets solitary, linear-lanceolate, 2.0—2.5 mm long, pubescent. Lower glume scale-like, minute. Upper glume membranous, 1.5—2.0 mm long, pubescent, 5-nerved. Lower lemma empty. Upper lemma elliptic, lanceolate, 1.5—2.0 mm long, faintly nerved, apex muticous. Anthers 3, yellow, \pm 1 mm long. Caryopsis elliptic, 1.0—1.5 mm long.

Fls. & Frts. : Throughout the year.

Distribution : Bilaspur, Gwalior, Indore, Morena, Ratlam, Sidhi.

3. **B. ramosa** (L.) Stapf in Prain, Fl. Trop. Afr. 9 : 542. 1919; *Panicum ramosum* L. Mant. Pl. 1 : 29. 1767.

Annual. Culms 30—75 cm tall, decumbent, ascending. Leaves lanceolate, cordate at base, glabrous; sheath loose, glabrous; ligule a short rim of hairs. Inflorescence consists of 5—many—racemes; rachis finely pubescent. Spikelets 3 mm long, usually in pairs, ovoid or obovoid, turgid, apiculate. Lower glume 1 mm long. Upper glume \pm 2 mm long, 5-nerved. Upper lemma hermaphrodite, 2.0—2.25 mm long, transversely rugose, apiculate; palea equalling lemma. Anthers 3, yellow, \pm 1.5 mm long. Caryopsis \pm 1.5 mm long, ovoid, apiculate, brown.

Fls. & Frts. : July—Oct.

Distribution : Balaghat, Damoh, Mandla, Rewa, Sidhi.

4. **B. reptans** (L.) Gardn. & Hubb. in Hk. Ic. Pl. sub. t. 3363.1938; *Panicum reptans* L. Syst. Nat. ed. 10. 870. 1759.

Annual. Culms slender, decumbent, 20—30 cm tall, nodes pubescent; internodes 2.5—7.0 cm long. Leaves ovate-lanceolate, cordate at base; sheaths 1—2 cm long, margins ciliate; ligule hairy. Inflorescence made of 5—8 racemes, alternate, 1.5—3.0 cm long. Spikelets in pairs, secund, 2mm long; pedicels with bulbous-based bristles. Lower glume hyaline, minute. Upper glume 9-nerved, boat-shaped, pointed, 2 mm long. Lower floret neuter or male. Upper floret hermaphrodite. Lemma indurate, 1.6 mm long, golden brown, apiculate; palea clasped by lemma. Anthers 3, yellow, 0.3 mm long. Caryopsis flattened-oval, 1.2 mm long.

Fls. & Frts. : July—Sept.

Distribution : Balaghat, Hoshangabad, Morena, Ratlam, Rewa, Sagar, Sidhi.

14. CAPILLIPEDIUM Stapf

- 1a. Annual, culms very weak, trailing or climbing; sessile spikelets 4—4.5 mm long ... *C. filiculme* 2
- 1b. Perennial, culms erect or geniculate; sessile spikelets 2.5—3 mm long (3—5 mm long in *C. parviflorum*) :
- 2a. Lower glume of the sessile spikelet channelled on back ; leaves not distinctly narrowed at base; panicle large, diffused ... *C. parviflorum* 4
- 2b. Lower glume of the sessile spikelet flat on back; leaves distinctly narrowed at base; panicle usually dense :
- 3a. Culm nodes glabrous; ligule membranous; upper lemma 1.2 mm plus 1—1.5 cm long awn ... *C. assimile* 1
- 3b. Culm nodes densely bearded; ligule lacerate ; upper lemma represented by \pm 2 cm long awn ... *C. hugelii* 3

1. *Capillipedium assimile* (Steud.) A. Camus in Lecomte, Fl. Gen. de II Indo-Chine 7 : 314. 1922; *Andropogon assimilis* Steud. in Zoll. Syst. Ver Z. 58. 1854 and in Syn. Pl. Glum 1 : 397. 1854.

Perennial. Culms 30—75 cm tall, hard, geniculate. Leaves linear-lanceolate, \pm 13 cm long, \times 3 mm wide; midrib hirsute, tubercle hairs on basal part ; ligule membranous. Inflorescence open panicle, branches capillary. Spikelets paired, pale green, dimorphic, upper pedicelled; pedicels longitudinally grooved, margins ciliate. Lower spikelet sessile, fertile, 2.5 mm long. Lower glume subcoriaceous, lanceolate; laterally

2-grooved, ciliate on back. Upper glume broadly lanceolate, 2-keeled, ciliate, 5-nerved. Upper lemma \pm 1.2 mm long, awned, 1-nerved, awns 1.0—1.5 cm long. Anthers 3, yellow, 1.5—2.0 mm long. Caryopsis \pm 1 mm long, brownish.

Fls. & Frts. : Sept.—Dec.

Distribution : Ambikapur, Bastar, Bilaspur, Hoshangabad, Mandla, Raigarh, Sidhi.

2. *C. filiculme* (Hook. f.) Stapf in Hook. Ic. Pl. sub tab. 3085. 1922; *Andropogon filiculmis* Hook. f. Fl. Brit. Ind. 7 : 181. 1896.

Annual, very weak trailing grass, climbs over other vegetation. Culms 60—90 cm long, usually branched, glabrous, nodes bearded. Leaves elliptic-lanceolate, 5—20 cm long, margins scabrid; sheaths bearded at tip; ligule membranous. Inflorescence a decomposed panicle, 5—12 cm long, branches capillary; joints 2.0—2.5 mm long, longitudinally grooved and translucent, margins densely hairy; callus short, bearded. Sessile spikelets 4.0—4.5 mm long, elliptic-lanceolate, hairy, awned. Lower glume oblong-lanceolate, 3.8—4.5 mm long, dorsally hairy, 7—11-nerved, 2-keeled. Upper glume 3-nerved, grooved. Lower lemma empty, ovate-oblong, 1.2—1.5 mm long. Upper lemma reduced to 15—20 mm long awn. Anthers 3, yellow, \pm 2 mm long. Caryopsis \pm 1 mm long.

Fls. & Frts. : Aug.—Jan.

Distribution : Ambikapur, Bastar.

3. *C. huegelii* (Hack.) Stapf in Hook. Ic. Pl. sub tab. 3085. 1922; *Andropogon huegelii* Hack. in DC., Monogr. Phan. 6 : 492. 1889.

Perennial. Culms 30—80 cm tall, erect or branching from base, shortly creeping, often red, nodes hairy. Leaves 10—25 cm, linear, margins scabrid; sheaths compressed; ligule lacerate (membranous ciliate). Panicle branches capillary with bearded axils. Sessile spikelets \pm 3 mm long, pale green-purplish, callus hairy. Lower glume ovate, truncate, villous. Upper glume glabrous, apiculate. Lower lemma 2 mm long, ovate, glabrous. Upper lemma represented by an awn about 2 cm long. Anthers 3, yellow, \pm 1 mm long. Caryopsis \pm 2 mm long, elliptic.

Fls. & Frts. : Sept.—Nov.

Distribution : Gwalior, Indore, Sagar.

4. **Capillipedium parviflorum** (R. Br.) Stapf in Prain. Fl. Trop. Afr. 9 : 169. 1917. *Holcus parviflorus* R. Br. Prodr. Fl. No. Holl. 199. 1810.

Perennial. Culms 1—15 cm tall, usually erect, tufted, branched, internodes channelled, glabrous. Leaves up to 30 cm long, glabrous or pubescent; sheath pubescent-hirsute; ligule membranous. Inflorescence compound panicle, purple—black. Racemes reduced to 1 sessile and 2 pedicelled spikelets, joints and pedicels 1.8 mm long, shortly ciliate. Sessile spikelets 3—5 mm long, purplisholive brown. Lower glume truncate, shallowly concave on back, 6-nerved, scabrid; upper glume similar to lower; lemma 2—2.5 mm long, awn 1—2 cm long. Pedicelled spikelet usually male, similar to sessile. Anthers 3, yellow, 1.5—2 mm long. Caryopsis not seen.

Fls. & Frts. : Sept.—Dec.

Distribution : Indore.

15. CENCHRUS L.

- | | | |
|---|-----|-----------------------|
| 1a. Bristles connate into a cup, all bristles erect | ... | <i>C. setigerus</i> 3 |
| 1b. Bristles connate at the base only, all bristles not erect : | | |
| 2a. Bristles antrorsely scabrid, tips filiform inner bristles ciliate on margins | ... | <i>C. ciliaris</i> 2 |
| 2b. Bristles retrorsely scabrid, tips reflexed or hook-like inner bristles glabrous | ... | <i>C. biflorus</i> 1 |

1. **Cenchrus biflorus** Roxb. Fl. Ind. 1 : 238. 1820.

Annual. Culms 20—60 cm tall, erect or ascending. Leaves linear-lanceolate, scabrid; sheaths glabrous; ligule ciliate. Inflorescence racemose 5—8 cm long, dense, straw-coloured, rarely purplish; rachis scabrid, involucre sessile or minutely stalked; bristles united at base forming a shallow disc; outer bristles in one row, spreading or deflexed, hook-like; inner ones glabrous on back, densely ciliate on margins. Spikelets usually 2-flowered, 4—6 mm long. Involucral glumes membranous. Lower lemma

barren, 3—5 mm long. Upper one as lower, acuminate, 5-nerved, membranous. Grain 2.5 mm long, elliptic, dorsally compressed, rugose. Anthers 3, yellow, 2 mm long.

Fls. & Frts. : Aug.—Dec.

Distribution : Sidhi.

2. *Cenchrus ciliaris* L. Mant. Alt. 302. 1771.

Annual or perennial. Culms 20—80 cm tall, erect or decumbent. Leaves linear glabrous; sheath loose, glabrous; ligule a rim of hairs. Inflorescence a raceme, 3—15 cm long, pale or purplish. Involucres sessile spreading; bristles antrorsely barbed, connate at the base only. Spikelets 1—3 in each involucre, 4—5 mm long. Lower lemma ovate-lanceolate, cuspidately acuminate, 3—5-nerved. Upper lemma as lower, 5—7-nerved, membranous. Palea lanceolate, membranous. Anthers 3, yellow, 1—2 mm long. Caryopsis 2 mm long, truncate, dorsally compressed.

Fls. & Frts. : Sept.—Dec.

Distribution : Gwalior, Indore, Sidhi.

3. *C. setigerus* Vahl, Enum. Pl. 2 : 395. 1806; *C. biflorus* Hook. f. Fl. Brit. Ind. 7 : 89. 1896, *non* Roxb. 1820.

Annual or perennial from a stout rootstock. Culms 20—60 cm tall, erect or geniculately ascending nodes glabrous. Leaves flat, linear-lanceolate, glabrous or pilose; sheaths keeled, lower part ciliate, mouth bearded, ligule ciliate. Inflorescence a raceme, 2—9 cm long, straw-coloured or purplish, solitary, cylindric; rachis scabrid. Involucre usually 2—3-flowered, rounded at base, bristles thick, connate into a cup, 1—3 mm long; outer 1.5—2.5 mm long. Spikelets in clusters of 2—3, 4 mm long, sessile, ovate-acute. Lower lemma barren or male, 4 mm long, 5—7-nerved, palea 3 mm long. Upper lemma hermaphrodite, 4.0—4.25 mm long. Lodicules absent. Anthers 3, yellow, 2.0—2.25 mm long. Caryopsis oblong, 2.0—2.5 mm long.

Fls. & Frts. : Aug.—Nov.

Distribution : Gwalior, Raigarh.

16. CEPHALOSTACHYUM Munro

Cephalostachyum pergracile Munro in Trans. Linn. Soc. 26 : 141. 1868; Fl. Brit. Ind. 7 : 413. 1896.

Shrubby bamboos. Culms 10—12 m tall, erect, glaucous-green, 5—7 cm in diameter; internodes 30—45 cm long, walls very thin. Culm sheaths 10—15 cm long, 15—20 cm broad, covered with black deciduous hairs on back, ovate, cordate; a wavy fringe bordering the top of sheath and ending to rounded auricle; the fringe and auricle covered with white bristles; ligule very narrow, entire. Foliage leaves variable, linear-lanceolate, 15—35 cm broad; petiole short, scabrid; sheaths glabrous, auricled at mouth with cilia; ligule very narrow, entire. Panicle large, drooping. Spikelets supported by chaffy bracts; rachis slender, wiry 3—5 cm between clusters. Spikelets in bracteate clusters, 1.25—1.75 cm long. Lemma 1.0—1.5 cm long, ovate-lanceolate, many-nerved, densely hairy, mucronate; palea keels ciliate apex deeply bifid. Lodicules 2, narrow, lanceolate, ciliate. Anthers purple. Caryopsis ovate-oblong, 1.0—1.25 cm long, furrowed on one side, ending in a beak of 1.25 cm long.

Fls. & Frts. : Rare.

Distribution : Bastar, Raipur.

17. CHIONACHNE R. Br.

Chionachne koenigii (Spreng.) Thw. Enum. Pl. Zeyl. 369. 1864; *Coix koenigii* Spreng. Syst. 1 : 238 1825; *Polytoca barbata* (Roxb.) Stapf ex Hook. f. Fl. Brit. Ind. 7 : 102. 1896.

Strongly perennial, monoecious. Culms 70—150 cm tall, erect, stout, nodes hairy. Leaves linear-lanceolate, margins razor-sharp; sheath compressed, covered with irritating hairs which extends up to blade; ligule membranous. Inflorescence made of racemes, single female spikelet at base and upper ones male; spathes herbaceous, 1.0—1.75 mm long, glabrous or hairy. Male spikelet linear, lanceolate, \pm 10 mm long, glabrous. Lower glume 8.5—9.5 mm long, 9—11-nerved; keels pilose. Upper glume membranous, 7-nerved. Lower lemma hyaline, 3-nerved, muticous at apex. Lodicules 2, cuneate. Anthers 3, yellow, \pm 6.5 mm long. Female spikelet sessile, 4—6 mm long, lower glume 4—5 mm long. Lemmas with hayline

margins. Upper glume membranous, 4—5 mm long, ciliate at margins. Lower lemma empty, \pm 3.5 mm long, 3-nerved, epaleate. Upper lemma shorter than the lower, 1-nerved. Palea equal to lemma, nerveless. Lodicules 2. Caryopsis 4—5 mm long, enclosed in hardened lower glume, white, shining, glabrous, oblong, rounded above.

Fls. & Frts. : Sept.—Jan.

Distribution : Balaghat, Bastar, Betul, Bilaspur, Gwalior, Hoshangabad, Indore, Morena, Raigarh.

18. CHLORIS Swartz

- 1a. Empty lemma solitary above the fertile floret :
- 2a. Spikes spreading, up to 20 cm long; empty lemma reduced to an awn; caryopsis 4—4.5 mm long ... *C. dolichostachya* 2
- 2b. Spikes crowded, less than 6 mm long; empty lemma oblanceolate, truncate; caryopsis 1—1.5 mm long, shining ... *C. virgata* 4
- 1b. Empty lemmas 2—4 above the fertile floret :
- 3a. Empty lemmas 3—4; culm puberulous below the inflorescence; caryopsis 2—2.5 mm long, subtrigonus ... *C. montana* 3
- 3b. Empty lemmas 2; culms glabrous below the inflorescence; caryopsis \pm 1.75 mm long, fusiform ... *C. barbata* 1

1. *Chloris barbata* Sw. Fl. Ind. Occ. 1 : 200. 1796. Hook. f. Fl. Brit. Ind. 7 : 292. 1896.

Perennial. Culms 25—75 cm tall, base geniculate. Leaves flat, folded in xeric condition, glabrous; sheath compressed, keeled, glabrous; ligule a narrow membrane. Inflorescence made of digitate spikes (4—17), rachis scabrous. Spikelets 2.5—3 mm long, 2-seriate, imbricate, sessile. Lower floret solitary, perfect, upper two florets imperfect; rachilla disarticulates above glumes with a tuft of hairs at base. Lower glume \pm 1 mm long, 1-nerved, short-awned. Upper glume 2—2.5 mm long, awn up to 5 mm long. Lower lemma 2.5—3 mm long broadly elliptic, membranous.

3-nerved, often tinged with purple, keel ciliate, awn 2.5—4.5 mm long, bristle like. Empty lemmas 2, smaller, truncate, with short awns. Anthers 3, yellow, 1.5 mm long. Caryopsis 1.75 mm long fusiform.

Fls. & Frts. : Aug.—Jan.

Distribution : Gwalior, Hoshangabad, Sagar.

2. *Chloris dolichostachya* Lagasca, Gen. et Spec. Pl. 5. 1816.

Perennial. Culms 30—100 cm tall, erect or procumbent, nodes glabrous. Leaves flat, 10—25 cm long, glabrous except near sheath; sheaths compressed, mouth hairy; ligule hairy. Inflorescence consists of 4—10 digitate spikes; rachis scabrid. Spikelets sessile, 2-seriate, 6.5—7.0 mm long. Florets awned, lower floret perfect and upper imperfect. Lower glume membranous, lanceolate, \pm 2.5 mm long. Upper glume similar in structure, 5—6 mm long, awned. Lower lemma 5—6 mm long, 3-nerved; awn \pm 12 mm long. Sterile lemma represented by 8—10 mm long awn. Lodicules 2, small. Anthers 3. Caryopsis oblong-lanceolate, 4.0—4.25 mm long, brown, sub-trigonous.

Fls. & Frts. : Sept.—Dec.

Distribution : Ambikapur, Betul, Gwalior, Hoshangabad, Mandla, Morena, Raipur, Rewa, Sagar, Sidhi.

3. *C. montana* Roxb. Fl. Ind. 1 : 331. 1820; Hook. f. Fl. Brit. Ind. 7 : 292, 1896.

Perennial. Culms 10—50 cm tall with variable habits. Leaves flat or folded, lanceolate, glabrous or sometimes pilose along the margins; sheath compressed, glabrous, mouth with long hairs; ligule membranous. Inflorescence of 3—6 digitate spikes, rachis scabrid and pilose. Spikelets \pm 3 mm long, 2-seriate, imbricate, ovate, lowest floret perfect and 3—4 imperfect florets above it, rachilla bearded at base. Lower glume 2—2.5 mm long, keeled, acute. Upper glume 2.5—3 mm long. Lower lemma 2.5—3 mm long, elliptic, margins ciliate, awn 6.5—7 mm long. Palea scabrid on keel. Upper lemmas gradually smaller, with smaller awns. Anthers 3, small, caryopsis 2—2.5 mm long, brownish.

Fls. & Frts. : Aug.—Jan.

Distribution : Gwalior.

4. *Chloris virgata* Sw., Fl. Ind. Occ. 1 : 203. 1796.

Perennial. Culms 15—50 cm tall, erect or decumbent, usually flattened and profusely branched. Leaves flat, glabrous, hairy near throat; sheath loose, glabrous, keeled; ligule membranous. Inflorescence consists of 4—9 spikes, 2.5—3.5 cm long, digitate; rachis capillary, scabrid. Spikelets 3—4 mm long, sessile, in two rows. Lower glume 2 mm long, 1-nerved. Upper glume 3—4 mm long, lanceolate, scabrid on keel, short awned. Lower lemma 2.5—3.5 mm long, oblong-lanceolate, bifid at tip, awn \pm 7 mm long. Empty lemma oblanceolate, 1.8—2.0 mm long, truncate with \pm 5 mm long awn. Anthers 3, yellow, 0.2—0.3 mm long. Caryopsis shining, trigonous, 1.0—1.5 mm long.

Fls. & Frts. : Aug.—Dec.

Distribution : Balaghat, Bastar, Bilaspur, Hoshangabad, Indore, Morena, Rajnandgaon, Rewa, Sagar, Satna, Sidhi.

19. **CHRYSOPOGON** Trin.

- 1a. Length of pedicels at least half of sessile spikelet; base of plant with creeping rhizomes ... *C. aciculatus* 1
- 1b. Length of pedicels shorter than half of the sessile spikelet; creeping rhizomes absent :
- 2a. Leaves conspicuously distichous; panicle narrow, interrupted ... *C. polyphyllus* 3
- 2b. Leaves and panicle not as above :
- 3a. Upper glume of the sessile spikelet pectinately ciliate on the keel; sessile spikelet 4—6 mm long ... *C. fulvus* 2
- 3b. Upper glume of the sessile spikelet glabrous; sessile spikelet 6—7 mm long ... *C. serrulatus* 4

I. *Chrysopogon aciculatus* (Retz.) Trin. Fund. Agrost. 118. 1820; *Andropogon aciculatus* Retz. Obs. Bot. 5 : 22. 1789; Fl. Brit. Ind. 7 : 188. 1896.

Perennial. Culms 30—50 cm tall. Leaves 15—30 cm long, linear-lanceolate, oblong-acute from cordate base, margin scabrid; sheath glabrous, overlapping, compressed, flabellate on creeping part; ligule a hairy rim. Inflorescence an exserted panicle, branches in several whorls, purplish or dark brownish. Spikelets in groups of 3, one sessile, 2 pedicelled. Sessile spikelet hermaphrodite, 3.5—4.0 mm long, oblique; callus very sharp with golden brown hairs. Lower glume 3.0—3.2 mm long, lanceolate, bidentate, 3-nerved, upper part hirsute. Upper glume 3.5 mm long, boat-shaped, aristate, ciliate. Lower lemma 2.5—3.0 mm hyaline, 2-nerved. Upper lemma 3 mm long, 1-nerved. Palea 1 mm long, hyaline. Anthers 1 mm long. Pedicelled spikelets 4.0—4.5 mm long. Lower glume 4—5 mm long, glabrous. Upper glume 3—4 mm long. Lower floret empty. Lower lemma 3.2—3.5 mm long. Upper lemma 2.8—3.0 mm long, mucronate. Anthers 3, orange yellow, 2.5 mm long. Caryopsis not seen.

Fls. & Frts. : July—Nov.

Distribution : Damoh, Shukla : 28747.

2. *C. fulvus* (Spreng.) Chiv. Fl. Somalia 1 : 327. 1929; *Pollinia fulva* Spreng. Pugill. 2 : 10. 1815; *Andropogon monticola* Roem. & Schult. Fl. Brit. Ind. 7 : 129. 1896.

Perennial. Culms densely tufted, erect and branching, 50—70 cm tall. Leaves linear-acuminate, glabrous; sheath keeled, glabrous, lower ones overlapping; ligule a hairy rim. Inflorescence a panicle, branches filiform, arranged in whorls. Spikelets in groups of 3, one sessile, 2 pedicelled. Sessile spikelet 4—7 mm long; callus short, densely covered with golden hairs. Lower glume 4—6 mm long, narrowly oblong, 2—4-nerved. Upper glume 5 mm long, compressed, 3-nerved, margin hyaline; awns 3—6 mm long. Palea absent or small. Pedicelled spikelet 4—5 mm long, dorsally compressed. Lower glume 5 mm long, lanceolate, acuminate, 7-nerved. Upper glume 5 mm long, acuminate, 3-nerved. Lemma 3.5 mm long, hyaline. Anthers 3, yellow or purple, 3—4 mm long. Caryopsis not seen.

Fls. & Frts. July—Dec.

Distribution : Ambikapur, Balaghat, Bastar, Gwalior, Raigarh, Sidhi.

3. **Chrysopogon polyphyllus** (Hack.) Blatt. & Mc Cann in J. Bombay Nat. Hist. Soc. 32 : 416. 1928. *Andropogon polyphyllus* Hack. ex Hook. f. Fl. Brit. Ind. 7 : 194. 1896.

Perennial. Culms 50—100 cm tall, thick, glabrous. Leaves linear, crowded, glabrous, scaberulous on margins; sheath compressed hard; ligule membranous. Inflorescence a panicle, branches very unequal peduncle glabrous. Sessile spikelets \pm 5 mm long, callus hairy, white to rusty red. Lower glume strongly compressed. Upper glume equal to spikelet, 2-fid, awned, keel hirsute, margins ciliate. Lemma 4—5 mm long, hyaline, obtuse, ciliate. Pedicelled spikelets male or neuter. Anthers 3, yellow, 2 mm long. Caryopsis not seen.

Fls. & Frts. : Sept.—Dec.

Distribution : Hoshangabad.

4. **C. Serrulatus** Trin. in Mem. Acad. Sci. Petersb. Ser. 6, 2 : 318, 1832. *Andropogon monticola* Schult. var. *trinii* Hook. f. Fl. Brit. Ind. 7 : 193, 1896.

Perennial. Culms 30—80 cm tall, tufted. Leaves flat, linear, glabrous or sparsely hairy, margins scabrid, sheath compressed; ligule ciliate. Inflorescence a panicle, yellowish, rachis scabrid. Sessile spikelet 6—7 mm long, awned. Lower glume 5.5—6 mm long, 5—7 nerved, aristate. Upper glume 5.2—5.7 mm long, 3-nerved arista 13—14 mm long. Lower lemma hyaline, linear, 5—5.5 mm long, nerveless. Upper lemma reduced to awn. Pedicelled spikelet 6—7 mm long. Anthers 3, yellow, 2.5 mm long. Caryopsis not seen.

Fls. & Frts. : July—Dec.

Distribution : Sidhi.

20. COELACHNE R. Br.

Coelachne simpliciuscula (Wight & Arn.) Munro ex Benth. in J. Linn. Soc. Bot. 19 : 93. 1881; *Panicum simpliciusculm* Wight & Arn. ex Steud. Syn. Pl. Glum 1 : 96. 1854.

Annual. Culms 15—40 cm tall, decumbent, weak. Leaves scattered up to panicle, blades tapering to a point, rough to touch, nerves striate;

sheath loose, striate; ligule hairy. Inflorescence a variable panicle. Spikelets sessile or shortly pedicelled, globose or ovoid. Lower glume 1 mm long, nerves obscure. Upper glume 1.5 mm long, herbaceous, nerves obscure. Lower lemma 2 mm long, coreaceous, rounded on back. Upper floret neuter; rachilla stipitate. Anthers 2, yellow, 0.2—0.4 mm long. Caryopsis narrowly elliptic, \pm 0.5 mm long.

Fls. & Frts. : Dec.—March.

Distribution : Ambikapur, Bastar, Bilaspur, Raigarh.

21. COIX L.

- 1a. Lower glume of the male spikelets narrowly winged; spikelets 2—3 mm broad ... *C. lachryma-jobi* 3
- 1b. Lower glume of the male spikelet broadly winged; spikelets 5—6 mm broad :
- 2a. Plants floating or creeping; stem succulent, nodes rooting; upper surface of leaves glandular which bear bristle-like hairs ... *C. aguatica* 1
- 2b. Plants erect, stem, nodes and leaf surface not as above ... *C. gigantea* 2

Note : *Coix aguatica* and *C. gigantea* are morphologically very similar except their habit. To me, *C. agguatica* appears as an ecological adaptation of *C. gigantea* populations.

1. *Coix aguatica* Roxb. Fl. Ind. ed. 2. 3 : 571. 1832.

Annual or perennial. Culms 50—120 cm tall, terete, nodes glabrous. Leaves flat, linear-lanceolate, cordate at base, upper surface with glandular hairs, ciliate on margins; sheath compressed, glabrous; ligule membranous. Inflorescence consists of racemes, 3—7 cm long, speciform, with one basal female spikelet enclosed in a globose bract through which rachis passes and bears male spikelet on top. Male spikelet 2—3-nate, imbricate, long and short pedicelled spikelets, or all sessile, elliptic-lanceolate, 11—12 \times 4—6 mm long, muticous. Lower glume herbaceous, elliptic-lanceolate, 10.5—11.5 mm long, concave, many-nerved, keels 2, winged. Upper glume similar but wingless, 7—9-nerved. Lower lemma hyaline, equal to upper glume, 3—5-nerved. Anthers 3, orange coloured, 6.0—6.5 mm long. Female

spikelet ovoid, 10—11 mm long; cream coloured, acuminate, enclosed by bract forming a bony involucre. Lower glume chartaceous, oblong-lanceolate, 8—9 mm long, margins inrolled, apex acuminate, beaked. Upper glume hyaline, deeply 2-grooved, keeled, apex mucicous. Lower lemma empty, oblong-lanceolate, 7—8 mm long, 5-nerved acuminate. Upper lemma similar, faintly nerved; lodicules absent, sometimes staminodes present. Caryopsis ellipsoid in turbinate involucre.

Fls. & Frts. : Sept.—Dec.

Distribution : Balaghat, Bastar, Hoshangabad, Raigarh, Ratlam, Rajnandgaon, Sidhi.

2. **C. gigantea** Koenig ex Roxb. Fl. Ind. ed. 2. 3 : 570. 1823.

Perennial. Culms 1—2 m tall. Leaves linear-acuminate, glabrous, margins scabrid; sheath terete, tight, glabrous; ligule membranous. Inflorescence male or bisexual consists of several racemes. Spikelets groups of 3, 2 sessile and 1 pedicelled. Sessile spikelet with short glabrous callus. Lower glume many-nerved, winged. Upper glume narrow, acuminate, wingless. Lower lemma 7-nerved, incurved margins, \pm 1 cm long. Palea 2-nerved, winged; lodicules 2, cuneate. Anthers 3, 7 mm long. Upper lemma 3-nerved, lanceolate, margins infolded, 9.4 mm long. Palea hyaline, 4-nerved, lanceolate, 9 mm long. Anthers 3, 5.5—6.0 mm long; lodicules 2, cuneate. Caryopsis 1.0—1.5 cm long, acute, dull white.

Fls. & Frts. : Oct.—Jan.

Distribution : Balaghat, Hoshangabad, Mandla, Sagar.

3. **C. lacryma-jobi** L. Sp. Pl. ed. 1. 972. 1753.

Annual or perennial. Culms 1.0—1.5 m tall, robust, branching, spongy, glabrous, polished. Leaves flat, 10—50 cm long, cordate at base; sheaths glabrous, broad; ligule membranous. Inflorescence made of sub-erect spikes. Male spikelets terminal, 2—3-nate, loosely imbricate on a slender rachis, 8—12 mm long, up to 2 mm broad. Lower glume papery, many-nerved, with winged margins, densely ciliate. Upper glume thin, oblong-lanceolate, acuminate, 9-nerved. Lower floret male, triandrous. Lemma membranous, oblong-lanceolate, acuminate, faintly 5-nerved. Palea hyaline, 2-keeled. Upper floret male, triandrous or empty. Lemma

6—10 mm, oblong-lanceolate, acute, 5-nerved. Female spikelet basal ovoid, entirely surrounded by the hardened bract forming a bead-like bony involucre, yellowish white or bluish-grey, 6—11 mm long. Lower glume ovate-oblong, acute, papery. Upper glume thinner. Lower floret female or empty. Upper floret female. Lemma equal to spikelet. Caryopsis ovoid or globose \pm 5 mm long. Anthers 3, orange yellow, 4.5 mm long.

Fls. & Frts. : Sept.—Dec.

Distribution : Bilaspur, Gwalior, Hoshangabad, Indore, Jagdalpur, Mandla, Raigarh.

22. CRYPSIS Ait.

Crypsis schoenoides (L.) Lamk. Tab. Encycl. Meth. Bot. 1 : 166. 1791. *Phleum schoenoides* L. Sp. Pl. ed. 1 : 60. 1753. *Heleochoa schoenoides* (L.) Host. Icom. Gram. Austr. 1 : 23. 1801; Hook, f. Fl. Brit. Ind. 7 : 235. 1896.

Annual. Culms 5—15 cm tall, prostrate, striate, glabrous. Leaves 2—3 cm long, narrowly lanceolate, acuminate; sheaths deeply furrowed, margins glabrous or ciliate; ligule hairy. Inflorescence a compressed panicle, like a spike, major portion concealed in the sheath. Spikelets 3.2 mm long. Lower glume 2.5 mm long, linear, lanceolate, folded, glabrous, keel, ciliate, 1-nerved. Upper glume 2 mm long, ovate lanceolate, acute, 1-nerved, ciliate. Lemma 3.2 mm long, broadly ovate, acute, membranous, 1-nerved. Palea 3.2 mm long oblong, glabrous. Anthers 2—3, very small, yellow, filaments long. Caryopsis 1.2 mm long, oblong, ellipsoid.

Fls. & Frts. : Nov.—April.

Distribution : Chhatarpur : Bhaskar 33596.

Note : This species shows great variability according to environmental conditions.

23. CYMBOPOGON Spreng.

1a. Panicles narrow; hairs of pedicels and joints conceal the sessile spikelet; leaves filiform, ligule notched

... *C. schoenanthus* 3

1b. Panicles large; hairs of pedicels and joints not concealing the sessile spikelet; leaves flat, ligule truncate :

2a. Lower glume of sessile spikelet grooved in lower half; leaves cordate and amplexicaul at base ...

C. martinii 1

2b. Lower glume of sessile spikelet winged, with 2 shallow pits at base; leaves spatheolate at base, median nerve very thick ...

C. pendulus 2

1. **Cymbopogon martinii** (Roxb.) Wats. in Atkins, Gaz. N. W. Prov. Ind. 392. 1882; *Andropogon martinii* Roxb. Fl. Ind. 280. 1820.

Perennial. Culms tufted, erect, 1.5—2.0 m tall, glabrous, lower nodes often swollen. Leaves flat, linear-lanceolate, glabrous, base semi-amplexicaul or rounded; sheath terete, glabrous; ligule membranous. Inflorescence compound panicle; spathe 3—6 cm long; spatheole 2 cm long, enclosing 3—6 spikelets. Sessile spikelet 3—5 mm long, ovate or ovate-oblong, awned. Lower glume ovate-oblong, obtuse, grooved on the back. Upper glume lanceolate, acute; keel winged, serrulate. Lower floret empty. Lemma 3.5 mm long, nerveless, ciliate, awned. Palea absent. Upper floret bisexual. Lemma 3 mm long, 2-lobed, awned. Pedicellate spikelet male. Lower glume lanceolate-oblong, obtuse. Upper glume 3-nerved. Lemma hyaline. Palea absent. Anthers 3, yellow brown, 2.5—3.0 mm long. Caryopsis oblong.

Fls. & Frts. : Sept.—Feb.

Distribution : Bastar, Gwalior, Hoshangabad, Raigarh, Rajnandgaon, Sidhi.

2. **C. Pendulus** (Nees ex Steud.) Wats. in Atkins. Gaz. N. W. Prov. Ind. 392. 1882. *Andropogon pendulus* Nees ex Steud. Syn. Pl. Glum. 1 : 388. 1854.

Perennial. Culms 1—2 m tall, tufted, erect or ascending. Leaves up to 1 m in length, median nerve very thick, spatheolate at base; sheath tight, glabrous, striat; ligule membranous, truncate. Inflorescence 30—50

cm long, decompound (tertiary branching), sessile spikelets hermaphrodite, 5—6 mm long, lanceolate, palegreen, awns 9—11 mm long. Lower glume equalling the spikelet, winged, 4-nerved, 2 shallow pits at base. Upper glume equal to lower. Male spikelet violet or reddish at summit. Anthers 3, yellow, 1.5—2 mm long. Caryopsis not seen.

Fls. & Frts. : Feb.—April.

Distribution : M. P., Coll. no. 1833.

3. *C. schoenanthus* (Linn.) Spreng. Pugill. 2 : 15, 1815. *Andropogon schoenanthus* Linn. Sp. Pl. ed. 1 : 1056, 1753. Hook. f. Fl. Brit. Ind 7 : 204, 1896.

Perennial. Culms 1—2 m tall, erect. Leaves linear, glabrous, glaucous; sheath terete, glabrous; ligule membranous, notched. Inflorescence a panicle made of spikes enclosed in spathes, joints and pedicels narrowly clavate, margins ciliate. Sessile spikelet \pm 5 mm long, glabrous. Lower glume equal to spikelet, irregularly toothed. Upper glume similar, ciliate. Lemma oblong, ciliate, awn 12—15 mm long. Anther 3, pinkish 1.5—2 mm long. Caryopsis not seen. Pedicelled spikelet similar to sessile but male.

Fls. & Frts. : Sep.—Nov.

Distribution : Balaghat.

24. CYNODON Rich

- | | |
|--|----------------------|
| 1a. Lemmas equaling to, or shorter than the upper glume, hairs on lemmas clavellate... | <i>C. barberi</i> 2 |
| 1b. Lemmas longer than the upper glume, hairs on lemmas usually not clavellate : | |
| 2a. Inflorescence of 2—6 spikes up to 6 cm long, plant rhizomatous, ligule a ring of white hairs ... | <i>C. dactylon</i> 3 |
| 2b. Inflorescence of 4-several spikes, up to 10 cm long, plants not rhizomatous, ligule membranous ... | <i>C. arcuatus</i> 1 |

1. *Cynodon arcuatus* J. S. Presl. ex C. B. Presl., Haenk. 1 : 290, 1830; *C. intermedius* Rang. & Tad. in J. Bombay Nat. Hist. Soc. 26 : 304, 1918.

Perennial. Culms 20—40 cm tall, stoloniferous, **not** rhizomatous, leafy all over. Leaves linear, 2—10 cm long, acuminate, glabrous, margins scabrid; sheath compressed, glabrous; ligule membranous, truncate. Inflorescence consists of 4—6 (rarely 8) spikes. Spikelets 1.5—2.0 mm long, 1-flowered, awnless, arranged in two rows on the rachis. Lower glume 1 mm long, curved, lanceolate, 1-nerved. Upper glume 1.5 mm long, straight. Lemmas 2 mm long, obliquely ovate, oblong chartaceous, 3-nerved, margin and keel hairy. Palea scabrid on keel. Anthers 3, yellow, 0.5—1.0 mm long. Caryopsis 1.5 mm long, elliptic, brownish.

Fls. & Frts. : July—Sept.

Distribution : Balaghat, Bastar, Damoh, Gwalior.

2. *C. barberi* Rang. & Tad. in J. Bombay Nat. Hist. Soc. 24 : 846, 1916.

Perennial. Culms 25—40 cm tall from creeping stolons, rooting at nodes. slender, often branched. Leaves linear, lanceolate, acute, margins scabrid; sheaths compressed, keeled, glabrous, mouth bearded; ligule ciliate. Inflorescence of 4—5 spikes, whorled, spreading; rachis scaberulous, hairy at base. Spikelets sessile, 2.0—2.5 mm long, compressed, 2-seriate, imbricate, 1-flowered. Lower glume membranous, 1-nerved. Upper glume similar, 2.25—2.5 mm long, acute or mucronate at apex. Lemma boat-shaped, 1.8—2.0 mm long, membranous, 1.8—2.0 mm long, keel and margins hispid with clavellate hairs, acute. Anthers 3, small. Caryopsis oblong, 1.0—1.3 mm long.

Fls. & Frts. : Aug.—Nov.

Distribution : Rare, usually growing on sandy river beds; Gwalior, Rajnandgaon, Raigarh.

3. *C. dactylon* (L.) Pers., Syn. Pl. 1 : 85, 1805; *Panicum dactylon* L., Sp. Pl. 58, 1753.

Perennial. Flowering culms 10—40 cm tall, stoloniferous, rooting at nodes. Leaves narrow, linear, glabrous, glaucous; sheaths compressed,

glabrous; ligule ciliate. Inflorescence made of 2—6 spikes, erect, spreading; rachis slender. Spikelets sessile, 1.5—2.5 mm long, compressed, 1-flowered. Lower glume membranous, narrowly oblong, 1.0—1.5 mm long, keeled, acute. Upper glume similar, 1.5—2 mm long. Lemma membranous, 2.0—2.5 mm long, 3-nerved, keels and margins hispid with white hairs, apex acute. Anthers 3, very small. Caryopsis 1.25—1.5 mm long.

Fls. & Frts. : Throughout the year in moist places.

Distribution : All over the state.

25. CYRTOCOCCUM Stapf

Cyrtococcum oxyphyllum (Steud.) Stapf in Hook., Ic. Pl. sub. tab. 3096. 1922; *Panicum oxyphyllum* Steud. Syn. Pl. Glum 1 : 65. 1854.

Perennial. Culms 20—60 cm tall, branched at base, glabrous. Leaves sparsely hairy, margins scabrid; sheaths shorter than internodes, shortly hairy or smooth; ligule membranous, truncate. Inflorescence a panicle, branches filiform with scattered long white hairs. Spikelets crowded, 1.5—2.0 mm long, glabrous. Lower glume 1.0—1.5 mm long, acute, 3-nerved. Upper glume 1.5—1.8 mm long, elliptic. Lower lemma coreaceous, shining, smooth, a brown scar at top. Anthers 2, yellow, \pm 1 mm long. Caryopsis \pm 2 mm long, white, grooved along the centre.

Fls. & Frts. : Nov.—Feb.

Distribution : Bastar, Hoshangabad.

26. DACTYLOCTENIUM Willd.

- 1a. Spikes 2—5 cm long; ligule membranous; caryopsis reniform ... *D. aegyptium* 1
- 1b. Spikes 0.5—2 cm long; ligule very small membrane or hairy; caryopsis not reniform :
- 2a. Rachis projection 2 mm long; back of rachis grooved on each side; plants perennial and glaucous ... *D. indicum* 3

- 2b. Rachis projection 3—4 mm long;
back of rachis not grooved; plants
annual and green ... *D. aristatum* 2

1. *Dactyloctenium aegyptium* (L.) P. Beauv. Ess. Agrost. Expl. Pl. 15. 1812; *Cynosurus aegyptius* L., Sp. Pl. 72. 1753; *Eleusine aegyptia* (L.) Desf. Fl. Brit. Ind. 7 : 295. 1896.

Annual. Culms 15—50 cm tall, terete or compressed, erect or ascending, glabrous. Leaves flat, linear-lanceolate, glabrous or hispid, acute; sheath compressed, sparsely hispid; ligule membranous. Inflorescence of 2—6 digitate spikes; rachis stout, projected as rigid sharp point beyond the spikelets. Spikelets sessile, \pm 2 mm long, laterally compressed, densely crowded, 3—5-flowered. Lower glume ovate, 3.5—4.0 mm long, 1-nerved; keel narrowly winged, scabrid. Upper glume ovate, 3.5—4.0 mm long, 1-nerved; keel narrowly winged, apex cuspidate, 1.5—2.0 mm long, incurved. Lower lemma ovate, 3.0—3.5 mm long, 1-nerved. Empty lemma one or absent. Palea keels hispid. Anthers 3, yellow, \pm 0.5 mm long. Caryopsis globose, rough, 0.8 mm long, reniform.

Fls. & Frts. : Aug.—Nov.

Distribution : Bastar, Raipur, Sidhi.

2. *D. aristatum* Link, Hort. Berol. 1 : 59. 1827; *Eleusine aristata* sensu Hook. f. Fl. Brit. Ind. 7 : 296. 1896.

Annual. Culms 5—1 cm tall, erect. Leaves linear-lanceolate, sparsely hairy or glabrous; sheath compressed, hairy; ligule very small, membranous. Inflorescence usually solitary spike; rachis slender, hairy at base, apical prolongation 3—4 mm long beyond the spikelets. Spikelets densely crowded, laterally compressed, sessile in two rows, 3-flowered. Lower glume 2.5—3.0 mm long, 1-nerved; keel winged, produced into incurved cuspidate 1.5—1.8 mm long. Lower lemma membranous, 3.5—4.0 mm long, 1-nerved, similar to upper glume. Empty lemma one, similar to fertile. Palea keels hispid. Anthers 3, \pm 0.4 mm long. Caryopsis globose, rugose.

Fls. & Frts. : July—Oct.

Distribution : Ambikapur, Balaghat, Bilaspur, Indore, Mandla, Raigarh, Raipur, Rewa, Satna, Sidhi.

3. *Dactyloctenium indicum* Boiss. Diagn. Ser. 2, 4 : 131, 1859 :
Eleusine indica (Boiss.) Duthie, Fodd. Grass. N. Ind. 58, 1888.

Perennial. Culms spreading 5—40 cm long, rooting at nodes, tomentose with long hairs, nodes villous. Leaves linear, small, hairy; sheath compressed, hairy; ligule hairy. Inflorescence of digitate spike forming a cross, hairy at base, rachis projection 2 mm long. Spikelets 3.2 mm long. Lower glume 2 mm long, keeled, arista 1 mm long. Upper glume 2.7 mm long, ovate, arista 0.7 mm long, broadly ovate, acute, cuspidate, glabrous. Anthers 3, yellow, 0.5—0.8 mm long. Caryopsis ovoid, rugose, \pm 0.5 mm long.

Fls. & Frts. : Sept.—Jan.

Distribution : Katni.

27. DENDROCALAMUS Nees.

Dendrocalamus strictus (Roxb.) Nees in tinnaea 9 : 476. 1834.
Bambos stricta Roxb. Corom. Pl. 1 : 58. 1798.

Strong perennial, deciduous. Culms 6—15 m tall, 2.5—8 cm in diameter, internodes 30—45 cm long, hollow in wet and solid in dry climate, young ones glaucous-green, old dull-green or yellowish, nodes swollen. Culm sheaths variable, 7—30 cm long, covered on the back with golden-brown stiff hairs, sometimes glabrous, striate, rounded at the top, slightly auricled, margins ciliate; imperfect blade triangular hairy, ligule narrow. Foliage leaves; linear-lanceolate, 2.5—25 cm long, rounded at the base into short petiole, terminating above in a sharp acuminate twisted point, margins scabrous; leaf-sheaths striate, hairy, ending in a prominent callus and short auricle with a few, wavy, deciduous cilia, ligule narrow.

Inflorescence a large, branching panicle with dense, glabrous, spaced heads, rachis rounded, smooth. Spikelets 8—12 mm long, hairy spinescent, fertile and sterile mixed. Empty glumes 2 or more, ovate, spinescent, many nerved. Lemma ovate ending in a sharp spine surrounded by ciliate tufts of hairs. Palea 6—8 nerved, ovate or obovate, emarginate keels ciliate. Anthers 4—5 mm long, yellow, apiculate. Lodicules absent, yellow-brown. Ovary, ovate, style 6—10 mm long undivided, ending into purple feathery

stigma. Caryopsis brown, shining, 7—8 mm long, beaked, shining, ovoid to sub-globose.

Fls. & Frts. : Rare.

Distribution : Ambikapur, Balaghat, Bastar, Bilaspur, Hoshangabad, Indore, Jabalpur, Raigarh, Raipur, Rajnandgaon, Rewa, Seoni, Sidhi.

28. DESMOSTACHYA Stapf

Desmostachya bipinnata (L.) Stapf. Fl. Cap. 7 : 632. 1900; *Briza bipinnata* L. Syst. Nat. ed. 10. 875. 1759; *Eragrostis cynosuroides* (Retz.) P. Beauv. Essai Agrost. 162. 1812; Hook. f. Fl. Brit. Ind. 7 : 324. 1896.

Strong perennial. Culms 0.3—1 m tall, rhizomes thick, creeping, deep rooted. Leaves linear, leathery, convolute, acute; sheaths leathery, glabrous, hairy at throat; ligule a ring of hairs. Inflorescence a large panicle consisting many spikes. Spikelets 2-seriate, pectinate, 3—6-flowered, purple brown. Lower glume 0.5—0.7 mm long; keeled, mucronate, 1-nerved. Upper glume 1 mm long, obtuse. Lemmas 1.5—1.7 mm long; keels scabrid. Anthers 3, purplish yellow, 0.8—1.0 mm long. Caryopsis 0.4 mm long, obliquely ovoid, compressed.

Fls. & Frts. : Aug.—Oct. and March—April.

Distribution : Gwalior, Raipur, Rewa, Sheopuri.

Note : Strong, extensive and scaly rhizome plus the needle like new emerging shoots are good field characters.

29. DICHANTHIUM Willemet.

1a. Peduncle of the raceme hairy ... *D. aristatum* 2

1b. Peduncle of the raceme glabrous :

2a. Lower glume of the sessile spikelet boat-shaped, keel not winged, median nerve present, ligule a large membrane ... *D. annulatum* 1

- 2b. Lower glume of the sessile spikelet
not as above, ligule a short ciliate
membrane ... *D. caricosum* 3

Note Based on morphological characters and ecological adaptations, it appears, that *D. aristatum* is an ecological form of *D. caricosum*. However, experimental testing is necessary.

1. ***Dichanthium annulatum*** (Forssk.) Stapf in Prain, Fl. Trop. Afr. 9 : 178. 1917; *Andropogon annulatus* Forssk. Fl. Aegypt-Arab. 173. 1775; Brit. Ind. 7 : 196. 1896.

Perennial. Culms 40—100 cm tall, erect or ascending. Leaves linear, acuminate, hairy, margins scabrid. Inflorescence consists of 2—10 subdigitate racemes. Sessile spikelets hermaphrodite. 3.0—3.5 mm long, narrow with 1.5—2.5 cm long awn. Anthers 3, yellow, \pm 2 mm long. Caryopsis light brown, \pm 2 mm long, broadly elliptic. Pedicelled spikelets male or neuter.

Fls. & Frts. : Throughout the year.

Distribution : Ambikapur, Bastar, Betul, Bilaspur, Gwalior, Hoshangabad, Raigarh Raipur, Rajnandgaon, Rewa, Sidhi.

2. ***D. aristatum*** (Poir.) C. E. Hubb. in Kew Bull. 1939 : 654. 1940; *Andropogon aristatus* Poir. Encycl. Suppl. 585. 1810.

Perennial. Culms 0.75—2 m tall, erect or ascending, leafy, branched, nodes hairy. Leaves linear, glabrous; sheath compressed glabrous; ligule short, ciliate. Inflorescence consists of 1—7 racemes; peduncle 3—10 cm long; joints \pm 2 mm long; callus short, hairy. Sessile spikelet 5—6 mm long, compressed, awned, Lower glume 5.0—5.5 mm long, 7—9-nerved. Upper glume similar, 3-nerved. Lower lemma empty, hyaline, 4.0—4.5 mm long, margins ciliate, epaleate. Upper lemma reduced, bifid, awned from sinus, awns 2—3 cm long. Anthers 1.2—1.5 mm long. Caryopsis fusiform, 2 mm long, slate coloured. Pedicelled spikelets similar to sessile except being narrow and rusty.

Fls. & Frts. : Aug.—Nov.

Distribution : Bilaspur, Hoshangabad, Indore, Mandla, Morena, Sagar, Satna, Seoni, Sidhi.

Dichanthium caricosum (L.) A. Camus in Bull. Mus. Hist. Nat. Paris 27 : 549. 1921; *Andropogon caricosus* L. Sp. Pl. ed. 2. 1480. 1763.

Perennial. Culms 0.5—2 m tall, erect or decumbent, single or branched, nodes hairy or not. Leaves linear-lanceolate, glabrous or hairy; sheaths compressed or terete, glabrous, hairy at mouth; ligule membranous. Inflorescence consisting of 1—8 racemes; joints 1.5—1.7 mm long; callus short hairy. Sessile spikelets 5—6 mm long, imbricate, awned. Lower glume 5.0—5.5 mm long, 7—9-nerved, elliptic. Upper glume similar, 3-nerved. Lower lemma empty, 4.0—4.5 long, nerveless, margins ciliate, epaleate. Upper lemma reduced to stipe, bifid, awned from sinus; awn \pm 2.5 cm long. Anthers 3, yellow, 1.0—1.5 mm long. Caryopsis linear to fusiform, 1.5—1.8 mm long. Pedicelled spikelets 5—6 mm long, acute. Lower glume 2-keeled, 9—13-nerved; keels hairy. Upper glume similar, 3-nerved. Lemma 3.0—3.5 mm long, nerveless, epaleate. Anthers 3, yellow, \pm 1.5 mm long.

Fls. & Frts. : July—Dec.

Distribution : Ambikapur, Bilaspur, Raigarh, Satna, Sheopur, Sidhi.

30. DIECTOMIS Kunth

Diectomis fastigiata (Sw.) Kunth in Humb. et Bonpl. Nov. Gen. et Sp. 1 : 193. 1816. *Andropogon fastigiatus* Sw. Prod. Veg. Ind. Occ. 26. 1788; Hook. f. Fl. Brit. Ind. 7 : 167. 1896.

Perennial. Culms. 30—50 cm tall, erect or decumbent, branched, nodes glabrous. Leaves narrowly linear, acuminate, scabrid; sheath loose, glabrous; ligule membranous. Inflorescence a solitary spike in the axis of a spathiform leaf sheath, peduncle short or long, callus bearded. Sessile spikelet about 3 mm long, laterally compressed. Lower glume linear acuminate, keeled, centre hyaline, villous. Upper glume 2.5 mm long, membranous, 2-fid, awned, keel villous. Lemma 2.5—3 mm long, 2-toothed, awn 3—3.5 cm long. Palea minute, hyaline. Pedicelled spikelet hyaline with slender awn, 11-nerved, neuter. Anthers 3, brownish yellow, 1.5 mm long. Caryopsis 1.8—2 mm long, light brown, fusiform, style persistent.

Fls. & Frts. : Sept.—Dec.

Distribution : Bastar, Bilaspur, Mandla, Sidhi.

31. DIGITARIA Heist. ex Fabric.

- 1a. Verrucose hairs present on the spikelets :
- 2a. Culms erect, all leaves linear; inflorescence of 2—6 racemes 4—10 cm long; caryopsis purplish ... *D. violascens* 9
- 2b. Culms creeping with short stolons, involucre leaves broader; inflorescence of 2—3 racemes 1.5—7 mm long; caryopsis pale ... *D. longiflora* 5
- 1b. Verrucose hairs absent on the spikelets :
- 3a. Hairs on spikelets clavate, sometimes glabrous :
- 4a. Spikelets 2.2—2.5 mm long, arranged in the threes; caryopsis \pm 2.5 mm long, broadly elliptic... *D. ternata* 8
- 4b. Spikelets 1.2—1.5 mm long, arranged in pairs; caryopsis \pm 1 mm long, ovoid or elliptic acute :
- 5a. Tips of caryopsis protruding above the lower lemma; inflorescence of 3—7 racemes; anthers \pm 0.5 mm long, yellow. ... *D. abludens* 1
- 5b. Tips of caryopsis not protruding above the lower lemma; inflorescence of 2—3 racemes; anthers \pm 0.3 mm long, purplish ... *D. stricta* 7
- 3b. Hairs on the spikelets, if any, not clavate :
- 6a. Upper glume 1-nerved or nerveless scale; spikelets elliptic-lanceolate; lower glume absent :
- 7a. Racemes densely pubescent on the lower axils; upper glume 3-nerved; ligule 0.5—2 mm long membrane; caryopsis whitish, not transparent... *D. setigera* 6

- 7b. Racemes puberulous or glabrous, upper glume nerveless, very short, hairy; ligule very short; membrane; caryopsis transparent ... *D. duthieana* 4
- 6b. Upper glume well developed :
- 8a. Spikelets of each pair heteromorphous; lower lemma of sessile spikelet with very prominent 7-nerves, pectinate; anthers \pm 0.5 mm long : ... *D. bicornis* 2
- 8b. Spikelets of each pair not heteromorphous; lower lemma of sessile spikelets 3-nerved, glabrous; anthers 1.2 mm long ... *D. ciliaris* 3

1. *Digitaria abludens* (Roem. & Schult.) Veldkamp. in *Blumea* 21 : 53. 1973 ; *Panicum abludens* Roem. & Schult. *Syst. Veg.* 2 : 457. 1817; *Digitaria granularis* (Spreng.) Henr. *Monogr.* 302. 1950.

Annual. Culms terete, 1—40 cm tall, erect or ascending from base. Leaves 6—10 cm long, linear-acuminate; sheath glabrous; ligule membranous, truncate. Inflorescence consists of 3—7 racemes on a long, glabrous peduncle. Rachis narrowly winged. Pedicels unequal with clavate hairs. Spikelets 1.2—1.5 mm long, elliptic-lanceolate. Lower glume absent. Upper glume 1 mm long, elliptic, acute, 3—5-nerved. Lower floret sterile. Upper floret hermaphrodite. Lemma 1.0—1.2 mm long, elliptic, brownish-black at maturity. Anthers 3, yellow, \pm 0.5 mm long. Caryopsis \pm 1 mm long, elliptic.

Fls. & Frts. : Sept.—Oct.

Distribution : Damoh, Shukla : 28728.

2. *D. bicornis* (Lamk.) Roem. & Schult. *Syst.* 2 : 470. 1717; Henr. *Monogr.* *Digitaria* 971. 1950; *Paspalum bicorne* Lamk. *Encycl.* 1.

176. 1791; *Panicum bicornis* Kunth, Rev. Gram. 1 : 33. 1829; *Digitaria bififormis* Willd. Enum. Pl. Hort. Berol. 1 : 92. 1809; Henr. Mon. *Digitaria* 978. 1950; Bor, Grasses Burm. Ceyl. Ind. Pak. 299. 1960.

Annual. Culms 30—50 cm tall, decumbent. Leaves scabrid, sparsely soft pillose; sheath glabrous to pilose; ligule membranous, truncate. Inflorescence consists of 2—5 racemes; rachis winged, serrate. Spikelets binate, 2.75—3.5 mm long, lanceolate, glabrous to slightly pubescent. Lower glume variable, 0.2—0.5 mm long, actebifid. Upper glume 1.0—2.75 mm long, 3-nerved, pubescent. Sterile lemma equal to spikelet. Sessile spikelet glabrous, 7-nerved, slightly pubescent and pectinate, pubescence usually mixed with bristles. Fertile lemma slightly shorter than the spikelet. Anthers 3, purple, \pm 0.5 mm long. Caryopsis \pm 2.5 mm long, yellowish.

Fls. & Frts. : Aug.—Oct.

Distribution : Ambikapur, Balaghat, Bilaspur, Mandla, Raigarh, Raipur, Sidhi.

3. *D. ciliaris* (Retz.) Keol. Grass. 27. 1802; Clayton in Fl. W. Trop. Afr. 2, 3 : 453. 1972; *Panicum ciliare* Retz. Obs. Bot. 4 : 16. 1786.

Annual. Culms 20—60 cm tall, erect or decumbent. Leaves glabrous, except bulbous based hairs on the base; sheath 5—10 cm long; ligule membranous, truncate. Inflorescence consists of 2—9 racemes of variable sizes; rachis 0.5—1.0 mm wide, flat with a sharp median keel on one side, scabrid. Spikelets in pairs, lanceolate, acute, 2.5—3.0 mm long. Lower glume 0.3 mm long, triangular. Upper glume 2 mm long, narrowly triangular, acute, 3-nerved, hairy. Lower floret sterile. Upper floret hermaphrodite. Lemma 2.8 mm long, 3-nerved, glabrous, lanceolate, acute. Anthers 3, purplish, 1.2 mm long. Caryopsis \pm 2 mm long.

Fls. & Frts. : Aug.—Nov.

Distribution : Betul, Bilaspur, Gwalior, Mandla, Hoshangabad, Raigarh, Sheopuri.

4. *D. duthieana* Henr. ex Bor in Kew Bull. 1953 : 273. 1953; et in Henr. Monogr. *Digitaria*, 944, 1950.

Perennial, caespitose, stoloniferous. Culms 15—30 cm tall, decumbent. Leaves glabrous, margins scabrous; sheath glabrous, pilose at

mouth; ligule membranous. Inflorescence consists of racemes; rachis angular with scabrous margins. Spikelets \pm 2.5 mm long, 5-nerved. Anthers 3, yellow, \pm 1 mm long. Caryopsis 1.2—1.5 mm long, transparent, narrowly elliptic.

Fls. & Frts. : July—Dec.

Distribution : Saugar. Considered as endemic to M. P. (Bor 1960). However, the specimen have been examined from Coimbatore. *Chanarabose* 2886, 29770, 31121 and observed as common plant in the area.

5. *D. longiflora* (Retz.) Pers., Syn. Plan. 1 : 85, 1805, *Paspalum longiflorum* Retz. Obs. Bot. 4 : 15, 1786. Hook. f. Fl. Brit. Ind. 7 : 17, 1896.

Annual. Culms 10—50 cm tall with short creeping stolons. Leaves linear, hairy or glabrous; sheath compressed, sparsely hairy or glabrous; ligule membranous. Inflorescence consists of 2—3 racemes, rachis flat, winged, glabrous. Spikelets 1.5—2 mm long, ellipsoid. Lower glume absent. Upper glume 1.5—1.7 mm long, membranous, covered with verrucose hairs. Lower lemma empty, 5—7-nerved. Upper lemma hermaphrodite, \pm 1.5 mm long, elliptic. Anthers 3, yellow, 0.5 mm long. Caryopsis elliptic, pale.

Fls. & Frts. : Sept.—Dec.

Distribution : Bilaspur, Hoshangabad.

6. *D. setigera* Roth ex Roem. & Schult. Syst. Veg. 2 : 474. 1817.

Annual. Culms 0.7—1.5 m tall, erect. Leaves 10—30 \times 0.5—1.0 cm, acuminate, ventrally pubescent, dorsally glabrous; sheath loose, glabrous; ligule 0.5—2.0 mm long, membranous. Inflorescence made of 4—15 racemes, up to 6 cm long. Spikelets elliptic-acute; rachis winged, margins seabrid. Lower glume small, hyaline, scale-like. Upper glume 1.25 mm long, narrow, 3-nerved, sparsely hairy. Lower floret sterile. Upper floret hermaphrodite. Lemma elliptic-acute, pale shining, margins clasping the palea. Anthers 3, 1.25 mm long. Caryopsis elliptic, whitish, \pm 2 mm long.

Fls. & Frts. : Aug.—Oct.

Distribution : Balaghat, Hoshangabad, Raigarh.

7. *Digitaria stricta* Roth ex Roem. & Schult. Syst. Veg. 2 : 474. 1817.

Annual. Culms 15—60 cm tall, decumbent-ascending. Leaves 5—15 cm long, scabrid or ciliate at base; sheath glabrous, long hairs at throat, Ligule 2.0—2.5 mm long, membranous, truncate. Inflorescence of 2—3 racemes. Spikelets paired, elliptic-lanceolate, acute. Upper glume 0.2—0.5 mm long, ovate obtuse. Lower floret sterile. Upper floret fertile. Lemma apiculate, purple or dark brown. Palea 1 mm long. Anthers 3, purplish, 0.3 mm long. Caryopsis \pm 1 mm long, ovoid, deep purple.

Fls. & Frts. : Sept.—Dec.

Distribution : Bastar, Balaghat, Bilaspur, Indore, Mandla, Rewa, Sidhi.

8. *D. ternata* (A. Rich.) Stapf in Dyer. Fl. Cap. 7 : 376. 1898; *Cynodon ternatus* A. Rich. Tent. Fl. Abyss. 2 : 405. 1851.

Annual. Culms 10—40 cm tall, erect, leafy at base. Leaves 5—10 cm long, finely acuminate; sheath loose, glabrous; ligule membranous, truncate. Inflorescence of usually 2 racemes, sub-sessile; rachis triquetrous, winged, scabrid. Spikelets in threes, 2.2—2.5 mm long, elliptic, acute, hairy. Lower glume absent. Upper glume 2.0—2.3 mm long, elliptic, membranous, 3-nerved, covered with clavate hairs. Lower floret sterile. Upper floret fertile. Lemma 2.0—2.2 mm long, elliptic, cartilaginous, brownish black at maturity. Palea tightly enclosed in lemma. Anthers 3, yellow, \pm 0.5 mm long. Caryopsis \pm 2.5 mm long, elliptic, deep pink.

Fls. & Frts. : Sept.—Oct.

Distribution : Damoh, Pachmarhi.

9. *D. violascens* Link, Hort. Berol. 1 : 229. 1827.

Annual. Culms up to 45 cm tall, prostrate or decumbent, glabrous. Leaves linear-lanceolate, tapering to fine point, base contracted, rough to touch; sheath loose, glabrous; ligule membranous, truncate. Inflorescence consisting of sub-digitate false spikes or racemes; rachis 0.8 mm wide, flat, midrib very prominent, wing definite, scabrid. Spikelets 1.2—1.7 mm long, elliptic-oblong, glabrescent or silky. Lower glume minute or absent. Upper glume equal to spikelet, 5—7 nerved. Lower floret sterile. Upper

floret hermaphrodite, 0.8—1.5 mm long, lanceolate, acute, margins incurved. Anthers 3, yellow, 0.5 mm long. Caryopsis 1.2 mm long, elliptic, purplish.

Fls. & Frts. : During rainy season.

Distribution : Bilaspur.

32. DIMERIA R. Br.

Dimeria ornithopoda Trin. Fund. Agrost. 167. t. 14. 1820.

Annual. Culms 25—40 cm tall, weak, slender. Leaves 10—13 cm long, basal portion with tuberculate hairs; sheath keeled, glabrous, hairy at throat; ligule ciliate. Inflorescence usually consists of 2 spikes; rachis glabrous, scabrid on margins. Spikelets solitary, 1.5—2.0 mm long, linear; callus hairy. Lower glume \pm 1.5 mm long, coriaceous, keeled, 1-veined, margins ciliate. Upper glume equal to spikelet, papery, lanceolate, keeled, fimbriate. Lower lemma minute, linear-acute, nerveless, glabrous, \pm 1 mm long. Upper lemma fertile, 1.5 mm long, oblong-acute, 2-toothed with 9—10 mm long awn. Anthers 3, yellow, \pm 0.6 mm long. Caryopsis cylindrical, \pm 1.6 mm long 1/3 of grain is embryo.

Fls. & Frts. : Sept.—Feb.

Distribution : Ambikapur, Bastar, Bilaspur, Raigarh, Shivpuri, Sidhi.

33. DINEBRA Jacq

Dinebra retroflexa (Vahl.) Panzer in Denkrchr. Acad. Wiss. Munchen 270. t. 12. 1814; *Cynosurus retroflexa* Vahl, Symb. Bot. 2 : 20. 1791.

Annual. Culms 20—60 cm tall, erect or ascending from base, glabrous, Leaves linear-lanceolate, glabrous or sparsely pilose; sheaths compressed, glabrous, long hairy at mouth; ligule membranous. Inflorescence a raceme, made of several spikes, alternate, opposite or whorled, 0.5—3.0 cm long, green, yellowish or purplish, erect when young, deflexed with age; rachis flat, scabrid. Spikelets closely imbricate, 4.5—5.5 mm long, 2—3-flowered. Lower glume 4.5—5.0 mm long, aristate. Upper glume similar

except a little longer. Lower lemma \pm 2 mm long, 3-nerved, pilose. Anthers 3, yellow, \pm 0.4 mm long. Caryopsis oblong, free in lemma & palea.

Fls. & Frts. : Aug.—Nov.

Distribution : Bilaspur, Indore.

34. DIPLACHNE P. Beauv.

Diplachne fusca (L.) P. Beauv. Ess. Agrost. 80, 165. 1812; *festuca fusca* L. Sp. Pl. ed. 2. 109. 1762.

Perennial, rhizomatous. Culms tufted, 50—80 cm tall. Leaves glabrous, usually involute; sheath loose, glabrous; ligule 2—5 mm long, membranous. Inflorescence panicle, 15—20 cm long; rachis fragile. Spikelets 6—10 mm long, 6—10-flowered, elliptic, grey or olive green. Lower glume 2 mm long, lanceolate, acute, 1-nerved, scabrid. Upper glume 2.6 mm long, ovate-acute, 1-nerved. Lemma 3.5 mm long, oblong, 3-nerved, mucronate or shortly awned from sinus. Anthers 3, yellow, \pm 1 mm long. Caryopsis 1.2 mm long ovoid-oblong, subtrigonus.

Fls. & Frts. : Jan.—April.

Distribution : Damoh; also found in other districts on saline, low-land areas.

Note : Usually found on saline soil and moist places.

35. ECHINOCHLOA P. Beauv.

- | | | |
|--|-----|-------------------------|
| 1a. Ligule present, hairy; spikelets long awned | ... | <i>E. stagnina</i> 4 |
| 1b. Ligule entirely absent; spikelet not long awned (except <i>E. crusgalli</i> var. <i>crusgalli</i>) : | | |
| 2a. Lower glume 2—2.5 mm long; spikelets densely crowded; caryopsis not deciduous; plants robust, branching from lower swollen nodes; midrib of leaves white and prominent | ... | <i>E. frumentacea</i> 3 |

- 2b. Lower glume less than 2 mm long; spikelets not crowded; caryopsis deciduous; plants not as above :
- 3b. Spikelets 2.5—3 mm long; lower lemma and upper glume equally acute; spikes distantly arranged... *E. colonum* 1
- 3b. Spikelets 3—4 mm long (excluding awn); lower lemma usually produced into variable awn; spikes relatively crowded ... *E. crusgalli* 2

1. *Echinochloa colonum* (L.) Link, Hort. Berol 2 : 209. 1833;
Panicum colonum L. Syst. Nat. ed. 10. 2 : 870. 1759.

Annual. Culms 15—50 cm tall, erect or decumbent. Leaves 5—15 cm long, narrow, scaberulous; sheath compressed, glabrous; ligule absent. Inflorescence consists of several racemes along the main axis. Spikelets usually 2-nate, 2.5—3.0 mm long, globose, acute, hispid. Lower glume acute, 5-nerved, 1.5—1.7 mm long. Upper glume 2.5—3.0 mm long, acute, 7-nerved. Lower lemma 2.0—2.5 mm long. Upper lemma 1.8 mm long. Anthers 3, yellow, 0.6 mm long. Caryopsis 1.25 mm long, ovoid, dull white.

Fls. & Frts. : Aug.—Nov. and March—April.

Distribution : Ambikapur, Balaghat, Bastar, Bilaspur, Raigarh, Rajnandgaon, Gwalior, Pachmarhi, Hoshangabad, Indore, Raipur Satna, Sidhi, etc.

Note : Usually growing in ditches, around ponds and low lying areas. It is a common weed of rice fields.

2. *E. crusgalli* (L.) P. Beauv. Ess. Agrost. 53 : 161. 1812;
Panicum crusgalli (L.) Sp. Pl. 56. 1753.

Annual. Culms 30—80 cm tall, terete, usually erect. Leaves glabrous, soft, acuminate; sheath compressed, glabrous; ligule absent. Inflorescence consists of racemes, solitary or 2-nate; rachis triquetrous, glabrous, margins scabrid. Spikelets paired, ovate to elliptic, 3—4 mm long, cuspidate or awned. Lower glume ovate-orbicular, 1.25 mm long, 5-nerved. Upper glume equalling spikelet, 5—7-nerved, cuspidate. Lower lemma

barren, membranous, awned or cuspidate. Upper lemma fertile, 2.5 mm long, ovate-elliptic, yellowish white, polished. Anthers 3, yellow, oblong. Caryopsis \pm 2 mm long, elliptic.

Fls. & Frts. : Aug.—Nov. and during summer in rice fields.

Distribution : Balaghat, Indore, Raigarh, Satna, Shivpuri.

3. **E. frumentacea** (Roxb.) Link, Hort. Berol. 1 : 204. 1827;
Panicum frumcntaceum Roxb. Fl. Ind. 1 : 307. 1820.

Annual. Culms up to 1.5 m tall, very robust, branched from lower swollen nodes. Leaves 1—2 cm broad, midrib prominently white; sheath loose, membranous, glabrous, longer than internodes; ligule absent. Inflorescence made of racemes, 2-nate or 3-nate; rachis angled, scabrid, villous in the axis or branches. Spikelets 3—4 mm long, awnless, cuspidate, turgid. Lower glume 2.5 mm long, broader than long, apiculate, 5-nerved, minutely hispid. Upper glume similar to spikelet, cuspidate, compressed, 5—7-nerved. Lower lemma barren. Upper lemma fertile, elliptic, acute, minutely ciliolate, awnless. Anthers 3, yellow, 1.5 mm long. Caryopsis 2.0—2.5 mm long, elliptic.

Fls. & Frts. : Aug.—Nov.

Distribution : Balaghat, Indore.

4. **E. stagnina** (Retz.) P. Beauv. Ess. Agrost. 53 : 161. 1812;
Panicum stagninum Retz. Obs. 5 : 17. 1789.

Annual or perennial. Culms usually 0.5—1 m tall, sometimes more, glabrous. Leaves rigid, glabrous, margins scabrid; sheath glabrous, ciliate at mouth; ligule present and hairy. Inflorescence made of racemes, distant, appressed; rachis hispid or scabrid. Spikelets paired, elliptic, 5—6 mm long (excluding awn), acuminate. Lower glume membranous, 1.5—2.5 mm long, 5-nerved. Upper glume elliptic, equalling the spikelet, 5—7-nerved, pubescent, acute-cuspidate. Lower lemma male or barren, similar to upper glume, dorsally depressed, cuspidate or awned. Upper lemma fertile, 3.5—4.0 mm long, acuminate-mucronate, straw-coloured, polished. Anthers 3, translucent dotted, \pm 2 mm long. Caryopsis yellowish white, broadly elliptic, \pm 3 mm long.

Fls. & Frts. : Sept.—Dec.

Distribution : Ambikapur, Balaghat, Sidhi.

36. ELEUSINE Gaerth.

- 1a. Spikes slender, straight, glabrous at base,
caryopsis oblong, trigonous, leaves usually
folded ... *E. indica* 1
- 1b. Spikes stout, incurved, hairy at base,
caryopsis globose, leaves usually flat ... *E. coracana* 2

1. *Eleusine coracana* (L.) Gaertn. Fruct. 1 : 8, t. I., 1788. *Cynosurus coracanus* L. Syst. Nat. ed. 10, 2 : 875, 1759.

Annual. Culms 30—75 cm tall, erect, tufted, stout, 2—3-noded. Leaves flat, usually overtopping the culm; sheath loose compressed, ligule hairy. Inflorescence made of 4—7 rachis stout, flattened or subtrigonus, scabrid, base pubescent spikelets 3—5-flowered, laterally compressed. Lower glume 1-nerved, lanceolate. Upper glume similar to lower, 3—7 nerved. Lower lemma 4—5 mm long, lanceolate. Palea 2/3 of the lemma, keels winged. Anthers 3, yellow, 1—5 mm long. Caryopsis \pm 1 mm., dark brown, globose.

Fls. & Frts. : Aug.—Oct.

Distribution : Khandwa, 29 (cultivated for grains).

2. *E. indica* (L.) Gaertn, Fruct. 1 : 8. 1788; *Cynosurus indicus* L. Sp. Pl. ed. 172. 1753.

Annual. Culms 30—60 cm tall, loosely tufted, glabrous. Leaves deep green, usually folded; sheath compressed, glabrous; ligule membranous. Inflorescence made of 4—8 subdigitate spikes, pubescent at base. Spikelets 2-seriate, elliptic, serrulate on top. Lower glume 1.5—2.5 mm long, acute, 1-nerved. Upper glume 2—4 mm long, keeled and folded, scabrid. Lemma 2.5—4.0 mm long acute. Anthers 3, yellow, 0.5 mm long. Caryopsis 1.2 mm long, rugose, avoid, pointed at ends, dark brown.

Fls. & Frts. : Aug.—Nov.

Distribution : Balaghat, Bilaspur, Hoshangabad, Indore, Raigarh, Raipur, Satna, Sidhi.

37. ELYONURUS Willd.

Elyonurus royleanus Nees ex. A. Rich. Tent Fl. Abyss. 2 : 471. 1851.

Annual, herbaceous, Culms 10—25 cm tall, tufted, decumbent, branched, nodes glabrous. Leaves linear, involute, glabrous or sparsely hairy, acute; sheath compressed, glabrous, mouth bearded; ligule lacerate. Inflorescence of solitary raceme, often tinged with purple, partly enclosed in a flattened sheath, joints 2—2.5 cm long, densely bearded at apex with long white hairs, callus short, bearded. Sessile spikelet \pm 12 mm long, linear, awned. Lower glume 11—12 mm long, 7—9 nerved, coriaceous, linear-lanceolate, apex beaked, 2-keeled, keels hairy, beak 6 mm long, 2-fid, violet coloured, margins below the beak with violet-coloured tubercles each provided with a pencil of whitish-glistending hair. Upper glume 5—5.5 mm long, membranous, boat-shaped, 1-nerved, acuminate to aristate. Lower lemma empty, palea absent. Upper lemma hermaphrodite, 2.5—3 mm long, obovate, lanceolate, 1-nerved. Palea absent. Anthers 3, 1—1.5 mm long. Caryopsis about 3 mm long. Pedicelled spikelet 8—9 mm long, pedicels 2—2.5 mm long. Lower glume herbaceous, obscurely nerved, keels winged. Upper glume 6.5—7 mm long, concave, awns scabrid. Lemma hyaline. Anthers 3.1—1.5 mm long.

Fls. & Frts. : Aug.—Nov.

Distribution : Gwalior.

38. ELYTROPHORUS P. Beauv.

Elytrophorus spicatus (Willd.) A. Camus in Lecomte, Fl. Gen. del' Indo-China 7 : 547. 1923. *Dactylis spicata* Willd. in Ges. Naturf. Freunde Berlin, Neue Schrift 3 : 416. 1801. *Elytrophorus articulatus* P. Beauv. Ess. Agrost. 67, t. 14. 1812. Hookf. f. Fl. Brit. Ind. 7 : 306. 1896.

Annual. Culms 10—35 cm tall, erect or decumbent, slender, tufted; nodes glabrous. Leaves mostly basal, linear, glabrous, acute; sheath compressed, glabrous; ligule membranous, truncate. Inflorescence of false spikes, narrow, cylindrical, interrupted towards base, green or straw coloured, rachis scaberulous. branches erect, densely spiculate forming clusters of varied shapes. Spikelets sessile, laterally compressed, 2—4 mm long, awned. Glumes subequal, 2—3 mm long, shortly appressed hairy, 1-nerved, keel scaberulous, awns short. Lemma 2.5—3 mm long, 3-keeled,

lanceolate, acute, margins ciliolate, awns 1—1.2 mm long. Palea 1—1.5 mm long, 2-keeled, broadly winged, apex lacerate. Anthers 3, yellow, 0.2—0.3 mm long. Caryopsis ellipsoid, reddish, small.

Fls. & Frts. : Sept.—Feb.

Distribution : Ambikapur, Bastar, Bilaspur, Durg, Gwalior, Raigarh, Raipur, Rewa.

39. ENNEAPOGON P. Beauv.

- 1a. Basal leaves filiform; panicle steel grey; up to 4 cm long, compact; awns straight, not bristly ...*E. brachystachyus* 1
- 1b. Basal leaves filiform; panicles often with purplish-grey tinge, up to 7 cm long, awns bristly, curved at maturity ... *E. elegans* 2

1. *Enneapogon brachystachyus* (Jaub. & Spach) Stapf in Dyer Fl. Cap. 7 : 654. 1900. *Pappophorum brachystachyum* Jaub. & Spach. in Ann. Sci. Nat. Bot. ser. 3. 14 : 365. 1850 et in Ill Pl. Orient. 4 : 34. t. 324. 1851. Hook. f. Fl. Brit. Ind. 7 : 302. 1896.

Perennial. Culms 15—40 cm tall, tufted, filiform, nodes hairy. Leaves linear, filiform, convolute; sheath pubescent; ligule a short rim of hairs. Inflorescence a compact panicle, steel grey. Spikelets about 5 mm long with awns, 2—3 flowered. Lower glume 2.2 mm long, ciliate on margins and keels, 3—4 nerved. Upper glume 3.2 mm long, ovate-lanceolate, softly pubescent outside, margins hyaline. Lemma 1.5 mm long, densely villous near base, all awns almost equal, shortly ciliate, not bristly, straight. Palea 1.5 mm long, shortly ciliate on the keels. Caryopsis 1.5 mm long, reddish brown.

Fls. & Frts. : Aug.—Dec.

Distribution : Locality not given, rare plant for the area. Common in desert or North, West India.

2. *E. elegans* (Nees ex Steud.) Stapf in Bull. 1907 : 224. 1907; T. Cooke, Fl. Bombay 1040. 1908. *Pappophorum elegans* Nees ex Steud. Syn. Pl. Glume 1 : 199. 1854; Fl. Brit. Ind. 7 : 301. 1896.

Perennial. Culms 5—20 cm tall, erect slender, base often thickened, nodes tomentose. Leaves narrowly linear, convolute, rigid, softly pubescent; sheath pubescent with long hairs; ligule a ring of long hairs. Inflorescence a compact panicle 3—7 cm long, purplish tinged, rachis villous. Spikelets \pm 6 mm long with awns, shortly pedicelled. Lower glume 3.5 mm long, ovate, lanceolate, 9-nerved, pubescent. Upper glume 5 mm long, 7-nerved. Lemma 1.5 mm long, orbicular below, 9-nerved, lower half plumose. Palea keels pubescent. Caryopsis 1.5 mm long, brownish, cylindrical.

Fls. & Frts. : Aug.—Dec.

Distribution : On dry hills. Rare Plant.

40. ERAGROSTIELIA Bor.

- 1a. Basal leaves very long, rolled or folded, reaching to the base of the inflorescence :
 - 2a. Keels of the palea broadly winged; wings hyaline and smooth ... *E. leioptera* 3
 - 2b. Keels of the palea narrowly winged; wings ciliate; leaves with long white hairs ... *E. nardooides* 4
- 1b. Basal leaves much shorter, never reaching the base of inflorescence, often a few centimeters long;
 - 3a. Keels of the palea broadly winged; wings ciliate; leaves almost filiform ... *E. bifaria* 1
 - 3b. Keels of the palea not broadly winged; wings smooth; leaves broader, obtusely apiculate, coriaceous ... *E. brachyphylla* 2

1. *Eragrostiella bifaria* (Vahl) Bor in Ind. For 66 : 270. 1940;
Poa bifaria Vahl, Symb. Bot. 2 : 19. 1791.

Perennial. Culms 20—50 cm tall, old leaves remains at base. Leaves filiform, convolute; sheath glabrous, hard; ligule membranous, truncate. Inflorescence a raceme of 8—20 mm long. Spikelets overlapping by half of their length, 6—20 mm long, linear-elliptic. Lower glume 1.7 mm long, lanceolate. Upper glume 1.8 mm long, narrowly

ovate. Lemma 2 mm long, ovate, acute. Palea winged along the keels, margins ciliolate. Anthers 3, yellow, 0.3 mm long. Caryopsis \pm 0.5 mm long, broadly ovate, pale brownish.

Fls. & Frts. : Aug.—Oct.

Distribution : Balaghat, Shivpuri, Sidhi.

Note : Found on rocky slopes.

2. ***E. brachyphylla*** (Stapf) Bor in Ind. For. 66 : 270. 1940; *Eragrostis brachyphylla* Stapf, apud. Hook. f. Fl. Brit. Ind. 7 : 326. 1896.

Perennial. Culms 25—45 cm tall, erect. Leaves nearly radical, 7—20 cm long; sheath terete, glabrous; ligule 1.5 mm long, hairy. Inflorescence a raceme 7—20 cm long, compressed. Spikelets 6—18 mm, linear oblong, secund, biseriate. Lower glume 2 mm long, acute, keeled. Upper glume 2 mm long, acute, keeled. Lemma 2.0—2.5 mm long, 3-nerved. Palea 2.0—2.4 mm long, obovate, concave, keels scabrid. Anthers 3, yellow, \pm 0.8 mm long. Caryopsis ellipsoid, trigonous, \pm 1 mm long.

Fls. & Frts. : Aug.—Dec.

Distribution : Bilaspur, Damoh, Hoshangabad, Indore, Rewa, Shivpuri.

3. ***E. leioptera*** (Stapf) Bor in Ind. For. 66 : 270. 1940. *Eragrostis leioptera* Stapf in Hook. f. Fl. Brit. Ind. 7 : 325. 1896.

Perennial. Culms 30—60 cm tall, tufted, erect. Leaves long, glabrous, terete; sheath short, slightly compressed, glabrous, a few hairs at mouth; ligule a very narrow rim of hairs. Inflorescence 15—25 cm long, slender racemes with secund, distichous, and distantly placed spikelets. Rachis angular, smooth. Spikelets 8—12 mm long, sub-sessile, compressed, 10—20-flowered. Glumes sub-equal, 1.75 mm long, lower distinctly keeled, upper dorsally rounded. Lemmas 2.5 mm long, broadly ovate, obtuse or sub-acute. Palea equalling the lemma, two-keeld, keels winged, smooth hyaline. Anthers 3, \pm 1.5 mm long. Caryopsis \pm 1 mm long narrowly elliptic, brown.

Fls. & Frts. : Sep.—Nov.

Distribution : Ambikapur, Sengupta 15552 (Rare species)

4. *Eragrostiella nardoides* (Trin.) Bor in Ind. For. 66 : 270. 1940.
Eragrostis nardoides Trin. in Mem. Acad. Sci. Petersb. ser. 6, 1 : 415. 1830.
 Hook. f. Fl. Brit. Ind. 7 : 326. 1896.

Perennial. Culms 30—50 cm tall, densely tufted, erect. Leaves as long as the stem convolute, sparsely hairy on lower portion; sheath glabrous, slightly compressed, no hair at mouth; ligule a minute membrane. Inflorescence 15—20 cm long, slender, subflexuous. Rachis terete, smooth. Spikelets 5—10 mm long, oblong to linear, 20—30 flowered, relatively close-set than *E. leioptera*. Glumes sub-equal, \pm 1.5—1.75 mm long, ovate, sub-acute, nerves faint, palea equal to lemma, wings shortly ciliate. Anthers 3, yellow, \pm 0.8 mm long. Caryopsis \pm 0.5 mm long, brown, subovoid or subglobose, embryo end pointed.

Fls. & Frts. : Aug.—Oct.

Distribution : Ambikapur, Balaghat, Rajnandgaon.

41. ERAGROSTIS P. Beauv.

- 1a. Spikelets not breaking up at maturity ... *E. tef* 17
- 1b. Spikelets breaking up at maturity :
- 2a. Spikelets breaking up from above downwards; rachis fragile :
- 3a. Lemmas ciliate on the margins :
- 4a. Lemmas acuminate, 3—2.5 mm long, panicle cylindric... *E. ciliata* 5
- 4b. Lemmas obtuse, 1—2 mm long, panicle sub-speciform, lobed ... *E. coarctata* 6
- 3b. Lemmas not ciliate on the margins :
- 5a. Keels of palea ciliate :
- 6a. Panicle compact and dense (little effuse in *E. ciliaris* var. *clarkei*) :

- 7a. Palea hairs longer than the width of floret and glands of hair base conspicuous; anthers 2; annual ... *E. ciliaris* 4
- 7b. Palea hairs shorter than the width of floret and glands of hair base inconspicuous; anthers 3; perennial ... *E. riparia* 16
- 6b. Panicles effuse :
- 8a. Inflorescence sticky, due to glands on branchlets, to which grains of sand adhere ... *E. viscosa* 22
- 8b. Inflorescence not sticky, no glands on branchlets and glumes ... *E. tenella* 18
- 5b. Keels of palea scabrid or smooth, not ciliate :
- 9a. Panicle thyrsiform, bearing numerous capillary branches; lemmas 1.5 mm long, markedly truncate ... *E. aspera* 1
- 9b. Panicle oblong or linear, branches not capillary; lemma about 1 mm long :
- 10a. Inflorescence branches 5—12 cm long, usually bare at base; caryopsis 0.3—0.5 mm long, ellipsoid; stem tall and stout ... *E. namaquensis* 11

- 10b. Inflorescence branches less than 5 cm long; stem slender :
- 11a. Branches of the Panicle almost whorled, spikelets loose, scattered, usually less than 8-flowered, caryopsis 0.7 mm long, elliptic ... *E. japonica* 10
- 11b. Branches of the panicle mostly solitary; spikelets densely clustered, 6—10 flowered; caryopsis 0.5 mm long, ovoid ... *E. diarrhena* 8
- 2b. Spikelets breaking up from below upwards; rachis tough; lemmas falling away with or without paleas :
- 12a. Plants glandular :
- 13a. Lower branches of Panicle fascicled, with glandular bands below culm nodes ... *E. pilosa* 14
- 13b. Lower branches of panicle not whorled; glandular bands below the culm nodes absent ;
- 14a. Pedicels of spikelets with crateriform glands; spikelets 1.5—2 mm wide; no specific smell in the plant ... *E. poaeoides* 15
- 14b. Pedicels without crateriform glands, spikelets 2—4 mm wide; specific smell present in fresh plant ... *E. cilianensis* 3

- 12b. Plants eglandular :
- 15a. Spikelets ovate to oblong. 4—12 × 2—3 mm ... *E. unioloides* 21
- 15b. Spikelets linear less than 2 mm wide :
- 16a. Lemmas up to 1.5 mm long, acute to sub-acute, with overlapping margins or tips :
- 17a. Spikelets up to 35 flowered; anthers 2, about 0.3 mm long; ligule membranous ... *E. gangetica* 9
- 17b. Spikelets up to 10-flowered; anthers 3, 0.5—0.7 mm long; ligule fringed ... *E. nutans* 12
- 18a. Anthers 2 :
- 19a. Spikelets versatile; pedicels over 5 mm long; lemmas broadly ovate-acute ... *E. tremula* 2
- 19b. Spikelets not versatile, pedicels less than 2 mm long; lemmas narrow, elliptic or lanceolate ... *E. pappiana* 13
- 18b. Anthers 3 :
- 20a. Pedicel of the spikelet with a glandular band; caryopsis compressed, dorsally grooved ... *E. teunifolia* 19
- 20b. Pedicels of the spikelets devoid of glands; caryopsis not compressed or grooved :
- 21a. Caryopsis cylindrical, ± 0.5 mm long; lateral nerves of lemma very prominent ... *E. atrovirens* 2

21b. Caryopsis sub-globose, \pm 1 mm long; lateral nerves of lemma not prominent :

22a. Spikelets fascicled in groups, dark brown or reddish; leaves flat convolute ... *E. zeylanica* 23

22b. Spikelets in effused panicle, slaty-green; leaves filiform, drooping ... *E. curvula* 7

1. *Eragrostis aspera* (Jacq.) Nees, Fl. Afr. Austr. 408. 1841; *Poa aspera* Jacq. Hort. Vindob, 3 : 32. 1776; *P. paniculata* Roxb. Fl. Ind. 1 : 341. 1820.

Tufted annual. Culms 20—80 cm tall. Leaves up to 30 cm long; ligule ciliate, long hairs at the throat of sheath. Inflorescence a panicle, loose, ovate-elliptic, 15—30 cm long. Spikelets 3—10 mm long, 1.0—1.5 mm wide, often purple; pedicels long and fine; rachilla fragile. Lemma 1.2—1.7 mm long, obtuse to truncate. Palea keels scabrid. Anthers 3, 0.2—0.3 mm long. Caryopsis subglobose, 0.5 mm long.

Fls. & Frts. : Aug.—Oct.

Distribution : Madhya Pradesh : Acc. No. 2123 : Damoh, *Shukla* : 29987.

2. *E. atrovirens* (Desf.) Trin. ex Steud. Nom. Bot. ed. 2. 1 : 562. 1840 ; *poa atrovirens* Desf. Fl. Atlant. 1 : 73. 1798.

Strongly perennial. Culms 50—80 cm. Leaves 10—20 cm long, narrow linear, acute ; sheath striate ; ligule membranous, truncate. Inflorescence a branching panicle, 5—20 cm long, ovate or oblong. Spikelets 5—10 mm long, 6—12-flowered, glaucous, grey or purplish ; pedicel 1—3 mm long. Lower glume 1.4 mm long, lanceolate-acute, 1-nerved. Upper glume 1.8 mm, boat-shaped, lanceolate acute, nerved. Lemma 1.4 mm—2.0 mm long. acute, 3-nerved, scarbrid along mid nerve. Palea equalling lemma, narrowly ovate, scarbrid along nerves. Anthers 3, brownish yellow, sometimes purple, 0.6—1.0 mm long. Caryopsis red brown, 0.5—1.0 mm long, cylindrical.

Fls. & Frts. : Aug.—Nov. but in moist places all round the year.

Distribution : Bilaspur, Borighat, Gwalior, Hoshangabad, Jabalpur Pachmarhi, Raigarh, Rewa, Sagar, Sheopuri, Sidhi, Umaria nala.

Eccological notes ; Widely distributed in Madhya Pradesh particularly on heavy moist soils.

3. *Eragrostis cilianensis* (All.) Vignolo-Lutani in Malpighia 18 : 386. 1904 ; *poa cilliansis* All. Pl. Pexem. 2 : 246. t, 91. f. 2. 1785.

Annual. Culm 10—50 cm tall with disagreeable odour when fresh, all glands pitted. Leaves 2—7 mm wide ; sheath pilose at throat ; ligule a ring of hairs. Inflorescence a condensed panicle. Spikelets 5—15 mm long, 2—4 mm wide. Lemmas 2.0—2.8 mm long, glandular on keels. Palea persistent scabrid. Anthers 3, yellow brown, 0.3—0.5 mm long. Caryopsis rugulose, reddish brown, globose, 0.5 mm in diameter.

Fls. & Frts. : During and just after rainy season.

Distribution : Widely distributed all over.

4. *E ciliaris* (L.) R. Br. in Tuckey. Narr. Exp. Congo App. 478. 1818 ; *poa ciliaris* L. Syst. Nat. 2 : 875. 1759.

Weak annual. Culms \pm 35 cm tall, erect. Leaves up to 12 cm long ; sheath glabrous ; ligule ciliate. with long hairs at the throat of sheath. Inflorescence a spike like panicle, appears woolly due to the long cilia on the keel of paleas. Spikelets culstered, 2.0—4.5 mm long rachilla fragile. Lemma 1.0—1.5 mm long, obtuse, midnerve slightly excurrent. Palea keels tuberculate cilliate, hairs exceeding the width of the floret. Anthers 2, light pink, about 0.2 mm long. Caryopsis 0.3—0.5 mm long, ovate or elliptical.

Fls. & Frts. : Aug.—Oct.

Distribution : All over India.

5 *E ciliata* (Roxb.) Nees, Agrost. Bras. 512. 1829 ; *poa ciliata* Roxb. Fl. Ind. ed. 1. 1 : 436. 1820 ; *P. incurvata* Rottl. ex Stapf in Hook. f. Fl. Brit. Ind. 7 : 313. 1896.

Perennial. Culms 0.5—1 m tall, base noded ; sheaths hard, bearded at mouth ; Leaves linear, lanceolate, acuminate glabrous ; ligule hairy. Inflorescence a panicle ; branches hirsute, cylindrical, compact. Spikelets 2—3 mm long, compressed, 6—12-flowered. Lemma 2.0—2.5 mm, nerves prominent. Palea keels long ciliate. Anthers about 1.5 mm long. Caryopsis ovoid to ellipsoid, terete, 0.5—0.7 mm long.

Fls. & Frts. : Nov.—Feb.

Distribution : Bastar, Gwalior, Raigarh.

6. *E. coarctata* Stapf apud. Hook. f. Fl. Brit. Ind. 7 : 313. 1896.

Perennial. Culms 5—40 cm tall. Leaves linear, convolute, acuminate, glabrous, glaucous ; sheath tight, bearded at mouth ; ligule very short. Inflorescence a panicle, subspiciform, lobed or lax, 5—14 × 1.0—1.5 cm, branches hispid. Spikelets 2—3 mm, slightly compressed, 5—12-flowered. Lemma 1.5 mm long, obtuse, membranous, nerves prominent. Palea keels ciliate. Anthers 1.0—1.2 mm. Caryopsis ovoid, about 1 mm long.

Fls. & Frts. : During and just after rainy season.

Distribution : Bastar, Bilaspur, Raigarh, Raipur, Sidhi.

Note : There is form variation in this species. As Hooker (1896) has mentioned : Dwarf ones 5—7 cm tall and the tall one 60—90 cm and leaves 1.0—1.5 cm broad and panicle 15 cm long.

7. *E. curvula* (Schard.) Nees, Fl. Afr. Aust. 397. 1841 ; *poa curvula* Schard. Gott. Anz. Ges. Wiss. 3 ; 2073. 1821.

Perennial. Culms densely tufted, 30—120 cm tall, erect. Leaves narrow, up to 30 cm long ; sheath narrow, keeled, hairy below. Panicle variable contracted to open spreading, lower branches may be whorled. Spikelets 8—10 mm long, linear, slaty green ; rachilla fragile. Lemma broadly elliptic, 1.5—2.5 mm long, obtuse-subacute. Palea smooth to scabrid on keel, persistent, Anthers 3, 0.7—1.0 mm long. Caryopsis elliptic to subglobose, 0.6—0.8 mm long.

Fls. & Frts. : Feb.—April.

Distribution : Native of South Africa, introduced into several countries including India.

Note : This is a polymorphic species with variable chromosome numbers ($2n=20, 42, 63, 80$). The integrading forms have been recorded. A detailed biosystematic study is required to evaluate this complex.

8 *E. diarrhena* (Schult.) S.eud. Syn. Pl. Glum 1 : 226. 1854 ; *poa diarrhena* Schult. Syst. Veg. 2 : 616 ; 1927 ; *Eragrostis interrupta* sensu Fl. Brit. Ind. var. *Koenigii* Stapf ex Hook. f. Fl. Brit. Ind. 7 : 316. 1896.

Strongly perennial. Culms thick, 0.15—1 m tall. Leaf size very variable ; sheath glabrous ; ligule membranous. Inflorescence a panicle, either contracted with appressed branches or interrupted, branches mostly solitary. Spikelets minute, clustered, 4—6-flowered. Lemma about 1 mm long, obtuse. Palea keels scaberulous. Anthers 2, yellowish brown, about 0.3 mm long. Caryopsis reddish-brown, polished, 0.5 mm long, ovoid in shape, embryo end pointed.

Fls. & Frts. : Sept.—Jan.

Distribution : Bori, Gwalior, Hoshangabad, Indore, Mandla, Rewa, Sagar, Sidhi.

Ecological Notes : Usually found on damp soil near water-logged places, around large perennial tanks, moist river beds and rock crevices during rains. Plants collected from dry places during off seasons or over-grazed areas are relatively much smaller. Generally, this is a tall grass confined to good soil and moist places.

9. *E. gangetica* (Roxb.) Steud. Syn. Pl. Glum 1 : 266. 1854 ; *poa gangetica* Roxb. Fl. Ind. 1 : 341. 1820.

Annual to short lived perennial. Culms 40—75 cm tall. Leaves flat or in-rolled, linear, acute, 10—22 cm long, sheath glabrous ; ligule membranous, truncate. Inflorescence a terminal branching panicle, lower branches not whorled, usually solitary. Spikelets linear, 1.0—1.5 mm wide, 4—10 mm long. Glumes lanceolate, about half of lemma, 1-nerved,

scabrid on back. Lemma 1.0—1.5 mm long, acute to sub-obtuse. Palea scabrid on nerves. Anthers 2, about 0.3 mm long, dark pink, appearing blackish. Caryopsis sub-globose, 0.4—0.6 mm long.

Fls. & Frts. : Sept.—Nov.

Distribution : Bilaspur, Bori, Hoshangabad, Jabalpur, Pachmarhi, Raigarh, Sagar, Seoni, Shivpuri, Sidhi, Tikamgarh.

Note : Narrow panicle, few branches, greyish spikelets and persistent paleas after the fall of lemmas and caryopsis are the distinguishing features of this species.

Ecological Notes : Usually this species prefers heavy and moist soils along streams, dry river beds or around stagnated water. Plenty of moisture is required for growing.

10. *E. japonica* (Thunb.) Trin. in Mem. Acad. Sci. Petersb. 1 (6) : 405. 1831 ; *poa japonica* Thunb. Fl. Jap. 51. 1784 ; *Eragrostis interrupta* var. *tenuissima* Stapf ex Hook. f. Fl. Brit. Ind. 7 : 316. 1896.

Weak perennial. Culms 15—80 cm tall ; sheath glabrous ; ligule membranous. Inflorescence a contracted panicle, branches whorled. Spikelets loose, scattered, few-flowered (usually less than 8 flowers). Lemma less than 1 mm long. Palea keels scabrid. Anthers 2, yellow, 0.3 mm long. Caryopsis reddish-brown, polished. 0.7 mm long, elliptic.

Fls. & Frts. : Sept.—Jan.

Distribution : Bilaspur, Damoh, Mandla, Raigarh, Sidhi.

11. *E. namaquensis* Schrad. var. ***diplachnoides*** (Steud.) W.D. Clayton in Kew Bull. 25 : 251. 1971 ; *E. diplachnoides* Steud. Syn. Pl. Glum 1 : 268 : 1854 ; Bor, Grass. Burm. Ceyl. Ind. Pak. 508. 1960 ; *E. interrupta* var. *diplachnoides* (Steud.) Stapf in Fl. Brit. Ind. 7 : 316. 1896.

Annual. Culms tufted, erect, 30—120 cm tall. Leaves flat, up to 30 cm long ; sheath compressed ; glabrous ; ligule membranous, truncate. Panicle linear, 10—40 cm long, branches scaberulous. Spikelets 4—8-flowered, ovate-oblong, 1.5—3.0 mm long, short pedicelled and compressed ; rachilla fragile. Lemmas broadly ovate, 0.7—1.0 mm long, obtuse

Palea keels scabrid. Anthers 2, 0.2—0.3 mm long. Caryopsis ellipsoid, 0.3—0.5 mm long.

Fls. & Frts. : Aug.—Jan.

Distribution ; Chandra, Morena, Raipur.

12. *E. nutans* (Retz.) Nees ex Steud. Nom. Bot. ed. 2. 563. 1840 ; *poa nutans* Retz. Obs. Bot. 4 : 19. 1786 ; *Eragrostis stenophylla sensu* Fl. Brit. Ind. 7 : 318. 1896.

Annual or perennial. Culm densely tufted, 30—50 cm tall, erect. Leaves about 10 cm long; sheath smooth, at mouth long silky hairs, ligule fringed, 0.3 mm long. Inflorescence a small panicle, about 10 cm long, branches alternate, rather distant. Spikelets 6—10-flowered, 5—6 mm long, blue grey ; rachilla tough. Lemma chartaceous, 1.5 mm long. Palea keels scabrid, gently curved. Anthers 3, 0.5—0.7 mm long. Caryopsis 0.5—0.6 mm long, elliptic or sub-globose.

Fls. & Frts. : Sept.—Dec.

Distribution : Balaghat, Bilaspur, Damoh, Raipur, Sidhi.

13. *E. pappiana* Chiov. in Ann. Inst. Bot. Roma. 8 : 371. 1908.

Annual. Culms 3—9 cm tall, erect. Leaf and sheath glabrous ; ligule membranous, truncate. Inflorescence an open panicle. Spikelets 1.5—2.0 mm wide. Lemmas narrower, elliptic or lanceolate-acute. Paleas deciduous, scabrid. Anthers 2, light yellow, 0.6—1.0 mm long. Caryopsis dark brown, spindle-shaped, narrow, 0.6—1.0 mm long, styles persistent.

Fls. & Frts. : Sept.—Dec.

Distribution : Bilaspur, Raipur.

Note : This species is superficially very similar to *Eragrostis tremula* but the pedicels are not more than 2 mm long. Lemma, palea and caryopsis are also distinct.

14. *E. pilosa* (L.) P. Beauv. Ess. Agrost. 71 : 162-175. 1812 ; *poa pilosa* L. Sp. Pl. 68.1753.

Annual. Culms slender, erect or ascending from decumbent base, 10—50 cm tall; sheath glabrous, striate; ligule ciliate. Inflorescence a delicate, open panicle, lower branches fascicled or sub-whorled with glands, long hairs in the axils of branches. Spikelets 3—5 mm long, very narrow and straight. Lemma acute with purple tip, 1.2—1.5 mm long. Palea smooth. Anthers 3, dark pink, 0.2 mm long. Caryopsis 0.6—1.0 mm long, ellipsoid, brown.

Fls. & Frts. : Sept.—Dec.

Distribution : Balaghat, Bilaspur, Raigarh, Raipur, Rewa, Sagar, Shivpuri, Sidhi.

Note : Usually grows on moist, open ground and waste places.

15. *E. poaeoides* P. Beauv. Ess. Agrost. 162. 1812 ; *poa eragrostis* L. Sp. pl. 68.1753.

Annual. Culms 10—50 cm tall. Leaf margins and sheaths glandular, ciliate ; ligule truncate. Inflorescence an open panicle, crateriform glands present on the pedicels or spikelets and inflorescence branches, sometimes not obvious in younger plants. Spikelets 1.5—2.0 mm wide, obive grey or purplish. Lemmas ovate, obtuse, about 2 mm long. Palea keels scabrid. Anthers 2, 0.2—0.3 mm long. Caryopsis red brown, 0.5—0.7 mm long, round in outline and slightly flat on dorsal side.

Fls. & Frts. : Aug.—Oct.

Distribution : All over India, especially in north west India and almost throughout M.P. There is no specimen in Central Circle herbarium at Allahabad but during field trips it has been observed as a species common in M.P. There are two specimens in C.N.H., Calcutta one from Gwalior and an other just mentioned as from M.P.

16. *E. riparia* (Willd.) Nees, Agrost. Bras. 512. 1829; *poa riparia* Willd. in Ges. Natur. Freunde Berlin Neue Schrift 4 : 185. 1803; *E agrostis tenella* (L.) P. Beauv. var. *riparva* Staf in Hook. f. Fl. Brit. Ind. 7 : 315. 1896.

Tufted perennial. Culms 30—70 cm. Ligule ciliate. Inflorescence delicate, contracted, narrow, sub-cylindric panicle ; rachis glabrous. Spikelets crowded, 3 × 1.5 mm Lemma 1.0—1.25 mm long, rounded at apex.

Palea ciliate but cilia shorter than the width of the floret, hairs not tubercle-based as in *E. ciliaris*. Anthers 3, 0.2 mm long, light pink. Caryopsis brown, ovoid, 0.4—0.5 mm long.

Fls. & Frts. : Aug.—Nov.

Distribution : Raipur, Verma 17251.

17. *E. tef* (zucc.) Trotter in Bull. Soc. Bot. Ital. 62. 1918 ; *poa tef* zucc. Diss. Ist Pianta Panizz. Abiss. 1774.

Annual. Culms branching and spreading, 30—100 cm tall, sheath glabrous ; ligule membranous. Inflorescence a panicle with long flexuous branches. Spikelets 6—8 mm long, 4—12-flowered, straw coloured to dark green, florets persistent. Lemma 2.0—2.7 mm long, acute. Palea scabrid on keels. Anthers 2—3, yellow, 0.6—0.8 mm long. Caryopsis spindle-shaped, red brown, 1.0—1.2 mm long.

Fls. & Frts. : Aug.—Dec. and April—May.

Distribution : This species is native of Ethiopia ; introduced experimentally into several countries of the world.

18. *E. tenella* (L.) P. Beauv. ex. Roem. & Schult. Syst. Veg. 2 : 576. 1817 ; *poa tenella* L., Sp. Pl. 1 : 60. 1753 ; *Eragrostis tenella* var. *plumosa* (Retz.) Stapf in Hook. f. Fl. Brit. Ind. 7 : 315. 1896.

Annual. Culms slender, weak, 10—40 cm tall ; sheath glabrous ; ligule ciliate, throat of sheath with long hairs. Inflorescence a terminal panicle, 3—15 cm long, 10—30 mm wide, pyramidal to elliptic. Spikelets 1.5—2.5 mm long. Lemma 0.8—1.2 mm long, scaberulous on the keel. Palea hairy on the nerves, hairs shorter than the width of the floret. Anthers 3, light to dark pink, 0.2—0.3 mm long. Caryopsis pale to light brown, 0.4—0.6 mm long, ovoid and polished.

Fls. & Frts. : July—Oct.

Distribution : Bilaspur, Damoh, Gwalior, Indore, Hoshangabad, Raigarh, Raipur, Sagar, Sidhi, Mandla.

19. *E. tenuifolia* (A. Rich.) Steud. Syn. Pl. Glum 1 : 268. 1854 ; *poa tenuifolia* A. Rich. Tent. Fl. Abyss. 2 : 425. 1851 ; *Eragrostis tenuifolia* Hochst. in Fl. Brit. Ind. 7 : 322. 1896.

Perennial. Culms tufted, laterally compressed, 10—70 cm tall, erect. Leaves 5—30 cm long, glabrous ; sheath compressed ; ligule hairy. Panicle 5—20 cm long ; pedicels usually with glandular ring. Spikelets 5—15-flowered, dark green or olive-grey, margins coarsely serrate, breaking up from base ; rachilla persistent. Glumes lanceolate, unequal. Lemma oblong-elliptic, 1.7—2.5 mm long, nerves obscure. Palea green, persistent keels scabrid. Anthers 3, 0.5—1.0 mm long. Caryopsis oblong, 1 mm long, compressed, dorsally grooved.

Fls. & Frts. : Aug. —Dec.

Distribution : This species is easily recognizable by the dark green or slaty serrate spikelets, small glumes and flat, grooved grains.

20. *E. termula* Hochst. ex Steud. Syn. Pl. Glum 1 : 269. 1854 : *poa tremula* Lamk. Encycl. Meth. Bot. 1 : 185.1791 ; *p. multiflora* Roxb. Fl. Ind. 1 : 340.1820.

Annual. Culms 30—100 cm tall, erect. Leaf margins and sheath glabrous ; ligule membranous. Inflorescence an open panicle, branches filiform. Spikelets showing trembling motion on long fine pedicels (usually over 5 mm). Spikelets 8—50 mm long, usually slightly curved, 10—100-flowered, pallid to purplish. Lemma broadly ovate-acute, 1.7—2.0 mm long, 2.5—3.0 mm wide, with irregularly wavy and hyaline, margins. Palea scabrid. Anthers 2, deep pink, 0.3—0.5 mm long. Caryopsis reddish brown, round like a lentil seed and beaked at the embryo end, 0.4—0.6 mm long.

Fls. & Frts. : Sept.—Dec.

Distribution : Bilaspur, Damoh, Pachmarhi, Raigarh, Sidhi, Tikamgarh.

21. *E. unioloides* (Retz.) Nees ex Steud. Syn. Pl. Glum 1 : 264. 1854 ; *poa unioloides* Retz. Obs. Bot. 5 : 19. 1789.

Annual, rarely perennial. Culm 20—50 cm tall. Leaf flat, 2—4 mm wide ; sheath striate ; ligule membranous. Inflorescence a panicle, branches ascending. Spikelets ovate-oblong, strongly compressed, obtuse, 4—12 mm long, 2.0—3.5 mm wide, often pink or purplish. Florets closely imbricate. Lemmas 2 mm long, narrowly ovate in side view,

acute at the tip when flattened, membranous, strongly keeled, tinged with pink or purple, lateral nerves prominent. Palea scabrid on nerves, falling off with lemma. Anthers 2, deep pink, 0.3 mm long. Caryopsis about 0.7 mm long, dark brown, embryonic end narrow, pointed, lower end round and broad.

Fls. & Frts. : Sept.—March.

Distribution : Ambikapur, Bastar, Bilaspur, Damoh, Hoshangabad, Indore, Raigarh, Rajnandgaon.

Note : This species has many forms and grows on variable habitats, usually along the ditches in water-logged areas, muddy sandy soil, clay and black cotton soil after rainy season. The typical form is annual, however, perennial and stoloniferous forms have also been recorded. Under shade, spikelets are green, becoming purple in full sunlight. Spikelets and lemma size also vary widely. A biosystematic study should reveal the reasons for variation and various forms.

22. *E. viscosa* (Retz.) Trin in Mem. Acad. Sci. Petersb. 1(6) : 397. 1830 ; *poa viscosa* Retz. Obs. Bot. 4.1786 ; *p. glutinosa* Roxb, ex Staf in Hook. f. Fl. Brit. Ind. 7 : 316.1896.

A weak annual. Culms 10—40 cm, sweet-scented glandular plant : more than half of the plant consists of the panicle. Inflorescence, glumes and younger parts of stem are sticky, owing to presence of glands, which are usually brownish-black, to which sand particles adhere. Ligule base and mouth of sheath with very long cillia. Spikelets 1.5—4.5 mm long ; rachilla fragile. Lemmas oblong-elliptic, 1.0—1.25 mm long, smooth or scaberulous on keel. Palea keels ciliate. Anthers 2—3, yellowish or pinkish brown, 0.2—0.3 mm long. Caryopsis pale brown, polished, 0.5—0.7 mm long.

Fls. & Frts. : Sept.—Nov.

Distribution : Raipur, Sidhi.

23. *E. zeylanica* Nees & Mey. in Nov. Act. Nat. Cur. 19. Suppl. 1 : 204. 1843 ; *E. elongata* sensu Ft. Brit. Ind. 7 : 319. 1896.

Perennial. Culms tufted, stiff. 40—100 cm tall. Leaves narrow, flat or convolute ; sheath mouth bearded ; ligule a short ring of hairs.

Panicle variable, branches simple; rachis glabrous. Spikelets crowded, short pedicelled, dark brown or reddish, 10—20-flowered. Lemma ovate-lanceolate, 2.0—2.5 mm long. Palea curved, keels very stout and scabrid. Anthers 3, yellow, ± 1 mm long. Caryopsis ovoid to sub-globose, ± 1 mm long.

Fls. & Frts. : Feb.—April.

Distribution : Bilaspur, Sidhi.

24. EREMOPOGON (Hack.) Stapf.

Eremopogon foveolatus (Del.) Stapf in Prain, Fl. Trop. Afr. 9 : 183. 1917. *Andropogon faveolatus* Del. Fl. d'Egypte. 16, t 8, f. 2. 1812; Hook. f. Fl. Brit. Ind. 7 : 168. 1896.

Perennial. Culms 30—70 cm tall, densely tufted, usually decumbent, nodes bearded. Leaves narrow, linear, scaberulous beneath, rigid; sheaths shorter than the internodes, scabrous-glabrous, basal sheaths silky-villous; ligule ciliate, hyaline, truncate. Inflorescence of 3—6 racemes, 2—4 cm long; peduncle capillary, joints, and pedicels with long silky hairs. Spikelets ± 5 mm long (sessile and pedicelled ones equal) oblong-lanceolate, glabrous, purplish. Callus shortly hairy. Lower glume 4—5 mm long, 4-nerved, usually with a pit above the middle. Upper glume equal to lower, 3-nerved. Lower lemma much shorter, glabrous, nerveless. Upper lemma reduced to an awn 5—8 mm long. Anthers 3, yellow, ± 2 mm long. Caryopsis not seen.

Fls. & Frts. : Sept.—Nov.

Distribution : Gwalior, Rewa, Sidhi.

43. ERIOCHLOA Kunth

Eriochloa procera (Retz.) C. E. Hubbard in Kew Bull. 1930 : 256. 1930. *Agrostis procera* Retz. Obs. Bot. 4 : 19. 1786. *E. Polystachya* Hook. f. Fl. Brit. Ind. 7 : 20. 1896 (non H. B. K.).

Perennial, rhizomatous. Culms 20—100 cm tall, terete, erect. Leaves flat, linear-lanceolate, glabrous; sheaths compressed, glabrous; ligule hairy.

Inflorescence a panicle, rachis angular; pedicels short, scabrid. Spikelets paired, rarely solitary, 3—3.5 mm long, acute, hispid. Lower glume fused with rachis. Upper glume \pm 3 mm long, 5-nerved, membranous. Lower lemma empty, similar to upper glume. Upper lemma elliptic to ovate, 2—2.5 mm long, mucronate. Anthers 3, yellow. Caryopsis elliptic.

Fls. & Frts. : July—Dec.

Distribution : Gwalior, Nagar Haveli, marked M. P. 1949.

44. EULALIA Kunth

- 1a. Sessile spikelets 4—6 mm long; ligule hairy or lacerate; anthers 2—3 mm long :
- 2a. Lower glume papery, 3.5—4 mm long, nerveless, 2-keeled; awns of sessile spikelet 9—12 mm long ... *E. trispicata* 3
- 2b. Lower glume coriaceous, 5—6 mm long, 4-nerved; awns of sessile spikelet 17—20 mm long ... *E. quadrinervis* 2
- 1b. Sessile spikelets \pm 3 mm long, ligule 1.5 mm long membranous, anthers \pm 2 mm long, rachis with golden violet stiff hairs... *E. hirtifolia* 1

1. *Eulalia hirtifolia* (Hack.) A. Camus in Ann. Soc. L. Lyon, n. s. 68 : 202. 1922; *Pollinia hirtifolia* Hack in DC. Monogr. Phan. 6 : 165. 1889; Hook. f. in Fl. Brit. Ind. 7 : 111. 1896.

Annual. Culms 60—90 cm tall, erect, leafy. Leaves narrow, both surfaces pubescent, tip filiform; ligule 1.5 mm long, membranous; sheath glabrous. Inflorescence of 3—8 spikes up to 8 cm long; rachis with golden violet stiff hairs. Sessile spikelet 3 mm long, lanceolate, awned. Glumes sub-equal, \pm 3 mm long, lower chartaceous, shining, ciliate with golden hairs; upper obtuse, glabrous, lower portion hairy, one-nerved, margins ciliate. Pedicels of pedicellate spikelets 2.5 mm long, with pale violet hairs. Anthers 3, yellow \pm 2 mm long. Caryopsis not seen.

Fls. & Frts. : Oct.—Dec.

Distribution : Raigarh.

2. **E. quadrinervis** (Hack.) O. Ktze. Rev. Gen. Pl. 2 : 275. 1891. *Pollinia quadrinervis* Hack. in DC. Monogr. Phan. 6 : 158. 1889. Hook. f. Fl. Brit. Ind. 7 : 110. 1896.

Perennial. Culms 50—100 cm tall, slender, glabrous or pubescent at top, leafy upto inflorescence. Leaves linear, acuminate, glabrous or hairy below, margin scabrid; sheaths glabrous or with scattered tubercle-based hairs; ligule short, hairy. Inflorescence of 3—6 false spikes, 7—15 cm long, sub-digitately arranged with golden brown or mauve hairs. Internodes of rachis and pedicels 2.5—3 mm long, joints of rachis oblique and swollen at tip, stiff, white hairs present. Spikelets 5—6 mm long, oblong-lanceolate. Lower glume 5—6 mm long, coriaceous, ovate-lanceolate, keels hispid, 4-nerved. Upper glume equal to lower, shining, lanceolate, keel-glabrous, 3-nerved. Lower floret empty. Upper floret hermaphrodite; lemma 2.5—3 mm long, ciliate towards top, bilobed, lobes acute; awn 17—20 mm long (in pedicelled spikelets 14 mm). Anthers 3, yellow, 3 mm long. Caryopsis not seen.

Fls. & Frts. : Aug.—Nov.

Distribution : Indore 5599. Rare.

3. **E. trispicata** (Schult.) Henr. in Blumea 3 : 453. 1940. *Pollinia argentia* Trin. in Bu'l. Sci. Acad. Petersb. 71. 1836. Hook. f. Fl. Brit. Ind. 7 : 111. 1896.

Perennial. Culms 50—100 cm tall, leafy at base, turning reddish-brown with age. Leaves linear-lanceolate, glabrous or sparsely hairy, usually flat; sheath terete, glabrous except mouth; ligule lacerate, truncate. Inflorescence consists of 3—7 digitate racemes, densely racemes, densely silky. Sessile spikelet 4—5 mm long, lanceolate, awned, obtuse. Lower glume papery, 3.5—4 mm long, hairy at base, 2 keeled. Upper glume similar, but boat-shaped, 1-nerved. Lower lemma empty. Upper lemma \pm 3 mm long, linear, apex clefted, awned from sinus, awns 9—12 mm long, ciliate. Palea absent. Anthers 3, yellow, \pm 2 mm long. Caryopsis oblong. Pedicelled spikelets similar to sessile one.

Fls. & Frts. : Sept.—Dec.

Distribution : Bilaspur, Panigrahi 13215 A. Rare.

45. EULALIOPSIS Honda

Eulaliopsis binata (Retz.) Hubb. in Hook. Ic. Pl. t. 3262. 1935;
Andropogon binatus Retz. Obs. Bot. 5 : 21. 1789.

Perennial. Culms 40—100 cm tall, erect, densely tufted with root-stock and basal sheaths. Leaves 20—45 cm long, base rounded, ventrally glabrous, dorsally hirsute with tubercle-based hairs; ligule hairy. Inflorescence consists of 2—4 racemes, up to 5 cm long. Sessile spikelets \pm 4.5 mm long, lanceolate, callus short with rusty hairs. Lower glume 3.3—3.5 mm long, 3—4-toothed, 5—7-nerved, ciliate. Upper glume 4 mm long, 5-nerved, ciliate. Lower lemma \pm 3 mm long, lanceolate, male or neuter, 1-nerved. Upper lemma fertile, bidentate, ciliate, 3.4—4.0 mm long, awns 5—8 mm long. Pedicelled spikelets similar. Anthers 3, yellow \pm 1 mm long. Caryopsis 1.5 mm, black.

Fls. & Frts. : June—Aug.

Distribution : Ambikapur, Balaghat, Bastar, Bilaspur, Hoshangabad, Raipur, Seoni, Sidhi.

46. GIGANTOCHLOA Kurz

Gigantochloa hasskarliana (Kurz) Baker ex Heyne, Nutt. Plant. Ned. Ind. ed. 2. 1 : 299. 1927; Holttum in Gard. Bull. Sing. 16 : 118. 1958; *Shizostachyum hasskarli num* Kurz in Ind. For. 1 : 352. 1876; *Oxytenanthera nigrociliata sensu* Munro in Trans. Linn. Soc. 26 : 128. (not *Bambusa nigrociliata* Buese).

Perennial. Culms 8—12 m tall, 2—5 cm thick, dark hairs below the nodes. Culm sheaths \pm 15 cm, dark hairy on back, black-fringed margins when young; blade deflexed, narrow at base, hairy above; auricles stiff, dark green, entire, usually raised and rounded at ends. Ligule up to 4 mm long; Foliage leaves : leaf blades 15—40 \times 2.5—4.5 cm, lanceolate, glabrous, midrib prominent, nerves 9—12, glands like nerves; auricles small; ligule short, entire or toothed. Panicle large, compressed, rachis pubescent. Spikelets in small groups at the nodes of inflorescence, 2 \times 0.5 cm, flattened base. Glume 2—3, fringed with dark hairs. Lemmas 4—5, the longest 2 cm, fringed with dark hairs. Palea narrow, equal to lemma;

keels ciliate. Anthers ± 7 mm long, narrow, purple, tips hairy. Fruit narrow, hairy tip, dorsally grooved, beak penicillate. Ovary pubescent.

Fls. & Frts. : Rare.

Distribution : Bastar.

47. HACKELOCHLOA O. Ktze.

Hackelochloa granularis O. Ktze, Rev. Gen. Pl. 2 : 776. 1891.

Annual. Culms 60—90 cm tall, erect, hirsute with tubercle based hairs. Leaves 5—10 cm long, hirsute with cordate base; sheath loose, hispid; ligule membranous, tip hairy. Inflorescence a terminal, axillary raceme; peduncle 1.5—2.0 cm long; joints flattened, fused with pedicels. Sessile spikelet globose, ± 1.3 mm long. Lower glume rounded-orbicular, pitted and tubercled. Upper glume 1.0—1.2 mm long, obtuse, membranous. Lower lemma empty, 1 mm long. Upper lemma obtuse, bisexual. Anthers 3, orange yellow, ± 0.5 mm long. Caryopsis ± 0.5 mm long, ovoid, shining.

Fls. & Frts. : July—Nov.

Distribution : Ambikapur, Balaghat, Bilaspur, Hoshangabad, Indore, Mandla, Raigarh, Sidhi.

48. HEMARTHRIA R. Br.

Hemarthria compressa (L. f.) R. Br. Prodr. 207. 1810; *Rottboellia compressa* L. f. Suppl. 114. 1781.

Perennial. Culms 40—80 cm tall, erect or decumbent. Leaves 9—15 cm long, base rounded or subcordate, margins scaberulous; sheaths hairy at base and throat; ligule membranous. Inflorescence a solitary raceme or of false spikes. Sessile spikelets 4—6 mm long. Lower glume 5 mm long, lanceolate, obtuse, ciliate, 5—7-nerved, winged. Upper glume 4 mm long boat-shaped, mucronate. Lower lemma ± 3 mm long, oblong, hyaline. Anthers 3, yellow, 1.2—1.5 mm long. Caryopsis brownish, ± 1 mm long.

Fls. & Frts. : Sept.—Dec.

Distribution : Ambikapur, Bilaspur, Damoh, Hoshangabad, Indore, Rewa, Sidhi, Tikamgarh.

49. HETEROPOGON Pers.

Heteropogon contortus (L.) P. Beauv. ex Roem. & Schult. Syst. Veg. 2 : 836. 1817 : *Andropogon contortus* L. Sp. Pl. 1 : 1045. 1753.

Perennial. Culms tufted, erect, 25—100 cm tall. Leaves 4—20 cm long, linear, acute, ciliate at base; sheaths striate, glabrous; ligule a fringed membrane with short hairs (lacerate). Inflorescence a terminal raceme up to 12 cm long. Sessile spikelets terete, 6.5—7.0 mm long, 7—9-nerved, lanceolate. Upper glume 5 mm long, 3-nerved. Lower lemma 3 mm long, empty, hyaline. Upper stout geniculate awn, 7—8 cm long, epaleate. Anthers 3, yellow, 2.0—2.5 mm long. Caryopsis cylindrical, hairy, 1.0—1.5 mm long. Pedicelled spikelets male or neuter.

Fls. & Frts. : Aug.—Jan.

Distribution : Ambikapur, Balaghat, Bastar, Bilaspur, Gwalior, Hoshangabad, Indore, Raigarh, Raipur, Sagar, Sidhi etc.

50. HORDEUM L.

Hordeum vulgare L. Sp. Pl. 84. 1753.

Annual. Culms 30—75 cm tall, erect, tufted. Leaves 15—30 cm long, soft, well developed auricle; sheath glabrous, loose; ligule 1.5—2.0 mm long, membranous. Inflorescence a terminal spike. Spikelets single flowered. Glumes 5—6 mm long, linear-lanceolate, awned, hairy. Lemma 7—10 mm long, 5-nerved, hairy on keel, awn 5—7 mm long, scabrid. Anthers 3, linear, pale yellow, 3.0—3.5 mm long. Caryopsis 8—9 mm long, cream coloured.

Fls. & Frts. : Jan.—March.

Distribution : Cultivated species.

51. HYGRORIZA Nees

Hygroriza aristata (Retz.) Nees in Wt. & Arn. Édinb. New Phil. J. 15 : 380. 1833; *Pharus aristatus* Retz. Obs. Bot. 5 : 23. 1789.

Annual, aquatic, free floating grass with fibrous roots. Culms spreading 15—35 cm tall. Leaves 2.0—3.5 × 0.8—1.7 cm, ovate to ovate

lanceolate, adaxial surface, papillate; sheath flat, loose, glabrous; ligule 0.8 mm long, membranous, truncate. Inflorescence a globose panicle. Spikelets one-flowered, 17—18 mm long including awn. Glumes reduced. Lemma 7 mm long, chartaceous, hispid, 5-nerved; awn 10 mm long. Palea 6 mm long chartaceous, hispid, acute, 3-veined. Anthers 6, light yellow, 3.5 mm long. Caryopsis \pm 5 mm long, lanceolate, awned.

Fls. & Frts. : Oct.—Dec.

Distribution : Damoh, Rewa, Rajnandgaon.

52. IMPERATA Cyr.

Imperata cylindrica (L.) P. Beauv. var. *major* (Nees) C. E. Hubb.
ex Hubb. & Vaughan, Grass. Maur. 96. 1940.

Strong perennial. Culms 0.3—2 m tall, nodes bearded with hard rootstocks and extensive rhizomes. Leaves variable scabrid on margins; sheath loose, glabrous or slightly pubescent, longer than internodes; ligule lacerate, dorsally silky. Inflorescence compact cylindrical panicle. Spikelets 3.0—3.5 mm long, covered with long, white, silky hairs, purple stigma hanging at maturity. Lower glume 3 mm long, 5-nerved, hairy. Upper glume 2.8 mm long. Lower lemma 1.6 mm long, epaleate. Anthers 2, pale yellow, 2 mm long. Caryopsis 1.0—1.25 mm long, oblong.

Fls. & Frts. : Aug.—Sept. and March—April.

Distribution : Balaghat, Bastar, Bilaspur, Damoh, Jabalpur, Mandla, Raipur, Rajnandgaon, Rewa, Sidhi.

Note : It is a polymorphic species with variable chromosome numbers. Three varieties have been recognised. It can stand shade, dry condition, overgrazing, trampling and competition with other species.

53. ISACHNE R. Br.

Isachne globosa (Thunb.) O. Ktze. Rev. Gen. Pl. 2 : 778. 1891;
Milium globosum Thunb. Fl. Jap. 49. 1784.

Annual. Culms 20—60 cm tall, erect or ascending. Leaves 5—10 cm long, glabrous; sheath loose, glabrous; ligule 2 mm long, a tuft of hairs. Inflorescence a contracted panicle, 4—10 cm long, branches capillary, scabrid. Spikelets 2-flowered, 2 mm long, nearly globose. Lower

glume 1.8 mm long, light green, ovate-obtuse, 5-nerved, hairy. Upper glume 1.7 mm long, broader, 9-nerved, scabrid. Lower floret male, 1.8 mm long, glabrous. Lemma 1.5—1.7 mm long, flat with inflexed edge. Palea membranous, similar to lemma. Anthers 3, dark brown, 1 mm long. Upper floret fertile or female, 1.5 mm long. Lemma 1.2 mm long. Caryopsis \pm 0.8 mm long, deep pink.

Fls. & Frts. : Aug.—Sept.

Distribution : Ambikapur, Balaghat, Bastar, Damoh, Bilaspur, Raigarh, Sidhi.

54. ISCHAEMUM L.

- | | | |
|--|-----|---------------------|
| 1a. Lower glume of sessile spikelets with nodules and rugosities; ligule 4—5 mm long membrane | ... | <i>I. rugosum</i> 4 |
| 1b. Lower glume of sessile spikelet without nodules or rugosities; ligule much shorter : | | |
| 2a. Racemes 5—12, paniculate; rachis with tuft of hairs at joints | ... | <i>I.-duthiei</i> 1 |
| 2b. Racemes usually less than 5; rachis may be hairy but not with tuft of hairs : | | |
| 3a. Sessile spikelet 6.5—7.5 mm long; anthers 2.5—3 mm long; leaves glaucous, glabrous | ... | <i>I. pilosum</i> 3 |
| 3b. Sessile spikelets 5—6 mm long; anthers \pm 2 mm long; leaves pubescent to villous on both surfaces | ... | <i>I. indicum</i> 2 |

1. *Ischaemum duthiei* Stapf ex Bor in Kew Bull. 1950 : 188. 1950.

Perennial. Culms 50—80 cm tall, terete, glabrous, rooting at lower nodes. Leaves linear, acute, glabrous on upper surface, pubescent on lower; sheath terete, pubescent; ligule membranous. Inflorescence of sub-digitate spikes; rachis with tuft of hairs at joints. Sessile spikelets \pm 5 mm long, lanceolate, awned. Lower and upper glume equal to spikelet. Lemma

4—5 mm long, hyaline, awn 8—10 mm long. Pedicelled spikelets male, similar to sessile in structure, awnless. Anthers 3, brownish, 2—2.5 mm long. Caryopsis 1.5 mm long, elliptic, light brown, styles persistent.

Fls. & Frts. : Nov.—Feb.

Distribution : Sidhi, Panigrahi 2116.

2. **I. indicum** (Houtt.) Merrill in J. Arn. Arb. 19 : 320. 1838; *Phleum indicum* Houtt. Nat. Hist. 11, 13 : 198. t. 90. f. 2. 1782.

Perennial. Culms 30—60 cm tall, erect or decumbent. Leaves 10—20 cm long, pubescent to villous on both surfaces; sheath glabrous; ligule 1.0—1.5 mm long, membranous, truncate. Inflorescence made of 2—3 spikes. Sessile spikelets 5—6 mm long, oblong-lanceolate. Lower glume 5.2 mm long, sub-obovate, glabrous, terminal wings ciliolate on upper surface. Upper glume 5 mm long, boat-shaped, keels scabrid, awn 2 mm long. Lower lemma 4.2 mm long, hyaline, boat-shaped, glabrous. Palea 4.2 mm long, linear-lanceolate, 2-nerved, scabrid. Anthers 3, yellow, \pm 2 mm long. Upper lemma deeply notched, 3-nerved, awns twisted, 1.8 cm long. Upper glume 5—8 mm long, 5-nerved. Lower lemma 2-nerved, margin ciliate. Anthers 3, yellow, \pm 2 mm long. Caryopsis 1.5 mm long with persistent style.

Fls. & Frts. : Aug.—Dec.

Distribution : Bastar, Bilaspur, Hoshangabad, Raipur, Sidhi.

3. **I. Pilosum** (Klien ex Willd.) Wight in Madras Lit. Sci. J. 138, 1835; Hack. Monogr. Androp. 240. 1889; Hook. f. Fl. Brit. Ind. 7 : 130. 1896. *Andropogon pilosus* Klein ex Willd. Sp. Pl. 4 : 920. 1806.

Perennial, rhizomatous. Culms 0.4—2 m tall, erect glabrous. Leaves linear, glaucous; sheath terete, glabrous; ligule membranous. Inflorescence of 3—5 sub-digitate racemes. Spikelets in pair, joints and callus densely hairy. Sessile spikelet 6.5—7.5 mm long, lanceolate, awned. Lower glume 5—6 mm long, hairy, 5—7 nerved. Upper glume 6.5—7.2 mm long, 5—9 nerved, hairy. Lower lemma 5—5.5 mm long, elliptic. Palea nerveless. Anthers 3, yellow \pm 3.5 mm long. Upper lemma 4.5—5

mm long, hyaline, 3-nerved, apex clefted. Awn 7—8 mm long. Anthers 3, yellow, 2.5—3 mm long. Caryopsis oblong, dorsally compressed.

Fls. & Frts. : Sept.—Feb.

Distribution : One specimen at C. N. H. with locality given as M. P. Coll. No. 792.

4. *I. rugosum* salisb. Icon. Strip. Rar. 1 : t. 1. 1791.

Annual or Perennial. Culms 50—60 cm tall, erect or ascending. Leaves 10—20 cm, hairy on margins; sheath loose rough; ligule 4—5 mm long, membranous, truncate. Inflorescence a paired raceme; joints and pedicels trigonous, dorsal angle ciliate. Sessile spikelet 5.5—6.0 mm long, ovate-oblong, callus bearded. Lower glume 5.5 mm long, lower $\frac{2}{3}$ chartaceous, upper $\frac{1}{3}$ membranous, slightly oblique. Upper glume 5.5 mm long, slightly bidentate; keel winged ciliate. Lower lemma 4.5 mm long, lanceolate, acute. Lower floret usually male with 1.5 cm long awn. Stamens 3, yellow, 2 mm long. Caryopsis 2 mm long, ovoid, brown.

Fls. & Frts. : Aug.—Oct.

Distribution : Bilaspur, Gwalior, Indore, Raigarh, Raipur, Sagar, Sidhi.

55. *ISEILEMA* Anderss

1a. Tubercles present on spathe and or margins of the lower glume of the involucrel spikelets :

2a. Racemes in dense fascicles; hermaphrodite spikelets longer than the involucrel ...

I. holei 2

2b. Racemes not in dense fascicles; hermaphrodite spikelet as long as the involucrel ...

I. prostratum 4

1b. Tubercles absent on spathe and/or margins of the lower glumes of the involucrel spikelets :

- 3a. Pedicels of the involucre spikelets as broad as long; beak of lower glume of the sessile spikelets as long as or longer than the lower elliptic portion.. *I. anthephoroides* 1
- 3b. Pedicels of the involucre spikelets longer than the breadth at apex; lower glume of sessile spikelets shorter than the lower elliptic portion ... *I. laxum* 3

1. *Iseilema anthephoroides* Hack. Mon. Androp. 683. 1889.

Annual. Culms 20—100 cm tall tufted. Leaves flat, glabrous or sparsely hairy, tubercle-based hairs on margins; sheaths, compressed, glabrous; ligule lacerate. Inflorescence a narrow panicle; spathes with tubercle-based hairs. Involucral spikelet 6.5—7 mm long, lanceolate, 3—5 nerved. Lemma nil. Pedicelled spikelet reduced to a long pedicel. Hermaphrodite spikelet 6—6.5 mm long lanceolate, awned. Lower glume 6—5.5 mm long, bifid. Upper glume similar but acuminate. Lower lemma empty. Upper lemma reduced to 12—14 mm long awn. Anthers 3, yellow, \pm 2.5 mm long. Caryopsis not seen.

Fls. & Frts. : July—Dec.

Distribution : Indore.

2. *I. holei* Haines, Bot. Bihar & Orissa, 3 : 1103 (BSI reprint). 1961.

Annual, Culms 60—100 cm tall, tufted. Leaves linear, glabrous; sheath glabrous; ligule membranous, hyaline. Inflorescence made of racemes enclosed in spathes. Involucral spikelets \pm 5 mm long, pedicelled, lanceolate. Lower glume 4—4.5 mm long, 5-nerved. Upper glume similar, 3-nerved. Anthers 3, yellow, \pm 2 mm long. Hermaphrodite spikelets 4.5—5 mm long, glabrous, awned. Lower glume 4—4.75 mm long, membranous, bifid. Upper glume similar, acute. Lower lemma absent. Upper lemma reduced to 17—18 mm long awn. Palea nerveless. Anthers 3, yellow, 2—2.5 mm long. Caryopsis ellipsoid.

Fls. & Frts. : Oct.—Feb.

Distribution : M. P. Coll. no. 2261.

3. *Iseilema laxum* R. Br. Prodr. 205. 1810.

Perennial. Culms 70—90 cm tall, erect, densely tufted. Leaves 15—30 cm long, setaceous, rigid, scabrid; sheath glabrous; ligule hairy. Inflorescence solitary raceme, 7—11.5 cm long. Sessile spikelets 8.4—9.2 mm long, linear-lanceolate; callus shortly bearded. Lower glume 8.4—9.2 mm long, chartaceous, bidentate, deeply grooved, 2-keeled, one winged. Upper glume 4—5 mm long, boat-shaped, awn 1.5 cm long. Lower lemma male, 6.3 mm long, lanceolate, hyaline, ciliate. Upper lemma equal to lower, bisexual, 2-lobed; awn 3.5 cm long. Palea ciliate. Pedicelled spikelet 9.5—11.0 mm long, glabrous. Anther 3, yellow, 2.5—3.0 mm long. Caryopsis \pm 3.5 mm long, boat-shaped.

Fls. & Frts. : Oct.—Nov.

Distribution : Balaghat, Bastar, Bilaspur, Damoh, Durg, Gwalior, Hoshangabad, Indore, Rewa, Satna, Sidhi, Tikamgarh.

4. *I. prostratum* (L.) Anders. in Nov. Act. Soc. Sci. Upsal. ser. 3. 2 : 251. 1856; *Andropogon prostratum* L. Mant. Alt. 304. 1771.

Perennial. Culms 30—80 cm. tall, erect or decumbent. Leaves 8—18 cm, glaucous; sheath smooth, ligule membranous, truncate. Inflorescence a panicle, spathe 3—18 mm long, linear-lanceolate, margins scarious. Involucral spikelets 5—6 mm long. Lower glume 6 mm long, 5 ribed on back. Upper glume glabrous, margins 1-nerved. Lower lemma absent. Upper lemma male. Anthers 3, yellow, 1.5—2.0 mm long. Pedicelled spikelets similar, callus white haired. Sessile spikelet 2.5—3.0 mm long, lanceolate. Lower glume 2.5 mm long, acute, 4-nerved. Upper glume elliptic-lanceolate, keel scabrid. Lower lemma 2.5 mm long, linear, hyaline. Upper lemma bisexual, epaleate. Anthers 3, brownish yellow, 3 mm long. Caryopsis \pm 2 mm long, brown.

Fls. & Frts. ; Sept.—Jan.

Distribution : Bastar, Bilaspur, Indore, Mandla, Hoshangabad, Rajnandgaon.

56. JANSENELLA Bor.

Jansenella griffithiana (C. Muell.) Bor in Kew Bull. 1955 : 98. 1955; *Danthonia griffithiana* C. Muell. in Bot. z. 14 : 347. 1856; *Avena malabarica* Heyne ex Hook. f. Fl. Brit. Ind. 7 : 69. 1896.

Annual. Culms 15—40 cm tall, weak, straggling. Leaves 3—5 cm long, ovate-lanceolate, glabrous or pilose; sheaths loose, glabrous; ligule, lacerate. Inflorescence a compact panicle, branches short, glabrous or hairy. Spikelets 5—6 mm long, sessile. Lower glume 4 mm long with arista 3—5-nerved, glabrous or hairy. Upper glume 4.5—5 mm long, 3—5-nerved; both glumes awned. Lower floret male or neuter, awned, acuminate. Upper floret hermaphrodite; lemma 3 mm long, linear-oblong, hispid or pilose; lateral awns triangular at base, median awn flattened, strongly twisted, twice as long as the spikelets. Anthers 3, yellow, 0.5—0.75 mm long. Caryopsis not seen.

Fls. & Frts. : Aug.—Nov.

Distribution : Bastar.

57. LEERSIA Soland.

Leersia hexandra Swartz. Prodr. Veg. Ind. Occ. 21. 1788; Hook. f. Fl. Brit. Ind. 7 : 94. 1896.

Perennial, aquatic grass. Culms 50—120 cm long, forming dense masses around the swamps or lakes in shallow water, nodes hairy. Leaves flat, rigid, glaucous, serrulate along margins; sheath smooth or scaberulous; ligule membranous. Inflorescence a terminal, contracted panicle, 5—10 cm long; branches 2—3 cm long. Pedicels very short. Spikelets 3—4 mm long, closely imbricate, oblong, compressed. Glumes reduced to a rim. Lemma 3—4 mm long, cartilaginous, 5 nerved; lateral nerves forming thick border, compressed; keel rigidly ciliate. Palea shorter, dimidiate, linear-oblong, 3-nerved; keels ciliate. Anthers 6, equalling the palea. Caryopsis almost equal to lemma, glabrous, hardly enclosed by the lemma and palea.

Fls. & Frts. : Sept.—Nov.

Distribution : Ambikapur, Bastar, Bilaspur, Sidhi.

58. LEPTOCHLOA P. Beauv.

1a. Spikelets 4—6 mm long, 3—7 flowered;
upper glume shorter than first floret ... *L. chinensis* 1

- 1b. Spikelets 1.5—2.5 mm long, usually 2—3-flowered; upper glume longer than the first floret

... *L. panicea* 2

1. *Leptochloa chinensis* (Linn.) Nees in Syll. Ratisb. 1 : 4 1824. Hook. f. Fl. Brit. Ind. 7 : 299. 1896. *Poa chinensis* Linn. Sp. Pl. 69. 1753.

Annual. Culms 40—90 cm tall, tufted, erect or geniculate, nodes glabrous. Leaves linear, glabrous; sheaths compressed, glabrous; ligule lacerate, short. Inflorescence a loose panicle, branches alternate; rachis stiff, scaberulous. Spikelets 4—6 mm long, 3—7 flowered linear. Lower glume 1.25—1.5 mm long, membranous, 1-nerved, keel scaberulous. Upper glume 1.4—1.6 mm long, 1-nerved, keel scaberulous. Lemma 1.8—2 mm long, 3-nerved, pubescent or glabrous. Palea keels ciliate. Anthers 3, 0.3—0.4 mm long. Caryopsis \pm 1 mm long, obtusely trigonous, brown.

Fls & Frts. : Sept.-Feb.

Distribution : Ambikapur, Bilaspur, Rewa.

2. *L. panicea* (Retz) Ohwi, in Bot. Mag. Tokyo, 55 : 311. 1941 ; *Poa panicea* Retz. Obs. Bot. 3 : 11. 1783.

Annual. Culms 25—60 cm tall, geniculate, ascending. Leaves 10—25 cm long, linear-lanceolate with tubercled hairs; sheath glabrous or hairy along margins, compressed; ligule lacerate. Inflorescence a panicle, composed of several slender, ascending branches, often purplish. Spikelets usually 3-flowered, narrowly elliptic, 1.9—2.5 mm long overlapping. Lower glume 0.7—1.5 mm long, lanceolate, acute. Upper glume 0.9—1.6 mm long, narrowly ablong, mucronate. Lemmas 0.8—1.2 mm long, elliptic-oblong, 3-nerved, margin slightly rolled. Anthers very small, pinkish. Caryopsis 0.5 mm long, broadly elliptic, trigonous in cross-section.

Fls. & Frts. : July—Nov.

Distribution : Damoh, Shukla; 28652

59. LOLIUM L.

Lolium temulentum L. Sp. pl. 83. 1753.

Annual. Culms erect, 15—60 cm tall, nodes glabrous. Leaves 10—20 cm, acute; sheath glabrous; ligule membranous, truncate.

Inflorescence a solitary spike; rachis flexuous. Spikelets alternate, elliptic-oblong, 5—15-flowered. Lower glume absent. Upper glume 9 mm long, elliptic-oblong, 5-nerved, with \pm 1.5 cm long, awn. Palea 6 mm long, oblong, winged, 2-keeled, serrulate along keels. Anthers 3, linear, pale yellow, 2—3 mm long. Caryopsis 4.5—5.0 mm long, oblong.

Fls. & Frts. : Dec.—May.

Distribution : Damoh, Shukla, 29799.

60. MANISURIS L.

1. Lower glume of sessile spikelets awnless, winged on both sides above the middle ... *M. clarkei* 1
2. Lower glume of sessile spikelet with one or two divaricate awns, with transverse rows of tubercles or hooks ... *M. forticulata* 2

1. *Manisuris clarkei* (Hack.) Bor, *apud* Santapau, Fl. Khandala 357, 1953. *Rottboellia clarkei* Hack. in Ost. Bot. Z. 41 : 8, 1891.

Annual. Culms 20—60 cm tall, erect, striate, compressed, nodes with ring of hairs. Leaves linear-lanceolate, hairy, midrib prominent; sheath compressed, ciliate; ligule lacerate. Inflorescence of solitary racemes, supported by a spathe, rachis very fragile, joints pyriform, shorter than the spikelet, ciliolate, and with a broad cavity at the tip, sides not hollow. Sessile spikelet 2.5—3 mm long, obtuse, closely imbricate. Lower glume 3—5-nerved: disk and hyaline wings ciliate at tip, scabrid and hairy below the middle. Upper glume 2.5—3 mm long, ovate, sub-acute, membranous, 1-nerved, glabrous. Lemma shorter than upper glume, hyaline, nerveless. Palea hyaline, nerveless. Pedicelled spikelet sterile, represented by an empty glume. Anthers 3, yellow, \pm 1 mm long.

Fls. & Frts. : Sept.—Nov.

Distribution : Balaghat, Raigarh.

2. *M. forticulata* C.E.C. Fischer in Kew Bull. 1933. 355. 1933. *Rottboellia divergens sensu* Fl. Brit. Ind. 7 : 155. 1896, non Hack. in DC. Monogr. Phan. 6 : 292. 1889.

Annual. Culms 10—25 cm tall, erect, slender ; nodes with binate flowering branches. Leaves linear, acuminate, hairy, rising without constriction from sheath; sheaths loose, hairy; ligule membranous, obtuse. Inflorescence a solitary raceme, 2—4 cm long; peduncle filiform, sheathed ; joints of the rachis shorter than the spikelets, sub-clavate. Sessile spikelet \pm 6 mm long; awns 5—8 mm long. Lower glume coriaceous with 5—7 transverse echinulate ridges below the middle, tip clefted. Upper glume much shorter, \pm 3 mm long, thinly membranous, 1-nerved. Lemma 2.5—3 mm long, broadly ovate, nerveless. Anthers and caryopsis not seen.

Fls. & Frts. : Sept.—Nov.

Distribution : Hoshangabad (Pachmari), Joseph 11336.

61. MELANOCENCHRIS Nees

Melanocenchrus jacquemontii Jaub. & Spach, III. Pl. Or. 4 : 36. 1851 ; *Gracilea roylena* Hook. f. Fl. Brit. Ind. 7 : 284. 1896.

Annual. Culms 7—30 cm tall, densely tufted. Leaves 2.5—5.0 cm long, acutely pointed, glabrous, ciliate on margins; sheath glabrous, ligule a fringe of hairs. Inflorescence spicate, fillform, 1.3—5.0 cm long. Spikelets in cluster of threes, 6—8.5 mm long (including awn), green or purple. Involucral glumes 4 ; outer glumes \pm 7 mm long, hairy below, awn retrorsely barbed ; inner glumes 6.5—7.0 mm long, wider than outer. Palea as long as the glume, 2-toothed; rachilla projected beyond palea. Inner floral glume stalked, distinctly 3-toothed at apex, scabrid on back. Anthers 3, pale yellow \pm 1 mm long. Caryopsis 1.5—2.0 mm long, oblong, polished, grey brown.

Fls. & Frts. : Sept.—Nov.

Distribution : Ambikapur, Balaghat, Bilaspur, Damoh, Hoshangabad, Indore, Jabalpur, Mandla, Sagar, Satna, Sidhi.

62. MICROSTEGIUM

- 1a. Sessile spikelets 4.5—5 mm long; upper lemma well developed; anthers \pm 3 mm long ; ligule 4—9 mm long ... *M. petiolare* 2

- 1b. Sessile spikelets 2.5—3.5 mm long ; upper lemma very short ; anthers 1.5—2 mm long ; ligule a short membrane ... *M. ciliatum* 1

1. *Microstegium ciliatum* (Trin.) A. Camus in Ann. Soc. Linn. Lyon, n.s. 68 : 201, 1921. *Pollinia ciliata* Trin. In Mem. Acad. Sci. Petersb. ser. 6, 2 : 306, 1832.

Perennial or annual. Culms up to 1.2 m tall, decumbent, rooting at lower nodes. Leaves lanceolate, base narrowed like petiole, glabrous, except basal portion with bulbous-based hairs; sheath tight, glabrous, a few hairs at mouth; ligule short, membranous. Inflorescence of subdigitate racemes. Spikelets in alternate pairs. Sessile spikelets 2.5—3.5 mm long, narrow, ciliate. Lower glume \pm 3 mm long, lanceolate, dorsally grooved, keels scabrid, tips forked. Upper glume equal to lower, 1-nerved, awned or mucronate. Lower floret male or neuter. Upper floret hermaphrodite. Lemma \pm 0.5 mm long, narrowly oblong, acute, awn 5—17 mm long (variable). Anthers 3, yellow 1.5—2 mm long. Caryopsis not seen.

Fls. & Frts. : Sept.—Dec.

Distribution : Bilaspur, Panigarhi 1188.

2. *M. petiolare* (Trin.) Bor in Ind. For. Rec. (Bot.) 1, 3 : 87, 1938. *Spodiopogon petiolaris* Trin. in Mem. Acad. Sci. Petersb. ser. 6, 2 : 301, 1832. *Ischaemum petiolare* Hack. Monogr. Androp. 238, 1889, Hook. f. Fl. Brit. Ind. 7 : 138, 1896.

Perennial. Culms 0.6—1 m tall, decumbent, rooting at nodes; nodes pubescent. Leaves lanceolate, both surfaces with tubercle based hairs, margins scabrid ; sheaths terete, margins ciliate; ligule 4—9 mm long, truncate, back pubescent, decurrent into margins of sheaths. Inflorescence consisting of 8—20 racemes, simple or divided. Sessile spikelets 4.5—5 mm long, lanceolate-oblong. Lower glume equalling spikelets, dorsally grooved, toothed, 6—8 nerved, keels scabridly ciliate. Upper glume scabrid, 3-nerved. Lower floret male. Upper floret hermaphrodite. Lemma 3—4.5 mm long, ovate-oblong, 2-lobed, with 4—8 mm long awn from the sinus. Anthers 3, yellow, 3 mm long. Caryopsis not seen.

Fls. & Frts. : Sept.—Dec.

Distribution : Baildilla, Bastar.

63. MNESITHEA Kunth

Mnesithea leavis (Retz.) Kunth. Rev. Gram. 1 : 154. 1829 ;
Rottboellia leavis Retz. Obs. Bot. 3 : 11. 1783.

Perennial. Culms erect, 30—160 cm tall, tufted. Leaves 15—30 cm long, hairy at base ; sheaths loose, glabrous ; ligule membranous. Inflorescence a raceme, 8—20 cm long. Sessile spikelets glabrous, 3.5—4.5 mm long. Lower glume 3.5 mm long, slightly emarginate, faintly 4—5-nerved. Upper glume 4 mm long, 3-nerved. Lower lemma with faint marginal nerves. Palea absent. Upper lemma 3-nerved. Pedicelled spikelets reduced. Anthers 3, pinkish, \pm 2 mm long. Caryopsis 1.5—2.0 mm long.

Fls. & Frts. : Sept.—Nov.

Distribution : Balaghat, Damoh, (rare plant).

64. NARENGA Bor

Narenga porphyrocoma (Hance) Bor in Ind. For. 66 : 267. 1940.
Saccharum narenga Wall. Cat. n. 8846 *nom. nud.* *Eriochrysis narenga*
Nees ex Steud. Syn. Pl. Flum. 1 : 411. 1855.

Perennial. Culms 2—2.5 m tall, rounded, appressed silky below the panicle and on nodes. Leaves narrow at base, upper surface glabrous, lower scabrid with tubercle based hairs, median nerves strong, margins very scabrid; sheath scabrous with long hairs near throat or hairy all over; ligule ciliolate; membranous, 2—3 mm long. Inflorescence narrow, dense panicle, woolly, 30—45 cm long, minutely scaberulous, bearded at nodes ; primary branches 2—4-nate. glabrous ; secondary branches alternate ; internodes of rachis fragile, hairy at base. Sessile spikelets 2.5—3 mm long, entire, short hairy on margins; upper equal to lower, keeled, obtuse ; margins ciliate. Lower floret empty. Upper hermaphrodite; lemma 2—3 mm long, nerveless, ciliate. Anthers 3, yellow, 1.5 mm long. Caryopsis 1 mm long, blackish purple.

Fls. & Frts. : Oct. —Jan.

Distribution : Ambikapur, Bilaspur, Pacharhi, Sidhi.

65. OPHIUROS Gaertn. f.

Ophiuros exaltatus (L.) O. Ktze. Rev. Gen. Pl. 2 : 780. 1891;
Aegilops exaltata L. Mant. Pl. 2 : 575. 1771.

Strongly perennial. Culms 60—120 cm tall, glabrous, bulbous at base. Leaves 30—40 cm, glabrous, hairy at base, margins minutely tubercled; sheath loose, glabrous; ligule membranous truncate. Inflorescence consists of spikes, 8—12 cm long, corymbosely fascicled, ended as rattle snake tail. Spikelets 2.0—3.5 mm long, equalling the joint. Lower glume of sessile spikelets 3 mm long, glabrous, with many small pits. Upper glume 3 mm long, boat-shaped, obtuse. Lower lemma 2 mm long, hyaline, 2-nerved. Upper lemma 2 mm long. Anthers 3, yellow, 1.5—2.0 mm long. Caryopsis slightly dorsally compressed. \pm 1.5 mm long.

Fls. & Frts. : Sept.—Oct.

Distribution : Balaghat, Bilaspur, Damoh, Gwalior, Mandla, Sagar, Sidhi.

66. OPLISMENUS P. Beauv.

- | | | |
|--|-----|------------------------|
| 1a. Awns barbellate, capillary, long, white
hairy on rachis; leaves rarely more than
4 cm long | ... | <i>O. burmanii</i> 1 |
| 1b. Awns smooth, viscid, filiform; leaves
10 cm or more long | ... | <i>O. compositus</i> 2 |

1. *Oplismenus burmanii* (Retz.) P. Beauv. Ess. Agrost. 54 : 168, 169. 1812. *Panicum burmanii* Retz. Obs. Bot. 3 : 10. 1783.

Annual. Culms 10—70 cm long, prostrate, rooting at nodes, slender, pubescent at nodes. Leaves thin, ovate to elliptic-lanceolate, softly pubescent, margins smooth; sheath compressed, lower loose, hispid to softly pubescent; margins ciliate; ligule hyaline membranous, tip ciliate. Inflorescence a panicle, made of 3—7 racemes (0.7—1.5 cm) secund, ascending; rachis slender, triquetrous, pilose with bristles. Pedicels short, with bristles. Spikelets \pm 3 mm long, on inner angle of the rachis, elliptic-lanceolate. Lower glume 1.5—2 mm long, 5-nerved,

dorsally pubescent, margins ciliate; awn 2.5—10 mm long, pubescent. Upper glume similar to lower. Lower lemma empty. Upper lemma 2—2.5 mm long, 5—7-nerved, chartaceous, whitish-yellow. Anthers 3, yellow, \pm 1 mm long. Caryopsis 2—2.5 mm long, convex on back, hilum about half the length caryopsis.

Fls. & Frts. : July—Dec.

Distribution : Common species all over the state on sandy soil in shady localities.

2. **O. compositus** (L.) P. Beauv. Ess. Agrost. 54 : 168—169. 1812.
Panicum compositum L. Sp. Pl. ed. 1 : 57. 1753.

Perennial. Culms up to 1 m long, decumbent, rooting at base, terete, branched, glabrous or hairy along a line adaxial to the supporting leaf. Leaves lanceolate, base rounded, minutely hairy to velvety below; sheaths markedly striate, densely ciliate along the margin; ligule short, ciliate, truncate. Inflorescence a panicle, made of 3—5 one sided racemes alternately arranged on triquetrous rachis which is glabrous to hairy. Racemes 2.5—6 cm long, decreasing in length upwards. Pedicel short, tip truncate with bristles. Spikelets 3.8—5 mm long (excluding awn), lanceolate, acuminate. Glume sub-equal \pm 3 mm long, thin, lanceolate to oblong. Lower glume 5-nerved with 1.25 mm long awn. Upper glume 7—9 nerved with 2.5—3 mm long awn. Lower floret barren, equalling the spikelet. Upper floret hermaphrodite, oblong, acute, \pm 3 mm long, whitish to brownish, polished. Lemma and palea sub-coriaceous. Anthers 3, yellow, \pm 1 mm long. Caryopsis dorsally compressed, 2.5—3 mm long.

Fls. & Frts. : July—Feb.

Distribution : Bastar, Bilaspur, Bori, Mandla, Raigarh, Rewa, Sidhi.

67. **OROPETIUM** Trin.

- 1a. Spikelets 3—4 mm long; spikes 4—10 cm long; perennial ...*O. roxburghianum* 1
- 1b. Spikelets up to 2 mm long; spikes up to 2 cm long; annual :

- 2a. Lemma glabrous; spikes much compressed; spikelets 1.5—2 mm long ... *O. thomaeum* 2
- 2b. Lemma hirsute; spikes terete or slightly compressed; spikelets \pm 1.5 mm long ... *O. villosulum* 3

1. **Oropetium roxburghianum** (Steud.) S. M. Phillips in Kew Bull. 30(3) : 469. 1975; *Lepturus roxburghianus* Steud. Syn. Pl. Glum. 1 : 357. 1854; Hook. f. Fl. Brit. Ind. 7 : 365. 1896; *Tripogon roxburghianus* (Steud.) Bhide in J. Proc. Asiat. Soc. Beng. II, 7 : 515. 1912; Bor, 524. 1960.

Perennial. Culms 10—25 cm tall, tufted, erect. Leaves filiform, glabrous, with few white hairs along the margins; sheath compressed glabrous; ligule membranous. Inflorescence spicate usually purple. Spikelets 3—4 mm long, 1—2-flowered, sunken in the hollow of rachis. Lower glume \pm 0.75 mm long, 1-nerved, asymmetrical. Upper glume coriaceous, 3 mm long, acute. Lemma \pm 2.5 mm long, 3-nerved, hairy at base, minutely 2—3-toothed at apex. Palea smooth. Anthers 3, yellow or purplish, 0.5—1.0 mm long. Caryopsis \pm 1 mm long, terete.

Fls. & Frts. : Aug.—Nov.

Distribution : Pachmarhi, Rewa.

2. **O. thomaeum** (L. f.) Trin. Fund. Agrost. 98, t. 3, 1820. *Nardus thomaea* L. f. Supple. 105. 1781.

Annual. Culms 5—10 cm tall, densely tufted, branched. Leaves setaceous, up to 2 cm long, acute, glabrous or with sparsely long hairs; sheath compressed, spathaceous, glabrous; ligule lacerate. Inflorescence of spikes enclosed in sheaths, rachis 4-gonous. Spikelets sessile, sunken in the hollow of rachis, 1-flowered, \pm 2 mm long. Lower glume 0.5 mm long, hyaline, nerveless, lacerate at apex. Upper glume \pm 2 mm long, rigid, 3-nerved. Lemma 1—1.25 mm long, boat-shaped. Anthers 3, yellow, very small. Caryopsis \pm 0.5 mm long, oblong.

Fls. & Frts. : July.—Sept.

Distribution : Gwalior, Rewa, Sidhi.

3. **O. villosulum**. Stapf ex Bor in Kew Bull. 1949 : 571. 1950.

Annual. Culms 5—10 cm tall, tufted, branched. Leaves setaceous, up to 2.5 cm long, scabrid; sheath compressed, spathaceous, glabrous; ligule short, membranous. Inflorescence of spikes enclosed in sheaths; rachis 4-gonous. Spikelets 1—1.5 mm long, 1-flowered, sunken in the hollow of rachis. Lower glume 1—1.2 mm long, nerveless, truncate at apex. Upper glume 2—2.5 mm long, 3-nerved, cuspidate. Lemma 1.5—1.7 mm long 3-nerved hispid all over. Anthers 3, yellow, minute. Caryopsis 0.5 mm long, oblong.

Fl. & Frts. : July—Sept.

Distribution : Bhopal, Sanchi.

68. ORYZA L.

- 1a. Spikelets over 8 mm long, awned :
 - 2a. Spikelets persistent; anthers 3, about 2 mm long ... *O. sativa* 4
 - 2b. Spikelets caducous; anthers 6, about 5 mm long ... *O. rufipogon* 3
- 1b. Spikelets less than 7 mm long, usually awnless :
 - 3a. Spikelets absolutely glabrous, 6—7 mm long and persistent ... *O. glaberrima* 1
 - 3b. Spikelets hispid, scaberulous, 4—5 mm long and caducous ... *O. minuta* 2

1. *Oryza glaberrima* Steud. Syn. Pl. Glum 1 : 3. 1854.

Annual. Culms 40—100 cm tall, erect, tufted. Leaves 20—50 cm long scabrid; sheath loose, glabrous; ligule of the lower leaves under 6 mm long, rounded or truncate. Spikelets oblong or oblong-elliptic. Sterile lemma flat, membranous, linear, 6—7 mm long, glabrous, persistent, usually awnless, if awned the awns smooth or scaberulous. Lemma and palea glabrous or sometimes hispid. Cultivated rice.

Fls. & Frts. : Aug.—Oct.

Distribution : Ambikapur, Sidhi.

2. *O. minuta* J. S. Presl. ex C. B. Presl. Rel. Haenk. 1 : 208. 1830.

Annual. Culms tufted, up to 1.5 m tall. Leaves up to 50 cm long, \pm 2 cm wide, scabrid; sheath terete, glabrous with well-defined auricle and stiff hairs; ligule membranous, 5 mm long. Inflorescence a terminal panicle, main branches widely spaced, the lowest whorled, scaberulous and drooping. Spikelets many, 4—5 mm long, dark brown or black when ripe, articulate above the minute glumes. Glumes 1.5—2.0 mm long. Lemma I : 1-nerved, linear-lanceolate, acuminate, 1.6 mm long. Lemma II : similar. Lemma III : folded at midnerve, oblong, rounded, awn 1.8 mm long. Palea hispid scaberulous, fitted to lemma, apiculate. Anthers 3, pale yellow or purplish. Stigma deep purple. Caryopsis flat, red-brown, 3.5 mm long.

Fls. & Frts. : Aug.—Oct.

Distribution : Ambikapur, Sidhi.

3. *O. rufipogon* Griff. Notul. 3 : 5. 1851.

Annual, shallow-water wild rice. Culms 1.0—1.5 m tall, lower parts spongy. Leaves linear, acuminate, scabrid on margins and veins; sheath terete, loose, glabrous, with developed auricle; ligule up to 1.7 cm long, splitting at tip. Inflorescence an exserted compound panicle; main branches angular and scabrid. Spikelets 8—9 mm long, falling with age, articulation above minute semi-circular glumes. Lemma I : 1-nerved, 2.5 mm long. Lemma II : 2.4 mm long. Lemma III : 7 mm long, strongly folded about the midnerve; awn \pm 7 cm long, scabrid. Palea similar, awn 6 mm long. Anthers 6, yellow, 5 mm long. Caryopsis 4—5 mm long, similar to *Oryza sativa*.

Fls. & Frts. : Sept.—Nov.

Distribution : Ambikapur, Balaghat, Bilaspur, Indore, Katni, Sidhi.

4. *O. sativa* L. Sp. Pl. 333. 1753.

Annual. Culms 40—100 cm tall, erect, tufted. Leaves 20—50 cm, scabrid; sheath loose, glabrous; ligule 0.8—1.0 cm long, membranous, acute. Inflorescence a panicle, branches scabrid. Spikelets 8—12 mm

long, ovate-oblong, laterally compressed. Glumes reduced, lip-like structure. Lower lemma empty, scale-like, acuminate, epaleate, 1-nerved. Upper lemma 5—6 mm long, chartaceous, scabrid, setose on the keel at top, 5-nerved, \pm 4 cm long; awn retrorsely barbed. Palea acute, similar to lemma, 3-nerved. Anthers 3, light yellow, \pm 2 mm long. Caryopsis \pm 5 mm long, various shaped according to varieties.

Fls. & Frts. : Usually Aug.—Nov.

Distribution : Cultivated species.

69. PANICUM L

- 1a. Leaf blades ovate-acuminate, amplexicauf; spikelets gibbous ... *P. brevifolium* 1
- 1b. Leaf blades linear to narrowly lanceolate; spikelets symmetrical :
 - 2a. Lemma of the upper floret transversely rugose; nerves of the upper glume and lower lemma obscure ... *P. maximum* 2
 - 2b. Lemma of the upper floret quite smooth; nerves of upper glume and lower lemma conspicuous :
 - 3a. Spikelets 4—5 mm long, sharply acute, ovate to elliptic in back view; leaf sheaths hairy; spikelets persistent ... *P. miliaceum* 3
 - 3b. Spikelets up to 3.5 mm long and not in shape as above :
 - 4a. Spikelets about 1.5 mm long; dwarf grass ... *P. walenje* 9
 - 4b. Spikelets over 2 mm long; plants relatively taller :
 - 5a. Spikelets narrowly lanceolate to lanceolate-oblong, acute :

- 6a. Spikelets narrowly lanceolate; leaf blades broad, flat; culms spongy floating ... *P. paludosum* 5
- 6b. Spikelets lanceolate to lanceolate-oblong; leaf blades narrow often involute; culms tufted rhizomatous ... *P. repens* 7
- 5b. Spikelets oblong, ovate-oblong to elliptic, acute or obtuse :
- 7a. Margins of lower glume ciliate, 5-nerved; culm base woody ... *P. notatum* 4
- 7b. Margins of lower glume not ciliate, 3 or 5-nerved; culm base not woody :
- 8a. Anthers \pm 1 mm long; upper glume 2—3.5 mm long 11—13-nerved; ligule ciliate ... *P. sumatrense* 8
- 8b. Anthers \pm 0.7 mm long; upper glume 1.5—2 mm long, 11-nerved; ligule lacerate ... *P. psilopodium* 6

1. *Panicum brevifolium* L. Sp. Pl. ed. 1. 59. 1753.

Annual. Culms 20—50 cm tall, decumbent, rooting at nodes. Leaves ovate-elliptic, acuminate, 2—8 × 1—3 cm long; sheath with long hairs on throat, hairy, rarely glabrous; ligule membranous. Inflorescence a panicle, just exerted from the sheath; main axis hairy; branchlets glabrous with axillary cushions. Spikelets slightly gibbous, glabrous to hairy, 1.5—2.0 mm long. Lower glume acute, 3—5-nerved, hairy, 1.5 mm long. Upper glume 5-nerved, boat-shaped, 1.8—2.0 mm long, acute, hairy. Lower floret neuter. Upper floret hermaphrodite, narrow elliptic. Lemma 5-nerved, 1.5 mm long. Palea hyaline. Anthers 3, yellow, \pm 0.5 mm long. Caryopsis \pm 1.5 mm long, narrowly elliptic.

Fls. & Frts. : Sept.—Feb.

Distribution : Bastar, Bilaspur, Sidhi.

Note : It grows in moist, shady places.

2. ***Panicum maximum*** Jacq. Collect. Bot. 1 : 76. 1786.

Robust, perennial, with short rhizome. Culms up to 2 m tall, glabrous to hairy. Leaves up to 60 × 2 cm, glabrous, margins scabrid; sheath glabrous; ligule hairy, 1.5 mm long. Inflorescence large, open compound panicle. Spikelets 3.0—3.5 mm long, green or purple-tinged, ellipsoid. Lower glume 1.5 mm long. Upper glume 3 mm long, 5-nerved, acute. Lower floret male, nerves obscure. Anthers 3, purple, 1.8 mm long. Upper floret hermaphrodite. Lemma transversely rugose, 3-nerved. Caryopsis ± 2.25 mm long, narrowly elliptic.

Fls. & Frts. : Sept.—Jan.

Distribution : Bilaspur, Indore, Sidhi.

3. ***P. miliaceum*** L. Sp. Pl. ed. 1. 58. 1753.

Annual. Culms 40—70 cm tall, erect, nodes glabrous. Leaves flat, linear-lanceolate, sparsely hairy; sheath terete, hispid all over; ligule hairy. Inflorescence an effuse panicle, about half the length of culm; branches long scabrid. Spikelets elliptic or ovate-acute, 4.0—4.5 mm long. Lower glume 2—3 mm long, ovate-acute, 5—7-nerved. Upper glume 4.0—4.5 mm long, convex, acuminate, 7—11-nerved. Lower floret empty. Lemma similar to upper glume. Upper floret hermaphrodite. Lemma chartaceous, elliptic, 2.5—2.7 mm long, smooth, shining. Anthers 3, linear, yellow or purplish, ± 1.5 mm long. Caryopsis orbicular, plano-convex, white, 2.5 mm long.

Fls. & Frts. : Sept.—Dec.

Distribution : Gwalior.

4. ***P. notatum*** Retz. Obs. Bot. 4 : 18. 1786; *P. montanum* Roxb. Fl. Ind. 1 : 315. 1820.

Perennial. Culms up to 120 cm tall, base woody. Leaves acuminate, linear-lanceolate, 15—18 × 2—3 cm, broad and cordate at base, bulbous based hairs on both surfaces, margins scabrid; sheath hairy on margins; ligule (densely) hairy. Inflorescence a narrow panicle with slender branches. Spikelets numerous, ovoid, acute, 1.5—2.5 mm long. Lower glume ovate-acute, 1—2 mm long, 5-nerved; margins long ciliate. Upper

glume ovate-acute, 5-nerved, glabrous, 2.0—2.5 mm long. Lower floret neuter. Lemma 5-nerved, 2.2 mm long, epaleate. Upper floret hermaphrodite. Lemma indurated, boat-shaped, nerves obscure, 1.8 mm long. Palea 1.7 mm long. Anthers 3, yellow, 0.8 mm long.

Fls. & Frts. : Sept.—Feb.

Distribution : Ambikapur, Balaghat, Bastar, Bilaspur, Bori, Raigarh, Shivpuri, Sidhi.

5. *P. paludosum* Roxb. Fl. Ind. ed. Carey & Wall 1 : 310. 1820.

Annual. Culms 80—125 cm tall, decumbent or creeping. Leaves 20—30 cm long, acuminate; sheath loose glabrous; ligule a ring of hairs. Inflorescence an open panicle. Spikelets 3.0—3.5 mm long, lanceolate, acute. Lower glume 1 mm long, sub-orbicular, 3—5-nerved. Upper glume 3.2 mm long, ovate-lanceolate, 9-nerved. Lower floret barren, Lemma 2.5 mm long, acute, 9-nerved. Upper floret hermaphrodite, 2.0—2.5 mm long, narrowly elliptic acute. Lemma 2.2 mm long, white, shining. Anthers 3, purple, \pm 1 mm long. Caryopsis 1.8 mm long, elliptic.

Fls. & Frts. . Aug.—Oct.

Distribution : Ambikapur, Balaghat, Bilaspur, Damoh, Durg, Raigarh, Shivpuri, Sidhi.

6. *P. psilopodium* Trin, Gram. Panic. 217. 1826.

Annual. Culms 30—50 cm tall, erect, glabrous. Leaves 6—15 cm long, acuminate; sheath compressed, glabrous; ligule 1.5—2.0 mm long, lacerate. Inflorescence a lax panicle. Spikelets 2.5—3.0 mm long, elliptic, acute, purplish. Lower glume 1.0—1.2 mm long, ovate, apiculate, 3-nerved. Upper glume 1.5—2.0 mm long, membranous, 11-nerved. Lower floret barren. Lemma 2.5 mm long, 9-nerved. Upper floret bisexual. Lemma 1.2—1.7 mm long, obtuse or apiculate. Anthers 3, \pm 0.7 mm long. Caryopsis \pm 1.5 mm long, dark brown, ellipsoid.

Fls. & Frts. : July—Nov.

Distribution : Ambikapur, Balaghat, Bilaspur, Damoh, Rajnandgaon, Shivpuri, Sidhi.

7. *Panicum repens* L. Sp. Pl. ed. 2 : 87. 1762; Hook. f. Fl. Brit. Ind. 7 : 49. 1896.

Perennial, rhizomatous. Culms 0.4—1 m tall, simple or branched, nodes glabrous. Leaves linear-lanceolate, glabrous, acuminate; sheath glabrous, ciliate at throat; ligule hairy, annular. Inflorescence an open panicle, branches scabrid. Spikelets elliptic-lanceolate, 2.5—3.0 mm long, glabrous. Lower glume ovate to orbicular, 0.5—1.0 mm long. Upper glume membranous, elliptic-lanceolate, 2.5—3.0 mm long, 5—9-nerved, glabrous, acute. Lower floret male. Anthers 3, purple \pm 1 mm long. Upper floret hermaphrodite. Lemma chartaceous, elliptic-oblong, 2.5—2.7 mm long, glabrous, white. Anthers 3, purple, 1.0—1.5 mm long. Caryopsis white, oblong, 2.0—2.5 mm long.

Fls. & Frts. : Aug.—Dec.

Distribution : Bilaspur, Indore, Hoshangabad.

8. *P. sumatrense* Roth ex Roem. & Schult. Syst. Veg. 2 : 434. 1817; *P. miliare* Lamk. Tab. Encycl. Meth Bot. 1 : 173. 1791, *nomen superfl.*

Annual. Culms 0.3—1 m tall, erect or geniculate. Leaves linear, flat, glabrous or sparsely hairy; sheath loose, ciliate at throat; ligule ciliate, truncate. Inflorescence a contracted panicle. Spikelets 2.0—3.5 mm long, ellipsoid, glabrous, green or purple tinged. Lower glume 0.7—1.5 mm long, 3—5-nerved, acuminate. Upper glume 2.0—3.5 mm long, ovate, concave, 11—13-nerved. Lower floret neuter. Upper floret hermaphrodite. Lemma 2—3 mm long, cartilaginous, shining. Anthers 3, purple \pm 1 mm long. Caryopsis sub-globose, cream coloured, \pm 1.5 mm long.

Fls. & Frts. : July—Oct.

Distribution : Common all over the State.

9. *P. walense* Mez. in Engl. Bot. Jahrb. 34 : 146. 1904; *P. humile* Nees ex Steud. Syn. Pl. Gram. 84. 1854 (non Thunb. ex Trin. 1826); *P. austro-asiaticum* Ohwi in Act Phytotax. & Geobot. Kyoto 11 : 45. 1942; Bor, Grass. Bur. Ceyl. Ind. Pak. 324. 1960.

Annual. Culms 15—45 cm tall, tufted, erect or ascending. Leaves 10—15 cm long, acuminate; sheath loose, glabrous; ligule 1.0—1.5 mm

long, ciliate. Inflorescence open panicle. Spikelets 1.5—1.75 mm long, acute, greenish or purple tinged. Lower glume 1 mm long, lanceolate, 3-nerved. Upper glume 1.75 mm long, 3-nerved. Lower floret barren. Lemma 1.5 mm long, 5-nerved. Upper floret bisexual, 1.5 mm long. Lemma 1.3 mm long, boat-shaped. Anthers 3, purplish, \pm 1 mm long. Caryopsis 1 mm long, elliptic, whitish.

Fls. & Frts. : Sept.—Oct.

Distribution : Damoh, Shukla : 29465.

70. PASPALIDIUM Stapf

- 1a. Spikes shorter than the internodes; usually annual; rachis produced; upper lemma granulare ... *P. flavidum* 1
- 1b. Spikes longer than the internodes ;
 - 2a. Spikelets 1.5—2.5 mm long; rachis produced into a sharp point; upper glume half the length of upper lemma. *P. punctatum* 3
 - 2b. Spikelets 2.5—3 mm long; rachis not produced; upper glume equalling the upper lemma : ... *P. geminatum* 2

1. Paspalidium flavidum (Retz.) A. Camus in Lecomte, Fl. Gen. de l'Indo-Chine 7 : 419. 1922; *Panicum flavidum* Retz., Obs. Bot. 4 : 15. 1786.

Annual. Culms 20—70 cm tall, sub-compressed, nodes glabrous. Leaves linear, lanceolate, glabrous; sheath compressed, glabrous; ligule hairy, very short. Inflorescence consists of several spikes, alternate on axis, shorter than the internodes. Spikelets 2.5—3.0 mm long, biseriate, glabrous, acute. Lower glume membranous, 1.3—1.5 mm long. Upper glume membranous, ovate, 2.0—2.2 mm long, 7-nerved. Lower floret empty. Lemma chartaceous, 5-nerved, rounded at apex. Upper floret hermaphrodite. Lemma chartaceous, coriaceous, 2.2—2.5 mm long, mucronate. Anthers 3, yellow, \pm 1 mm long. Caryopsis broadly elliptic, 1.5 mm long.

Fls. & rFrts. : July—Dec.

Distribution : Ambikapur, Balaghat, Bilaspur, Hoshangabad, Indore, Raigarh, Raipur, Rewa, Saugar, Shivpuri, Sidhi.

2. **Paspalidium geminatum** (Forssk.) Stapf in Prain, Fl. Trop. Afr. 9 : 583. 1920; *Panicum geminatum* Forssk. Fl. Aegypt.—Arb. 18. 1775.

Perennial, stoloniferous. Culms 0.4—1 m tall, sub-compressed, nodes glabrous. Leaves linear-lanceolate, glabrous; sheath glabrous; compressed; ligule hairy. Inflorescence made of several racemes, appressed to rachis, alternate, longer than internodes. Spikelets solitary secund, ovate-acute, 2.5—3.0 mm long, glabrous. Upper glume membranous, 1.8—2.0 mm long, convex, 5-nerved. Lower glume hyaline, 0.5—0.7 mm long, nerveless. Lower floret empty. Lemma membranous, 2.5—3.0 mm long. Upper floret hermaphrodite. Lemma coriaceous, elliptic, 2.0—2.2 mm long, 5-nerved, apiculate. Anthers 3, yellow, 1.0—1.5 mm long. Caryopsis \pm 2 mm long, broadly elliptic.

Fls. & Frts. : July—Dec.

Distribution : Gwalior, Morena, Raipur.

3. **P. punctatum** (Burnm.) A. Camus in Lecomte, Fl. Gen. de l'Indo-Chine' 7 : 419. 1922; *Panicum punctatum* Brum. Fl. Ind. 26. 1768.

Perennial. Culms 0.6—1.2 m tall, basal portion spongy, floating, rooting at nodes. Leaves linear-acute, margin scabrid; sheath glabrous, lower inflated; ligule reduced to a ring of hairs. Inflorescence made of several false spikes, distant and appressed to the rachis. Spikelets 1.5—2.5 mm long, imbricate, plano-convex, glabrous. Lower glume 0.7—1.2 mm long, membranous truncate. Lower floret neuter. Lemma 5-nerved, 2-4 mm long. Palea nil. Upper floret hermaphrodite. Lemma indurated, acuminate, cuspidate, finely punctate, transversely rugose. Palea similar, fitting into the lemma. Anthers 3, \pm 1 mm long. Caryopsis orbicular, compressed.

Fls. & Frts. : Aug.—Dec.

Distribution : Raipur, Satna, Shivpuri, Sidhi.

71. PASPALUM L.

- 1a. Spikelets about 1.25 mm long, packed in 2 rows on the rachis ... *P. compactum* Z.
- 1b. Spikelets 2 mm or longer, not so packed on the rachis :

- 2a. Spikelets broadly elliptic to ovate-elliptic, acute, 2—4 mm long ... *P. vaginatum* 5
- 2b. Spikelets rotundate-elliptic, broadly obovate-elliptic to almost orbicular obtuse :
- 3a. Lower lemma chartaceous or cartilaginous, smooth, shining ... *P. cartilagineum* 1
- 3b. Lower lemma membranous :
- 4a. Annual; lower lemma nearly rounded and shining on back ... *P. scrobiculatum*
- 4b. Perennial; lower lemma with short transverse wrinkles on back, slightly raised margins, deep brown or olivaceous ... *P. plicatulum* 3

1. *Paspalum cartilagineum* J. S. Presl. ex C. B. Presl. Rel. Haenk. 1 : 216. 1830.

Perennial. Culms 50—75 cm tall, erect; cataphylls hairy at rootstock. Leaf margins scabrid; sheath loose and glabrous; ligule membranous. Inflorescence consisting of 2—4 spikes; rachis flattened, margins scabrid. Spikelets 2 mm long. Lower glume absent. Upper glume obtuse, 2 mm long, glabrous. Lower lemma 2 mm long, 5-nerved. Upper lemma similar, 1.6 mm long. Anthers 3, yellow, 0.5—0.8 mm long. Caryopsis 1.5—1.8 mm long and \pm 1 mm wide, plano-convex, dark brown.

Fls. & Frts. : March—May.

Distribution : Bilaspur, Panigrahi : 8789.

2. *P. compactum* Roth, Nov. Pl. Sp. 36. 1821 as *Paspalus compactus* Roth.

Annual. Culms 15—30 cm tall, base decumbent, rooting and branching at lower nodes, leafy to the top, nodes hairy. Leaves ovate-lanceolate, acuminate, base decurrent. surfaces hairy; sheath loose, striate, hairy, margin hirsute; ligule hairy, hairs white, stiff. Inflorescence raceme

of false spikes; rachis up to 1 mm wide. Spikelets packed in 2 rows, pedicelled, ovate-lanceolate, plano-convex, Lower glume absent. Upper glume equal to spikelet, 5-nerved, margins hyaline. Lower floret sterile. Upper floret hermaphrodite. Lemma \pm 1 mm long, elliptic, minutely punctate. Anthers 3, yellow, 0.5 mm long. Caryopsis 0.5—0.8 mm long, ovate.

Fls. & Frts. : Aug.—Oct.

Distribution : Ambikapur.

3. *P. plicatum* Michx. Fl. Bor. Amer. 1 : 45. 1803.

Perennial. Culms. 50—100 cm tall, tufted, sub-erect, leafy. Leaves 3—10 mm wide, folded at base, flat above, pilose near base; sheath pilose at throat; ligule membranous. Inflorescence consists of 3—10 racemes. Spikelets 2.5—2.8 mm long, obovate, brown at maturity, glabrous, except a appressed pubescent glume. Fertile lemma transversely rugose, margins slightly raised. Anthers 3, yellow, 0.8 mm long. Caryopsis not seen.

Fls. & Frts. : March—May.

Distribution : Bilaspur, *Panigrahi* : 8887.

4. *P. scrobiculatum* L. Mant. Pl. 1 : 29. 1767.

Annual. Culms 20—90 cm tall, tufted, erect or ascending. Leaves 6—18 cm, acuminate, glabrous, margins papillate; sheath compressed, glabrous; ligule 1 mm long, membranous. Inflorescence consists of 2—6 spikes, closely placed together; rachis flattened, 2.0—2.5 mm wide. Spikelets in 2 rows, 2.5—2.8 mm long, elliptic ovate. Lower glume absent. Upper glume 2.5 mm long, membranous. 3—5-nerved. Lower lemma similar to upper glume. Upper floret bisexual. Lemma nearly rounded, edges slightly inflexed, stiff shining, olivaceous. Anthers 3, cream coloured, 0.8—1.0 mm long. Caryopsis 2.0—2.25 mm long, ovoid or globose, biconvex, pale.

Fls. & Frts. Aug.—Sept.

Distribution : Ambikapur, Balaghat, Bastar, Bilaspur, Durg, Hoshangabad, Mandla, Pachmarhi, Rajnandgaon, Raigarh, Shivpuri, Sidhi.

5. **Paspalum vaginatum** Swartz, Prod. Veg. Ind. Occ. 21. 1788; *P. distichum* L. Syst. Nat. ed. 10 : 855. 1759.

Perennial, aquatic. Culms 1.0—1.5 m long, creeping, rooting at nodes. Leaves distichous, 5—10 cm long, acute, glabrous; sheath compressed, glabrous; ligule 1 mm long, membranous, truncate. Inflorescence consists of 2—3 one-sided spikes; rachis flat, 1.0—1.5 mm wide. Spikelets 2.5—3.5 mm long, solitary or 2-nate, elliptic, acute, dorsally flat. Lower glume absent. Upper glume 3.5 mm long, ovate-acute, 5-nerved. Lower lemma 3.5 mm long. Upper lemma 2.8 mm long, boat-shaped, hairy at tip. Anthers 3, purplish, \pm 1 mm long. Caryopsis 2.5—2.8 mm long elliptic.

Fls. & Frts. : Aug.—Sept.

Distribution. : Balaghat, Bilaspur, Gwalior, Shivpuri.

72. PENNISETUM Rich.

1a. Lemmas similar, lower not 3-lobed; upper floret deciduous; rachis ribs not winged :

2a. Anther cells bearded at the tip :

3a. Wild grass, perennial; spikelets solitary, not gaping; bristles 10—18 mm long ... *P. purpureum* 5

3b. Cultivated grass, annual; spikelets crowded, gaping and exposing the caryopsis; bristles less than 7 mm long ... *P. typhoides* 6

2b. Anther cells not bearded at the tip :

4a. Rachis of the spikes villous or woolly; spikelets 4 mm long; inner bristles ciliate ... *P. orientale* 2

4b. Rachis of the spikes glabrous, often scabrid; spikelets 7—8 mm long; bristles glabrous ... *P. hohenackeri* 1

1b. Lemmas dissimilar, lower often 3-lobed; upper floret readily disarticulating; rachis ribs winged below the pedicels :

- 5a. Spikelets pedicelled, solitary or in groups of 2—3, usually hairy; lower glume about half the length of lower lemma ... *P. pedicellatum* 3
- 5b. Spikelets sessile, solitary, glabrous; lower glume minute, nerveless ... *P. polystachion* 4

1. ***Pennisetum hohenackeri*** Hochst. ex Steud. Syn. Pl. Glum. 1 : 103. 1854 ; *P. alopecuroides* Nees ex Steud. Syn. Pl. Glum. 1 : 102. 1854.

Perennial. Culms 40—100 cm tall, erect, glabrous. Leaves narrowly linear, pilose towards base, margins scabrid; sheath compressed, glabrous; ligule hairy. Inflorescence a spike; rachis scabrid; pedicels hairy, bristles unequal, glabrous, free to the base. Spikelets 7.5—8.0 mm long, glabrous, linear-lanceolate. Lower glume hyaline, nerveless, minute. Upper glume hyaline, 3.0—3.2 mm long, 1—3-nerved. Lower floret empty, epaleate. Lemma 9—11-nerved. Upper floret bisexual, 6.2—7.5 mm long. Lemma 5-nerved. Anthers 3, yellow, 4—5 mm long. Caryopsis lanceolate, 1.5 mm long, awned.

Fls. & Frts. : Aug.—Feb.

Distribution : Balaghat, Bastar, Bilaspur, Bori, Indore, Pachmarhi, Rajnandgaon.

2. ***P. orientale*** L. C. Rich. in Pers. Syn. Pl. 1 : 72. 1805.

Strong perennial with stout rhizomes. Culms 60—100 cm tall, nodes glabrous. Leaves linear, flat, glabrous or pilose, margins scabrid; sheath smooth, bearded at mouth; ligule hairy. Inflorescence a spike; rachis angular, hispid. Involucres unequal, bristly, antrorsely barbed. Spikelets 2—3, lanceolate, 6.0—6.5 mm long. Lower glume 2.5—3.0 mm long, hyaline. Upper glume lanceolate, 4.0—4.5 mm long. Lower lemma empty. Upper lemma fertile, ovate, \pm 6 mm long, 5-nerved, acuminate. Anthers 3, yellow, \pm 2 mm long. Caryopsis ellipsoid, \pm 2 mm long.

Fls. & Frts. : Nov.—Jan.

Distribution : Bilaspur, Raipur, Hoshangabad.

3. ***P. pedicellatum*** Trin. in Mem. Acad. Sci. Petersb. ser. 6. 3 : 184. 1834.

Annual. Culms 30—120 cm tall, nodes glabrous. Leaves glabrous or hispid, margins scabrid; sheath terete, usually glabrous; ligule membranous. Inflorescence made of several spikes; rachis angular. Involucres sessile, bristles free to the base; inner ones woolly. Spikelets solitary or in groups of 2—3, lanceolate, 5—6 mm long. Lower glume lanceolate, 2—3 mm long, hairy. Upper glume oblong-lanceolate, 5—6 mm long, hairy, 5-nerved, cuspidate to acuminate. Lower lemma 4—5 mm long, pubescent, 3-toothed at apex. Palea hyaline, lacerate. Upper lemma chartaceous, elliptic, 3.0—3.5 mm long, margins ciliate. Stamens 3, yellow. Caryopsis lanceolate, 2.5—3.0 mm long.

Fls. & Frts. : Aug.—Dec.

Distribution : Balaghat, Bastar, Bilaspur, Bori, Indore, Jabalpur, Mandla, Raipur, Rajnandgaon, Satna, Sidhi.

4. ***P. polystachion*** (L.) Schult. *Syst. Veg. Mant.* 2 : 146. 1824; *Panicum polystachion* L. *Syst. Nat.* ed. 10. 2 : 870. 1759; *Pennisetum setosum* (Swartz.) Rich. in *Pers. Syn. Pl.* 72. 1805; Bor, *Grass. Bur. Ceyl. Ind. Pak.* 348. 1960.

Usually perennial. Culms up to 2 m tall, glabrous. Leaves linear-lanceolate, 3—15 mm wide, hirsute behind ligule; sheath glabrous or sparsely hairy; ligule hairy. Inflorescence a false spike, cylindric, compact, branches angled, scaberulous. Involucres sub-sessile; bristles many, densely ciliate. One bristle stouter than the rest and up to 3 cm long. Spikelets 4—5 mm long, solitary, glabrous. Lower glume 0.5—1.0 mm long, acute, nerveless. Upper glume oblong-elliptic, mucronate, 3-lobed, 5—7-nerved. Lower floret male or barren. Upper floret hermaphrodite, 2—3 mm long, ciliate at apex. Anthers 3, yellow, 1.75—2.0 mm long, tips glabrous. Caryopsis elliptic-oblong, \pm 2 mm long.

Fls. & Frts. : Sept.—Nov.

Distribution : Balaghat, Bilaspur, Indore, Sidhi.

5. ***P. purpureum*** Schumach. *Beskr. Guin. Pl.* 44. 1827.

Strongly perennial with creeping rhizomes. Culms tufted, 2—3 m tall like sugarcane, hairy at nodes. Leaf blade linear, tapering, rough on

both surfaces, margins sharp; sheath terete, glabrous, mouth hairy; ligule hairy. Inflorescence a false spike, cylindrical, dense. Spikelets surrounded with involucres. Spikelets sessile, if in groups of 2—4 the lateral pedicelled, all lanceolate, acuminate, 5—7 mm long, all hermaphrodite or laterals male or neuter. Lower glume rudimentary or absent. Upper 0.5—1.0 mm long, ovate-lanceolate. Lower floret male or barren. Upper floret hermaphrodite or male in laterals. Lemma lanceolate, acuminate, usually 5-nerved. Palea 2-toothed. Anthers 3, purplish, 2.5—3.0 mm long, minutely penicillate; styles united. Caryopsis 2 mm long, elliptic, aristate.

Fls. & Frts. : Sept.—Nov.

Distribution : Gwalior.

6. *P. typhoides* (Burm.) Stapf & C. E. Hubb. in Kew Bull. 1933 : 271. 1933; *Alopecurus typhoides* Burm. Fl. Ind. 27. 1768.

Annual. Culms 1.0—2.5 m tall, erect. Leaves 30—40 cm long, scabrid; sheath terete, hairy above, ligule a ring of dirty white hairs. Inflorescence a compact, cylindrical panicle, 15—30 cm long on pubescent peduncle. Spikelets 2—4-nate, 1—2 imperfect ones, ovate-elliptic, 2.5—3.0 mm long. Involucre bristles many, 4—5 mm long, cream colour or brownish. Pedicels 3.0—3.5 mm long, white hairy. Lower glume 0.5 mm long, orbicular, ciliate. Upper glume absent. Lower lemma 2.5 mm long, obtuse or truncate, mucronate, 3-nerved. Palea 2—3-toothed, ciliate at apex. Anthers 3, yellow, hairy at apex, \pm 3 mm long. Upper lemma bisexual, 5 mm long, 5-nerved, ciliate. Caryopsis 2.0—2.5 mm long, slaty coloured.

Fls. & Frts. : Sept.—Oct.

Distribution : Cultivated throughout the State.

73. *Perotis* Ait.

Perotis indica (L.) Ktze. Rev. Gen. Pl. 2 : 787. 1891; *Anthoxanthum indicum* L. Sp. Pl. 1 : 28. 1753. *P. rotis latifolia* Ait. Hort. Kew. 1 : 35. 1789; Hook. f. Fl. Brit. Ind. 7 : 98. 1896.

Annual. Culms erect, 40—50 cm tall. Leaves 1.0—3.5 cm, narrowly ovate, cordate at base, margins scabrid; sheath terete, glabrous; ligule membranous, truncate. Inflorescence a terminal spike. Spikelets 1.5—2.5 mm long, 2-awned, hispid. Lower glume 1.9 mm long, lanceolate, 1-nerved; awn 1 cm long. Upper glume similar to lower, with 7.5 mm long awn. Lemma 0.6 mm long, lanceolate, hyaline, 1-nerved. Palea nerveless. Anthers 3, 0.4 mm long. Caryopsis 1.4 mm long, terete, brown.

Fls. & Frts. : Oct.—Nov.

Distribution : Ambikapur, Balaghat, Bastar, Bilaspur, Hoshangabad, Raigarh, Sidhi.

74. *Phalaris* L.

Phalaris minor Retz. Obs. Bot. 3 : 8. 1783.

Annual. Culms 50—80 cm tall, erect or decumbent. Leaves 20—25 cm long, glabrous; sheath keeled, glabrous; ligule 5—10 mm long, truncate. Inflorescence 5—10 cm long, cylindrical panicle. Spikelets ellipsoid, acute, laterally strongly compressed. Pedicels 2 mm long. Glumes equal, 5—6 mm long, 3-nerved, acute; keels winged. Lowest lemma absent; middle lemma reduced; upper lemma fertile, 2.8—3.0 mm long, ovate-acute, 5-nerved. Palea lanceolate, ciliate at top. Anthers 3, pale yellow, 1.5 mm long. Caryopsis \pm 2 mm long, aloid, apiculate.

Fls. & Frts. : Jan.—March.

Distribution : Damoh, Shukla : 29800.

75. PHRAGMITES Trin

Phragmites karka (Retz.) Trin ex Steud. Nom. Bot. ed. 2. 2 : 324. 1841; *Arundo karka* Retz. Obs. Bot. 4 : 21. 1786.

Strongly perennial. Culms 1—2 m tall, erect, fistular with extensive rhizomes. Leaves 30—40 cm long glabrous ventrally, rough dorsally; sheath loose, throat hairy; ligule 2—3 mm long, membranous, margins fimbriate. Inflorescence a large open panicle; rachilla fragile, 4—7 mm long, white hairs on joints. Spikelets 9—12 mm long, pedicel 1—6 mm long. Lower glume 3—4 mm long, lanceolate, 1-nerved. Upper glume

4.0—5.5 mm long, elliptic, acute. Lower lemma empty, 7.5—12.0 mm long. Fertile lemma 8—10 mm long, narrowly lanceolate. Palea 2.5—3.0 mm long, ciliate at apex. Anther 3, yellow, 2.0—2.5 mm long. Caryopsis purplish, narrowly elliptic, 1.5 mm long.

Fls. & Frts. : Sept.—Nov.

Distribution : Ambikapur, Bilaspur, Bori, Gwalior, Raigarh, Raipur, Rajnandgaon, Sidhi.

76. POGONATHERUM P. Beauv.

- 1a. Spikelets up to 2 mm long; callus hairs 2 mm long; lower floret absent or obsolete; upper floret with 1 stamen (rarely 2) *P. crinitum* 1
- 1b. Spikelets 2.5—3 mm long; callus hairs up to 1.5 mm long; lower floret male; upper floret with 2 stamens. *P. paniceum* 2

1. *Pogonatherum crinitum* (Thunb.) Kunth, Enum. Pl. 1 : 478. 1833. *Andropogon crinitus* Thunb. Fl. Jap. 40, t. 7. 1784.

This species resembles *P. paniceum* Hack. for which it is often mistaken. However, it is relatively slender. Sessile spikelets up to 2 mm long, more truncate and broader above. Upper glume longer than the lower, glabrous or shortly ciliate. Lower floret absent; lemma of upper floret more toothed; awn 18—22 mm long. palea 2/3 the length of lemma, Anthers usually 1, rarely 2.

Fls. & Frts. : July—Oct.

Distribution : Common in M. P.

2. *P. paniceum* (Lamk.) Hack. in Allg. Bot. Zeit. 12 : 178. 1906. *Saccharum panicum* Lamk. Encycl. Meth. Bot. 1 : 595. 1785. *Pogonatherum saccharoideum* P. Beauv. Ess. Agrost. 176, 177. 1812; Hook. f. Fl. Brit. Ind. 7 : 141. 1896.

Perennial. Culms 10—50 cm tall, densely tufted, nodes shining. Leaves soft, pale green, base rounded, tubercular scabrid, sheath lax.

smooth; ligule reduced, fimbriate. Inflorescence a solitary terminal raceme 1.5—3 cm long; joints and pedicels 1—1.5 mm long, depressed, trigonous, margins with white hairs. Sessile spikelets 2.5—3 mm long, linear-oblong, lower glume 2—3 mm long, membranous, truncate at top, back convex, 2—3-nerved, ciliate below the apex. Upper glume equalling spikelet, membranous, obtuse, keels hispid or scabrid, hairy at apex, awn 12—14 mm long. Lower floret male with 2 stamens, rarely hermaphrodite. Upper floret hermaphrodite. Lemma 1.5—2.5 mm long, narrow, almost keeled, toothed, hyaline, nerveless. Anthers 2, rarely 1, yellow. Caryopsis \pm 1.5 mm long, linear.

Fls. & Frts. : July—Sept.

Distribution : Bastar, Bilaspur, Hoshangabad, Raipur, Shahdol, Sidhi.

77. POLYPOGON Desf.

Polygogon monspeliensis (L.) Desf. Fl. Atlant. 1 : 67. 1798; *Alopecurus monspeliensis* L. Sp. Pl. 61. 1753.

Annual. Culms 20—60 cm tall, usually decumbent. Leaves 4—10 cm long; sheaths loose, glabrous; ligule 5—7 mm long, lacerate. Inflorescence 5—10 \times 1 cm, cylindrical panicle, usually interrupted. Spikelets 1.2—2.0 mm long, linear-lanceolate. Glumes nearly equal, 1.5—2.0 mm long, lanceolate, 2-toothed with a scabrid awn, 4—7 mm long. Lemma oblong, 4-toothed, 5-nerved; awn 1 mm long. Anthers 3, light yellow, \pm 0.5 mm long. Caryopsis \pm 1 mm long, elliptic.

Fls. & Frts. : Jan.—March.

Distribution : Bilaspur, Jabalpur, Mandla, Raigarh, Rewa, Sagar, Sidhi.

78. PSEUDANTHISTIRIA (Hack.) Hook. f.

Pseudanthistiria hispida Hook. f. Fl. Brit. Ind. 7 : 219, 1896.

Annual. Culms 30—75 cm tall, terete branched. Leaves linear-lanceolate, hirsute, margins scabrid; sheaths glabrous to hirsute; ligule membranous truncate. Inflorescence a panicle, leafy with spathes, joints

and callus hairy. Sessile spikelet \pm 4 mm long, lanceolate, awned. Lower glume \pm 4 mm long, hairy on back, 7-nerved, apex truncate. Upper glume similar to lower, 3-nerved. Lower lemma nil. Upper lemma reduced as awn, 25—28 mm long. Anthers 3, yellow, 2—2.5 mm long. Caryopsis not seen. Pedicelled spikelets staminate, anthers 3, yellow, 2—2.5 mm long.

Fls. & Frts. : Sept.—Jan.

Distribution : Indore, Khandwa.

79. PSEUDOPOGONATHERUM A. Camus

Pseudopogonatherum contortum (Brongn.) A. camus in Lecomte, Fl. Gen. de l' Indo-Chine 7 : 255. 1922; *Pogonatherum contortum* Brongn. in Duperr. Voy. Coq. Bot. 90 : 17. 1831.

Annual. Culms 20—60 cm tall, tufted, erect. Leaves 10—30 cm long, convolute, finely acuminate; sheath glabrous; ligule short ciliate. Inflorescence consists of 3—20 racemes, alternate or opposite, silky white. Spikelets 1.5—2.5 mm long, lanceolate. Lower glume 2 mm long, papyraceous; margins inflexed, depressed between keels, white hairy. Upper glume 2 mm long, ovate-lanceolate, keeled; awns 0.7—1.5 mm long. Lower florets barren. Lemma 1.5 mm long, ovate, nerveless, glabrous. Upper floret fertile. Lemma 1.75 mm long, linear, 1-nerved, entire or 2-fid, awn 3 cm long. Palea absent. Anthers 3, yellow, \pm 0.5 mm long. Caryopsis \pm 1 mm long, linear, pale yellow.

Fls. & Frts. : Sept.—Oct.

Distribution : Bilaspur, Raigarh, Sidhi.

80. PSEUDORAPHIS Griff.

- 1a. Spikelets 8—10 mm long, 1—3 on each branch; sheath glabrous; culms erect ... *P. brunaniana* 1
- 1b. Spikelets 4—6 mm long, solitary; sheath scabrid; culms leafy and floating ... *P. spinescens* 2

1. Pseudoraphis brunoniana (Griff.) Not. 3 : 29. 1851; *Panicum brunonianum* Griff. Not. 3 : 29. 1851.

Annual. Culms 50—70 cm tall, erect or decumbent. Leaves 2—8 cm long, ventrally glabrous, basal portion and dorsal surface scabrid; sheath glabrous; ligule lacerate. Inflorescence a panicle, axis and branches angular, furrowed, scabrid-hispid. Spikelets 8—10 mm long including awn. Lower glume 0.8—1.0 mm long, orbicular. Upper glumes 8—10 mm long with awns. Sterile floret 5—7 mm long, male or neuter. Lemma 5—7 mm long, many-nerved. Fertile floret bisexual, 2 mm long, linear-oblong. Anthers 3, yellow, 1.0—1.5 mm long. Caryopsis 1.0—1.5 mm long, ovate-oblong, white.

Fls. & Frts. : Sept.—Oct.

Distribution : Damoh, Shukla : 29432.

2. *P. spinescens* (R. Br.) Vickery in Proc. Roy. Soc. Queensl. 62, n. 7, 69. 1952; Bor, Grass. Bur. Ceyl. Ind. Pak. 353. 1960; Hook. f. Fl. Brit. Ind. 7 : 62. 1896.

Perennial. Culms 20—100 cm tall, floating, much branched and leafy. Leaves flat, linear or lanceolate; sheath compressed, scabrid along margins, ligule short and hairy. Inflorescence a spreading panicle, branches simple; rachis produced into 8—11 mm long bristle beyond the terminal spikelet. Spikelets solitary, subsecund, lanceolate, 6.0—6.5 mm long. Lower glume \pm 0.5 mm long, orbicular. Upper glume 6.0—6.5 mm long, 9—11-nerved, lanceolate. Lower lemma 4.5—4.7 mm long, 5—7-nerved, acuminate. Anthers 3, yellow, \pm 1.5 mm long. Upper lemma chartaceous elliptic, 1.75—2.0 mm long, obscurely nerved. Anthers 3, pale yellow, 1.2 mm long. Caryopsis 2 mm long, elliptic.

Fls. & Frts. : Sept.—Jan.

Distribution : Dhar, Raipur. Sagar.

81. PSEUDOSORGHUM A. Camus

Pseudosorghum fasciculare (Roxb.) A. Camus. in Bull. Mus. Hist. Nat. Paris 26 : 662. 1920. *Andropogon fascicularis* Roxb. Fl. Ind. 269. 1929; Hook. f. Fl. Brit. Ind. 7 : 177. 1896.

Annual. Culms 30—75 cm tall, terete, decumbent. Leaves flat, lanceolate; sheath compressed, glabrous or sparsely hairy; ligule membranous,

truncate. Inflorescence made of racemes in pairs one short and the other long peduncled; joints and callus hairy. Sessile spikelets \pm 4 mm long, elliptic, awned. Lower glume \pm 4 mm long, lanceolate, 7-nerved, shortly hispid. Upper glume equal to lower, boat-shaped, 7-nerved. Lower lemma equal to glumes, broadly lanceolate, margins cilioate. Upper lemma clefted into two acute lobes, with 18—20 mm long awn from sinus. Anthers 3, yellow 1.2—1.5 mm long. Caryopsis \pm 4 mm long, lanceolate.

Fls. & Frts. : Sept.—Dec.

Distribution : Ambikapur, Balaghat, Bastar, Bilaspur, Hoshangabad, Sidhi.

82. RHYNCHELYTRUM Nees

- | | | |
|--|-----|-----------------------|
| 1a. Pedicels of the spikelets with a few long hairs; spikelets 4—4.5 mm long; ligule hairy | ... | <i>R. repens</i> 1 |
| 1b. Pedicels of the spikelets without long hairs; spikelets very variable, 5—12 mm long; ligule obsolete | ... | <i>R. villiosum</i> 2 |

1. *Rhynchelytrum repens* (Willd.) C. E. Hubb. in Kew Bull. 1934 : 110. 1934; *Saccharum repens* Willd. Sp. Pl. 1 : 322. 1798.

Annual or perennial. Culms 20—50 cm tall, rooting at lower nodes. Leaves flat, linear, glabrous or finely pubescent; sheath glabrous or pilose, long hairy at mouth; ligule hairy. Inflorescence a lax panicle, white or pink, branches capillary. Spikelets solitary or paired, 4.0—4.5 mm long, densely hairy, appressed when young. Lower glume 1.0—1.3 mm long, hairy at base, 1-nerved. Upper glume equalling the spikelet, 5-nerved, hairy longer than glumes, tip bifid, mucronate to awned from sinus. Lower lemma empty. Palea ciliate on keels. Upper lemma \pm 2.5 mm long, 3-nerved. Anthers 3, \pm 2 mm long. Caryopsis 2.5 mm long, elliptic, brownish.

Fls. & Frts. : July—Feb.

Distribution : Hoshangabad.

Note : Rare species on rocky slopes. The pink feathery panicle is a field character distinguishable from other grasses.

2. *Rhynchelytrum villosum* (Parl.) Chiov. in Ann. Inst. Bot. Roma 8 : 310. 1908; *Monachyron villosum* Parl. in Hook. Fl. Nigrit. 191. 1849; *Rhynchelytrum wightii* Duthie, Fodd. Grass. N. Ind. 21. 1888.

Annual or short lived perennial. Culms 40—80 cm tall, tufted. Leaves flat, linear; sheath glabrous or hairy; ligule obsolete. Inflorescence a narrow panicle, branches and pedicels capillary. Spikelets very variable in size, 5—12 mm long; callus with long hairs. Lower glume up to 3 mm long, obtuse, concave spreading. Upper glume and lower lemma shortly and obtusely bilobed, awned or awnless, the former conspicuously gibbous, tapering above into a narrow glabrous beak. Palea ciliate on keels. Anthers 3, purplish, \pm 2 mm long. Caryopsis not seen.

Fls. & Frts. : Oct.—Feb.

Distribution : Pachmarhi, Panigrahi : 6605.

83. ROTTBOELLIA L. f.

Rottboellia exaltata L. f. Nov. Gram. Gen. 40, t. 1. 1779.

Annual. Culms tufted, erect. 1.0—1.5 m tall, rhizomatous. Leaves 30—40 cm long, flat, with tubercle based hairs on margins; sheath tight, glabrous; ligule lacerate. Inflorescence consisting of racemes; joints with rounded ends, 4.5 mm long. Sessile spikelets 5—6 mm long, ovate-lanceolate. Lower glume 5.5 mm long with 9—10 faint nerves. Upper glume 5.5 mm long, concave, sunken in the cavity of the rachis. Lower lemma lanceolate, acute, margins slightly folded. Upper lemma bisexual, 1.5—2.0 mm long, concave acute. Anthers 3, yellow, \pm 2 mm long. Pedicelled spikelets 5 mm long. Caryopsis 3 mm long, gibbous, embryo end broader.

Fls. & Frts. : Aug.—Nov.

Distribution : Ambikapur, Balaghat, Bori, Hoshangabad, Indore, Rajnandgaon, Rewa, Sidhi.

84. SACCHARUM L.

1a. Peduncle hairy below the panicle; hairs
silvery white; rachis very fragile ... *S. spontaneum* 3

1b. Peduncle not hairy below panicle; rachis less fragile :

2a. Spikelets 4—6 mm long; lower glume of sessile spikelet with long hairs; sheaths hairy at base, villous on margins ... *S. bengalense* 1

2b. Spikelets 3.5—4 mm long; lower glume of sessile spikelet glabrous; sheath glabrous except pubescence towards the throat ... *S. officinarum* 2

1. *Saccharum bengalense* Retz. Obs. Bot. 5 : 16. 1789; *S. munja* Roxb. Fl. Ind. 1 : 250. 1820.

Strongly perennial. Culms 2.5—3.6 m tall, grows in clumps, internodes solid and polished. Leaves mostly basal, about 1 m long, margins scabrid; sheaths hairy at base, villous on the margins; ligule a ciliate, truncate membrane. Inflorescence a plumose panicle, 30—90 cm long; purplish to cream-coloured. Spikelets 4—6 mm long, concealed by dense hairs of callus and lower glumes. Sessile spikelet longer than the pedicel of the pedicelled spikelet. Lower Glume 5 mm long with 2 strong lateral nerves, long hairy. Upper glume equalling lower. Lower floret empty. Upper floret bisexual. Lemma elliptic, hyaline, ciliate, mucronate. Anthers 3, yellow or purplish, 2.0—2.5 mm long. Caryopsis \pm 2 mm long, boat-shaped.

Fls. & Frts. : Oct.—Nov.

Distribution : Growing all over the state. Used as soil binder, and as a fence around crops and gardens.

2. *S. officinarum* L. Sp. Pl. 54. 1753.

Perennial. Culms 2—6 m tall, erect, glabrous, waxy below the nodes. Leaves linear, acute, very long, scabrous specially on margins; sheath pubescent towards throat; ligule ciliate. Inflorescence a large panicle, pyramidal, nodes bearded; rachis breaking at maturity; pedicels glabrous; Spikelets 3.5—4.0 mm long, covered with white silky hairs, callus with long hairs. Lower glume equalling spikelet, acute, margins

inserted. Upper glume similar to lower. Lower floret empty. Upper floret hermaphrodite. Lemma reduced. Anthers 3, purplish, ± 2 mm long. Caryopsis purple, cylindrical, 1.5 mm long.

Fls. & Frts. : Feb.—April.

Distribution : Cultivated.

3. *S. spontaneum* L. Mant. Pl. 2 : 183, 1771.

Strong perennial with extensive rhizomes. Culms 1—2 m tall, erect, glabrous, nodes hairy. Leaves 20—50 cm long, filiform, margins scabrid; sheaths auriculate, glabrous, throat hairy; ligule hairy. Inflorescence a lax panicle, silvery white. Spikelets 3—6 mm long, lanceolate, sessile and pedicelled similar, 1-flowered, bisexual. Sessile spikelet 3.5—4.0 mm long. Lower glume 3.5 mm long, sharply acute, margin ciliate, 2-nerved. Upper glume 4 mm long, 1-keeled. Lower lemma 3 mm long, oblong, ciliate, epaleate. Upper lemma bisexual, 3 mm long, linear-elliptic. Anthers 3, purple, ± 1 mm long. Caryopsis ± 3 mm long, narrowly lanceolate.

Fls. & Frts. : Sept.—Nov.

Distribution : Ambikapur, Balaghat, Bastar, Bhopal, Bilaspur, Bori, Chhatarpur, Gwalior, Hoshangabad, Indore, Mandla, Panna, Rajnandgaon, Rewa, Sagar.

85. *SACCIOLEPIS* Nash

- 1a. Spikelets sub-globose, blunt at tips ... *S. myosuroides* 3
- 1b. Spikelets obliquely lanceolate, acute at tips :
- 2a. Culms robust, creeping or floating with swollen spongy rhizome; spikelets 4—5 mm long; inflorescence interrupted. ... *S. interrupta* 2
- 2b. Culms slender, never spongy; spikelets 2.5—3.5 mm long in continuous pseudo-spikes, lower glume half the length of spikelet ... *S. indica* 1

1. **Sacciolepis indica** (L.) A. Chase in Proc. Biol. Soc. Wash. 21 : 8. 1908; *Aira indica* L. Sp. Pl. ed. 1. 1753.

Annual. Culms 20—60 cm tall, slender, spreading. Leaves flat to involute, glabrous, 2—4 mm wide; sheath slightly keeled shorter than internode; ligule membranous. Inflorescence a spike-like panicle, 1—4 cm long; pedicels discoid-tipped. Spikelets 2.5 mm long, glabrous or pilose near the summit. Lower glume ovate, $1/2$ — $2/3$ as long as the spikelet, 3—7-nerved. Upper glume 7—11-nerved. Lower lemma empty. Upper lemma narrowly ovate, about $1/2$ of the spikelet, acute, pale yellow, shining. Anthers 3, purple, ± 0.7 mm long. Caryopsis elliptical, ± 0.8 mm long.

Fls. & Frts. : Aug.—Dec.

Distribution : Ambikapur, Balaghat, Bastar, Bilaspur, Raigarh.

2. **S. interrupta** (Willd.) Stapf in Prain, Fl. Trop. Afr. 9 : 757. 1920; *Panicum interruptum* Willd. Sp. Pl. 1 : 341. 1758; Hook. f. Fl. Brit. Ind. 7 : 40. 1896.

Perennial. Culms creeping or floating with a swollen spongy rhizome, flowering culms 20—50 cm long, nodes glabrous. Leaves flat, lanceolate, glabrous, rounded at base; sheath swollen, glabrous, purple; ligule membranous, truncate. Inflorescence a terminal spike like panicle, interrupted below; branches with 5—6 flowers, usually one fertile. Spikelets fertile, ± 4 mm long, acute. Lower glume 1.2 mm long, mucicous. Upper glume elliptic-oblong, ± 4 mm long, 9—11-nerved, margins hyaline. Lower lemma empty. Upper lemma chartaceous, 2.0—2.5 mm long. Anthers 3, dark purple, ± 1.5 mm long. Caryopsis elliptic, 2.0—2.5 mm long, usually dorsally compressed.

Fls. & Frts. : Sept.—Dec.

Distribution : Balaghat, Bastar, Bilaspur, Rajnandgaon, Raigarh, Rewa, Sagar, Satna, Sidhi.

3. **S. myosuroides** (R. Br.) A. Camus in Lecomte, Fl. Gen. de l'Indo-Chine 7 : 460. 1922; *Panicum myosuroides* R. Br. Prodr. 189. 1810.

Annual. Culms terete, 30—60 cm tall, simple or branched, erect or decumbent. Leaves narrow, linear, usually glabrous, margins scabrous; sheath compressed, striate; ligule very short membrane. Inflorescence a narrow, cylindric panicle, 5—15 cm long, 3—4 cm wide, dense; rachis scabrous; pedicels unequal. Spikelets 2.0—2.5 mm long, elliptic, often purple tinged at tip. Lower glume ovate, \pm 1 mm long, 3-nerved. Upper glume elliptic, 2.0—2.2 mm long, 5—9-nerved. Lower lemma empty, 9—11-nerved. Upper lemma ovate-oblong, \pm 1 mm long, white, shining, 5-nerved. Anthers 3, purple, 0.5—0.8 mm long. Caryopsis elliptic-oblong, \pm 1 mm long.

Fls. & Frts. : Aug.—Dec.

Distribution : Bastar, Betul, Bilaspur, Gwalior, Rajnandgaon, Raigarh, Sagar, Sidhi.

86. SCHIZACHYRIUM Nees

- 1a. Lower glume of sessile spikelet 2.5 mm long; joints of the raceme 2—3 mm long; very slender plant; leaves up to 4 cm long, obtuse tip ... *S. brevifolium* 1
- 1b. Lower glume of sessile spikelet over 4 mm long; joints of the racemes over 4 mm long; plants robust; leaves much longer and acuminate :
- 2a. Fertile lemma 5—5.6 mm long; caryopsis 1.5—2 mm long, cylindric; lower glume of sessile spikelet dorsally rounded ... *S. sanguineum* 3
- 2b. Fertile lemma \pm 4 mm long; caryopsis \pm 4 mm long, linear; glume of sessile spikelet not round ... *S. exile* 2

1. *Schizachyrium brevifolium* (Sw.) Nees, *Agrost. Bras.* 332. 1829; *Andropogon brevifolium* Sw. *Prod. Veg. Ind. Occ.* 26. 1788.

Annual. Culms 40—60 cm tall, slender, tufted, decumbent. Leaves linear, acute, margins scabrous; sheath compressed, keeled, glabrous;

ligule a shallow membrane. Inflorescence consists of a series of racemes. Spikelets in pairs. Sessile spikelet linear-lanceolate, \pm 3 mm long. Lower glume bidentate, scaberulous on back. Upper glume boat-shaped, acute, 1-nerved, ciliolate. Lower represented by an empty lemma. Upper floret hermaphrodite, 2-toothed, 1.5 mm long; awns 8—16 mm long. Anthers 2, purple, 1.5 mm long. Caryopsis sublinear, tapering upwards, \pm 2 mm long.

Fls. & Frts. : Sept.—Jan.

Distribution : Ambikapur, Bilaspur, Rajnandgaon, Raigarh, Sidhi, Shivpuri.

2. *S. exile* (Hochst.) Stapf in Fl. Trop. Afr. 9 : 191. 1917; *Anaropogon exilis* Hochst. in Flora 24 : 241. 1844.

Annual. Culms 15—16 cm tall, erect, slightly compressed. Leaves linear, tapering, glabrous; sheath loose, glabrous; ligule a short membrane. Inflorescence made of short racemes in the spathe. Sessile spikelet up to 8 mm long, with bearded callus. Glumes equal. Lower glume with long white hairs; scaberulous on keels. Upper glume subulate, tips with long fine point. Lower floret empty. Upper floret hermaphrodite, 2-toothed, \pm 4 mm long; awn 12—20 mm long. Anthers 2, linear, 1.25—2.0 mm long. Caryopsis linear, \pm 4 mm long.

Fls. & Frts. : Oct.—Jan.

Distribution : Bilaspur, Pachmarhi, Shivpuri, Sidhi.

3. *S. sanguinium* (Retz.) Alston, Suppl. Fl. Ceyl. 334. 1931; *Rottboellia sanguniea* Retz. Obs. Bot. 3 : 25. 1783; *Andropogon hirtiflorus* Hook. f. Fl. Brit Ind. 7 : 167. 1896.

Perennial. Culms 15—50 cm tall. Leaves 10—15 cm long, acute; sheath compressed, glabrous; ligule membranous. Inflorescence spatheate, spikelike racemes; internode of rachis 6—8 mm long, 2-toothed at the tip. Sessile spikelets with oblique callus and stiff white hairs. Lower glume 7.2 mm long, 5-nerved, keeled. Upper glume 7.4 mm long, 3-nerved. Lower floret barren. Lemma 6.5 mm long, linear-lanceolate, nerveless.

Upper lemma 5.2 mm long, clefted; awn 2.2 cm long. Anthers 2, yellow, ± 2 mm long. Caryopsis cylindrical, 1.5—2.0 mm long.

Fls. & Frts. : Sept.—Nov.

Distribution : Damoh (Tendukhera), *Shukla* : 29464.

87. SCHOENEFELDIA Kunth.

Schoenefeldia gracilis Kunth, Rev. Gram 1 : 383, t. 53. 1830; *Chloris pallida* (Edgew) Hook. f. Fl. Brit. Ind. 7 : 289. 1896.

Annual. Culms 20—40 cm tall, slender, filiform. Leaves very narrow, tips attenuate; sheath glabrous; ligule of few hairs. Inflorescence of 3—5 spikes, golden yellow; rachis flattened, serrulate. Spikelets one-flowered, one-sided, sub-sessile, 1.8—2.0 mm long. Glumes sub-equal, compressed, keeled; upper bifid, with curved awn ± 3 cm long. Fertile lemma shorter than glumes, ovate-elliptic, laterally compressed, ciliate on nerves, minutely 2-toothed, with a fine awn between the teeth. Anthers 3, enclosed in floret, ± 1 mm long. Caryopsis narrow, acute, 2.0—2.5 mm long, free from pericarp.

Fls. & Frts. : Aug.—Oct.

Distribution : Shivpuri, *Panigrahi* : 6059.

Note : Common species on dry sandy places.

88. SEHIMA Forssk.

- | | | |
|---|-----|----------------------|
| 1b. Joints and pedicels glabrous or hairy on only one margin; lower glume of sessile spikelet with a deep longitudinal slit-like groove | ... | <i>S. Sulcatum</i> 2 |
| 1a. Joints and pedicels hairy on both margins; lower glume of sessile spikelet grooved without a slit | ... | <i>S. nervosum</i> 1 |

1. *Schima nervosum* (Rottl.) Stapf in Prain, Fl. Trop. Afr. 9 : 136. 1917; *Andropogon nervosus* Rottl. apud Willd. in Verh. Ges. Naturf. Freund. Berlin. Neue Schr. 4 : 218. 1803; *Ischaemum laxum* R. Br. Prodr. 205. 1810; Hook. f. Fl. Brit. Ind 7 : 137. 1896.

Perennial. Culms tufted, erect upto 90 cm tall. Leaves linear, tips filiform, rigid, scabrous; sheaths glabrous, striate; ligule hairy. Inflorescence a solitary raceme; pedicels and joints compressed, ciliate on both edges. Sessile spikelets 6—8 mm long, linear-lanceolate; callus shortly bearded. Lower glume 6—7 mm long, 2-toothed, deeply grooved on back. Upper glume boat-shaped, 5.5—6.5 mm long; arista 1.5 mm long. Lower floret male. Lemma 6 mm long, lanceolate, ciliate. Upper floret hermaphrodite. Lemma deeply cleft into two lobes; awn 2.5 cm long. Anthers 3, yellow, 3—4 mm long. Pedicelled spikelet equal to sessile. Caryopsis \pm 2 mm long, narrowly cylindrical.

Fls. & Frts. : Sept.—Jan.

Distribution : Ambikapur, Bilaspur, Indore, Morena, Ratlam, Sagar, Sidhi, Tikamgarh.

2. *S. sulcatum* (Hack.) A. Camus in Bull. Mus. Hist. Nat. Paris 27 : 373. 1921; *Ischaemum sulcatum* Hack. in DC. Monogr. Phan. 6 : 248. 1889; Hook. f., Fl. Brit. Ind. 7 : 737. 1896.

Perennial. Culms 20—50 cm. tall, slender, tufted. Leaves linear glabrous; sheath terete, glabrous; ligule ciliate. Inflorescence a terminal raceme. Sessile spikelet 9—10 mm long, linear-lanceolate, awned. Lower glume 8—9 mm long, deeply grooved, 6-nerved, 2-toothed. Upper glume boat-shaped, 3—5-nerved; awn 12—14 mm long. Lower lemma male, 4—5 mm long. Upper lemma 6 mm long, 2-toothed; awn from sinus 2.0—3.5 cm long. Anthers 3, yellow, 3—4 mm long. Caryopsis oblong, \pm 3 mm long. Pedicelled spikelets equal to sessile, awnless.

Fls. & Frts. : Aug.—Dec.

Distribution : Ambikapur, Bilaspur, Shivpuri.

89. SETARIA P. Beauv.

1a. Inflorescence a cylindrical and dense or lobed spiciform panicle; leaf blades folded or flat :

2a. Bristles retrorsely barbed ... *S. verticillata* 8

2b. Bristles antrorsely barbed :

- 3a. Upper glume as long as the upper lemma, the latter quite smooth or minutely rugose; inflorescence lobed; spikelets persistent ... *S. italica* 5
- 3b. Upper glume shorter than the upper lemma, the latter rugose :
- 4a. Inflorescence a cylindrical false spike :
- 5a. Spikelets 3 mm long; upper lemma coarsely rugose, boat-shaped and slightly keeled upwards, strongly curved in profile ... *S. glauca* 2
- 5b. Spikelets 2.25 mm long; upper lemma finely rugose, narrow and dorsally gently curved, not keeled ... *S. pumila* 7
- 4b. Inflorescence a narrow panicle; spikelets 1.8—2 mm long. ... *S. intermedia* 4
- 1b. Inflorescence a dense or rather loose, narrow or widely spreading panicle; leaves folded in fan-fashion between the longitudinal nerves :
- 6a. Perennial; spikelets \pm 3.5 mm long; leaves plicate ... *S. p'icata* 6
- 6b. Annuals; spikelets \pm 1 mm long; leaves not plicate :
- 7a. Upper glume about half the length of upper lemma; lower floret male or barren; branches of the panicle divided from the base and bearing short racemes; spikelets elliptic-acute, crowded ... *S. barbata* 1

7b. Upper glume about the length of upper lemma; lower floret barren; branches of panicle simple from the base; spikelets abruptly acute

... *S. homonyma* 3

1. *Setaria barbata* (Lamk.) Kunth, Rev. Gram 1 : 47. 1829; *Panicum barbatum* Lamk. Tab. Encycl. Meth. Bot. 1 : 171. 1971; *P. flavescens sensu* Hook. f. Fl. Brit. Ind. 7 : 56. 1896 (*non* Sw. 1788)

Annual. Culms 1.0—1.5 m tall, decumbent, slender. Leaves thin, linear-lanceolate, lightly plicate, softly hairy on both surfaces; sheath with hairy margins; ligule obscure. Inflorescence a loose narrow panicle; bristles 5—10 mm long. Spikelets \pm 1 mm long, sessile, green. Lower glume 0.2—0.3 mm long, orbicular, 3-nerved. Upper glume 0.4—9.0 mm long, apiculate, 5—7-nerved. Lower lemma 1 mm long, male, 5—7-nerved. Upper lemma 0.8—1.9 mm long, hermaphrodite, ellipsoid acuminate, transversely rugose. Anthers 3, 0.5—0.7 mm long. Caryopsis \pm 0.8 mm long, acuminate.

Fls. & Frts. : July.—Oct.

Distribution : Hoshangabad, Pachmarhi.

2. *S. glauca* (L.) P. Beauv. Ess. Agrost. 51 : 169, 178. 1812; *Panicum glaucum* L. Sp. Pl. ed. 1. 56. 1753.

Annual. Culms 30—60 cm tall, erect to geniculate. Leaves linear, tapering to a slender point, glabrous or with a few hairs at base, margins rough; sheaths keeled, glabrous; ligule ciliate. Inflorescence a dense panicle, spike-like, cylindrical, yellow at maturity, axis densely pubescent; bristles 5—20 in a cluster, scabrous, very unequal, 6—10 mm long. Spikelets broadly elliptic, \pm 3 mm long. Lower glume 1.0—1.3 mm long, 3-nerved. Upper glume 1.5 mm long, 5-nerved. Lower floret male or barren. Anthers 3, 1.8 mm long. Upper floret boat-shaped, convex on back, distinctly transversely rugose. Palea granular-punctate. Anthers 3, 1 mm long. Caryopsis rounded elliptic, \pm 2 mm long, plano-convex, hilum punctate, embryo more than half.

Fls. & Frts. : Aug.—Oct.

Distribution : Balaghat, Baster, Bilaspur, Bori, Gwalior, Indore, Mandla, Pachmarhi, Raipur, Satna, Shivpuri, Sidhi.

3. *Setaria homonyma* (Steud.) Chiov. in Nuo Vo Giorn. Bot. Ital. n. s 26 : 78. 1919; *Panicum homonymum* Steud., Syn. Pl. Glum 1 : 48. 1854; *P. rhachitrichum sensu* Fl. Brit. Ind. 7 : 56. 1896.

Annual. Culms 20—40 cm tall, tufted, erect, nodes pubescent. Leaves linear, base rounded, sparsely hairy; sheath villous on margins and mouth; ligule hairy. Inflorescence a pyramidal panicle, branches spreading, bristles twice as long as spikelets; pedicels hairy. Spikelets \pm 1 mm long, secund, dorsally compressed. Lower glume minute, membranous, 1—3-nerved. Upper glume 0.8 long, 5—6-nerved, obtuse. Lower lemma neuter. Upper lemma hermaphrodite, 0.8—1.0 mm long, ellipsoid, minutely rugose, tip rounded. Anthers 3, yellow, \pm 0.5 mm long. Caryopsis same as lower lemma.

Fls. & Frts. : July—Sept.

Distribution : Ambikapur, Bilaspur, Raigarh.

4. *S. intermedia* Roem. & Schult. Syst. Veg. 2 : 489. 1817; *Panicum tomentosum* Roxb. Fl. Ind. 1 : 303. 1820; *P. intermedium* (Roem. & Schult.) Roth, Nov. Pl. Sp. 47. 1821; *Setaria tomentosa* (Roxb.) Kunth, Rev. Gram. 1 : 47. 1829; Bor, Grass. Bur. Ceyl. Ind. Pak. 365. 1960.

Annual. Culms 70—100 cm tall, erect, nodes glabrous. Leaves 15—30 cm long, acuminate, narrowed to the base, hairy; sheath ciliate; ligule lacerate. Inflorescence a panicle; rachis scabrid. Involucre—bristles 1—3, up to 7 cm long. Spikelets solitary or often in pairs, 1.8—2.0 mm long. Lower glume \pm 0.7 mm long, apiculate, 3-nerved, glabrous. Upper glume 1.0—1.2 mm long, ovate-rounded, shortly apiculate, 7-nerved. Lower lemma 1.5 mm long, empty. Upper lemma transversely rugose. Anthers 3, yellow, \pm 0.8 mm long. Caryopsis \pm 1.5 mm long, rugose, brown.

Fls. & Frts. : July—Dec.

Distribution : Bastar, Damoh, Sidhi.

5. *S. italica* (L.) P. Beauv. Ess. Agrost. 51 : 170, 178. 1812; *Panicum italicum* L. Sp. Pl. 56. 1753.

Annual. Culms \pm 1 m tall, erect or geniculate at base, scabrid below the panicle. Leaves flat, soft, margins retrorsely scabrid; sheaths tight, glabrous, margins ciliate; ligule densely ciliate. Inflorescence a condensed panicle, 5—10 cm long; rachis rough, stout, branches spirally arranged. Spikelets persistent, broadly elliptic, 2.5—3.5 mm long. Lower glume \pm 1 mm long. Upper glume 1.5—2.0 mm long, elliptic, concave. Lower floret barren. Upper floret hermaphrodite. Lemma crustaceous, reddish or yellow. Anthers 3, yellow, 2.0—2.5 mm long. Caryopsis ellipsoid, light yellow.

Fls. & Frts. : July—Oct.

Distribution : Cultivated throughout the State.

6. *S. plicata* (Lamk.) T. Cooke, Fl. Bombay 2 : 919. 1908; *panicum plicatum* Lamk. Encycl. Meth. Bot. 4 : 736. 1797.

Perennial. Culms 80—120 cm tall, tufted. Leaves narrowly lanceolate, plicate; sheaths ciliate on margins, long hairy at mouth; ligule hairy. Inflorescence a loose panicle. Spikelets \pm 3.5 mm long, ovate-oblong, acute. Lower glume 1.0—1.5 mm long, orbicular. Upper glume up to $\frac{3}{4}$ of spikelet, obtuse, 5—7-nerved. Lower floret neuter. Upper floret fertile. Lemma 2.6 mm long, narrowly ovate, acute, transversely finely rugose. Anthers 3, yellow, 1.3 mm long. Caryopsis 1.5 mm long globose.

Fls. & Frts. : Aug.—Jan.

Distribution : Baster (Bailadilla).

7. *S. pumila* (Poir.) Roem. & Schult. Syst. Veg. 2 : 191. 1817; *Panicum pumilum* Poir. Encycl. Meth. Bot. Suppl. 4, 273. 1816; *S. pallidefusca* (Schum.) Stapf & Hubb. in Kew Bull. 1930 : 259. 1930; *Panicum pallide-fuscum* Schum. Beskr. Guin Pl. 58. 1827.

Annual. Culms 50—60 cm tall, decumbent-ascending, glabrous. Leaves acute, base contracted; sheath glabrous; ligule hairy. Inflorescence panicle; rachis pubescent. Spikelets 2.0—2.5 mm long, ovate, acute, 3-nerved. Upper glume 1.3—1.5 mm long, acute, 5-nerved. Lower lemma empty, 5-nerved, paleate. Stamens 3, rarely barren. Upper

lemma transversely rugose, not keeled. Palea glandular. Anthers 3, yellow, ± 0.8 mm long. Caryopsis ± 1.5 mm long, rugose, plano-convex.

Fls. & Frts. : Aug.—Nov.

Distribution : Balaghat, Bastar, Bilaspur, Bori, Damoh, Hoshangabad, Raigarh, Raipur, Rewa, Sidhi.

8. *S. verticillata* (L.) P. Beauv. Ess. Agrost. 51 : 178. 1812; *Panicum verticillatum* L. Sp. Pl. ed. 2. 82. 1762.

Annual. Culms 30—100 cm tall, erect or ascending. Leaves 10—30 cm long, soft, base rounded sparsely pilose; sheath glabrous, throat pilose; ligule hairy. Inflorescence spiciform, interrupted panicle; rachis slender, angular, scabrid. Spikelets 2.0—2.5 mm long, broadly ovate. Lower glume 0.8—1.0 mm long, 3-nerved. Upper glume 2.0—2.2 mm long, acute, 3—7-nerved. Lower lemma empty, epaleate. Upper lemma 1.8—2.0 mm long, broadly oblong. Anthers 3, yellow, ± 1 mm long. Caryopsis ± 1.5 mm long, finely rugose.

Fls. & Frts. : Aug.—Oct.

Distribution : Bilaspur, Damoh, Gwalior, Indore, Rajnandgaon, Raigarh, Satna.

90. SORGHUM Moench

1a. Plants annual :

2a. Culm nodes densely bearded with long silky hairs; spikelets 6—7 mm long, densely covered with golden-brown or brown hairs ... *S. deccanense* 4

2b. Culm nodes glabrous; spikelets 5—5.5 mm long, not hairy as above :

3a. Lower glume of sessile spikelet coriaceous and strongly nerved; caryopsis ± 2 mm in diameter, polished, white ... *S. bicolor* 1

- 3b. Lower glume of sessile spikelet
4.5 mm long ivory-yellow ... *S. cernuum var-
yemense* 2
- 1b. plants perennial :
- 4a. Anthers purplish \pm 3 mm long; cary-
opsis obovate, 3—3.5 mm long; ligule
hairy ... *S. controversum* 3
- 4b. Anthers yellow, 1—2.5 mm long;
caryopsis 1—2 mm long, ligule mem-
branous;
- 5a. Plants with well-developed rhi-
zomes; nodes glabrous;
- 6a. Leaf blades 0.5—2 cm wide;
panicles up to 25 cm long,
5 cm wide, with lower
branches 5—8 cm long ... *S. halepense* 5
- 6b. Leaf blades 2—4 cm wide,
panicles usually 25—55 cm
long, 10—25 cm wide, with
lower branches 10—25 cm
long ... *S. miliaceum* 6
- 5b. Plants without rhizomes; nodes
villous; pedicelled spikelet rudi-
mentary ... *P. nitidum* 7

1. *Sorghum bicolor* (L.) Moench, Meth, Pl. 207. 1794; *Holcus bicolor* L. Mant. Alt. 301. 1771; *Andropogon bicolor* Roxb. Fl. Ind. 1 : 272. 1820.

Annual. Culms up to 2 m tall, erect. Leaves linear, long, base rounded; sheath round, glabrous; ligule hard, rounded at apex, margins ciliate. Inflorescence a large panicle. Lower branches whorled. Spikelets paired, dissimilar. Pedicelled spikelet linear-elliptic, dark brown. Sessile spikelet \pm 5 mm long, ovate; callus hispid. Lower glume 5—6 mm long, 15-veined. Upper glume equalling lower, coriaceous, 0-veined. Lower lemma membranous, keeled, 3-nerved, margins fringed, \pm 5 mm long.

Upper lemma ovate, margins ciliate; awns \pm 10 mm long. Anthers 3, yellow, \pm 3 mm long. Caryopsis polished, \pm 2 mm long (in diameter).

Fls. & Frts. : Aug.—Oct.

Distribution : Gwalior, Sidhi.

2. *S. cernuum* var. *yemense* (Koern.) Snowden in Kew Bull. 1935 : 251 1935; *Andropogon sorghum* var. *yamensts* Koern. in Bull. Herb. Boiss. 2, App. 2 : 11. 1894.

Annual. Culms 1.5—2.5 m tall, erect. Leaves 20—40 cm long, glabrous; sheath glabrous; ligule 3—4 mm long, membranous, margins hairy. Inflorescence a loose panicle. Sessile spikelets 5.0—5.5 mm long, elliptic, acute. Lower glume 4.5 mm long, ovate, acute, glabrous. Upper glume 5.0—5.2 mm long, acuminate, glabrous. Lower lemma 3 mm long, acute, 2-nerved, ciliate. Upper lemma ovate, subacute. Pedicelled spikelets 5.0—5.5 mm long; pedicels hairy. Anthers 3, yellow \pm 3 mm long. Caryopsis 4.0—4.5 mm long, ivory-yellow.

Fls. & Frts. : Sept.—Dec.

Distribution : Damoh, Shukla : 29698.

3. *S. controversum* (Steud.) Snowden in J. L. Soc. (Bot.) 55 : 210. 1955; *Andropogon controversus* Steud. Syn. Pl. Glum. 1 : 391. 1854; *A. helepensis* Hook. f. Fl. Brit. Ind. 7 : 182. 1896.

Perennial, rhizomatous. Culms 1—2 m tall, terete, nodes glabrous or pubescent. Leaves flat, glabrous, mid-nerve prominent, apex tapering to a fine point; sheath terete, glabrous, glaucous; ligule hairy. Inflorescence an effuse panicle. Pedicelled spikelets linear-lanceolate, \pm 6 mm long, hairy. Sessile spikelet elliptic, 5—6 mm long, hairy, brownish, awned. Lower glume lanceolate, 5.0—5.5 mm long, dorsally hairy, 7-nerved. Upper glume equal, boat-shaped, 5—7-nerved. Lower lemma empty. Upper lemma 4.0—4.5 mm long, ciliate, 1-nerved, clefted at apex; awn 1.5—2.0 cm long. Anthers 3, purplish, \pm 3 mm long. Caryopsis obovate, 3.0—3.5 mm long.

Fls. & Frts. : Aug.—Dec.

Distribution : Indore.

4. *Sorghum deccanense* Stapf ex Bor, Gr. Burm. Ceyl. Ind. Pak. 245. 1960; *Andropogon purpureo-sericeus* Hook. f. Fl. Brit. Ind. 7 : 185. 1896 (non Hochst.).

Annual. Culms 1—2 m tall, erect, terete, nodes bearded. Leaves linear-lanceolate, flat, hairy, margins scabrid; sheath terete, glabrous; ligule hairy. Inflorescence a contracted panicle; rachis glabrous, swollen at base. Pedicelled spikelets slightly shorter than sessile, male. Anthers 3. Sessile spikelet 6—7 mm long, densely hairy, awned. Lower glume \pm 7 mm long, densely hairy, 7-nerved, keeled, beaked at tip, minutely 2-toothed. Upper glume similar, 5-nerved, 2-toothed. Lower lemma empty, 2-nerved, ciliate along margins. Upper lemma hyaline, clefted at apex; margins ciliate; awn \pm 3 cm long. Stamens 3, purple, 3.5—4.0 mm long. Caryopsis elliptic, \pm 4 mm long.

Fls. & Frts. : Aug.—Dec.

Distribution : Indora, Arora : 5972.

Note : Endemic to Madhya Pradesh and Western India.

5. *S. halepense* (L.) Pers. Syn. Pl. 1 : 101. 1805; *Holcus halepensis* L. Sp. Pl. 1047. 1753.

Perennial. Culms 1.0—2.5 m tall, with strong rhizomes. Leaves acuminate, margins scabrid; sheath glabrous; ligule 2—3 mm long, membranous. Inflorescence an effuse panicle, nodes hairy. Sessile spikelets 4.5—5.5 mm long, elliptic, acute. Lower glume 4.5 mm long, 5—11-nerved, ciliate on back. Upper glume 4.5—5.0 mm long, 2-nerved, hairy on back. Lower lemma 4.0—4.5 mm long, ciliate. Upper lemma 2 mm long, ovate. Pedicelled spikelets 4.5—5.5 mm long. Lemma empty. Anthers 3, yellow, \pm 1.8 mm long. Caryopsis \pm 1.4 mm long.

Fls. & Frts. : July—Oct. and March—April.

Distribution : Bilaspur, Damoh, Gwalior, Hoshangabad, Morena, Sagar, Sidhi.

6. *S. miliaceum* (Roxb.) Snowden in Jour. L. Soc. Bot. 55 : 207. 1955. *Andropogon miliaceus* Roxb., Fl. Ind. ed. Carey & Wall. 1 : 276. 1820.

Perennial. Culms erect, 1.5—2.0 m tall, with creeping root-stock. Leaves 30—35 cm long, filiform; sheath glabrous; ligule membranous. Inflorescence a large panicle, branches tomentose. Sessile spikelets 5 mm long, elliptic, acute. Lower glume 5 mm long, coriaceous, 2-toothed, hairy. Upper glume 5 mm long, sharply acute with ciliate keels. Lower lemma 4.5 mm long, ciliate on nerves, empty, epaleate. Upper lemma 3.5 mm long, broadly ovate. Pedicelled spikelet 5 mm long; callus bearded. Anthers 3, yellow, ± 1 mm long. Caryopsis ± 1.2 mm long.

Fls. & Frts. : Aug.—Nov.

Distribution : Balaghat, Bilaspur, Borighat, Damoh, Gwalior, Hoshangabad.

7. *S. nitidum* (Vahl) Pers. Syn. Pl. 1 : 101. 1805; *Holcus nitidus* Vahl. Symb. Bot. 2 : 102. 1791; *Andropogon serratus* Thunb. Fl. Jap. 41. 1784; Hook. f. Fl. Brit. Ind. 7 : 185. 1896.

Perennial. Culms 1.0—2.5 m tall, erect, nodes villous. Leaves up to 60 cm long, midrib white, sparsely hairy or glabrous, margins scabrid; sheath almost glabrous, long hairy at mouth; ligule membranous, truncate, dorsally ciliate. Inflorescence an elongated panicle, lower branches nearly whorled; rachis glabrous. Spikelets paired, dissimilar. Pedicelled spikelet rudimentary, ± 3 mm long; callus densely hairy. Sessile spikelet ± 4 mm long, elliptic-acute. Lower glume dorsally flattened, brown hairy on keels, 5—7-nerved. Upper glume similar to lower but glabrous and shining at the basal portion. Lower floret reduced, barren. Upper floret hermaphrodite, ± 2 mm long, hyaline, ciliate on margins, awned or awnless. Anthers 3, yellow, 2.0—2.5 mm long. Caryopsis ± 2 mm long, brownish.

Fls. & Frts. : Oct.—Dec.

Distribution : Bilaspur, Bori, Hoshangabad, Mandla.

91. SPODIOPOGON Trin.

Spodiopogon rhizophorus (Steud.) Pilger in Engler & Prantl, Naturl. Pflanzenf. Aufl. 2, 14e : 119. 1940; *Andropogon rhizophorus* Steud. Syn. Pl. Glum. 381. 1854; *Spodiopogon albidus* (Wall.) Benth. in J. Linn. Soc. (Bot.) 19 : 66. 1891; Hook. f., Fl. Brit. Ind. 7 : 108. 1896.

Annual or perennial. Culms 20—70 cm tall, decumbent, branched. Leaves linear-lanceolate, petioled, glabrous; sheath compressed, margins ciliate; ligule chartaceous, obtuse. Inflorescence an oblong panicle, branches hairy at base; racemes silky, joints of rachis flattened \pm 3 mm long. Pedicelled spikelets linear-lanceolate, slightly smaller than sessile, awned. Sessile spikelets 5.0—5.5 mm long, hairy, awned. Lower glume equal to spikelet, pilose, 7-nerved. Upper glume equal to lower, boat-shaped, with short arista. Lower lemma 3.0—3.25 mm long, nerveless, ovate. Anthers 3, \pm 3 mm long. Upper lemma 3.5—4.0 mm long, bilobed, with \pm 11 mm long awn. Anthers 3, \pm 3 mm long. Caryopsis \pm 3 mm long, fusiform.

Fls. & Frts. : Aug.—Dec.

Distribution : Bori, Hoshangabad, Indore, Mandla.

92. SPOROBOLUS R. Br.

1a. Plants annual, easy to uproot :

2a. Lower branches of the panicle alternate or sub-opposite; spikelets 0.8—1 mm long ... *S. tenuissimus* 7

2b. Lower branches of the panicle whorled; spikelets over 1 mm long;

3a. Anthers 2; caryopsis quadrangular in section ... *S. tetragonus* 8

3b. Anthers 3; caryopsis not quadrangular in section;

4a. Spikelets 1.5—2 mm long; lower glume 1—1.2 mm long; 1-nerved. ... *S. capillaris* 1

4b. Spikelets 1—1.2 mm long; lower glume 0.2—0.3 mm long nerveless ... *S. coromandelianus* 2

1b. Plants perennial, hard to uproot :

5a. Anthers 2, panicle effuse, lower glume 0.3—0.4 mm long ... *S. diander* 3

- 5b. Anthers 3; panicle contracted; lower glume more than 0.4 mm long :
- 6a. Spikelets 2.5 mm long; caryopsis sub-globose, slightly convex, roots very thick covered with soft felt of root hairs ... *S. marginatus* 6
- 6b. Spikelet under 2 mm long; caryopsis and roots not as above :
- 7a. Glumes minutely fringed; palea plicate in the middle; inflorescence usually interrupted; sheaths longer than internodes ... *S. indicus* 5
- 7b. Glumes not fringed; palea not plicate; inflorescence not interrupted; sheaths compressed, equalling the internodes ... *S. fertilis* 4

1. *Sporobolus capillaris* Miq. in Verh. Konink. Nederl. Inst. 3 : 4, 37. 1851.

Annual. Culms 20—40 cm tall, erect, tufted. Leaves linear-lanceolate, flat, hispid, bristly on margins; sheaths compressed; ligule hairy. Inflorescence an effuse panicle, branches capillary and scabrous. Pedicels longer than spikelets. Spikelets 1.5—2.0 mm long, greyish-green. Lower glume \pm 1 mm long, 1-nerved. Upper glume \pm 2 mm long, 1-nerved, acuminate. Lemma similar and equalling the upper glume, ovate. Palea scabrid. Anthers 3, pinkish, \pm 0.3 mm long. Caryopsis 0.8 mm long, discoid.

Fls. & Frts. : Aug.—Dec.

Distribution : Balaghat, Pachmarhi, Raigarh, Sidhi.

2. *S. coromandelianus* (Retz.) Kunth, Rev. Gram. 1 : 68. 1820; *Agrostis coromandeliana* Retz., Obs. Bot. 4 : 19. 1786.

Annual. Culms 15—40 cm tall, tufted, erect or ascending. Leaves lanceolate, glabrous or pilose, margins papillate; sheath compressed,

glabrous, hairy at mouth; ligule very short, hairy. Inflorescence an effuse panicle; branches capillary, whorled. Spikelets 1.2 mm long, lanceolate. Lower glume \pm 0.2 mm long, nerveless. Upper glume \pm 1 mm long, hyaline, 1-nerved, acute. Lemma similar, equalling the upper glume. Anthers 3, yellow, \pm 0.4 mm long. Caryopsis \pm 0.6 mm long, obovate.

Fls. & Frts. : Aug.—Dec.

Distribution : Gwalior, Hoshangabad.

3. *S. diander* (Retz.) P. Beauv. Ess. Agrost. 26 : 147 178. 1812; *Agrostis diandra* Retz. Obs. Bot. 5 : 19. 1789.

Perennial. Culms 30—50 cm tall, tufted. Leaves linear, filiform, attenuate; sheath glabrous; ligule hairy. Inflorescence a panicle, purplish or slaty. Spikelets 1.2—1.4 mm long, acute. Lower glume 0.3—0.4 mm long, nerveless. Upper glume 0.6—0.8 mm long, elliptic-ovate, 1-nerved. Lemma 1.5 mm long, lanceolate, 1-nerved. Palea 1.2 mm long, nerveless. Anthers 2, purplish, 0.3 mm long. Caryopsis 0.5—0.6 mm long, oblong-ovoid.

Fls. & Frts. : Sept.—Dec.

Distribution : Ambikapur, Sidhi.

4. *S. fertilis* (Steud.) W. D. Clayton in Kew Bull. 19 : 287. 1965; *Agrostis fertilis* Steud. Syn. Pl. Gram. 170. 1855.

Perennial. Culms 40—70 cm tall, tufted, terete. Leaves linear, convolute, glabrous, acuminate; sheaths compressed, glabrous; ligule hairy. Inflorescence a contracted panicle branches short. Pedicels shorter or longer than spikelets. Spikelets 1-flowered, 1.6—2.0 mm long, lanceolate. Lower glume 0.5 mm long, nerveless, acute. Upper glume \pm 1 mm long, 1-nerved. Lemma ovate, 1.5—2.0 mm long, 1-nerved. Palea subequal to lemma, 2-nerved. Anthers 3, \pm 0.5 mm long. Caryopsis 0.6—0.7 mm long, elliptic-obovate, brownish.

Fls. & Frts. : Aug.—Dec.

Distribution : Ambikapur, Bilaspur, Indore, Mandla, Pachmarhi, Sidhi.

5. *Sporobolus indicus* (L.) R. Br. Prodr. 170. 1810.

Perennial. Culms 50—120 cm tall, tufted, erect. Leaves mostly crowded near the base, tips filiform, glabrous; sheaths longer than internodes, ribbed, glabrous; ligule minute, hairy. Inflorescence a contracted panicle, often interrupted, branches very short. Spikelets 1.5—2.0 mm long, pale green. Pedicels shorter than spikelets. Glumes unequal, minutely fringed, hyaline, upper one nerved, 1/3 of spikelet. Lemma \pm 1 mm long, broadly ovate, 1-nerved. Palea plicate in the middle. Anthers 3, purplish, \pm 0.4 mm long. Caryopsis \pm 0.5 mm long, red brown, obovoid, adnate to pericarp.

Fls. & Frts. : Sept.—Oct.

Distribution : Betul, Bilaspur, Pachmarhi, Raigarh.

6. *S. marginatus* Hochst. ex A. Rich, Tent. Fl. Abyss. 2 : 397, 1851; *S. arabicus* Boiss. Diagn. ser. 1, 13 : 47. 1853; Hook. f. Fl. Brit. Ind. 7 : 252. 1896.

Perennial. Culms 20—60 cm tall, base woody, stoloniferous. Roots very thick, covered with soft felt of root-hairs. Leaves flat or convolute, margin serrulate, ciliate; sheaths glabrous; ligule hairy. Inflorescence a panicle, branches capillary. Spikelets 2.5 mm long. Pedicels short. Lower glume 0.5—0.8 mm long, ovate, nerveless. Upper glume 2.5 mm long, 1-nerved, obtuse. Lemma similar to upper glume. Anthers 3, yellow, \pm 0.5 mm long. Caryopsis sub-globose, 0.8 \times 0.6 mm, slightly convex.

Fls. & Frts. : July—Dec.

Distribution : Gwalior.

7. *S. tenuissimus* (Schrank) Retz. Rev. Gen. Pl. 3 : 396 1893; *Panicum tenuissimum* Schrank, in Denkschr. Bot. Ges. Regensb. 2 : 26. 1822.

Annual. Culms 15—50 cm tall, erect, slender. Leaves 4—20 cm long, finely acuminate; sheath glabrous; ligule minutely ciliate. Inflorescence a panicle, diffuse, delicate. Spikelets 0.8—1.0 mm long. Lower glume 0.1—0.2 mm long, truncate. Upper glume 0.3—0.5 mm long, subacute. Lemma equal to spikelet, ovate. Anthers 0.1—0.2 mm long, dark brown. Caryopsis 0.4—0.5 mm long, truncate.

Fls. & Frts. : Aug.—Sept.

Distribution : Balaghat, Raigarh, Rewa, Sagar, Sidhi.

8. *Sporobolus tetragonus* Bor in Kew Bull. 1949 : 251. 1949; *P. pulchellus sensu* Fl. Brit. Ind. 7 : 252. 1896 (Non R. Br. 1810.)

Annual. Culms 20—70 cm tall, very slender, capillary. Leaves flat, narrowly lanceolate, papillate on margins; sheath ciliate at mouth; ligule obscure. Inflorescence a narrow panicle, branches capillary, whorled. Spikelets 1.5 mm long, greyish, shortly pedicelled. Lower glume 0.8 mm long, lanceolate, acute. Upper glume 1.4 mm long, hyaline, broader than lower; more acute. Lemma similar to upper glume. Anthers 2, yellow, 0.5 mm long. Caryopsis 1 mm long, lenticular, reddish brown.

Fls. & Frts. : Aug.—Oct.

Distribution : Sidhi.

93. TETRAPOGON Desf.

Tetrapogon tenellus (Roxb.) Chiov. in Ann. Inst. Bot. Roma 8 : 352. 1908; *Chloris tenella* Roxb. Fl. Ind. 1 : 330. 1820; Hook. f. Fl. Brit. Ind. 7 : 290. 1896.

Annual. Culms 20—50 cm tall, erect or decumbent. Leaves linear-lanceolate, glabrous or sparsely hairy; sheath compressed, keeled, glabrous; ligule membranous. Inflorescence usually an erect spike. Spikelets 5—6 mm long, consisting 3—4 perfect and 1—3 sterile florets above. Lower glume \pm 3 mm long, 1-nerved, keeled. Upper glume 4.5—5.0 mm long, with short awn. Lowest lemma 5.0—5.5 mm long, 3-nerved, hairy; callus crustaceous; awn 7—8 mm long. Palea keels ciliate. Others fertile lemmas relatively shorter with shorter awns. Empty lemmas usually 2, obovate-cuneate, with short mucro or not. Anthers 3, yellow, \pm 3 mm long. Caryopsis 3.0—3.5 mm long, subtrigonal.

Fls. & Frts. : July—Nov.

Distribution : Gwalior, Indore.

94. THELEPOGON Roth

Thelepogon elegans Roth ex Roem & Schult. Syst. Veg. 2 : 788. 1817.

Perennial. Culms 20—60 cm tall, erect, stout. Leaves flat, hispid, margins scabrid and wavy; sheaths terete, scabrid; ligule membranous.

Inflorescence made of 2-several spikes; callus hairy. Sessile spikelet 6—7 mm long; lanceolate. Lower glume 5—6 mm long, transversely rugose, tubercled, apex beaked. Upper glume 6.0—6.5 mm long, boat-shaped, acuminate. Lower lemma elliptic, 2-nerved, ciliate. Anthers 3, yellow, 1.5—2.0 mm long. Upper lemma lanceolate, \pm 5 mm long, bilobed; awn 20—25 mm long. Anthers 3, yellow, 1.5—2.0 mm long. Caryopsis cylindric, \pm 2 mm long.

Fls. & Frts. : Aug.—Jan.

Distribution : Indore, Ratlam.

95. THEMEDA Forssk

- 1a. Pairs of involucrel spikelets inserted at different levels; involucrel spikelets without tubercle-based hairs; anthers equaling the spikelet ... *T. caudata* 1
- 1b. Pairs of involucrel spikelets inserted at the same level; spikelets with tubercle-based hairs; anthers shorter than spikelets :
- 2a. Involucrel spikelets over 6 mm long, glabrous or with sparse tubercle-based hairs; awn up to 6 mm long. *T. triandra* 4
- 2b. Involucrel spikelets less than 6 mm long, awn shorter; lower glume strigose :
- 3a. Panicle very loose with fan-shaped racemes; awn \pm 3.5 mm long; ligule absent ... *T. laxa* 2
- 3b. Panicle dense, congested; awn 0.5 mm long, ligule membranous ; ... *T. quadrivalvis* 3

1. *Themeda caudata* (Nees) A Camus in Lecomte, Fl. Gen. de l'Indo-Chine 7 : 364. 1922; *Anthlistiria caudata* Nees in Hook. et Arn. Bot. Beechey Voy. 245. 1838.

Strongly perennial. Culms 3—6 mm tall, about 1 cm in diameter, greenish yellow or pinkish. Leaves 1.0—1.5 m long, 5—15 mm wide, glabrous, margins scabrid; sheath very smooth, striate; ligule ciliate. Inflorescence a compound, false panicle, interrupted by involucre, spathe and spatheoles give leafy appearance. Each raceme subtended by 2 pairs of empty spikelets. Involucral spikelets 6.5 mm long, one of each pair empty other staminate. Lower glume scaberulous, 9-nerved. Upper glume 3/4th of lower glume, 3-nerved. Anthers equal to spikelet. General racemes with 2 sessile and 2—3 pedicelled spikelets. Sessile spikelet \pm 10 mm long, callus densely hairy. Lower glume coriaceous, \pm 8 mm long, 12-nerved, densely covered with golden hairs. Upper glume with hirsute keel, with hairs. Lemmas of lower floret 3/4th the glume, empty. Upper floret hermaphrodite. Lemmas similar to lower; awns, \pm 4.5 mm long; lodicules very large. Caryopsis 3.5 mm long, brown.

Fls. & Frts. : Sept.—Nov.

Distribution : Bilaspur, Raigarh.

2. *T. laxa* (Anderss.) A Camus in Bull. Mus. Hist. Nat. Paris 26 : 423. 1920; *Anthistiria laxa* Anderss. in Nov. Act. Sci. Upsal. Ser. 3.2 : 243 1856.

Perennial. Culm 60—120 cm tall, tufted, branched, leafy, glabrous. Leaves about 15 cm long, 5 mm wide, glabrous, margins scabrid, sparsely ciliate on lower surface; sheath compressed and spatheolate; ligule absent. Inflorescence consists of fan-shaped clusters of racemes. Spatheoles 2.0—3.5 mm long, acuminate. Involucral spikelets male or neuter, 5—6 mm long, callus glabrous. Lower glume narrow, spinously acute, 9—11-nerved, tuberculate-hairy. Upper glume 5 mm long, ciliate. Lemmas equal to glume. Sessile spikelets \pm 4 mm long (including hairy callus). Lower glume truncate, 9-nerved. Upper glume narrower, margins incurved, keel rounded in which lies the awn of upper lemma. Lower lemma 3 mm long, linear. Upper lemma reduced to awn, 3.0—3.5 mm long. Lodicules large. Pedicelled spikelets 2.5 mm long, very narrow, sharply acute. Anthers 3, yellow, \pm 2 mm long. Caryopsis 3—4 mm long, brown.

Fls. & Frts. : July—Nov.

Distribution : Balaghat, Bilaspur, Raigarh, Ratlam, Sidhi.

3. *T. quadrivalvis* (L.) O. Ktze. Rev. Gen. Fl. 2 : 794. 1891, *Andropogon quadrivalvis* (L.) in Murr., Syst. Veg. ed. 13. 758. 1774; *Anthistiria ciliata* L. f., Suppl. 113. 1781; Hook. f. Fl. Brit. Ind. 7 : 213. 1896.

Annual. Culms 30—90 cm tall, erect or ascending. Leaves 15—30 cm long; sheath loose, glabrous; ligule membranous. Inflorescence usually a dense panicle. Spatheoles 1.7—2.5 cm long, cymbiform, acuminate. Involucral spikelets sub-sessile, linear-lanceolate, 4.5—5.5 mm long, sharply acute. Lower glume 4.2—5.0 mm long with golden brown tubercled hairs, 2-keeled. Upper glume equal to lower, 3-nerved, glabrous. Lemma hyaline. 1-nerved, epaleate. Anthers 3, yellow, 1.0—1.5 mm long. Sessile spikelet hermaphrodite, 4.5 mm long, callus hairy. Lower glume \pm 4 mm long, lanceolate, 6—7-nerved. Upper glume similar. Upper lemma with 0.5 mm long awn. Anthers 3, yellow, 1.5—2.0 mm long. Pedicelled spikelets similar to involucral. Caryopsis subcylindric, 5—6 mm long, brown, callus hairy.

Fls. & Frts. : Sept.—Oct.

Distribution : Bastar, Bilaspur, Hoshangabad, Indore, Jabalpur, Ratlam, Raigarh, Seoni, Shivpuri, Sidhi.

4. *T. triandra* Forssk. Fl. Aegypt.-Arab. 178. 1775 : *Anthistiria imberbis* Retz. Obs. Bot. 3 : 11. 1783; Hook. f. Fl. Brit. Ind. 7 : 211. 1896.

Perennial. Culms 70—100 cm tall, erect. Leaves 15—30 cm long, rounded at base; sheath terete, glabrous; ligule 2 mm long, membranous, fringed. Inflorescence a panicle. Spatheole 3 cm long, compressed, keeled. Involucral spikelet subsessile, 6.2—6.4 mm long, linear-lanceolate, margin scarious. Lower glume 6.0—6.2 mm long, acute, many-nerved. Upper glume similar, 3-nerved. Lemma hyaline, equalling glume. Anthers 3, yellow 2.0—2.5 mm long, callus with brown hairs. Pedicelled spikelet similar to involucral. Caryopsis 3.0—3.5 mm long, truncate at apex.

Fls. & Frts. : Oct.—Nov.

Distribution : Ambikapur, Bastar, Bilaspur, Bori, Raipur, Rajnandgaon, Sagar.

96. THYSANOLAENA Nees

Thysanolaena mixima (Roxb.) O. Ktze. Rev. Gen. Pl. 2 : 794. 1891; *Agrostis maxima* Roxb. Fl. Ind. 1. 1820.

Perennial. Culms 1—3 m tall, erect, solid. Leaves 30—40 cm long, acuminate; sheath loose, glabrous; ligule membranous. Inflorescence a large panicle, with filiform glabrous branches. Spikelets numerous, 1—2-nate, minute, green-yellow, 2-flowered. Lower glume 0.5 mm long, ovate, acute. Upper glume 0.7 mm long, oblong-cuneate. Lower lemma 1.8 mm long, lanceolate. Upper lemma 1.4 mm long, 3-nerved. Anthers 2, yellowish, 0.7 mm long. Caryopsis 0.5 mm long, ovoid, reddish brown.

Fls. & Frts. : Nov.—May.

Distribution : Ambikapur, Bastar, Bilaspur, Bori, Raipur, Raigarh, Rewa, Sidhi.

97. TRAGUS Scop

Tragus roxburhii Panigrahi in Kew Bull. 29 (3) : 496. 1794; 496. 1974; *Lappago biflorus sensu* Hook. f. Fl. Brit. Ind. 7 : 97. 1896.

Annual. Culms 7—25 cm tall, tufted, erect or decumbent. Leaves flat, narrowly lanceolate, ciliate on margins; sheath glabrous, few hairs at mouth; ligule membranous, truncate. Inflorescence a terminal raceme; rachis pubescent, ending with spikelet. Burs on spikelets deciduous. Spikelets 4.0—4.5 mm long, sessile. Lower glume minute, nerveless. Upper glume equal to spikelet, 5-ribbed, with hooked spines. Lemma hyaline, 2.0—2.5 mm long, 3-nerved, acute. Anthers 3, yellow, \pm 0.6 mm long. Caryopsis 1.0—1.5 mm long.

Fls. & Frts. : July—Sept.

Distribution : Ambikapur, Indore, Sidhi.

98. TRIPOGON Roem & Schult.

1a. Lemmas clefted into 2-lobes, awned in the cleft; lobes awned or not :

2a. Leaves 5—20 cm long; ligule short; spikelets 10—30-flowered; lower glume 4—5 mm long ... *T. jaquemontii* 2

2b. Leaves 30—60 cm long; ligule obsolete; spikelets 4—10-flowered; lower glume \pm 1 mm long ... *T. lisboæ* 3

1. lemmas clefted into 4—lobes; median awn, 2—3 mm long, side ones 0.2—0.4 mm long, upper glume 2-fid ... *T. bromoides* 1

1. **Tripogon bromoides** Roem. & Schult. Syst. Veg. 2 : 600. 1817; *Trianthera bromoides* Roth ex Roem. & Schult., loc. cit. 600.

Perennial. Culms 25—60 cm tall, tufted, glabrous. Leaves convolute, acuminate; sheath glabrous or pilose, terete; ligule membranous. Inflorescence a raceme; rachis stiff, flattened. Spikelets sessile, 5—10-flowered. Lower glume thinly membranous, 2—2.5 mm long, 1-nerved, apex notched. Upper glume 3.5—4 mm long, shortly aristate. Lemma 6—7 mm long, 3-nerved, hairy at base, apex 4-lobed; median awn 2—3 mm long; side ones 0.2—0.4 mm long. Anthers 3, yellow, very small. Caryopsis 1.5—2 mm long, narrowly oblong.

Fls. & Frts. : Aug.—Dec.

Distribution : Jabalpur (M. P.), *Duthie* : 10038.

2. **T. jacquemontii** Stapf in Kew Bull. 1892 : 85. 1892.

Perennial. Culms 20—80 cm tall, tufted. Leaves mostly basal, glabrous, convolute; sheath glabrous, striate; ligule membranous. Inflorescence made of racemes; rachis flat, glabrous. Spikelets 0.6—3.0 mm long, 10—30-flowered. Lower glumes 4—5 mm long, membranous, 1-nerved, notched at apex. Upper glume similar, except being mucronate. Lemma 4.5—5.5 mm long (with awn 1.5—2.0 mm), 3-nerved, 2-lobed. Anthers 3, yellow, \pm 0.5 mm long. Caryopsis 1.5—2.0 mm long, oblong, brown.

Fls. & Frts. : Aug.—Dec.

Distribution : Betul, Indore, Pachmarhi, Rewa, Sagar.

3. **T. lisboae** Stapf in Kew Bull. 1892 : 84. 1892.

Perennial. Culms 20—60 cm tall, tufted, erect. Leaves flat or convolute, glabrous, sheath compressed, glabrous; ligule membranous. Inflorescence consists of spikes (6—10); rachis stout, slender. Spikelets 4—10 mm long, 5—10-flowered, crowded. Lower glume \pm 1 mm long, hyaline, lanceolate, obtusely toothed on one side. Upper glume 3.0—3.5

mm long, coriaceous, apiculate. Lemma 3.5 mm long, membranous, base bearded; awn short, ± 2 mm. Keels of paleas scabrid. Anthers 3, yellow ± 0.8 mm long. Most florets empty. Caryopsis not seen.

Fls. & Frts. : Oct.—Dec.

Distribution : Borighat, Panigrahi : 6570.

Note : Differences in stoutness of stem and size of spike and spikelets are remarkable. Very rare in the area.

99. TRITICUM L.

Triticum aestivum L. Sp. Pl. 85. 1753.

Annual. Culms 30—75 cm tall, erect, glabrous. Leaves 10—35 cm long, soft, glabrous; sheath terete, glabrous; ligule membranous. Inflorescence a spike; rachis compressed, ciliate. Spikelets 0.8—1.2 cm long, laterally compressed, 3—5-flowered. Glumes 8.5—10.0 mm long, ovate, awned. Lemma 1.0—1.3 cm long, ovate, 5-nerved, awn 5—8 cm long. Palea ciliate at top. Anthers 3, yellow, 3.5 mm long. Caryopsis 8—9 mm long, ellipsoid with longitudinal groove on ventral side.

Fls. & Frts. : Jan.—April.

Distribution : Cultivated all over the State.

100. UROCHLOA P. Beauv.

Urochloa panicoides P. Beauv. Ess. Agrost. 53, t. 11, fig. 1. 1812; *Panicum javanicum* Hook. f. Fl. Brit. Ind. 7 : 35. 1896.

Annual. Culms 30—60 cm tall, tufted, erect or ascending. Leaves linear-lanceolate, finely hirsute with tubercle based hairs; sheath loose, striate, hairy upwards; ligule hairy. Inflorescence consisting of 4—10 racemes; rachis flat or slightly wavy, 1 mm wide. Spikelets 2-seriate, 4—5 mm long, ovate to elliptic, acuminate. Lower glume 1.5—2.0 mm long, glabrous, 5-nerved. Upper glume similar to lower, 9—11-nerved. Lower floret male or barren. Lemma similar to upper glume, 5—7-nerved. Upper floret hermaphrodite. 2.5—3.0 mm long. Anthers 3, yellow, ± 2 mm long. Caryopsis elliptic oblong, compressed ± 2 mm long, yellowish.

Fls. & Frts. : July—Dec.

Distribution : Balaghat, Bhopal, Indore, Sidhi.

101. VETIVERIA Lem.-Lisanc.

- 1a. Lower glume about 5 mm long, with a row of marginal tubercles; joints and pedicels with basal tuft of hairs; callus of sessile spikelets bearded; roots not aromatic ... *V. lawsonii* 1
- 2b. Lower glume about 3.8 mm long, muriculate; joints and pedicels glabrous; callus of sessile spikelets glabrous, fibrous; roots aromatic ... *V. zizanioides* 2

1. *Vetiveria lawsonii* (Hook. f.) Blatt. & McCann. in J. Bombay Nat. Hist. Soc. 32 : 409. 1928; *Andropogon lawsonii* Hook. f. Fl. Brit. Ind. 7 : 187. 1896.

Perennial, rhizome woody, Culms 25—170 cm tall, base leafy, tufted, erect. Leaves linear, up to 50 cm long, glabrous or bristly; sheath compressed, keeled; ligule membranous, minute. Inflorescence a whorled panicle made of several racemes; rachis smooth; callus bearded. Sessile spikelets \pm 6 mm long, linear-lanceolate, polished, awned. Lower glume \pm 5 mm long, linear, glabrous, muriculate. Upper glume equalling the lower, boat-shaped, with 9—10 mm long arista. Lower floret empty. Upper floret hermaphrodite. Lemma 4.0—4.5 mm long, 2-lobed; awn 25—29 mm long. Palea hyaline, nerveless. Anthers 3, yellow, \pm 3 mm long. Caryopsis \pm 4 mm long, broader towards base. Pedicelled spikelets similar.

Fls. & Frts. : Aug.—Nov.

Distribution : Gwalior, Sagar, Sidhi, Shivpuri.

2. *V. zizanioides* (L.) Nash in Small. Fl. South-east U. S. 67. 1903; *Phalaris zizanioides* L. Mant. Pl. 2 : 183. 1771.

Strong perennial. Culms 1.0—1.5 m tall, erect, with rhizomatous root-stock; fibrous roots aromatic. Leaves 30—70 cm long, margins scabrid; sheath glabrous; ligule minute, membranous. Inflorescence a contracted panicle. Spikelets in pairs. Sessile spikelets lanceolate, acute. Lower glume 3.8 mm long, muriculate on back, 5-nerved. Upper glume 4.2 mm long, concave, spinulosely muricate on the keel, 1-nerved. Lower lemma

3.6 mm long, empty, retrorsely ciliate. Upper lemma 3 mm long, 3-nerved, mucronate. Pedicelled spikelets similar. Anthers 3, orange yellow, 2.2 mm long. Caryopsis \pm 2 mm long, base broader, middle to apex linear.

Fls. & Frts. : Aug.—Nov.

Distribution : Ambikapur, Balaghat, Bastar, Bilaspur, Damoh, Gwalior, Hoshangabad, Raipur, Rewa, Sagar.

102. ZEA L.

Zea mays L. Sp. pl. 971. 1753.

Annual. Culms 1—2 m tall, erect, glabrous, variable size. Leaves 20—25 cm long, 5—10 cm wide, ventrally hairy or glabrous; sheath glabrous; ligule 2—6 mm long, membranous. Plant monoecious. Male inflorescence a terminal panicle. Spikelets in Pairs. Lower glume 5—6 mm long, ovate-lanceolate, ciliate, truncate. Upper glume 6—7 mm long, subacute. Lower lemma 5.0—5.5 mm long, lanceolate, hyaline, obtuse, ciliate. Palea similar to lemma. Anthers 3, yellow, \pm 5 mm long. Female inflorescence a spadix enclosed in large bracts. Spikelets in several rows along the axis (variable with varieties). Glumes similar, broad, fleshy below. Lower floret barren. Palea present or absent. Caryopsis \pm 8 mm in diameter, sub-globose or dorsally flattened, Pale-yellow, purple or white.

Fls. & Frts. : July—Sept.

Distribution : Cultivated all over State.

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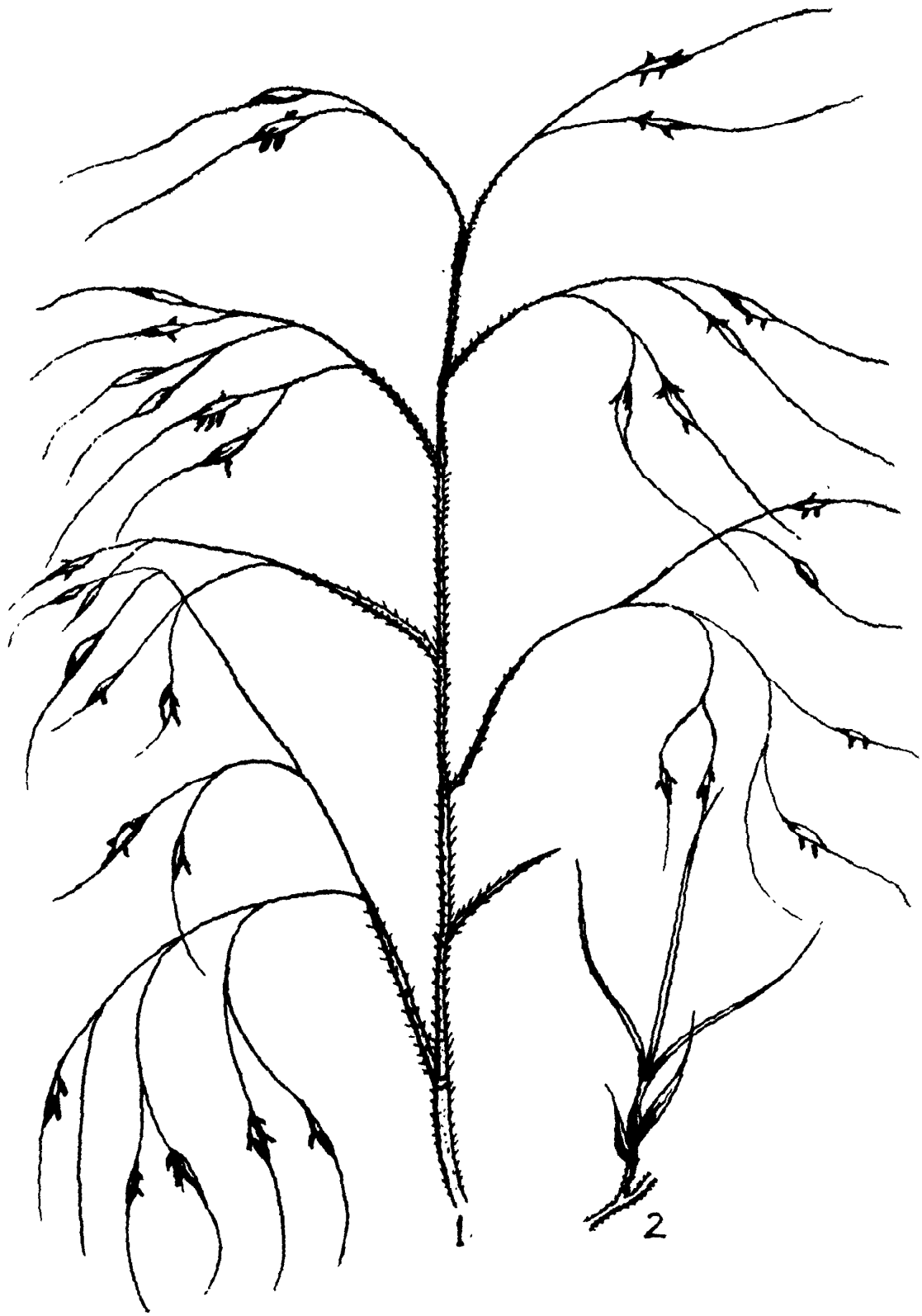


Fig. 1. *Aristida cyanantha* Nees ex Steud
1. Inflorescence. 2. Spikelet.

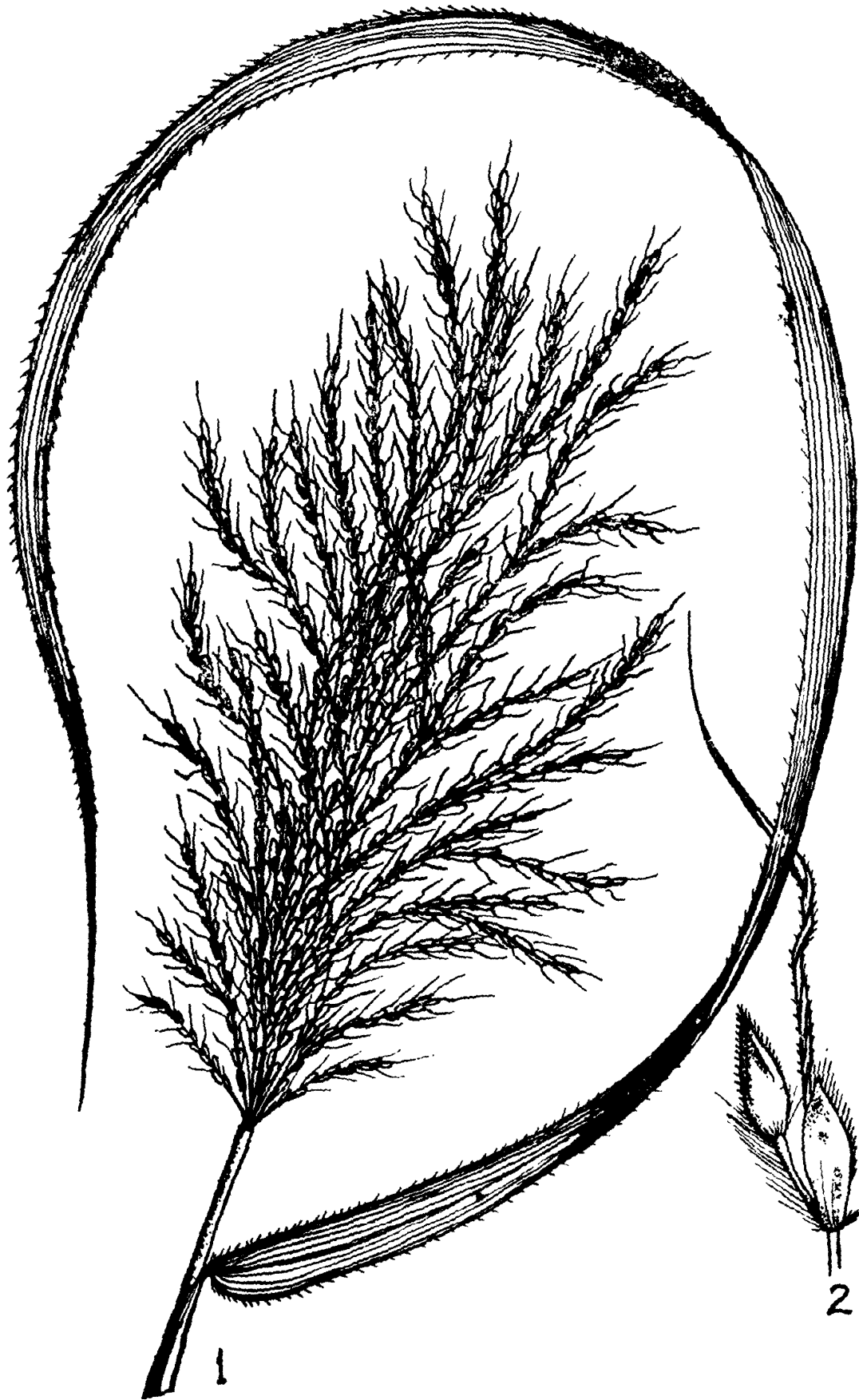


Fig. 2. *Bothriochloa intermedia* (R. Br.) A. Camus

1. Inflorescence. 2. Sessile and pedicelled spikelets.



Fig. 3. *Chionachne koenigii* (Spreng.) Thw.

1. Inflorescence with spathe. 2. Spikelet.

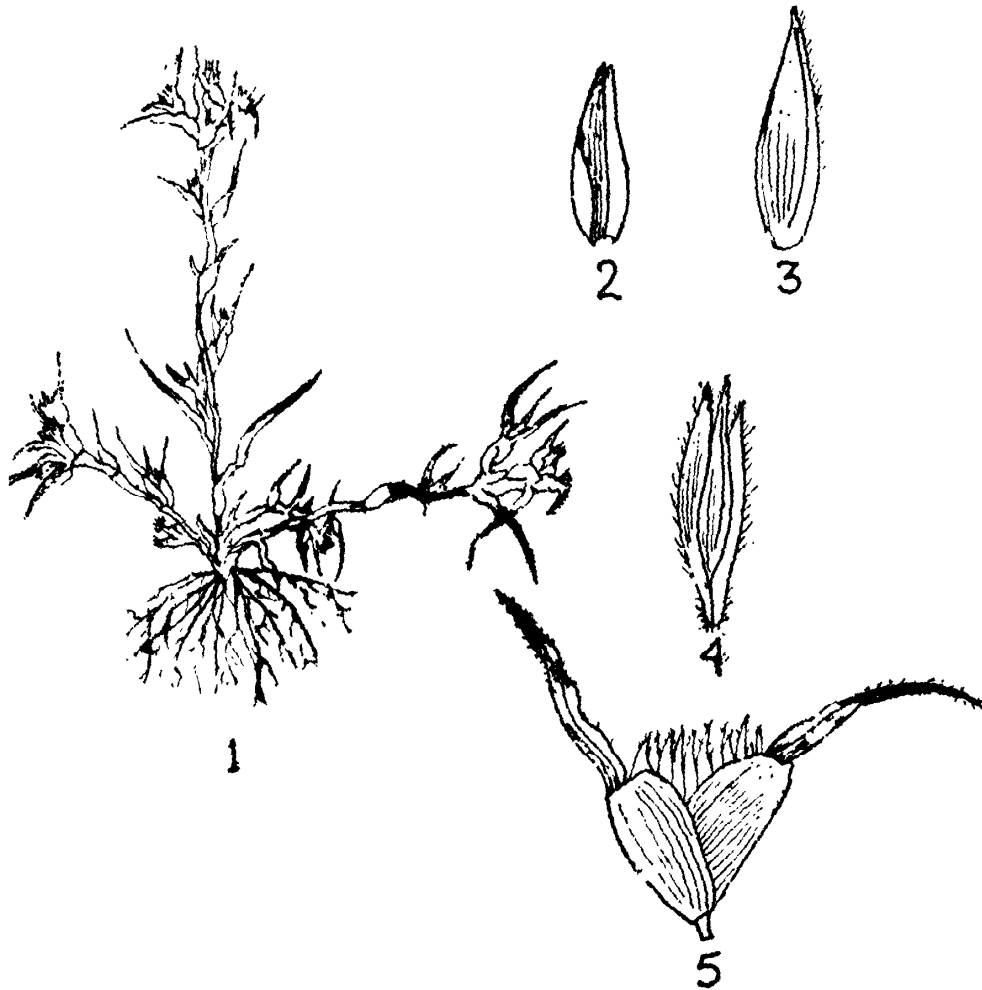


Fig. 4. *Crypsis schoenoides* (L.) Lamk

1. Plant. 2. Palea. 3. Lemma. 4. Spikelet. 5. Inflorescence with leaf sheath.

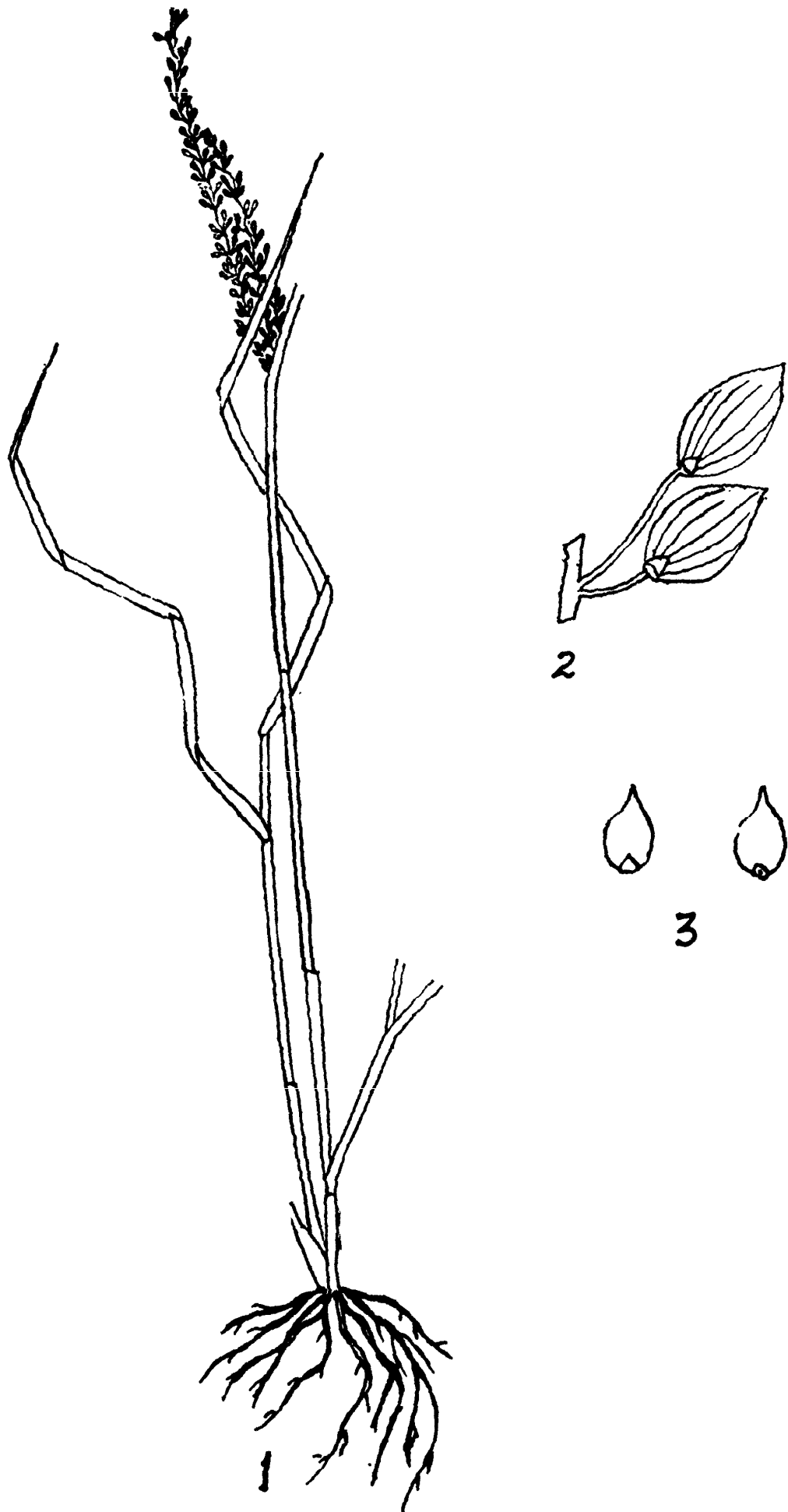


Fig. 5. *Digitalis abludens* (Roem. & Schult.) Veldkamp
1. Plant. 2. Spikelets. 3. Caryopsis.

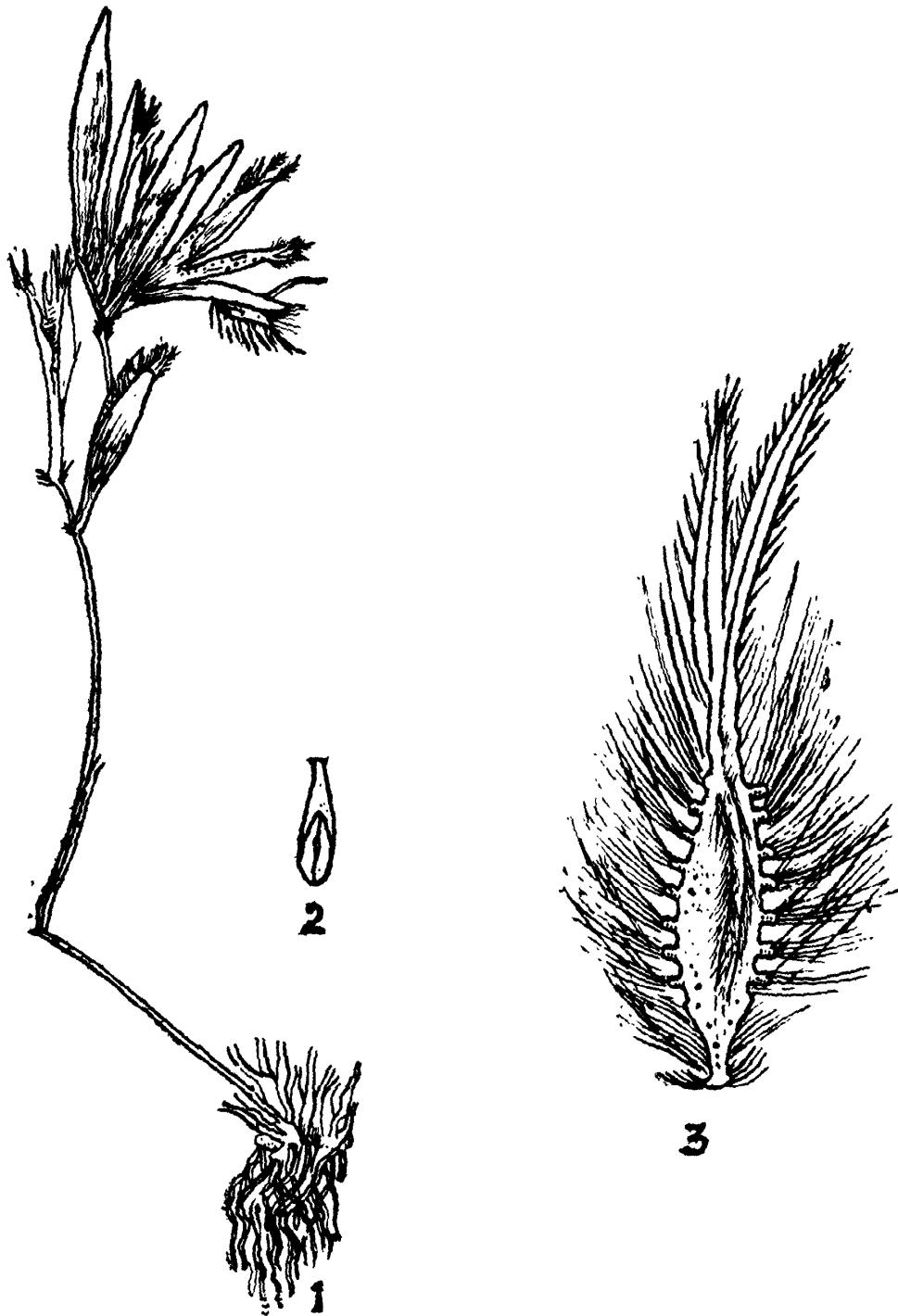


Fig. 6. *Elyonurus royleanus* Nees ex A. Rich.

1. Plant. 2. Caryopsis. 3. Dorsal view of Lower glume.

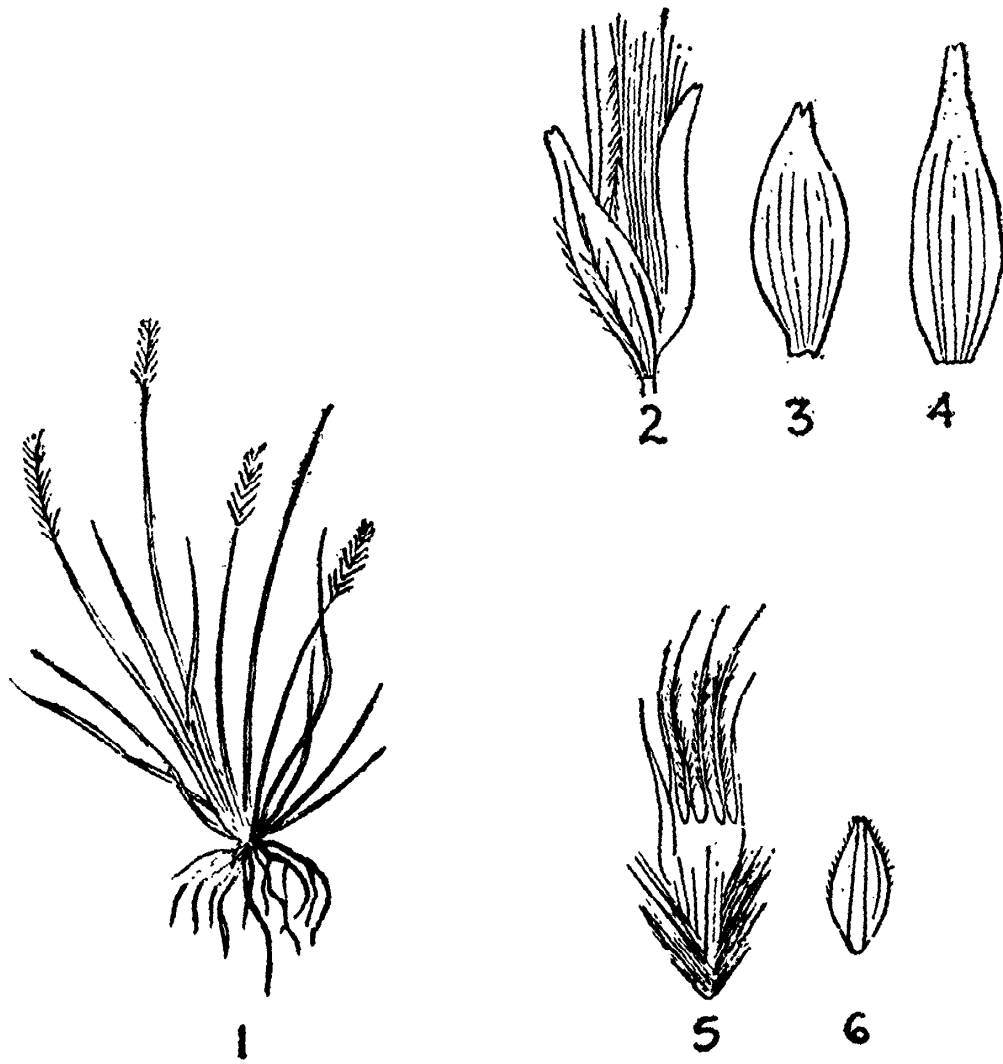


Fig. 7. *Eriopogon elegans* (Nees ex Steud) Stapf

1. Plant. 2. Spikelet. 3. Lower glume. 4. Upper glume.
5. Lemma. 6. Palea.



Fig. 8. *Eragrostiella nardoides* (Trin.) Bor
1. Inflorescence 2. Spikelet.



Fig. 9. *Eragrostis coarctata* Stapf

1. Inflorescence. 2. Spikelet.



Fig. 10. *Hygroriza aristata* (Retz.) Nees

1. Plant. 2. Spikelet.

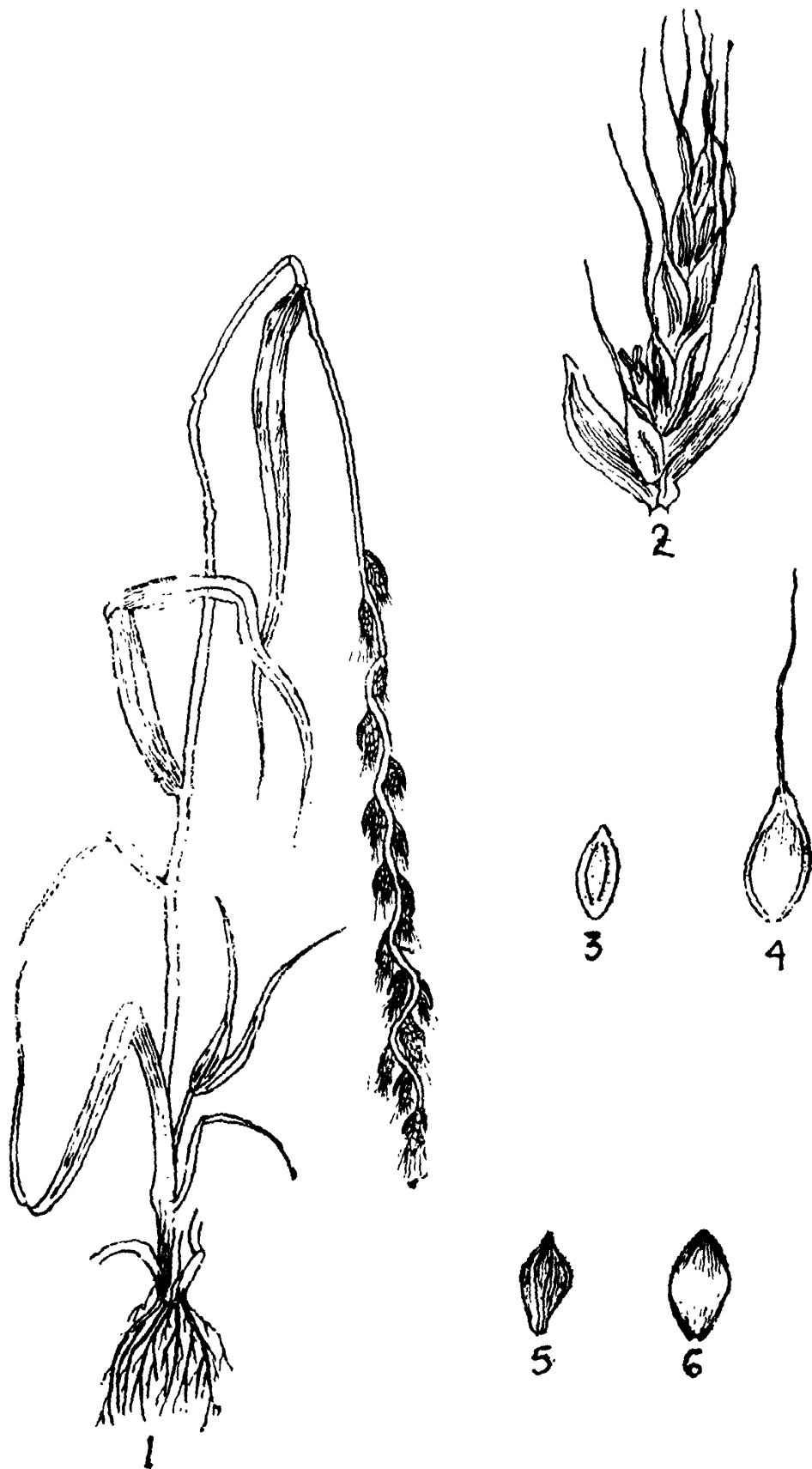


Fig. 11. *Lolium temulentum* L.

1. Plant. 2. Spikelet. 3. Caryopsis. 4. Lemma. 5&6. Palea (Inner and outer view).

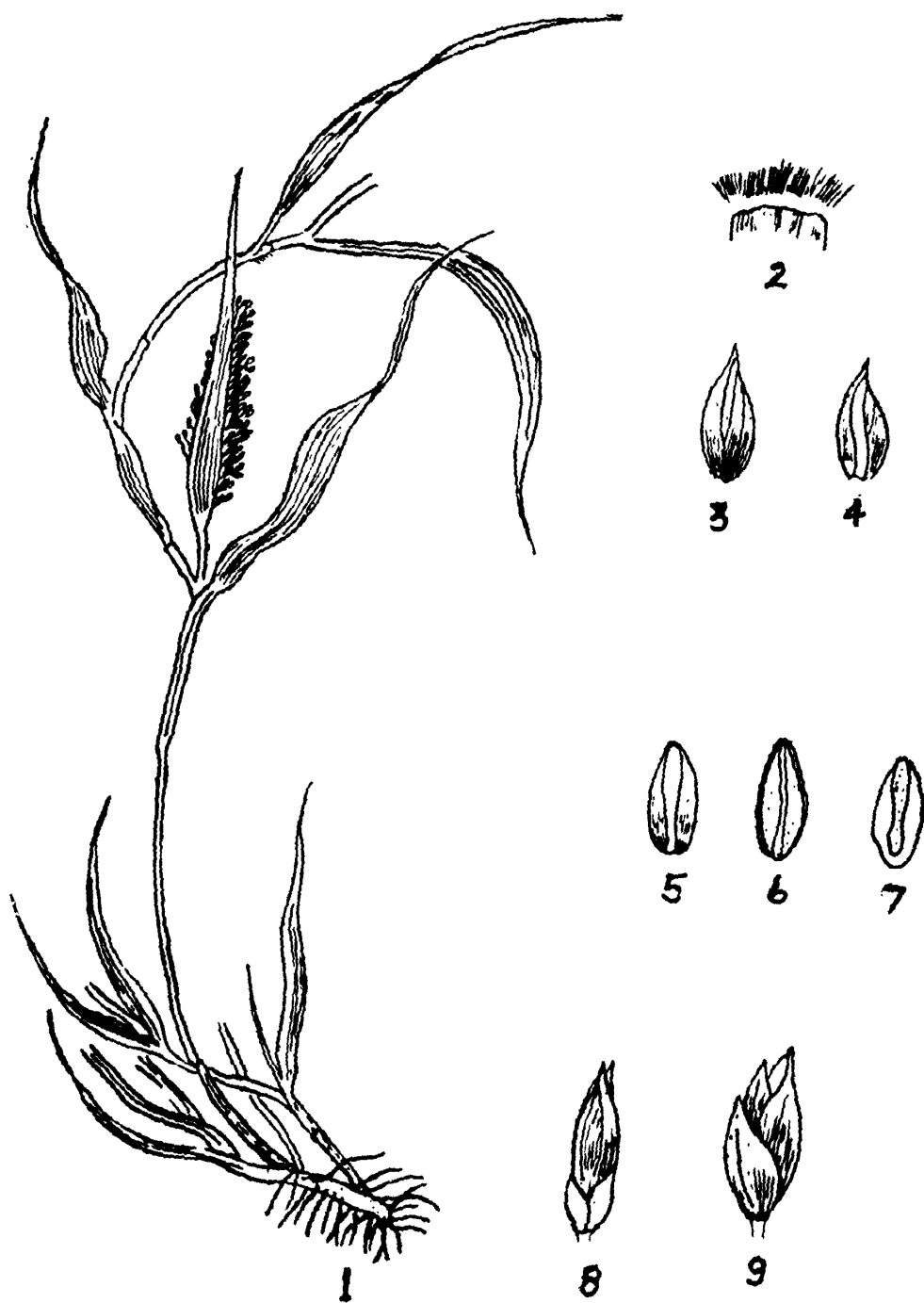


Fig. 12. *Panicum walense* Mez.

1. Plant. 2. Ligule. 3&4. Glumes. 5. Lemma. 6. Palea.
7. Caryopsis 8&9. Spikelet.

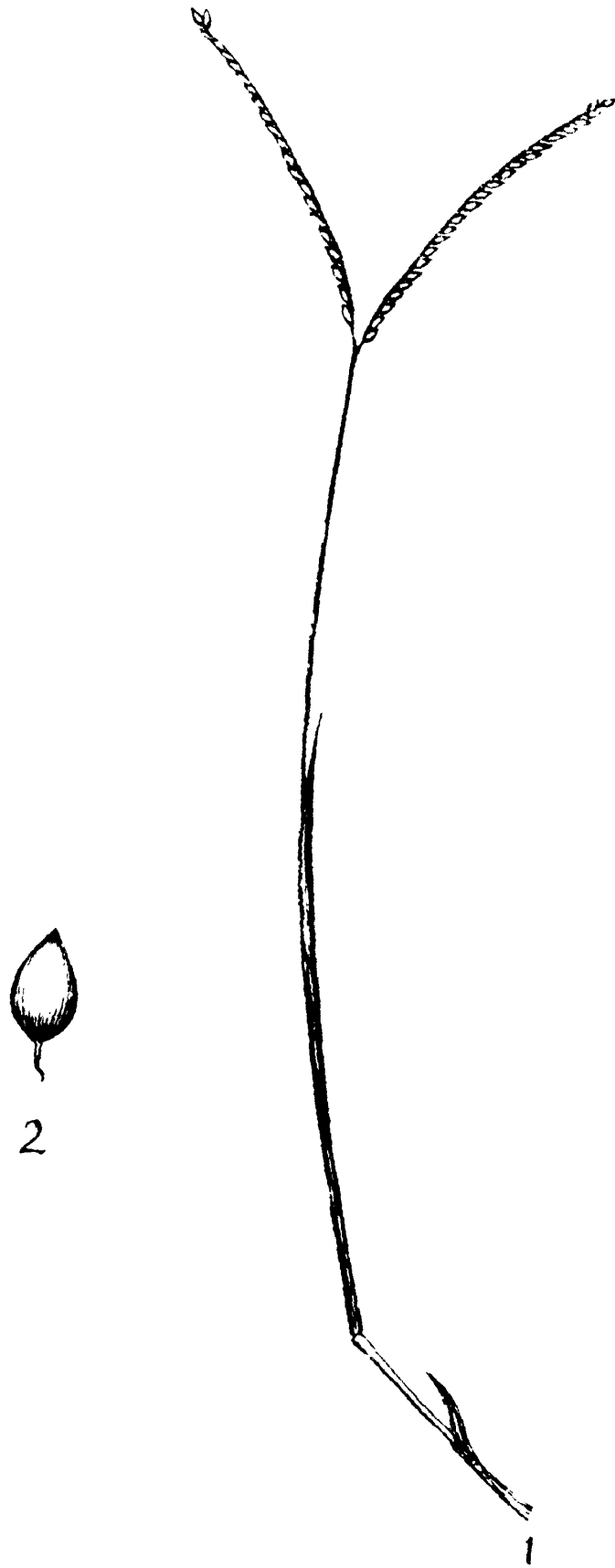


Fig. 13. *Paspalum compactum* Roth

1. Inflorescence. 2. Spikelet.



Fig. 14. *Schoenefeldia gracilis* Kunth.

1. Plant.
2. Spikelet.
3. Lower and upper glume.
4. Lemma.
5. Palea.
6. Caryopsis.

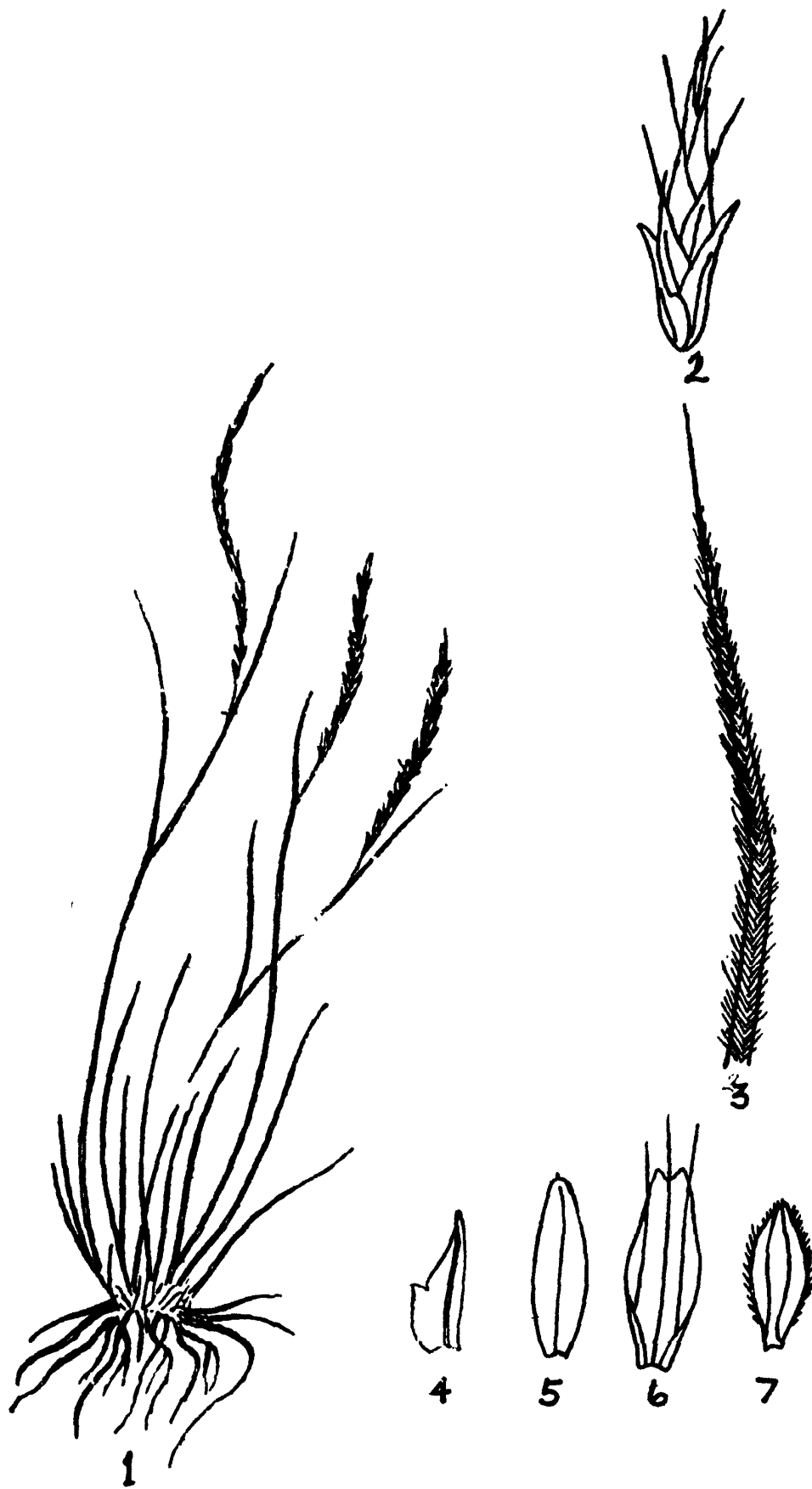


Fig. 15. *Tripogon bromoides* Roem. & Schult.

1. Plant. 2. Spikelet. 3. Portion of leaf enlarged. 4. Lower glume.
5. Upper glume. 6. Lemma. 7. Palea.



Fig. 16. *Tripogon hispidus* Stapf.

- 1. Plant. 2. Spikelet. 3. Lower glume. 4. Upper glume.
5. Lemma. 6. Palea.**