

**ENDEMIC AND THREATENED
FLOWERING PLANTS OF
MAHARASHTRA**



**DIPAK KUMAR MISHRA
N.P. SINGH**

BOTANICAL SURVEY OF INDIA
Ministry of Environment and Forests

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Series - 4

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**भारतीय वनस्पति सर्वेक्षण
BOTANICAL SURVEY OF INDIA**

**BOTANICAL SURVEY OF INDIA
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General view of tropical moist deciduous forest at Sinhagadh (Pune)



General view of tropical dry deciduous forest at Kinwat (Nanded) showing the community of *Tectona grandis*



General view of tropical thorn forest in Osmanabad district showing the community of *Acacia catechu*



Thalictrum dalzellii Hook.

PLATE 3



Crotalaria lutescens Dalz.



Crotalaria decasperma Naik

PLATE 4



Flemingia nilgheriensis (Baker) Wight ex Cooke



Vigna khandalensis (Sant.) Raghavan & Wadhwa



Pimpinella rollae Billore & Hemadri



Ceropegia huberi Ansari

PLATE 6



Ceropegia maccannii Ansari



Ceropegia media (Huber) Ansari

PLATE 7



Ceropegia noorjahaniae Ansari



Ceropegia oculata Hook.



Ceropegia panchganiensis Blatt. & McC.



Ceropegia sahyadrica Ansari & Kulkarni



Ceropegia vincaefolia Hook.



Frerea indica Dalz.

PLATE 10



Euphorbia concanensis Janarthanam & Yadav



Wiesneria triandra (Dalz.) Mich.

PLATE 11



Aponogeton bruggenii Yadav & Govekar



Arthraxon jubatus Hack.

PLATE 12



BOTANICAL SURVEY OF INDIA
Western Circle, Pune.

Flora of

Collection No. 176363

Family Flacocet
Genus Bhidea
Species burnisiana Bor
Locality Mingola, near Rahmase
Notes Stalked grass, 2-15 cm high,
nodes hairy. Leaves 3-5 dm long,
anthers yellow. Kated hairy.
Flowers 1-3, 2-3 cm long.

Collector D.K. Mishra Date 24.10.1992

Bhidea burnisiana Bor



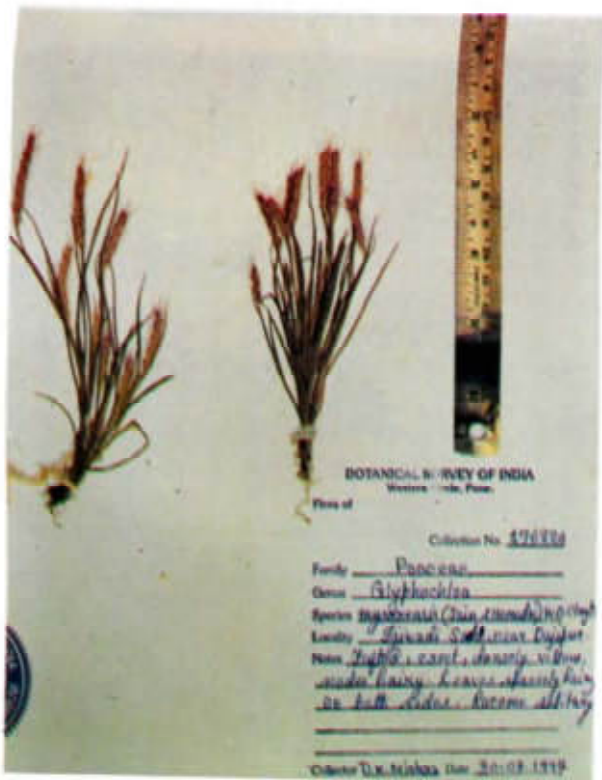
BOTANICAL SURVEY OF INDIA
Western Circle, Pune.

Flora of

Collection No. 176364

Family Dimeria
Genus Dimeria
Species woodrowii Stapf
Locality Forest, near Rahmase
Notes Stalked grass, 7-15 cm high,
nodes hairy. Leaves ~~long~~ glabrous
anthers yellow. Kated hairy.
Flowers at first erect and after
drooping ultimately incurved.
Collector D.K. Mishra Date 24.10.1992

Dimeria woodrowii Stapf



Glyphochloa mysorensis (Jain & Hemadri)
W.D. Clayton



Glyphochloa santapauli (Jain & Deshpande)
W.D. Clayton



Isachne bicolor Naik & Patunkar



Pseudodichanthium serrafalcoides (T. Cooke & Stapf) Bor

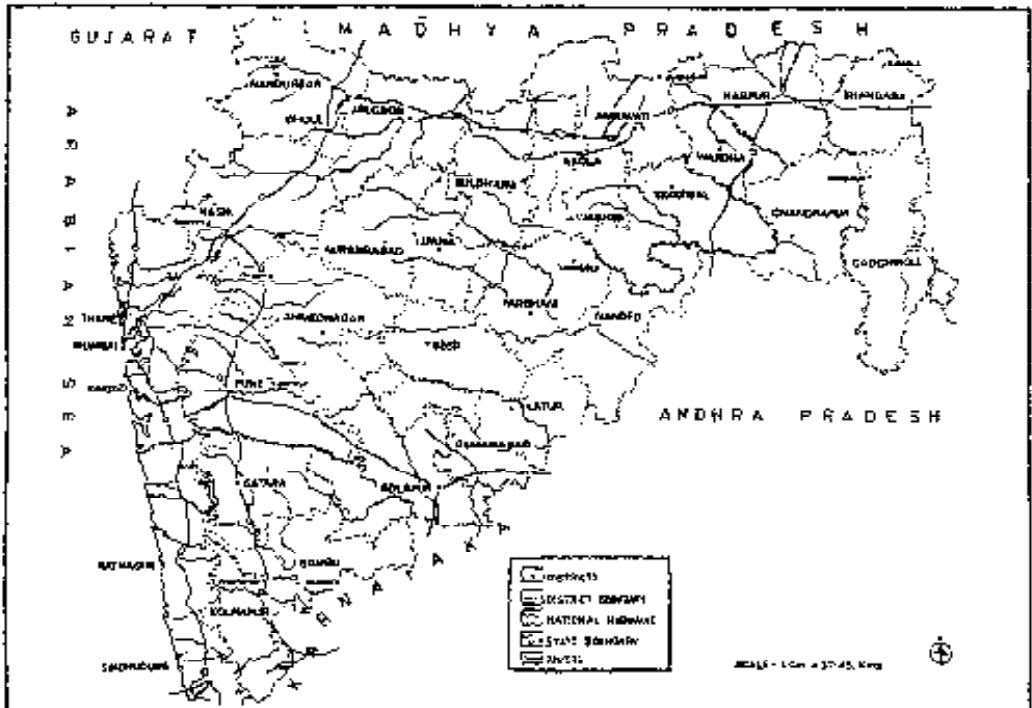
CHAPTER - I

INTRODUCTION

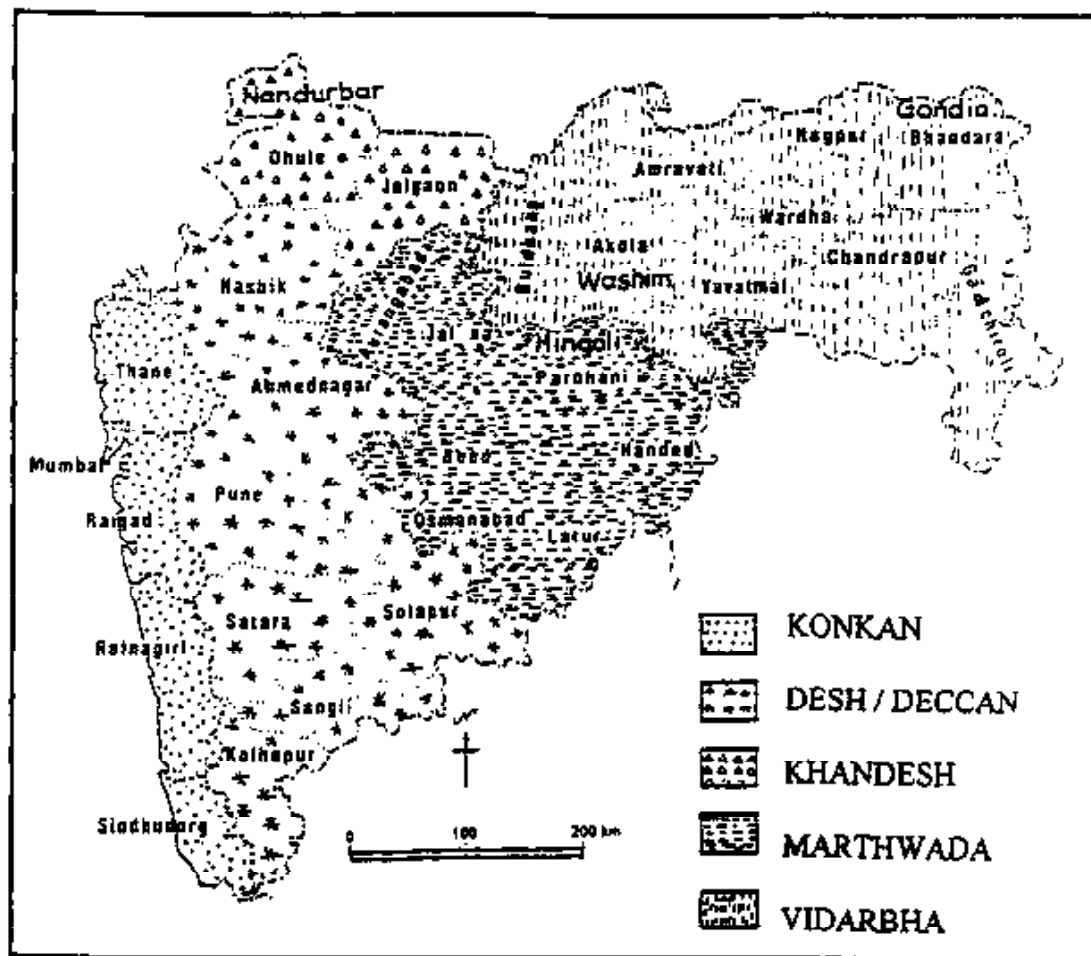
PHYSIOGRAPHY

The present Maharashtra State has emerged by the division of the bilingual state of Bombay on 1st May 1960. This state covers a larger part of Indian peninsula, lying between latitude $22^{\circ}1' - 16^{\circ}4'$ north and longitude $72^{\circ}6' - 80^{\circ}9'$ east. It is about 800 km east-west and 700 km north-south forming an irregular dentate pentagon, covering an area of 3,07,690 sq km. The state is bounded on the west by the Arabian sea, making a long coastline of about 720 km, on the north-west by Gujarat, on the north by Madhya Pradesh, on the south-east by Andhra Pradesh and on the south by Karnataka and Goa (Map-1).

Physiographically the state is divided into 5 divisions viz., Konkan, Deccan or Desh, Khandesh, Marathwada and Vidarbha (Map-2). **Konkan**, a narrow coastal strip to the west of Sahyadris, varies between 27-48 km in breadth and 800 km in length from Goa to Tapi basin. The average height of the region is 6-9 m from mean seal level. Politically it comprises 5 districts - Bombay, Raigad, Ratnagiri, Sindhudurg and Thane. **Deccan** is lying to the east of Sahyadris which is approximately 563 km long. The average height of Sahyadri hills in Deccan is 1200 m and the highest range at Kalsubai is 1646 m. It consists of 7 districts - Ahmednagar, Kolhapur, Nasik, Pune, Sangli, Satara, and Solapur. **Khandesh** lies in valley of the Tapi river located between Ajantha and Satpuda ranges and separated from western Maharashtra by the hills of Laling and Silviri. The 3 complete districts in Khandesh are Dhule, Jalgaon and Nandurbar. Besides, Baglan in Satana taluka of Nasik district is also considered as a part of Khandesh. 8 districts of Maharashtra viz. Aurangabad, Beed, Hingoli, Jalna, Latur, Nanded, Osmanabad and Parbhani are known as **Marathwada**. **Vidarbha** or the eastern Maharashtra comprises 11 districts viz. Akola, Amravati, Bhandara, Buldhana, Chandrapur, Gadchiruli, Gondia, Nagpur, Wardha, Wasim and Yavatmal. It stands on an upland plateau of 457 to 548.6 m elevation (M.R. Almeida, 1998). The Konkan, Deccan and Khandesh are the portions from the erstwhile Bombay state but Marathwada and Vidarbha are the regions which were annexed with Maharashtra after the formation of Maharashtra state from Hyderabad



Map 1: General Map of Maharashtra



Map 2: Maharashtra State Major Regions

i.e. Andhra Pradesh and central provinces i.e. Madhya Pradesh. Presently it has been divided into 34 districts. The state has a population of 7,89,37,187 people according to the 1991 census and the language spoken is Marathi.

Maharashtra is essentially a part of Western India and the northern part of the Western Ghats ranging from Parner fort on Daman-Ganga to Baba Budhan Hills in Mysore through Savantwadi and Goa is called Sahyadri. These are flat-topped mountains having a varying height of 20-2000 m above the sea level. These run north-south and are about 750 km in Maharashtra. These are 50-80 km broad and separate the Desh from narrow coastal strip of Konkan. It is widest, about 75-80 km, in Ulhas-Vaitarna valley in Bombay region. The Satmala range of the Sahyadri mountains starts from Saptashringi hills and extends towards Daulatabad, Aurangabad and Manmad. There is a gap in these ranges between Daulatabad, Manmad and Ajantha ranges, which is called

Ajantha-Daulatabad-Ankai gap. Below this comes the second important range of mountains known as the Balaghat range. It starts from Harischandragad in Akola taluka of Ahmednagar district and extends up to Gulbarga, through Bidar and Osmanabad. The third mountain range running west-east is known as Shambhu Mahadev mountains. They extend further into Karnataka. It was observed earlier that the altitude of Sahyadri ranges becomes less and less as they proceed towards east on the Desh side. The Desh plateau rises by stages from 335-366 m and 366-610 m at different places but the major part of Maharashtra is only 91-183 m high on the Desh side. The highest peaks of the Sahyadris lie near its main axis forming watershed between Desh and Konkan. The altitude drops suddenly to 122 m on Konkan side and thence almost to sea level. It does not come down by stages as on Desh side but suddenly. Strong hill forts on the peaks and spurs of Sahyadris have been known since the days of Kadambas. The famous among them are Sinhagad, Raigad, Pratapgad, Purandhar, Panhala, Harishchandragad, Shivneri, Daulatabad, Songa, Aguada, Fonda etc. In the 15th and earlier century's defense of the country depended upon the sturdiness of the hill forts. They were the guardian sentinels of the freedom of Maharashtra since Bahamani rule. During the days of Shivaji Maharaj, great care of these forts was taken being of immense strategic use.

Two conspicuous features in the scenery of Sahyadris are the mountain passes and 'Mavals'. The mountain passes locally called Ghat or Bari are the connecting routs between Desh and Konkan. These are often quite narrow and lead from plains at lower altitude to higher mountain plateau and vice versa. These ghats are very zigzag paths in the weak sectors of mountain with a scarp or canon on one side and a valley on the other. They open huge vistas of scenery. Waterfalls, rivulets, rivers and cultivated fields are noticeable from them as they wind their way through mountainous territory. There are 72 ghats in Maharashtra among which the famous are - Bor ghat or Khandala ghat between Bombay and Pune, Kasara ghat or Thal ghat between Bombay and Nasik, Pasarni ghat between Wai and Mahabaleshwar, Phonda ghat between Kolhapur and Kankavli, Varandha ghat between Bhor and Mahad, Fitzgerald ghat or Ambenali ghat between Mahabaleshwar and Mahad, Amba ghat between Kolhapur and Ratnagiri, Amboli ghat between Kolhapur, Ajra and Savantwadi, Malshej ghat between Bombay and Junnar, Melghat between Gavilgad and Amravati, Aner ghat between Narmada and Indore, Gonda

ghat between Mokhada and Tryambakeshwar, Parsuram ghat between Khed and Chiplun; Par ghat between Poladpur and Wada Kumbharoshi, Kumbharli ghat between Chiplun and Patan, Katraj ghat between Pune and Bhor, Diva ghat between Hadapsar and Saswad, Chandwad ghat between Nasik and Malegaon, Ramghat between Amboli and Goa, Nane ghat between Murbad and Junnar, Bawda ghat between Vaibhavwadi and Gaganbawda, Kudal ghat between Wai and Jauli, Nandurbar ghat between Jalgaon and Surat and Ankai Pass between Ajanta and Daulatabad.

'Mavals' are valleys well protected by two mountain spurs running parallel and are fed by mountain streams. They are well protected uplands, well-drained valleys, and well-watered by hill streams. They are different from the surrounding areas and provide unique climate and locations for plant growth in isolated conditions. They are something like the sholas in the Nilgiris in South India. Valleys of Mavals below Junnar are called 'Nere' The word is derived from the Persian word Nehar which means a tributary or a rivulet or a canal. Townships developed here are Sangamner, Junnar, Parner, etc.

DRAINAGE SYSTEM

The drainage system of Maharashtra is fed by six major rivers and many small rivulets. Originating from Desh part or elevated hill stations, all of the major rivers (except Narmada) flow into the Bay of Bengal after crossing the boundary of this state whereas the small rivulets enter into the Konkan region and meet the Arabian sea. The six major river system pass through Maharashtra are Narmada-Tapi-Purna, Wardha, Godavari, Bhima, Krishna and Hiranyakeshi or Ghatprabha.

The river Narmada starting from Amarkantaka in Madhya Pradesh, flows through a very small northern part of Maharashtra, entering Gujarat through Navapur. Similarly Tapi passes from Satmala and Ajantha in northern Maharashtra, meets Purna and ultimately the Arabian Sea at Baruch. This is the only major river system in Maharashtra flowing from east to west.

The river Wardha passes from Maharashtra near Sironcha and later meets Godavari.

The river Godavari starts at Tryambak near Nasik, passes through Nasik, Kopergaon, Puntamba in Ahmednagar district, Gagankhed and Nanded in Marathwada and thence into Andhra Pradesh. It is joined by the Pravara at Toka and by the Wardha, Pranahita and Vainganga near Sironcha which is the boundary between Maharashtra and Andhra Pradesh.

The river Bhima arises at Bhimashankar in Pune district and passes through Daund and Pandharpur area and joins Krishna.

The river Krishna originates from the main Sahyadri mountain range at Mahabelshwar in Satara district. It is joined by five tributaries also arising in the same range of Sahyadris and passes through Anantpur district in Andhra Pradesh towards Vishakhapatnam to join the Bay of Bengal at Nizampatanam.

The river Hiranyakeshi or Ghatprabha starts at Amboli in Sindhudurg district but flows very little in this state and passes into Karnataka.

The rivers in Konkan are neither extensive nor broad. They are shallow, flow very swiftly washing all the soil into sea. There are no conspicuous dams, water reservoirs or lakes in Konkan as on the Desh side. They get flooded in rainy season and dry up after February.

The principal rivers of Konkan which flow east to west and meet the Arabian sea are - Damanganga, Tansa, Vaitarna and Ulhas in Raigad and Thane districts, Amba, Kundalika, Savitri, Shastri and Vasisbthi also in Thane district, Kajali, Muchkundi, Shuk and Gadnadi in Ratnagiri district and Terekhol and Bhangsal in Sindhudurg district. The river Damanganga joins the Arabian sea in Gujarat and is a natural boundary between Maharashtra and Gujarat States, whereas the Terekhol river is the boundary between Goa, Karnataka and Maharashtra.

GEOLOGY & SOIL

The sequence of geological formations exposed in the state in order of increasing antiquity is tabulated below :

Age	Formation
Recent-Subrecent	Alluvium and soil
Pleistocene-Recent	Laterite
Cretaceous-Eocene	Deccan Trap with intertrappean sediments.
Cretaceous	Lameta beds
Upper-Carboniferous to Upper Triassic	Gondwana System
Late Pre-Cambrian	Vindhyan System Cuddapah System
Archaeans	Dharwan System

Archaeans (Dharwan System):

It is the oldest formation of Maharashtra found exposed in some parts of Amravati, Bhandara, Chandrapur, Nagpur, Yavatmal, Nanded, Kolhapur and Sindhudurg districts. The principal rocks of Archaean age include granites, gneisses, amphibolites, phyllites, quartzites, brecciated quartzites, ferruginous quartzites, micaceous quartzites, banded quartz magnetite, mica schist, Chlorite schist, mica-garnet-schists and horn-blende-schists.

Late pre-cambrian (Vindhyan System & Cuddapah System):

The oldest Archaean rocks are overlain by this formation. It is exposed in some parts of Bhandara, Chandrapur, Yavatmal, Kolhapur and Sindhudurg districts. It is of two types.

- a) **Vindhyan System:** The Vindhyan rocks generally comprise sandstones, shales, limestones and conglomerates. The most persistent and well defined rock type of this system are sandstones, which show a wide range in colour, compaction and grain size.
- b) **Cuddapah System:** The rocks of this system consist of shales, limestones and quartzites.

Upper-carboniferous to upper triassic (Gondwana System) :

This system is found in some part of Amravati, Chandrapur, Nagpur and Yavatmal. The formations belonging to this division are referable to the following groups:

Chikiala beds, Kota maleri, Kamthis, Barakars and Talchirs.

The Talchir series consists of a boulder bed at the bottom followed by shales and sandstones successively with minor intercalations of clay and rest with a basal conglomerate.

In Barakars, the predominant rocks are the white felspathic sandstone and grits, fireclays and carbonaceous shales and clays along with coal seams.

The rocks in the Kamthi group are sandstones, shales, calys and conglomerates of which the sandstones and shales form the bulk of the series.

The rocks of Kota-maleri group comprise sandstones, clays, limestones in the order of abundance.

The Chikiala beds represent the youngest member of the Gondwanas of the Pranhita-Godavari basin and comprise conglomerates, sandstones, shales and clays.

Cretaceous (Lameta beds):

This formation is noticed in some parts of Amravati, Chandrapur, Nagpur and Wardha districts. It is composed of red and grey clays, limestones and calcareous white sandstones. The clays are usually white with some reddish shales. The sandstones are loose, purplish white and are slightly calcareous.

Cretaceous-eocene (Deccan Trap with intertrappean sediments):

As regards the geology of Maharashtra, 90% of it is made up of Deccan Traps, consists of basaltic lava flows. The word 'Trap' is derived from Swedish word "Trappa", meaning a flight of stairs and can be observed everywhere in Maharashtra. Their step like appearance is due to peculiar mode of weathering of trap rocks.

The Deccan traps are thick bedded piles of consolidated lava flows having a maximum thickness of 3048 m, along the Bombay coast. This becomes rapidly less towards east and south. Thick intertrappean sediments

separate the individual lava flows from each other. Chemically the traps are of two kinds depending upon their acidic and basic nature, with all intergrades.

Each basaltic lava flow is usually composed of three parts lower, middle and upper. The lower and middle parts are hard and compact, greenish grey to dark grey or black in colour and is almost non-vesicular to very minutely vesicular in texture. They are traversed by numerous joints and fractures. The upper part of these flows is comparatively soft and vesicular. They are reddish-pink to purplish in colour and the vesicles are almost filled with zeolites and at places by other secondary minerals like calcite, greenish chlorophacite and quartz.

The ability of Deccan Traps to wear way differs at different places. As a result various shapes of plateau basalt, made up mostly of fine-grained plagioclase and augite are noticed. Magnetite is disseminated throughout. Silts and dykes are plentiful, particularly between Bombay and Pune. Here Agashe and Gupta found 120 dykes in the ghat region. Some dykes occur in the riverbeds also, or at very high elevation. They are locally known as "KAR"

The basaltic flows are generally of two types, viz. pahoehoe and aa. The pahoehoe flows weather easily and give rise to mature type of topography with smooth hill slopes and conical peaks. The aa flows weathers resulting in large boulders which accumulate at the base of hills, cliffs, terraces and benches are common.

Pleistocene- recent (Laterite):

This type is derived due to leaching of traps and Precambrian rocks, found at many places capping over the Deccan Traps and the gneisses. They occur over large areas on the high plateaus of the Sahyadris and at different levels up to sea. Laterite is a compact and vesicular rock essentially composed of hydrated oxides of aluminium and iron with small amounts of manganese oxides and titanium. Generally it is reddish brown in colour.

Recent-sub-recent (Alluvium and Soil):

Alluvium: The bedrock at several places, specially the river valley areas

of the state are covered by recent alluvium, deposited by the streams, generally consists of silts and soils.

Soil: Soils of Maharashtra are mainly formed from the Deccan Traps, generally from the augite or amygdaloidal basalt. These soils are black, dark brown or reddish in colour, and hence are called Black Cotton soils, or 'Regur' soils meaning thereby red soils. Very small proportions of soils are believed to have derived from Vindhyan and Gondwana formations. They are sandy or loamy soils, which are found at Nagpur, Bhandara, Chandrapur and at Redi and Savantwadi in Sindhudurg district.

Black Cotton soils or 'Regur' have high percentage of clay and are heavy in texture. They are sticky and plastic in nature and swell on wetting and shrink on drying. They contain adequate mineral nutrients and micronutrients and hence they provide good habitat for plant growth. It is slightly alkaline in nature and poor in humus and nitrogen. When derived from trap, the soil is generally black but it is light or yellowish when the sources are granite or gneiss. Clay fraction is responsible for dark colour and sticky nature of the soil. The base exchange capacity, water holding capacity and air dry moisture of black soil is higher than the red soil. The water retaining capacity decreases with the higher percentage of clay and increases with the percentage of humus. These soils do not get easily eroded, but loose water due to cracks and evaporation. Generally deep black cotton soils are not formed at high altitude of mountains. The black cotton soils in rain scarce zones of Ahmednagar, Solapur, Jalna, Beed and Aurangabad are saline and therefore, infertile. In point of chemical composition black Cotton soils contain alumina, siliceous acid, manganese oxide and dehydrated oxides of iron and calcium.

In Desh, two different types of soils are found. The first light brown soil is found in Mavals. The other deep coloured soil found on low gradients (0.914-1.219 m per mile) occurs in Kolhapur, Satara, Pune and Nasik districts. In this region, below the black soil, there is generally coarsely powdered sedimentary rock, which is called 'Murum' mixed sometimes with lime or 'Kankar' or salt or salinised lime and gypsum.

In the high temperature areas of Deccan Trap salt accumulates on the surfaces or it remains at a certain depth in the soil. In low-lying areas the salts get deposited permanently. This is called salination, which tends

to alkalization of the soil. Actually the salination is only one step earlier towards alkalization. Both are harmful to plant growth and affect the yield. In Maharashtra 37,586 hectares (83,000 acres) of soil is damaged due to salinity and about 38,395 hectares (85,000 acres) due to alkalinity (T.S. Mahabale, 1987).

The whole of the Konkan area is strewn with small shallow rivers and streams. Due to deposits of silt at their mouth they produce large estuarine beds of loose detroitus or littoran concrete. Seawater in high tide periodically inundates these beds and salt is deposited on them. Sometimes, due to heavy deposition of salt the land becomes uncultivable until the salt is washed away by fresh flooding monsoon water. These lands are known as Kharlands.

The soil situation in Khandesh and Vidarbha is different. Due to river Tapi the soils in Khandesh are extremely fertile and provide ideal conditions for different crops. Whereas the Vidarbha soils are formed by the Archaeans, the Vindhyan, the Gondwanas and the Traps. Vainganga, Purna and Pranhita rivers drain them. The Vindhyan soils of Nagpur and Bhandara districts lie in the valley of the Vainganga. They have a fair amount of calcium either as nodules (Kankar), or in layers. It reduces the salinity of soils.

Following are the major agro-climatic zones of Maharashtra as recognised by Dr. T.S. Mahabale (1987):

1. Mangrove belt
2. Lateritic soils of Konkan
3. Transitional soils adjacent to ghats on Konkan side
4. Soils in ghat region having high rainfall
5. Soils in the immediate vicinity of Sahyadris tolerant of high rainfall
6. Soils of Maval region
7. Soils in the plains with moderate rainfall
8. Soils in the scarcity zone and
9. Soils in high rainfall region and having mixed soils.

Economic rocks and minerals:

The state is rich in different types of rocks and minerals, which are economically important. The principal among them are Basaltic rocks or Trap, Archaean rocks, Lameta, Kamthis sandstone, Vindhyan and Gondwana sandstone, limestones, brecciated quartzites, kankar, asbestos, mica, clay, silica, stealite, zeolites, bauxite, common salt, copper, coal, lead-ore, manganese, chromite, tungsten, iron-ore, gypsum, kaolin, kyanite-sillimanite, corundum, gold, and radio active mineral uranium oxide. Different semi precious gemstones like jasper, agate, carnelian, chalcedony, heliotrope and amethyst are also available.

CLIMATE

The climate of Maharashtra is monsoonal. It is controlled by Arabian sea by its cooling effect and by Sahyadri mountains by its altitude. The year is divided into four main seasons. The winter season from December to February, summer season from March to May, monsoon season from June to September and postmonsoon season from October to November. On the basis of climate, the state can be classified under the following main types:

- i) **Monsoon:** This type characterised by an annual rainfall of more than 100 cm is confined to the coastal belt and the adjoining Ghat region covering the districts of Thane, Raigad, Ratnagiri and the western hilly parts of Pune, Satara and Kolhapur districts. The mean daily temperature is above 22°C throughout the year and the mean daily relative humidity is above 50%.
- ii) **Dry climate:** This type covers the semi-arid portions of Jalgaon, Nasik, Aurangabad, Pune, Beed, Satara, Osmanabad and Kolhapur and almost the whole of Dhule, Ahmednagar, Sholapur and Sangli districts. Mean daily temperature is above 18°C throughout the year. Annual rainfall is 60 to 80 cm and is confined mainly to south west monsoon season. Mean daily relative humidity is less than 50% throughout the year.
- iii) **Tropical Rainy:** Parts of Nasik and Jalgaon districts, eastern portion of Aurangabad, Beed and Osmanabad districts as well as the remaining districts of Marathwada (viz. Parbhani and Nanded) and Vidarbha have a tropical rainy climate. The precipitation is above 70 cm and confined

to the monsoon season. Mean daily temperature is above 18°C throughout the year. The average relative humidity is above 50% except during summer when it is less than 30% for 1 to 2 months.

Precipitation

The main form of precipitation in Maharashtra is the monsoon. Mist or snowfall is not experienced in the state. Fog is seen at certain high elevations like Khandala, Mahabaleshwar, Panchgani, Amboli, Matheran and Melghat in the pre and post monsoon period early in the morning when the humidity is high and variation in day and night temperature is wide.

The state experiences extremes of rainfall ranging from more than 7,000 mm over the ghats to less than 500 mm in Madhya Maharashtra. This is because the scarp wall of Sahyadris lies directly in the way of south east monsoon clouds and obstruct them. Heavily water-laden clouds pour their contents mostly on the high ranges of ghats and plateaus and only depleted clouds pass over to the Madhya Maharashtra. The coastal strip and the Western Ghats exposed to the southwest monsoon receive the heaviest rains exceeding 2,000 mm. Rainfall over the ghats may exceed 5,000 mm annually. The highest rainfall at Amboli is 7477 mm in Sindhudurg district. The lowest rainfall area in Maharashtra runs from Dhond-Baramati sector in Pune district to Indapur-Mhaswad sector to the southeast, where the annual rainfall is less than 500 mm. July is generally the rainiest month except in four districts viz., Ahmednagar, Aurangabad, Beed and Sholapur where September is the rainiest. Konkan receives 94% and Vidarbha 87% of annual rainfall during the monsoon season (June to September). Madhya Maharashtra and Marathwada get 83 % of the annual rain during the monsoon and about 11% during post monsoon months of October and November. The advent of the monsoon is generally sudden. The rainfall increases from 1 to 2% of the annual normal in May to 20 to 25% in June. The rainfall becomes heavy and vigorous on occasions in association with the cyclonic storms and depressions. The monsoon extends from south to north and reaches Bombay by about 10th June. The number of rainy days in a year varies from 75 to 100 in Konkan to 35 to 63 in the interior to the east of Western Ghats. Table 1 gives the rainfall at selected centres (see also Graph 1).

Table 1: Rainfall at selected centres in Maharashtra (1931-1960):

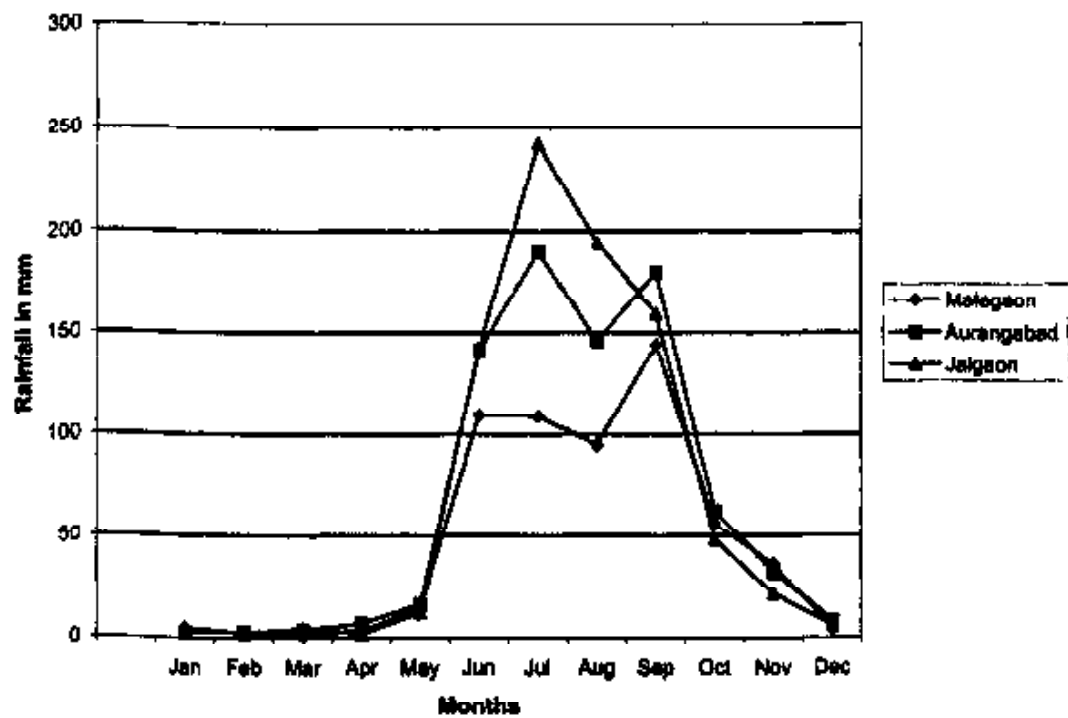
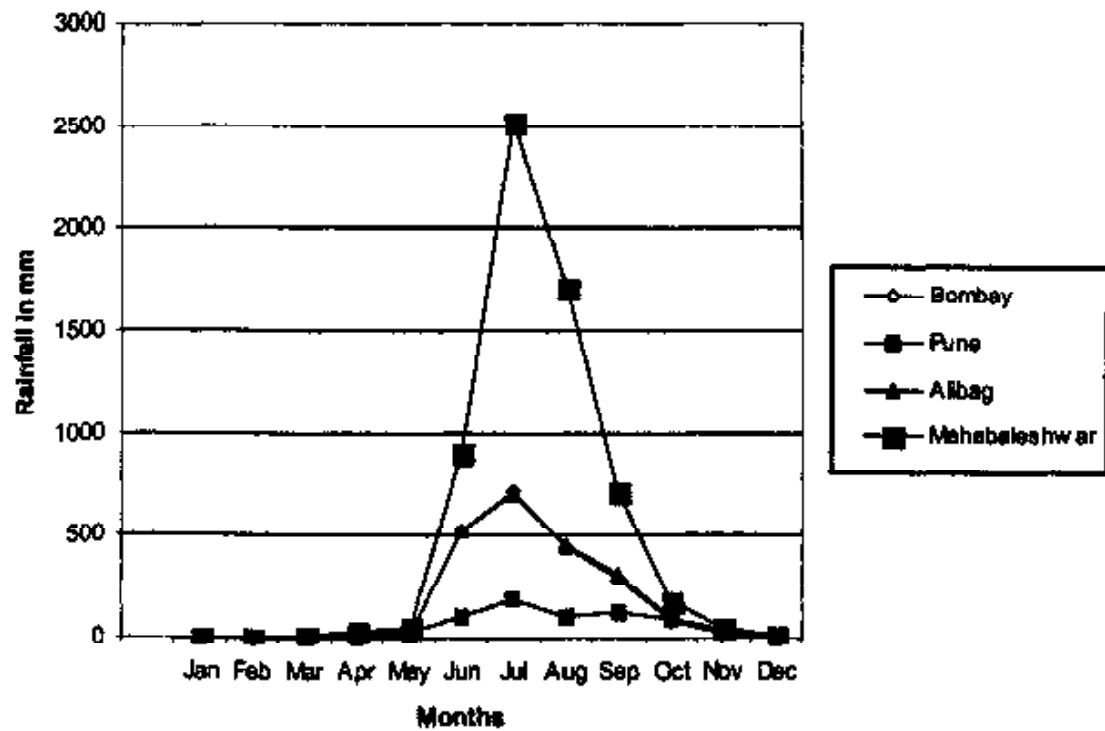
Month	Bombay		Alibag		Jalgaon		Malegaon		Ahmednagar	
	Monthly total (mm)	No. of Rainy days	Monthly total (mm)	No. of Rainy days	Monthly total (mm)	No. of Rainy days	Monthly total (mm)	No. of Rainy days	Monthly total (mm)	No. of Rainy days
January	2.0	0.3	2.0	0.3	5.1	0.4	4.0	0.4	3.3	0.3
February	1.1	0.1	0.3	0.1	2.1	0.2	2.8	0.2	0.4	0.1
March	0.4	0.1	0.3	0	4.7	0.5	1.2	0.2	5.0	0.3
April	2.8	0.3	2.0	0.2	2.1	0.2	3.6	0.4	11.2	1.0
May	16.0	1.2	17.0	1.1	12.5	1.0	14.8	1.2	26.2	1.8
June	520.3	15.4	528.3	15.4	142.7	6.9	109.5	6.3	131.2	7.2
July	709.5	23.5	699.3	24.2	242.2	15.6	108.8	7.9	101.9	7.0
August	439.3	19.1	447.7	21.0	194.0	11.6	94.9	5.7	98.3	5.5
September	297.0	12.8	310.1	14.1	159.3	8.1	144.1	8.2	174.7	8.4
October	88.0	3.7	90.2	4.2	48.1	2.2	55.7	3.2	83.9	4.5
November	20.6	1.0	28.2	1.4	21.6	1.1	36.2	1.5	33.3	1.6
December	2.2	0.3	2.5	0.2	6.0	0.5	3.9	0.4	7.9	0.5
Annual Total	2099.2	77.8	2124.9	82.2	840.4	48.3	579.5	35.6	677.3	38.2

Month	Pune		Mahabaleshwar		Solapur		Miraj	
	Monthly total (mm)	No. of Rainy days	Monthly total (mm)	No. of Rainy days	Monthly total (mm)	No. of Rainy days	Monthly total (mm)	No. of Rainy days
January	1.9	0.2	3.1	0.3	3.6	0.1	2.7	0.1
February	0.3	0.1	1.8	0.1	2.0	0.2	0.3	0
March	3.1	0.3	6.8	0.5	7.2	0.7	4.4	0.6
April	17.6	1.3	29.6	1.8	15.8	1.6	30.3	2.3
May	34.7	2.4	55.4	3.9	26.4	2.2	55.9	3.5
June	102.8	6.9	898.3	21.3	108.7	7.3	70.8	5.9
July	186.8	13.9	2521.3	30.9	127.7	9.2	116.3	10.8
August	106.4	9.0	1714.7	29.4	139.9	8.5	100.7	8.7
September	127.3	7.8	709.2	22.5	183.8	9.3	104.8	6.1
October	91.9	5.8	179.3	8.4	92.3	5.3	107.2	6.4
November	37.0	2.0	56.7	3.2	28.0	1.5	42.0	2.4
December	4.9	0.4	6.1	0.4	6.6	0.6	3.5	0.3
Annual Total	714.7	50.1	6182.3	122.7	742.0	46.5	638.9	47.1

Month	Aurangabad		Amravati		Akola		Chandrapur	
	Monthly total (mm)	No. of Rainy days	Monthly total (mm)	No. of Rainy days	Monthly total (mm)	No. of Rainy days	Monthly total (mm)	No. of Rainy days
January	2.7	0.4	15.0	1.3	9.1	0.8	5.1	0.6
February	3.0	0.3	12.7	1.1	7.7	0.6	20.6	1.4
March	3.8	0.5	12.3	1.0	7.5	0.5	21.5	1.7
April	7.2	0.7	13.0	0.9	6.6	0.6	17.1	1.6
May	16.8	1.3	11.9	1.2	10.9	1.1	10.9	1.1
June	141.2	8.0	149.3	8.6	146.0	8.2	181.1	1.3
July	189.3	13.1	285.7	14.7	260.7	14.1	403.8	18.3
August	145.8	10.1	209.6	11.3	170.1	9.4	362.6	15.4
September	179.4	9.4	185.9	9.3	177.9	8.1	234.5	10.8
October	62.1	4.2	49.6	2.9	46.3	2.7	72.5	3.9
November	32.3	1.7	23.9	1.2	27.6	1.3	14.4	0.9
December	8.5	0.4	5.6	0.5	6.4	0.5	2.5	0.3
Annual Total	792.1	50.1	974.5	54.0	876.8	47.9	1346.6	65.3

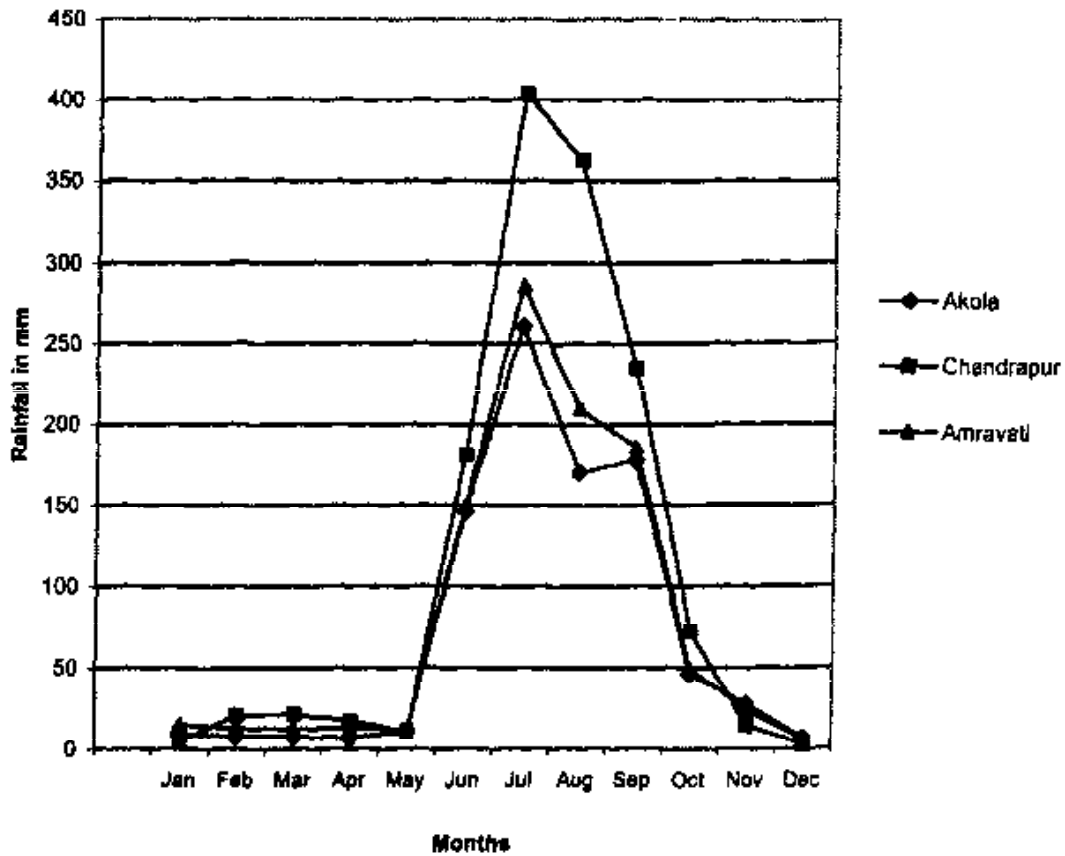
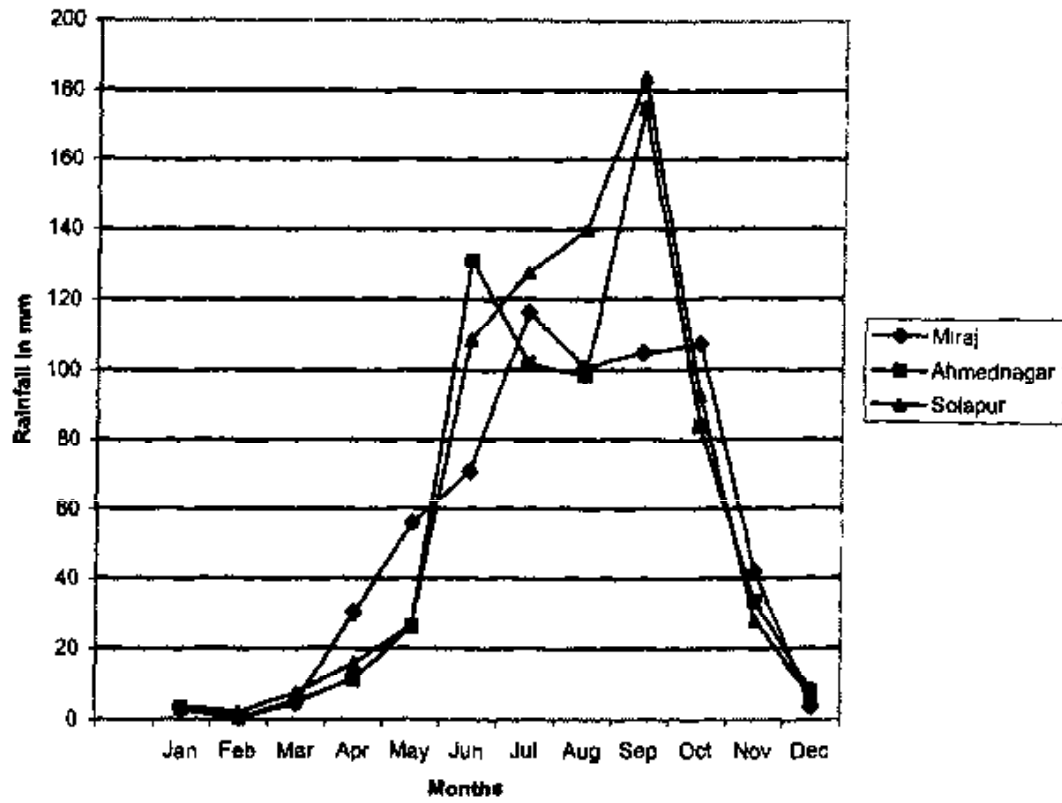
Source : Climatological tables of observatories in India (IMD).

Graph 1: Rainfall at Selected Centres in Maharashtra (1931-60)



Temperature :

Next to rainfall the most important factor for plant life is temperature. It depends upon the direction of solar radiation, nearness to sea and altitude. May is generally the hottest month when the mean maximum temperature for the coastal belt is 33°C, while for the interior it increases from about 38°C in the western parts to 43°C in the extreme east. Plains of Vidarbha



and adjacent east Khandesh of Madhya Maharashtra experiences severe summers with mean maximum temperature of 42 to 43° C in May. As there are gaps in the Western Ghats, sea breeze can penetrate through them into parts of Madhya Maharashtra. In this region, therefore, high temperatures persist for lesser duration, and evenings tend to become sufficiently pleasant. Temperatures begin to fall with the onset of southwest monsoon in June. The drop in day temperatures after May till August is 3.5°C over Konkan, while for the interior it ranges from 10 to 12°C. The fall in night temperature is less rapid. After the withdrawal of the monsoon there is a tendency for a rise in the temperatures till October in the interior and till November in the coastal belt due to increased insolation. During winter, cold waves affect the northern parts of the state-particularly the north Madhya Maharashtra resulting in a rapid and appreciable fall in temperatures. December is the coldest month for the interior with the mean minimum temperature of 13 to 14°C and January for Konkan with a mean minimum of 19°C. Both day and night temperatures then begins to rise rapidly from February to April. Over the coast, however, increase in the night temperatures is more marked being 5°C, while over the interior the rise in both day and night temperatures is 6 to 8°C.

The diurnal range of temperature over the coast is small during April to October being less than 7°C due to maritime influence. It, however, increases to as much as 10 to 11°C during November to March under the influence of northerly dry winds to land origin. Over the interior the range is always high and generally decreases from west to east. It is the least during the rainy months (about 7 to 8°C) reaching a maximum value of about 18°C over Madhya Maharashtra and 15 to 16°C over Vidarbha and Marathwada during January to March.

The mean annual range of temperature (i.e. the variation of the mean daily temperature through the year) is only 5°C for the coastal region, while for the interior it varies from 10°C for Madhya Maharashtra to 14°C for Vidarbha. Similarly, the mean change from the winter minimum (i.e. morning temperature) to the summer maximum (i.e. after noon temperature) is 13°C for the coastal belt while for the interior it varies from 16°C for Madhya Maharashtra, to 28°C for Vidarbha.

The lowest minimum temperature recorded in the state (up to 1965) was 0.6°C at Malegaon on the 1st February 1929 and the highest maximum temperature 48.3°C at Chandrapur on 16th May 1912. Table 2 shows the maximum and minimum monthly temperature at selected centres in Maharashtra (see also Graph 2).

Table 2: Maximum and minimum temperatures at selected centres in Maharashtra (1931-1960) in °C.

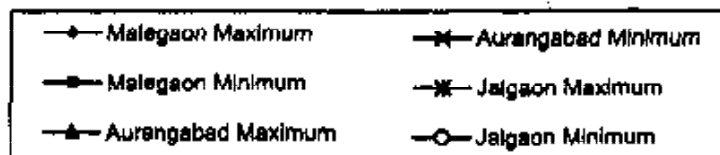
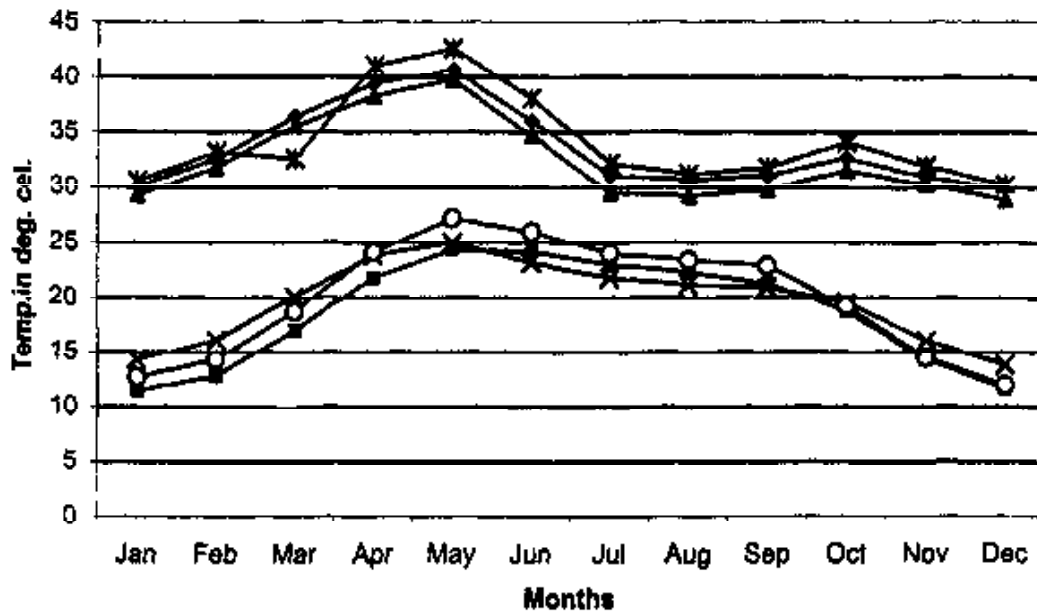
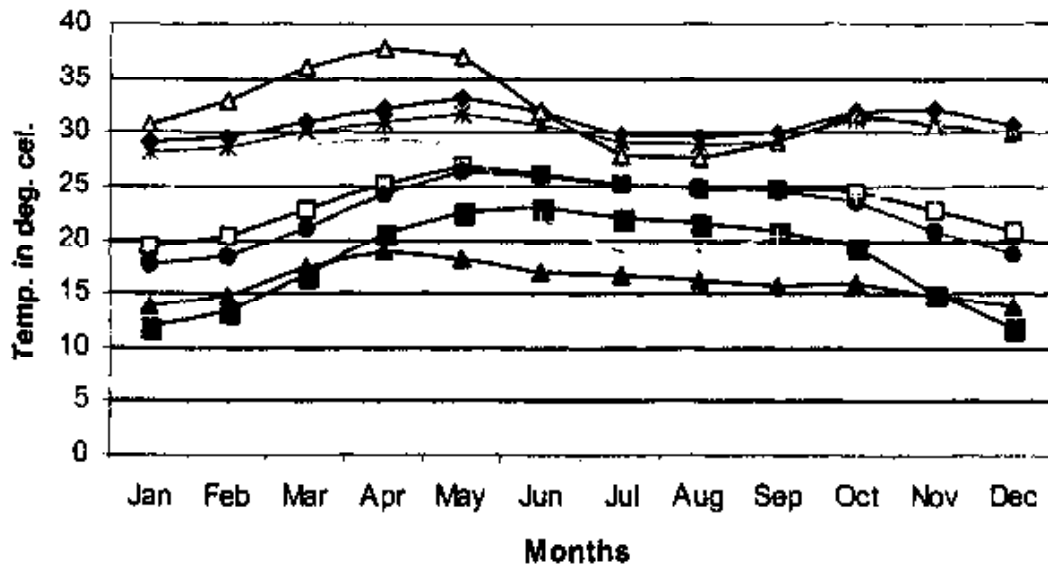
Month	Bombay		Alibag		Jalgaon		Malegaon		Ahmednagar	
	Daily max.	Daily min.	Daily max.	Daily min.	Daily max.	Daily min.	Daily max.	Daily min.	Daily max.	Daily min.
January	29.1	19.4	28.2	17.7	30.6	12.7	30.1	11.5	29.5	12.5
February	29.5	20.3	28.6	18.4	33.2	14.3	32.6	12.8	32.0	14.1
March	31.0	22.7	30.1	21.2	32.6	18.7	36.5	17.0	35.6	18.0
April	32.3	25.1	31.1	24.2	41.1	24.1	39.4	21.8	38.0	21.8
May	33.3	26.9	31.8	26.4	42.6	27.2	40.7	24.3	39.1	23.1
June	31.9	26.3	30.8	26.0	38.1	26.0	36.1	24.2	33.7	22.5
July	29.8	25.1	29.2	25.3	32.1	24.0	31.1	23.0	29.5	21.7
August	29.5	24.8	28.8	24.9	31.2	23.4	30.7	22.3	29.4	20.9
September	30.1	24.7	29.2	24.4	31.8	22.9	31.1	21.3	29.9	20.3
October	31.9	24.6	31.2	23.6	34.1	19.2	32.7	18.8	31.2	19.1
November	32.3	22.8	31.3	20.9	32.0	14.5	31.0	14.3	29.7	15.1
December	30.9	20.8	29.7	18.7	30.3	12.0	29.9	11.7	28.9	12.3
Annual mean	31.0	23.6	30.0	22.6	34.6	19.9	33.5	18.6	32.2	18.5

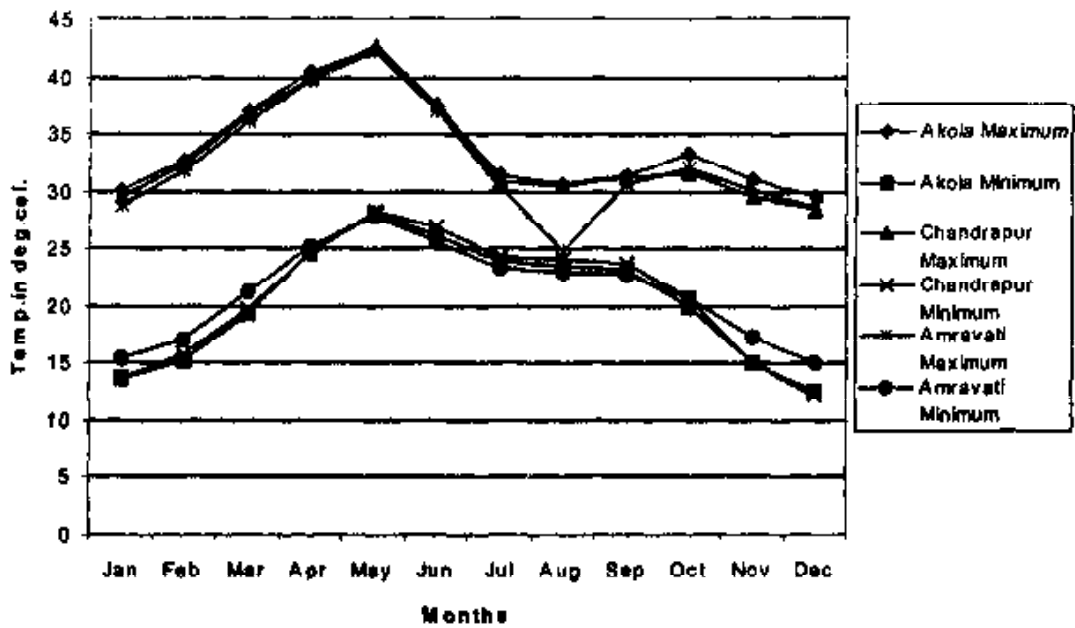
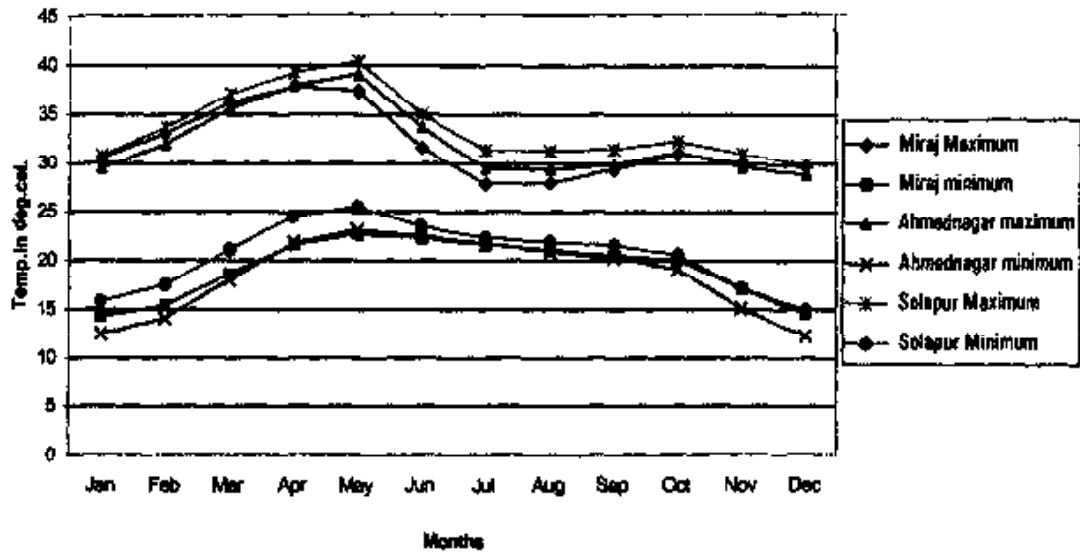
Month	Pune		Mahabaleshwar		Miraj		Solapur	
	Daily max.	Daily min.	Daily max.	Daily min.	Daily max.	Daily min.	Daily max.	Daily min.
January	30.7	12.0	24.6	13.8	30.6	14.3	30.8	15.8
February	32.9	13.3	26.1	14.9	33.1	15.4	33.7	17.5
March	36.1	16.8	28.8	17.4	36.2	18.6	37.1	21.1
April	37.9	20.6	29.3	18.8	37.9	21.6	39.3	24.5
May	37.2	22.6	28.8	18.2	37.4	22.7	40.4	25.5
June	31.9	23.0	21.9	16.9	31.6	22.3	35.0	23.5
July	27.8	22.0	19.0	16.7	27.9	21.6	31.4	2.3
August	27.7	21.5	18.9	16.3	28.0	21.1	31.3	21.9
September	29.2	20.8	20.3	15.7	29.4	20.5	31.5	21.5
October	31.8	19.3	24.0	16.1	31.0	20.1	32.3	20.6
November	30.8	15.0	24.0	14.9	30.1	17.1	31.0	17.2
December	30.1	12.0	23.5	13.9	29.7	14.6	30.0	15.0
Annual mean	32.0	18.2	24.1	16.1	31.9	19.2	33.7	20.5

Month	Aurangabad		Amravati		Akola		Chandrapur	
	Daily max.	Daily min.	Daily max.	Daily min.	Daily max.	Daily min.	Daily max.	Daily min.
January	29.3	14.3	28.9	15.5	30.2	13.7	29.5	13.7
February	31.8	16.1	31.8	17.2	32.8	15.2	32.3	15.9
March	35.6	20.1	36.2	21.2	37.1	19.4	36.7	19.8
April	38.3	23.8	39.7	25.2	40.5	24.6	40.0	24.7
May	39.8	25.0	42.2	27.8	42.4	28.1	42.8	28.3
June	34.7	23.2	37.0	25.7	37.4	26.2	37.7	26.9
July	29.5	21.8	30.3	23.4	31.4	23.9	30.9	24.3
August	29.2	21.2	24.8	23.0	30.7	23.5	30.5	24.1
September	29.8	20.9	30.6	22.7	31.5	23.1	31.2	23.7
October	31.6	19.6	32.1	20.8	33.3	20.0	31.6	20.7
November	30.3	16.1	30.1	17.4	31.0	15.0	29.5	15.1
December	28.9	13.8	28.6	15.1	29.6	12.6	28.4	12.2
Annual mean	32.4	19.7	33.1	21.3	34.0	20.4	33.4	20.8

Source: Climatological tables of observatories in India (IMD).

Graph 2: Maximum & Minimum temperatures at selected centres in Maharashtra (1931-'60)





Humidity

Over the coast, humidity is generally high. During June to October it is more than 80%. It is the least during winter afternoons when it may come down to about 60% at most places. High humidity, in association with warm temperatures from April to October render the weather uncomfortable.

Over the interior, the period February to April is very dry when humidity in the afternoons may be lower than 15% on individual days. With the

onset of monsoon humidity increases rapidly and remains high till October. After October humidity markedly decreases during daytime.

Over the high level stations, humidity increases towards afternoons, except during winter, as a result of the moist air rising above from the valleys below. Table 3 shows relative humidity at selected centres in Maharashtra.

Table-3: Relative humidity at selected centres in Maharashtra in %.

Month		Bombay	Alibag	Jalgaon	Malegaon	Ahmednagar
January	I	71	69	58	53	54
	II	63	—	27	27	29
February	I	72	70	45	43	44
	II	62	—	17	21	23
March	I	72	71	38	35	34
	II	63	—	13	18	18
April	I	73	74	39	33	34
	II	66	—	14	15	18
May	I	73	76	54	43	44
	II	68	—	18	23	22
June	I	80	84	72	67	72
	II	78	—	42	48	51
July	I	85	87	85	76	79
	II	85	—	65	66	64
August	I	85	87	87	77	80
	II	84	—	70	65	63
September	I	85	86	66	77	81
	II	80	—	60	63	62
October	I	80	79	70	65	68
	II	74	—	39	40	47
November	I	73	69	61	57	59
	II	67	—	30	34	40
December	I	70	68	63	56	57
	II	64	—	31	30	34
Mean		77	77	63	57	59
		71	—	35	37	39

Month		Pune	Mahabaleshwar	Miraj	Solapur
January	I	74	54	61	59
	II	54	49	34	29
February	I	64	43	56	39
	II	23	40	32	22
March	I	52	36	54	36
	II	20	43	25	19
April	I	50	39	64	41
	II	26	55	31	22
May	I	58	59	73	50
	II	36	67	41	24
June	I	74	95	81	72
	II	63	94	64	49
July	I	83	95	87	79
	II	78	100	76	61
August	I	85	99	87	79
	II	77	100	74	59
September	I	82	96	86	80
	II	71	98	68	58
October	I	79	75	76	68
	II	52	78	52	46
November	I	73	63	65	57
	II	40	62	42	36
December	I	75	56	65	54
	II	35	52	36	32
Mean		71	67	71	59
		46	70	48	38

Month		Aurangabad	Amravati	Akola	Chandrapur
January	I	52	49	57	71
	II	30	30	29	43
February	I	41	40	46	61
	II	23	22	22	31
March	I	33	33	34	46
	II	18	25	18	24
April	I	34	30	30	41
	II	20	23	16	23
May	I	47	37	39	36
	II	24	21	19	21
June	I	76	65	66	64
	II	51	43	43	49
July	I	87	84	81	82
	II	72	69	68	75
August	I	87	83	82	83
	II	69	69	67	74
September	I	84	81	81	83
	II	64	66	64	74
October	I	64	60	66	76
	II	46	45	41	64
November	I	56	48	59	72
	II	38	33	55	53
December	I	55	50	60	75
	II	33	33	32	47
Mean		60	55	58	66
		41	40	38	48

Source: Climatological tables of observatories in India (1931-1960).

SEA LEVEL PRESSURE AND WINDS

During January atmospheric pressure is uniform along the coast, over the rest of the state pressure gradient is north-south and is very weak. Accordingly, winds are light and mainly from north or northeast. Pressures

begin to decrease after January and the pressure gradient also weakens. During March, pressure is uniform throughout the state, and a reversal of the pressure gradient occurs in April. The winds strengthen and the pressure gradient remains strong throughout the monsoon till September. Winds are strong and from westerly direction. October is a month of transition when the pressure gradient weakens considerably and reverses gradually to the winter pattern. Winds are weak and northerly over the state. Pressure continues to rise thereafter till January, winds remaining northerly. It may be mentioned that due to the sea breeze effect, winds are from a westerly direction over the coastal belt throughout the year during the evening.

Sunshine and Cloudiness

From December to March skies are clear to lightly clouded throughout the state, with gradual increase thereafter till May. Over the interior, cloud development is more marked towards the afternoon during the premonsoon months of April and May. With the advance of the monsoon current in June there is a sharp increase in the cloudiness, when on an average, skies are overcast over Konkan on 10 to 12 days in a month and clear on hardly a day, while over the interior they are overcast on 6 to 8 days and clear on 1 to 4 days particularly in the mornings. Skies remain heavily clouded till September.

CHAPTER - II

PAST AND PRESENT WORK

PAST WORK:

The concept of endemism is quite old. A. P. Decandole (1855) and Engler (1882) have given a preliminary idea of endemism and its types. Later, different workers have done research on the concept of endemism. These workers include Drude (1890), Briquet (1905), Diels (1908), Herzog (1926), Chevalier and Guenot (1925), Wulff (1950), Bramwell (1972), Richardson (1978), etc. Favarger and Contrandropoulos (1961) studied endemism in the light of cytotaxonomy and provided a new classification. On the other hand the concept of threatened plants is comparatively new and people got interested in this field when International Union for Conservation of Nature and Natural Resources (IUCN) published their Red Data Book (1966). Getting inspiration from this book several other nations also published their own Red Data Books (Perring and Far-Well, 1977; Takhtajan, 1975).

However, in India the systematic study on endemic and threatened plants actually started since 1980. Before that several authors used the term endemic in their Flora while giving the distribution data of various taxa. Cooke (1901-1908) in his Flora used the term apparently endemic to Konkan and Peninsular India for several taxa. There were some stray papers dealing with the endemism of the plants of Western India. Chatterjee (1940) listed 34 endemic dicotyledonous genera from Peninsular India, though later 9 genera were excluded from this list. Rao (1972) stated 164 genera (of which 122 are monotypic) are endemic to Indian floristic region of which nearly 60 genera are confined to Peninsular India and Srilanka. Subramanyam & Nayar (1974) enumerated characteristic endemic species of Western Ghats. Nayar (1977) estimated that about 2,100 endemic flowering plants to occur in peninsular India which represent about 32% of its flora.

The Problem regarding threatened plants of India was first discussed in the 11th Technical Meeting of the IUCN in 1969. Subsequently Botanical Survey of India (BSI) published in 1980 a small book-let entitled 'Threatened Plants of India - A State-of the Art Report, wherein 19 threatened plant taxa from Peninsular India were included. Simultaneously,

the study in this field dramatically increased in India during 1980-85, through a programme called Project on Study, Survey and Conservation of Endangered Species of Flora (POSSCEF). In this programme, data on nearly 1,000 threatened plants were gathered. By compiling all this data the BSI published a Book entitled 'The Indian Red Data Book- I' (eds. Jain & Sastry, 1984) with 125 Data Sheets of flowering plants. This inspired the researchers of BSI as well as other institutions and they started collecting valuable information on endemic and threatened plant taxa. The result of which was the publication of three volumes of Red Data Book of Indian Plants (eds. Nayar & Sastry, 1987-90), in which a total of 814 Vascular plant taxa have been included from all over India of which 82 are from Maharashtra. Raghavan & Singh (1983) provided information on 58 endemic and rare taxa from Western India and 91 endemic taxa to Maharashtra State. Raghavan & Singh (1984) enumerated 594 endemic and threatened taxa of Western India. Vajravelu and Daniel (1983) gave information of 518 threatened plants in Peninsular India. Singh & Raghavan (1986) provided information on distribution and status of 227 taxa under 126 genera belonging to 42 families from Western India. Mistry & Almeida (1989) listed 10 rare plants from Ratnagiri district. Bachulkar (1993) enumerated 26 endemic and threatened taxa of Satara district with localities. According to Yadav (1997), of the 1790 species and 144 infraspecific taxa endemic to Peninsular India, 500 species and 45 infraspecific taxa occur in Maharashtra of which over 125 species endemic to Peninsular India are known only from Maharashtra. He has provided the complete list of these 545 taxa, which are endemic to India and occurring in Maharashtra. Yadav, S.S. *et al.* (1997) published a list of 33 endemic and threatened species of Maharashtra with brief descriptions and distribution data.

Jain & Rao (1983) brought out a book entitled 'An Assessment of Threatened Plants of India' in which the papers presented in the seminar held at Dehra Dun in 1981 were included. Vartak in Jain & Rao *op.cit.* listed 38 endemic and threatened plant species from 12 selected sacred grooves of Western Ghats. However, Ahmedullah & Nayar (1987) did the first exhaustive work on the endemic plants of Peninsular India. They have enumerated 57 endemic genera and 1940 endemic species and infraspecific taxa from the Peninsular India with their distribution data. Line drawings of some important endemic plants have also been included. Recently Nayar (1996) has given a detailed list of about 2,150 endemic plants of Peninsular India.

Scientists of the BSI, Western Circle explored most of the districts of Maharashtra. Billore (1972,*ined.*) listed 14 rare plant taxa from Thane district. Kulkarni (1988) listed 16 endemic taxa of which 14 are rare in Sindhudurg district. Kamble & Pradhan (1988) listed 20 threatened plant taxa from Akola district. Lakshminarasimhan & Sharma (1991) listed 23 endemic and 8 rare plant taxa from Nasik district. Kothari & Moorthy (1993) listed 115 endemic plant taxa with their distribution data in Raigad district. Deshpande *et al.* (1993 & 1995) listed 25 taxa endemic only to Satara district, 130 taxa endemic to Western Ghats as well as Satara district and 30 rare taxa in the district. Pradhan & Singh (1999) listed 12 endemic and 11 rare taxa from Ahmednagar district. Diwakar & Sharma (2000) listed 13 endemic and 3 rare taxa from Buldhana district.

M.R. Almeida (1996) in his Flora Maharashtra listed 175 rare plant taxa from Deccan, 43 from Khandesh, 123 from Konkan, 90 from Marathwada and 121 from Vidarbha. Singh & Karthikeyan (2000) estimated nearly 25 genera and 690 species and infraspecific taxa of plants which are endemic to India and occurring in Maharashtra, of which 8 genera and 158 species and infraspecific taxa are strictly endemic to the state. The complete list of these 690 taxa has been given in this book. The other information provided by them on Extinct Plant (7 taxa), Critically Endangered Plant (27 taxa), Endangered Plant (38 taxa), Vulnerable Plant (71 taxa) and Low Risk Plant (109 taxa).

REASONS FOR UNDERTAKING THE PRESENT WORK:

As mentioned earlier, Ahmedullah & Nayar (1987) did the first exhaustive work dealing with endemic plants of the Peninsular India (including Maharashtra). Since then many new plant taxa have been described from this state and also several taxa which were earlier considered as endemic to only Maharashtra State have been reported from the other parts of India. Hence, it had become necessary to assess the current position of endemic plants of the state. The study was also inevitable because, endemism is one of the most important factors for determining the status of threatened plants.

So far as threatened plants of Maharashtra is concerned, no detailed study was undertaken in the past. In the volumes of the Red Data Book of Indian Plants (1987-90) several taxa were included from Maharashtra, but they were categorised on the basis of earlier IUCN criteria and

categories. However, the criteria for categorising the threatened plants have been modified by IUCN in 1994. Recently, Yadav (1997) has classified the endemic plants of Maharashtra following the IUCN's revised criteria and categories, but detailed study with regard to individual species has not been done so far. Hence, the present study was undertaken to get an up-to-date picture of all endemic and threatened taxa of Maharashtra in the light of revised recommendations proposed by IUCN.

MATERIAL AND METHODS:

The present work is the result of intensive and extensive field explorations to different corners and pockets of Maharashtra during the period of 1996-1999. Two to three long tours (20-30 days duration) and several short tours (1-7 days duration) were conducted in each year. More importance was given to those localities from where a large number of endemic plants have been reported.

First of all a list of the endemic taxa of Maharashtra was prepared with their localities by referring to all the available literature. Then all these taxa were studied in BSI at Pune as well as other herbaria like MUA at Aurangabad, CAL at Howrah, SUK at Kolhapur, BLAT & BNHS at Mumbai and MACS at Pune. Later tours were conducted to most of the mentioned localities to collect various plants and record their field information. During these explorations several plants were collected for the first time after type collection and new localities of some threatened plants were also recorded. Later the collected plants were processed properly for herbarium specimens and were categorised into red list categories according to IUCN's revised recommendations.

The categorisation of different taxa was done mainly by own observations in the field after getting the preliminary information from literature and herbaria. The information of some newly described species was gathered by personal communication either with the original authors or with other experts in this field. During categorisation mainly the criterion 'B' (Extent of occurrence or Area of occupancy) of IUCN's recommendations (described in Chapter-IV) with their subcriteria B-1 and B-2 have been followed. The categories were determined by the main criteria (B) supported by either single or double subcriteria (B-1 & B-2), instead of at least two subcriteria compulsorily among the three as recommended by IUCN. This is due to lack of any detailed prior

information in this field. In some cases the criterion 'D' (number of mature individuals) and criterion 'E' (probability of extinction in the wild) have also been followed. The approximate extent of occurrence of different taxa has been measured by a minimum convex polygon (the smallest polygon in which no internal angle exceeds 180° and which contains all the sites of occurrence). However, the approximate area of occupancy was measured either by own assessment or by taking the help of other sources.

All the families in the present work have been arranged according to Bentham & Hooker's (1862-1883) system of classification with adjustment according to their present delimitation. The genera, species and infraspecific taxa are arranged alphabetically which seems more convenient to follow. Nomenclature of each taxon has been checked properly and updated. Complete citation of the taxa, which includes correct name, basionym and synonyms wherever necessary is given along with reference to original publications, district and state Floras, besides the Flora of British India and also reference to other similar works. After citations Vernacular names (wherever available), Information of Type specimens (if known), Description, Flowering & Fruiting period, Reference to illustration (wherever available), Habitat, Distribution, Specimens examined, Status, Criteria for determining the status and Notes are given. Under Types, those specimens which have been examined are marked with exclamatory marks (!) and under Types as well as Specimens examined, the herbarium where the respective specimens are lodged is indicated by their acronym within parenthesis. Under Notes, observations about the respective taxa alongwith their distinguishing characters have been provided. At the end of enumeration, a list of plants occurring in Maharashtra having international trade data have been given along with their value and the name of the country to where it is exported.

CHAPTER - III

VEGETATION

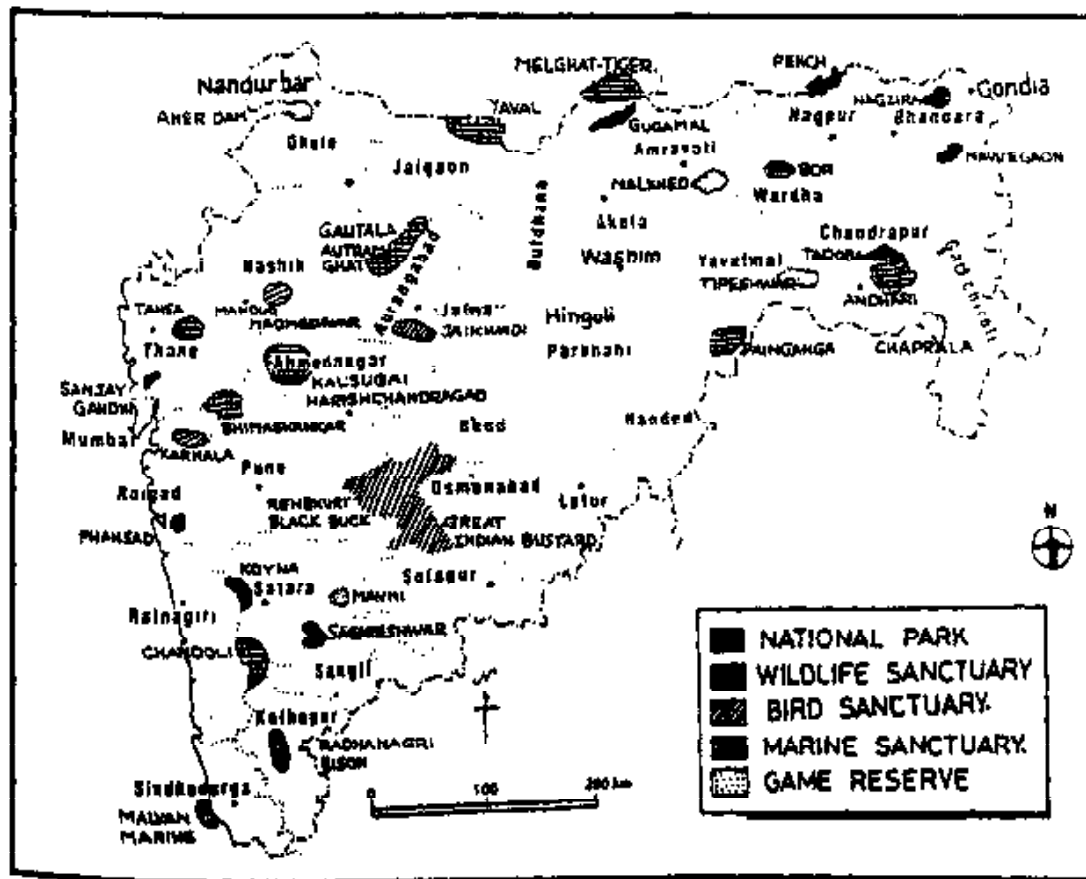
The floristic pattern of Maharashtra differs greatly due to factors like rainfall, temperature, humidity, type of soils and topography. The forest area recorded for the state is 63,842 sq km, which is *ca* 20.75% of its geographical area (The Hindu, Survey of the Environment, 1998). The total forest cover is 46,143 sq km, which is 15% of area, out of which 23,622 sq km is dense forests, 22,397 sq km is open forest and 124 sq km is mangrove forests. The number of national parks are 5 and sanctuaries are 25 which cover an area of 621.72 sq km and 14,354.88 sq km respectively (Map-3). Thus the total protected area is 14,976.60 sq km. The proportion of total protected area to total area is 4.87% and to forest area is 23.85% (M.R. Almeida, 1998).

From the management point of view the forests of Maharashtra are divided into 11 circles, 43 divisions and 5 subdivisions Table 4).

Table: 4: Forest circles, divisions, subdivisions and the number of ranges as well as forest area under each circle (Chief Forest Statistician Bulletin, 1992):

Circles	Divisions/S. Div. Ranges	No. of Sq km	Forest area
Kolhapur	Kolhapur division	27	4,466
	Savantwadi division		
	Satara division		
	Sangli Subdivision		
	Chiplun Subdivision		
Pune	Pune division	18	2,386
	Junnar division		
	Solapur division		
	Bhor subdivision		
Thane	Thane division	48	5,632
	Dahanu division		
	Shahapur division		
	Alibag division		
	Roha division		
	Sanjay Gandhi National Park		

Circles	Divisions/S. Div. Ranges	No. of Sq km	Forest area
Nasik	East Nasik division West Nasik division Ahmednagar division	21	5,280
Dhule	West Dhule division North Dhule division Mewasi division Jalgaon division Yaval division	28	6,431
Aurangabad	Aurangabad division Parbhani division Nanded division Beed subdivision Osmanabad subdivision	22	2,820
Amravati	Akot division Dharani division Amravati division Paratwada division Tiger project circle Paratwada (308.24 sq km)	20	3,575
Yavatmal	Wani division Yavatmal division Pusad division Akola division Buldhana division	33	6,139
Nagpur	Nagpur division Wardha division Bhandara division Gondia division	31	8,293
North Chandrapur	Brahmapuri division Wadsa division Chandrapur division Gadchiroli division	17	7,676
South Chandrapur	Allapalli division Bhamragad division Sironcha division Central Chandrapur division	24	11,100

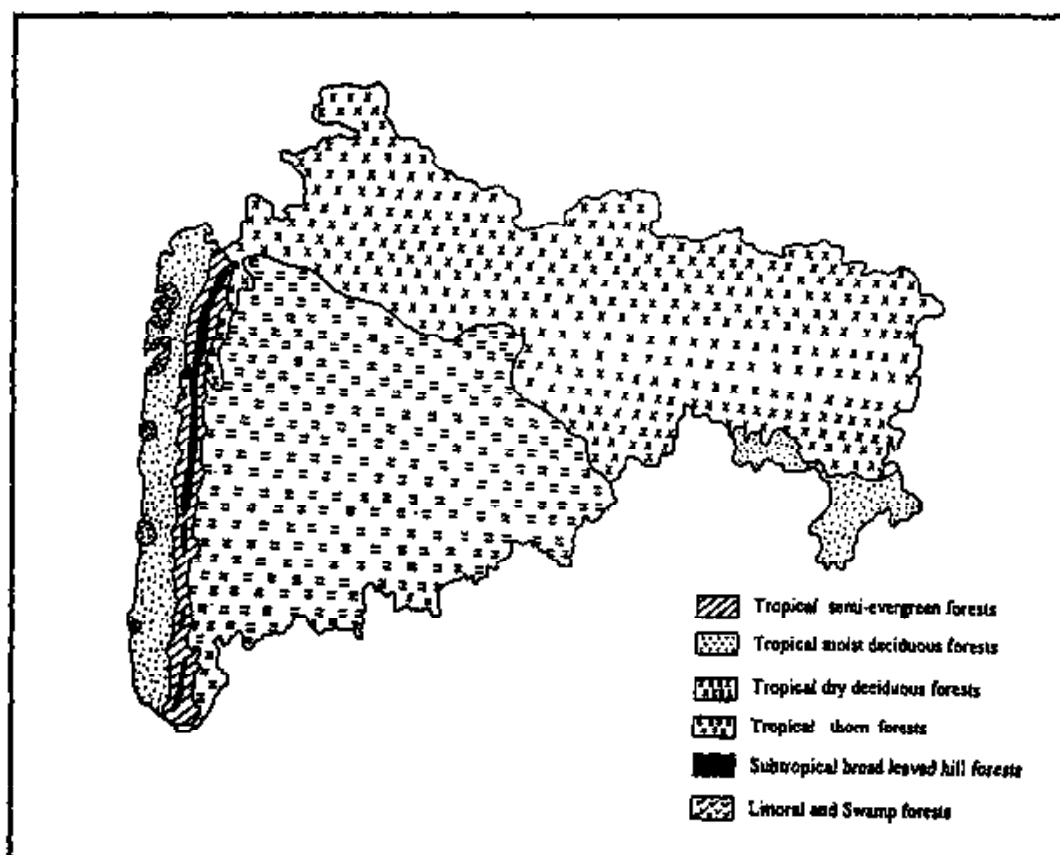


Map 3: National Parks & Sanctuaries in Maharashtra

Various authors from time to time proposed different classifications of the Indian forest types such as Champion (1936), Puri (1960), Champion and Seth (1968), etc. Among these Champion and Seth's classification is widely accepted. Therefore, in the present study the same classification is followed.

According to Champion and Seth (1968) the forests in the state can be broadly classified as follows (Map - 4):

- I. **Moist tropical forests:**
 1. Tropical semi-evergreen forests
 2. Tropical moist deciduous forests
 - a) Moist teak forests
 - b) Southern moist mixed deciduous forests
 3. Littoral and Swamp forests



Map 4: Forest types of Maharashtra

II. Dry tropical forests:

4. Tropical dry deciduous forests:

- a) Dry teak-bearing forests
- b) Southern dry mixed deciduous forests
- c) Babul forests
- d) Hardwickia forests,
- e) Dry bamboo brake

5. Tropical thorn forests

III. Montane subtropical forests:

6. Subtropical broadleaved hill forests

I. Moist tropical forests:

1. Tropical semi-evergreen forests

The forests of this type are distributed along the higher slopes of the Sahyadri ranges usually occurring in patches as narrow strips at an altitude between 450 m and 1500 m receiving high mean annual rainfall of 200 to 300 cm. Most of the areas in this category are still undisturbed and therefore, it presents most typical indigenous vegetation with higher percentage of endemism.

The vegetation in these forests is dominated by evergreen elements, but it devoid of huge buttressed trees as are found in the typical evergreen forests of Mysore and Kerala. The evergreen species are intermixed with a few deciduous elements, which are usually trees of low or medium average height with a comparatively smaller of girth and spreading canopies. As these type of forests are neither typical evergreen type nor true deciduous also, these can be treated under semi-evergreen type.

The common trees that form the first storey of this forest type are *Agalala lawii*, *Albizia lebbeck*, *A. odoratissima*, *A. procera*, *Anogeissus latifolia*, *Atalantia racemosa*, *Beilschmeidia dalzellii*, *Bombax ceiba*, *Calophyllum inophyllum*, *Carallia brachiata*, *Casearia graveolens*, *Celtis cinnamomea*, *Cinnamomum zeylanicum*, *Clausena dentata*, *Cryptocarya wightiana*, *Diospyros assimilis*, *D. montana*, *D. sylvatica*, *Drypetes venusta*, *Dysoxylum binectiferum*, *Elaeocarpus serratus*, *Erythrina stricta*, *Ficus racemosa*, *Flacourtia montana*, *Garcinia indica*, *G. talbotii*, *Holigarna arnottiana*, *H. grahamii*, *Knema attenuata*, *Lagerstroemia lanceolata*, *Lepisanthes tetraphylla*, *Ligustrum perrottetii*, *Litsea stocksii*, *Mimusops elengii*, *Myristica beddomei*, *Neolitsea zeylanica*, *Persea macrantha*, *Polyalthea fragrans*, *Prunus ceylanica*, *Putranjiva roxburghii*, *Schleichera oleosa*, *sterculia guttata*, *Symplocos beddomei*, *Syzygium cumini*, *S. hemisphericum*, *Terminalia bellirica*, *T. chebula*, *T. crenulata*, *Trichilia connaroides* etc.

The representative members of the second storey are *Acacia ferruginea*, *Acronychia pedunculata*, *Aporosa lindleyana*, *Bauhinia racemosa*, *Blachia denudata*, *Bridelia retusa*, *B. squomosa*, *Butea monosperma*, *Canthium dicoccum*, *Careya arborea*, *Cassis fistula*, *Cassine glauca*, *Cordia dichotoma*, *Dalbergia lanceolaria*, *Dillenia pentagyna*, *Dimocarpus longana*, *Dimorphocalyx lawianus*, *Emblica*

officinalis, *Ervatamia heyneana*, *Euonymus indicus*, *Ficus benghalensis*, *Garuga pinnata*, *Glochidion hohenackerii*, *Grewia tiliaefolia*, *Haldina cordifolia*, *Heterophragma quadriloculare*, *Holoptelea integrifolia*, *Hymenodictyon obovatum*, *H. orixense*, *Ixora nigricans*, *Kydia calycina*, *Lagerstroemia parviflora*, *Lannea coromandelica*, *Macaranga peltata*, *Mallotus philippensis*, *Memecylon umbellatum*, *Meyna laxiflora*, *Miliusa tomentosa*, *Mitragyna parviflora*, *Murraya koenigii*, *M. paniculata*, *Nothopegia colebrookiana*, *Nothopodytes nimmoniana*, *Olea dioica*, *Phyllanthus emblica*, *Piliostigma foveolatum*, *Pittosporum dasycaulon*, *P. napaulense*, *Pongamia pinnata*, *Sageraea laurifolia*, *Spondias pinnata*, *Symplocos laurina*, *Wendlandia thyrsoides*, *Xeromphis spinosa*, etc.

The common shrubby undergrowth which form the third storey are *Abutilon persicum*, *Acacia torta*, *Actephila excelsa*, *Allophyllus cobbe*, *Atylosia lineata*, *A. sericea*, *Barleria involucrata* var. *elata*, *B. lawii*, *B. strigosa*, *Blachia denudata*, *Blumea membranacea*, *Cajanus lineatus*, *Callicarpa tomentosa*, *Canthium rheedii*, *Capparis rotundifolia*, *Carissa congesta*, *C. inermis*, *Carvia callosa*, *Casearia graveolens*, *C. rubescens*, *Catunaregam spinosa*, *Colebrookea oppositifolia*, *Connarus monosperma*, *Crotalaria leshenaultii*, *Dichapetalum gelonoides*, *Elaeagnus latifolia*, *Embelica ribes*, *Flacourtia indica*, *Glycosmis mauritiana*, *Helicteres isora*, *Holarrhena antidysenterica*, *Ixora nigricans*, *Justicia betonica*, *Lasianthus laevis*, *Leea indica*, *Ligustrum perottettii*, *Litsea deccanensis*, *Lobelia nicotianifolia*, *Mackenzia perfoliata*, *Maesa indica*, *Connarus monosperma*, *Crotalaria leshenaultii*, *Dichapetalum gelonoides*, *Elaeagnus latifolia*, *Embelia ribes*, *Flacourtia indica*, *Glycosmis mauritiana*, *Helicteres isora*, *Holarrhena antidysenterica*, *Ixora nigricans*, *Justicia betonica*, *Lasianthus*, *Laevis*, *Leea indica*, *Ligustrum perottettii*, *Litsea deccanensis*, *Lobelia nicotianifolia*, *Mackenzia perfoliata*, *Maesa indica*, *Mallotus stenanthus*, *Maytenus puberula*, *M. rothiana*, *Meiogyne pannosa*, *Meyna laxiflora*, *Microcos paniculatus*, *Moghania strobilifera*, *Osyris quandripartita*, *Paramignya monophylla*, *Pavetta crassicaulis*, *P. tomentosa*, *Pittosporum wightii*, *Pogostemon benghalensis*, *Psychotria dalzellii*, *Rauwolfia densiflora*, *Rhinacanthus nasuta*, *Salacia chinensis*, *Scutia myrtiana*, *Securinega leucopyros*, *Strobilanthus reticulatus*, *Symplocos*

laurina, *Turraea villosa*, *Vernonia divergens*, *Vitex negunda*, *Woodfordia fruticosa*, *Zizyphus glaberrima*, etc.

Common climbers among vegetation are - *Acacia sinuata*, *Adena hondala*, *Aganosma cymosa*, *Ancistrocladus heyneana*, *Argyreia boseana*, *Capparis moonii*, *Cayratia elongata*, *Cissus discolor*, *Clematis gouriana*, *C. wightiana*, *Combretum ovalifolium*, *Cyclea burmanii*, *Dioscorea pentaphylla*, *Diploclisia glaucescens*, *Diplocyclas palmatus*, *Elaeagnus conferta*, *Embelia viridiflora*, *Erycibe paniculata*, *Gnetum ula*, *Gouania microcarpa*, *Grewia acuminata*, *Gymnema sylvestris*, *Jasminum malabaricum*, *Luvunga eleutherandra*, *Melothria* spp., *Mezoneuron cucullatum*, *Moullava spicata*, *Mucuna puriens*, *Olax psittacorum*, *O. wightiana*, *Oxyceros rugulosus*, *Paracalyx scariosa*, *Piper trichostachyon*, *Reissantia grahami*, *R. indica*, *Rourea minor*, *Rubia cordifolia*, *Salacia macrosperma*, *Schefflera venulosa*, *Spatholobus purpureus*, *Stephania japonica*, *Strychnos colubrina*, *Teramnus labialis*, *Toddalia aculeata*, *Trichosanthes tricuspida*, *Uvaria hookeri*, *Wattakaka volubilis*, *Zehneria scabra*, etc.

The common herbaceous members which form the ground cover or the fourth storey are - *Achyranthus aspera*, *Adelocaryum coelestinum*, *Adenoon indicum*, *Alysicarpus belgaumensis*, *Arisaema* spp., *Arundinella pumila*, *Asystasia dalzelliana*, *Biophytum sensitivum*, *Blumea solidaginoides*, *Blyxa octandra*, *Bryophyllum calycinum*, *Burmanna pusilla*, *Cardamine trichocarpa*, *Carex filicina*, *Cassia pumila*, *Centella asiatica*, *Chasalia curviflora*, *Cryptocoryne spiralis*, *Curcuma* spp., *Cyanoglossum glochidiatum*, *C. zeylanicum*, *Desmodium laxiflorum*, *D. triquetrum*, *Ecbolium linneanum*, *Exacum carinatum*, *E. pumilum*, *Glinus lotoides*, *Gnaphalium polycaulon*, *Habenaria* spp., *Haplanthus verticillatus*, *Hedyotis auricularia*, *H. corymbosa*, *Heracleum dalgadianum*, *H. grandis*, *Hitchenia caulina*, *Impatiens* spp., *Indigofera dalzellii*, *Kalanchoe pinnata*, *Leucas stelligera*, *Linum mysorensis*, *Neanotis lancifolia*, *Oldenlandia maheshwarii*, *Ophiorhiza harrissiana*, *Oplismenus compositus*, *Pimpinella adscendens*, *Pinda concanensis*, *Plectranthus stocksii*, *Polygonum glabrum*, *Rhynchoglossum obliquum* var. *parviflora*, *Senecio* spp., *Smithia* spp., *Solena amplexicaulis*, *Sonerila scapigera*, *Sopubia delphiniifolia*, *Striga* spp., *Swertia densiflora*, *Vicoa cernua*, etc.

The grasses found on open areas are - *Arundinella ciliata*, *A. metzii*, *A. pumila*, *A. spicata*, *Bhidea burnsiana*, *Danthonidium gammiei*, *Dimeria stappiana*, *Garnotia arborea*, *Jansenella griffithiana*, *Pseudodichanthium serrafalcoides*, *Peltophorus forficulata*, *P. mysorensis*, *P. ratnagirica*, *Tripogon* spp., etc.

The common epiphytes are - *Aerides crispum*, *Bulbophyllum fimbriatum*, *Dendrobium aqueum*, *D. herbaceum*, *D. lawianum*, *Epithema carnosum*, *Eria* spp., *Hoya retusa*, *H. wightii*, *Lepisorus linearis*, *Microsorium membranaceum*, *Oberonia* spp., *Remusatia vivipara*, etc.

Besides these, common stem parasites are *Dendrophthoe falcata* var. *coccinea*, *D. trigona*, *Helixanthera wallichiana*, *Macrosolen capitellatus*, *Viscum angulatum*, etc. *Striga gesneroides* is the most common root parasite.

2. Tropical moist deciduous forests:

This type of forests are found all along the eastern side of the Sahyadri ranges where the mean annual rainfall ranges from 130 to 180 cm and mean annual temperature from 24°C to 27°C. The forests of Allapalli subdivision in Gadchiroli district also fall under this category. These are further subdivided as follows:

a) Moist Teak forests

These are restricted mainly to hill terrain at an altitude over 20 m. Teak (*Tectona grandis*) is the dominant species throughout and it occupies major portion of the canopy. The entire top storey consists of deciduous species like *Acacia chundra*, *A. ferruginea*, *Albizia lebbeck*, *A. procera*, *Anogeissus latifolia*, *Bombax ceiba*, *Careya arborea*, *Dalbergia lanceolaria*, *D. latifolia*, *Diospyros tomentosa*, *Erythrina stricta*, *Garuga pinnata*, *Haldina cordifolia*, *Lagerstroemia parviflora*, *Lannea coromandelica*, *Madhuca indica*, *Mitragyna parvifolia*, *Oogeinia oogeinensis*, *Pterocarpus marsupium* var. *acuminatus*, *Salmalia malabarica*, *Sterospermum personatum*, *Schleichera oleosa*, *Tamarindus indica*, *Tectona grandis*, *Terminalia bellirica*, *T. chebula*, *T. crenulata*, *T. tomentosa*, etc.

The second storey consists of *Acacia polyacantha*, *Albizia procera*, *Bauhinia racemosa*, *Bridelia retusa*, *Butea monosperma*, *Cassia fistula*, *Cordia dichotoma*, *Dendrocalamus strictus*, *Dillenia pentagyna*, *Diospyros melanoxylon*, *D. montana*, *Emblica officinalis*, *Ficus racemosa*, *Grewia tiliaefolia*, *Heterophragma quodriloculare*, *Holarrhena antidysenterica*, *Holoptelea integrifolia*, *Ixora arborea*, *Kydia calycina*, *Madhuca longifolia* var. *latifolia*, *Mallotus philippensis*, *Mangifera indica*, *Miliusa tomentosa*, *Oroxylum indicum*, *Piliostigma foveolatum*, *Spondias pinnata*, *Sterculia urens*, *Syzygium cumini*, *Trewia polycarpa*, *Wrightia tinctoria*, *Xylia xylocarpa*, etc.

The shrubby undergrowth, which forms the third storey are *Antidesma acidum*, *Bridelia hamiltoniana*, *Callicarpa lanata*, *Cansjera rheedii*, *Carissa congesta*, *Carvia callosa*, *Casearia esculenta*, *C. graveolens*, *Catunaregam spinosum*, *Desmodium triangulare* var. *congestum*, *Flacourtia indica*, *Grewia nervosa*, *Helicteres isora*, *Hibiscus hirtus*, *Ixora brachiata*, *I. coccinea*, *Lantana camara* var. *aculeata*, *Meyna laxiflora*, *Paramignya monophylla*, *Pogostemon benghalensis*, *P. pupurascens*, *Thottea siliquosa*, *Urena lobata*, *Woodfordia fruticosa*, *Ziziphus glaberrima*, *Z. mauritiana*, *Z. oenoplia*, etc.

The common climbers are *Acacia pennata*, *A. torta*, *Ampelocissus latifolia*, *Anodendron paniculatum*, *Argyreia sericea*, *Atylosia scarabaeoides*, *Bauhinia vahlii*, *Beaumontia jerdoniana*, *Butea superba*, *Calycopteris floribunda*, *Capparis zeylanica*, *Cayratia elongata*, *Celastrus paniculatus*, *Chonemorpha fragrans*, *Cissampelos pareira*, *Cissus elongata*, *C. pallida*, *C. repanda*, *Clematis hedysarifolia*, *Cocculus hirsutus*, *Combretum ovalifolium*, *Cryptolepis buchnani*, *Dalbergia volubilis*, *Derris canarensis*, *D. scandens*, *Dioscorea bulbifera*, *D. hispida*, *D. pentaphylla*, *D. wallichii*, *Gloriosa superba*, *Hemidesmus indicus*, *Hiptage benghalensis*, *Jasminum malabaricum*, *Mucuna pruriens*, *Operculina turpethum*, *Premna coriacea*, *Smilax zeylanica*, *Toddalia aculeata*, *Trichosanthes bracteatus*, *Tylophora dalzellii*, *Ventilago bombaensis*, *Zizyphus rugosa*, etc.

Herbaceous flora is comparatively less in this region and sometimes totally lacking. Occasionally *Achyranthes aspera*, *Blepharis asperrima*, *Blumea virens*, *Curculigo* spp., *Curcuma pseudomontana*, *Desmodium laxiflorum*, *Elephantopus scaber*, *Eranthemum roseum*, *Hemigraphis*

latebrosa, *Hibiscus furcatus*, *Lepidagathis cristata*, *L. cuspidata*, *L. prostrata*, *Mukia maderaspatana*, *Ophiorrhiza prostrata*, *Oplismenus burmanii*, *Paracaryum coelastinum*, *Rungia crenata*, *Sida glutinosa*, *Smithia setulosa*, *Solena amplexicaulis*, *Tephrosia purpurea* and *T. tinctoria* are found.

b) Southern Moist mixed deciduous forests:

In these forests the evergreen component is usually larger than in the case of the teak-bearing forests, except for the very moist sub-type. Teak is present occasionally and may be an indicator of secondary succession. The stories in the following types of these forests are not as distinct as in the preceding ones.

The top storey consists of the trees like *Acacia chundra*, *Albizia lebbeck*, *A. procera*, *Anogeissus latifolia*, *Bombax ceiba*, *Dalbergia lanceolaria*, *D. latifolia*, *D. melanoxylon*, *D. montana*, *Erythrina stricta*, *Ficus nervosa*, *Garuga pinnata*, *Gmelina arborea*, *Haldina cordifolia*, *Lagerstromia parviflora*, *Lannea coromandelica*, *Madhuca indica*, *Mitragyna parvifolia*, *Ougenia oogeinensis*, *Pterocarpus marsupium* var. *acuminatus*, *Salmalia malabarica*, *Schleichera oleosa*, *Stereospermum personatum*, *Tectona grandis*, *Terminalia bellerica*, *T. chebula*, *T. crenulata*, *T. tomentosa*, *Tetrameles nudiflora*, etc.

The second storey consists of *Acacia polyacantha*, *Actinodaphne angustifolia*, *Bauhinia racemosa*, *Bridelia retusa*, var. *squamosa*, *Butea monosperma*, *Careya arborea*, *Cassia fistula*, *Cordia dichotoma*, *Dendrocalamus strictus*, *Dillenia pentagyna*, *Diospyros melanoxylon*, *D. montana*, *Emblica officinalis*, *Ficus glomerata*, *F. racemosa*, *Grewia tiliaefolia*, *Heterophragma quadriloculare*, *Holoptelea integrifolia*, *Hymenodictyon orixense*, *Kydia calycina*, *Madhuca longifolia* var. *latifolia*, *Mallotus phillipensis*, *Mangifera indica*, *Memecylon umbellatum*, *Miliusa tomentosa*, *Olea dioica*, *Piliostigma foveolatum*, *Polyalthia cerasoides*, *Pongamia pinnata*, *Pouteria tomentosa*, *Schrebera swietenoides*, *Spondias pinnata*, *Sterculia urens*, *Syzygium cumini*, *Wrightia tinctoria*, *Xylia xylocarpa*, etc.

The common shrubs which form the third storey are *Callicarpa lanata*, *Carrisa congesta*, *Carvia callosa*, *Casearia graveolens*, *Catunaregam spinosa*, *Desmodium gangeticum*, *Flacourtia indica*, *Helicteris isora*, *Ixora brachiata*, *Lasiosiphon glaucus*, *Leea asiatica*, *L. macrophylla*, *Zyzyphus oenoplia*, etc.

The common climbers are *Anodendron paniculatum*, *Elaeagnus conferta*, *Gnetum ula*, *Jasminium malabaricum*, etc.

The herbaceous elements are more or less same as in the moist teak forests. The common grasses growing as undergrowth are *Apluda mutica*, *Arthraxon nudus*, *Arundinella metzii*, *A. pumila*, *Digitaria adscendens*, *Dimeria stapfiana*, *Hackelochloa granularis*, *Heteropogon contortus*, *Ischaemum semisagittatum*, *I. tumidum*, *Jansenella griffithiana*, *Oplismenos burmani*, *O. compositus*, *Panicum notatum*, *Pseudanthistiria heteroclita*, *Setaria glauca*, *Sorghum halepense*, *Spodiopogon rhizophorus*, etc.

Among epiphytic orchids *Acampe praemorsa*, *Aerides maculosum*, *Dendrobium* spp. and *Rhyncostylis retusa* are quite common in the forests. Ferns like *Adiantum philippense*, *Athyrium falcatum*, *Cheilanthes farinosa*, *Lygodium flexuosum* etc. are also very common.

Wide ranges of stem and root parasites are also found in the moist deciduous forests of Maharashtra. The common stem parasites are *Cassytha filiformis*, *Cuscuta chinensis*, *C. reflexa*, *D. falcata* var. *falcata*, *D. falcata* var. *Coccinea*, *Helixanthera wallichiana*, *Macrosolen capitellatus*, *Scurrula philippensis*, *Tolypanthus lagenifer*, *Viscum articulatum*, etc. Among root parasites *Aeginetia indica*, *Christisonia calcarata*, *C. lawii*, *Cistanche tubulosa*, *Striga angustifolia*, *S. gesnerioides*, *S. lutea*. etc. are quite common.

3) Littoral and swamp forests:

The forests under this category can be divided into (a) Mangrove vegetation, (b) Coastal saline sand vegetation and (c) vegetation beyond high-tide mark.

a) Mangrove Vegetation:

This type of vegetation is found along the coastal areas and estuarine flanges of Konkan region. The constituent species are either in more or less dense forests of very low average height (Mangrove scrub) or in closed evergreen forests of moderate height (Mangrove forest). The true mangroves are specially adapted to survive on tidal mud, which is permanently wet with salt water, by the help of stilt roots, leathery entire leaves and viviparous germination.

The representative species of this vegetation are *Acanthus ilicifolius*, *Aegiceras corniculatus*, *Arthrocnemum indicum*, *Avicennia alba*, *A. marina* var. *marina*, *A. marina* var. *acutissima*, *A. officinalis*, *Bruguiera caryophylloides*, *B. cylindrica*, *B. gymnorhiza*, *B. parviflora*, *Caesalpinia crista*, *Ceriops tagal*, *Clerodendrum inerme*, *Colubrina asiatica*, *Cyperus difformis*, *C. polystachyos*, *C. rotundus*, *Derris trifoliata*, *Enicostemma hyssopifolium*, *Excochordia agallocha*, *Fimbristylis miliacea*, *F. schoenoides*, *Halophylla decipens*, *H. ovalis*, *Hydrophyllax maritima*, *Kandelia candel*, *Lumnitzera racemosa*, *Peplidium maritimum*, *Premna integrifolia*, *Rhizophora mucronata*, *Salvadora persica*, *Scaveola taccada*, *Scirpus littoralis*, *Sessuvium portulacastrum*, *Sphenoclea zeylanica*, *Sonneratia alba*, *S. apetala*, *S. calceolaris*, *Spinifex littoreus*, *Sueda fruticosa*, *S. maritima*, *S. monoica*, *Vitex trifolia*, *Wedelia biflora*, *Xylocarpus granatus*, *Zoysia matrella*, etc.

b) Coastal Saline Sand Vegetation:

This vegetation occurs along the coastal sand-dunes of Konkan regions. The trees or shrubs like *Barringtonia racemosa*, *Calophyllum inophyllum*, *Cerbera manghas*, *Clerodendrum inerme*, *Cocos nucifera*, *Colubrina asiatica*, *Pandanus fascicularis*, *Premna corymbosa*, *Thespesia populnea*, *Vitex trifoliata*, while herbs like *Crotalaria verrucosa*, *Cyperus arenarius*, *C. rotundus*, *Fimbristylis schoenoides*, *Launea pinnatifida*, *L. procumbens*, *Pedaliium murex*, *Perotis indica*, *Spinifex littoreus*, *Vernonia cinerea*, *Zoysia matrella* are noticed. Common climbers are *Canavalia virosa*, *Derris trifoliata*, and *Ipomoea pes-caprae* and *Leptadenia reticulata*.

c) Vegetation beyond high-tide mark:

This type is seen behind the coastal saline sand vegetation where the seawater can't reach due to high-tide. The common trees in this region are *Calophyllum inophyllum*, *Casuarina equisetifolia*, *Cocos nucifera*, *Erythrina indica*, *Pandanus tectorius*, *Phoenix sylvestris* and *Thespesia populnea*, while the common shrubs are *Calotropis gigantea*, *Clerodendrum inerme*, *Colubrina asiatica*, *Kirganelia reticulata* and *Vitex trifoliata*. The climbers like *Caesalpinia crista*, *C. nuga*, *Canavalia maritima* and herbs like *Boerhavia diffusa*, *Cassia tora*, *Cressa cretica*, *Crotalaria verrucosa*, *Cynodon dactylon*, *Eragrostis cilianensis*, *Glinus lotoides*, *Leonotis nepetaefolia*, *Paspallidium*

flavidum, *Sporobolus virginicum* etc. are also noticed in this zone. Recently extensive plantations of *Wedelia calendulacea* and *Scaveola taccada* are seen at some places for controlling the soil erosion.

II. DRY TROPICAL FORESTS:

4. Tropical dry deciduous forests:

These forests are situated in drier areas where the mean annual rainfall ranges from 50 to 150 cm and mean annual temperature from 26°C to 27.3°C. The forests of the districts of Kolhapur, Sangli, Satara, Pune, Ahmednagar, Nasik, Dhule, Jalgaon, Aurangabad, Jalna, Parbhani, Nanded, Yavatmal, Buldhana, Akola, Amravati, Wardha, Nagpur, Chandrapur, Bhandara and Gadchiruli are fully or partially covered by this type of vegetation. These are further subdivided as follows:

a) Dry teak-bearing forests:

These forests are open, understocked and large grassy areas are often met with due to biotic interference such as illicit felling, excessive grazing, fires and encroachments. Soils are dry, infertile and teak in low to fair amount mixed with dry deciduous species. The floristic composition is as follows:

The top storey consists of trees like *Acacia chundra*, *A. ferruginea*, *Albizia lebeck*, *Anogeissus latifolia*, *Azadirachta indica*, *Boswellia serrata*, *Careya arborea*, *Cordia dichotoma*, *Dalbergia latifolia*, *Emblia officinalis*, *Ficus amplissima*, *F. hispida*, *Gardenia latifolia*, *Garuga pinnata*, *Gmelina arborea*, *Heterophragma quadriloculare*, *Kydia calycina*, *Lagerstroemia parviflora*, *Lannea coromandelica*, *Madhuca longifolia* var. *latifolia*, *Mallotus philippensis*, *Mangifera indica*, *Mitragyna parvifolia*, *Moringa concanensis*, *Pterocarpus marsupium* var. *acuminatus*, *Salmalia malabarica*, *Semecarpus anacardium*, *Sterculia urens*, *Strychnos potatorum*, *Syzygium cumini*, *Tectona grandis*, *Terminalia olata*, *T. aruna*, *T. bellirica*, *T. crenulata*, etc.

The second storey is formed by *Acacia catechu*, *A. leucophloea*, *A. nilotica* ssp. *Indica*, *Antidesma acidum*, *Bauhinia rcemosa*, *Bridelia retusa*, *Butea monosperma*, *Cassia fistula*, *C. glauca*, *Ceriscoides turgida*, *Diospyros chloroxylon*, *D. melanoxylon*, *Dolichandrone*

falcata, *Hardwickia binata*, *Holarrhena antidysenterica*, *Ixora arborea*, *Meyna laxiflora*, *Piliostigma malabaricum*, *Pongamia pinnata*, *Wrightia tinctoria*, *Zizyphus glaberrima*, *Z. mauritiana*, etc.

The common shrubs and undershrubs which form the third storey are *Anisomeles indica*, *Carissa congesta*, *Cassia auriculata*, *C. tora*, *Catunaregam spinosa*, *Cissus woodrowii*, *Gymnosporia spinosa*, *Helicteres isora*, *Indigofera cassioides*, *Lantana camara* var. *aculeata*, *Leea macrophylla*, *Maytenus emarginata*, *Nyctanthes arbo-tristis*, *Securinega leucopyrus*, *Woodfordia fruticosa*, etc.

Some of the most commonly occurring herbs are *Acalypha lanceolata*, *Andrographis echiioides*, *Barleria cristata*, *Blumea eriantha*, *B. membranacea*, *Canscora decussata*, *Cassia pumila*, *Chrozophora rottleri*, *Chrysanthellum indicum*, *Colocasia esculenta*, *Commelina attenuata*, *C. hasskarlii*, *Crotalaria pusilla*, *Curculigo orchiioides*, *Curcuma pseudomontana*, *Cyperus alulatus*, *C. pygmaeus*, *Desmodium triflorum*, *Elytraria acaulis*, *Enicostemma axillare*, *Eriocaulon diana*, *Fimrbistylis ovata*, *Flemingia nana*, *Goniogyna hirta*, *Iphigenia indica*, *Justicia simplex*, *Knoxia sumatrensis*, *Kohautia nagporensis*, *Leucas cephalotis*, *Orthosiphon pallidus*, *O. rubicundus*, *Rungia pectinata*, *Sauromatum pedatum*, *Scilla hyacinthina*, *Thecagonum ovatifolium*, *Tylophora fasciculata*, *Uraria alopecuroides*, *U. rufescens*, *Vicoa indica*, etc.

Some of the common grasses are *Brachiaria remota*, *B. reptans*, *Chrysopogon polyphyllus*, *Dichanthium hugelii*, *Echinochloa colonum*, *Eragrostiella bifaria*, *Eragrostis gangetica*, *E. unioloides*, *Hackelochloa granularis*, *Hemarthria compressa*, *Ophiuros exatatus*, *Oplismenus burmannii*, *Rottboellia cochinchinensis*, *Saccharum spontaneum*, etc.

Some of the common climbers found in this type of forests are *Ampelocissus latifolia*, *A. tomentosa*, *Aspidopterys cordata*, *Dioscorea wallichii*, *Luffa acutangula* var. *amara*, *Olax scandens*, *Rhynchosia minima*, *Trichosanthes tricuspidata*, *Ventilago denticulata*, etc.

The most common parasite and epiphyte available in this type are *Cassytha filiformis* and *Vanda tessellata* respectively. The terrestrial orchid commonly found is *Peristylus plantagineus*. The bamboo, *Dendrocalamus strictus* occurs in abundance in patches.

b) Southern Dry mixed deciduous forest:

These forests are also open and understocked. Thorny species occur and tend to increase in proportion with the heavy grazing, etc. to which most of the area is subjected. Availability of grasses and plants useful as fodder are more. Bamboos are generally absent and usually of poor quality when present. Climbers are few, but may be abundant locally.

The common trees that form the top storey are *Acacia chundra*, *A. farnesiana*, *A. ferruginea*, *A. leucophloea*, *A. nilotica*, *A. tomentosa*, *Aegle marmelos*, *Ailanthus excelsa*, *Albizia odoratissima*, *Anogeissus latifolia*, *Azadirachta indica*, *Bombax ceiba*, *Boswellia serrata*, *Cochlospermum religiosum*, *Dalbergia latifolia*, *Dolichandrone falcata*, *Erythrina stricta*, *Heterophragma quadriculare*, *Lannea coromandelica*, *Schrebera swietenoides*, *soymida febrifuga*, *Tectona grandis*, *Terminalia bellirica*, *T. crenulata*, etc.

The second storey includes *Acacia torta*, *Albizia amara*, *A. chinensis*, *Balanites aegyptiaca*, *Bauhinia racemosa*, *Butea monosperma*, *Cassia fistula*, *Catunaregam spinosa*, *Diospyros melanoxylon*, *Dolichandrone falcata*, *Embelia tseriam-cottam*, *Erinocarpus nimmonii*, *Ficus hispida*, *F. retusa*, *Lagerstroemia microcarpa*, *Mangifera indica*, *Maytenus emarginata*, *Pongamia pinnata*, *Semecarpus anacardium*, *Wrightia tinctoria*, *Zizyphus glaberrima*, etc.

The common shrubs and undershrubs include *Anisomeles indica*, *Barleria prionitis*, *Boehmeria macrophylla*, *Breynia retusa*, *Carissa congesta*, *Carvia callosa*, *Cassia auriculata*, *Catunaregam spinosa*, *Clerodendrum serratum*, *Dodonaea viscosa*, *Flacourtia indica*, *Helicteres isora*, *Hyptis suaveolens*, *Kirganelia reticulata*, *Lantana camara* var. *aculeata*, *Lepidagathis cuspidata*, *Petalidium barlerioides*, *Pogostemon benghalensis*, *Rhus mysorensis*, *Tamilnadia uliginosa*, *Triumfetta rotundifolia*, *Woodfordia fruticosa*, *Zyzyphus nummularia*, etc.

The common climbers are *Acacia sinuata*, *Argyreia cuneata*, *Calycopteris floribunda*, *Capparis zeylanica*, *Cayratia elongata*, *Celatrus paniculatus*, *Combretum albidum*, *C. ovalifolium*, *Cryptolepis buchanani*, *Dioscorea hispida*, *D. oppositifolia*, *D. pentaphylla*, *Gloriosa superba*, *Jasminium auriculatum*, *J. malabaricum*, *Mucuna*

pruriens, *Oxytelma secamone*, *Paracalys scariosa*, *Rhynchosia aurea*, *Tragia plukenetii*, *Tylophora dalzellii*, *Wattakaka volubilis*, etc.

The herbaceous species are represented by *Alysicarpus hamosus*, *Argemone maxicana*, *Blainvillea acmella*, *Blepharis asperrima*, *Blumea eriantha*, *B. malcolmii*, *Borreria articularis*, *Caesulia axillaris*, *Celosia argentea*, *Centranthera indica*, *Commelina benghalensis*, *C. forsskalaei*, *Corchorus olitorius*, *Crotalaria filipes*, *Cyanotis fasciculata*, *Cyathocline purpurea*, *Desmodium gangeticum*, *Elephantopus scaber*, *Eranthemum roseum*, *Eriocaulon quinquangulare*, *Evolvulus alsinoides*, *Exacum bicolor*, *E. pedunculatum*, *Fuirena wallichiana*, *Geissaspis cristata*, *Glossocardia bosvallea*, *Goniocaulon indicum*, *Goniogyna hirta*, *Hemigraphis latebrosa*, *Justicia prostrata*, *Mollugo pentaphylla*, *Orthosiphon rubicundus*, *Phyla nodiflora*, *Phyllanthus lawii*, *Polygala persicariaefolia*, *Rungia pectinata*, *Scilla hyacinthina*, *Sclerocarpus africanus*, *Solanum indicum*, *Sopubia delphiniifolia*, *Trachyspermum stictocarpum*, *Tribulus terrestris*, *Wedelia urticaefolia*, *Xenostegia tridentata*, *Zornia gibbosa*, etc.

Some of the common grasses are *Aristida setacea*, *Arthraxon lancifolius*, *Brachiaria ramosa*, *B. reptans*, *Chloris dolichostachya*, *Chrysopogon fulvus*, *Cynodon dactylon*, *Dichanthium annulatum*, *D. kuntzeana*, *D. pertusum*, *Dinebra retroflexa*, *Eragrostiella brachyphylla*, *Eragrostis aspera*, *E. coarctata*, *E. tenella*, *E. remula*, *E. viscosa*, *Eremopogon foveolatus*, *Heteropogon contortus*, *Iseilema anthephoroides*, *Ophiuros exaltatus*, *Oplismenus burmannii*, *Perotis indica*, *Sehima nervosum*, *Setaria verticillata*, *Sporobolus capillaris*, *Themeda quadrivalvis*, etc.

The most common parasite is *Dendrophthoe falcata*. The orchids are mainly terrestrial such as *Habenaria digitata*, *H. roxburghii*, *Peristylus plantagineus* and *Zeuxine strateumatica*.

c) Babul forest:

This forest is entirely dominated by *Acacia arabica* and is found in Berar and some places of Pune division. The few associated species occur mainly where the Acacia canopy is broken, and there is usually very little undergrowth. There is a thin cover of grass and grazing is usually very high.

The representative dominant members are *Acacia arabica*, *A. eburnea*, *A. leucophloea*, *Azadirachta indica*, *Balanites aegyptiaca*, *Dichrostachys cinerea*, *Phoenix sylvestris*, *Prosopis spicigera*, *Zizyphus vulgaris*, etc. *Capparis grandis* and *Cassia auriculata* are the common shrubs whereas, *Cassia tora* is the common herb. The common grasses are *Chrysopogon fulvus*, *Dichanthium annulatum*, *Heteropogon contortus*, *Ischaemum pilosum*, etc.

d) Hardwickia forest:

These forests are dominated by *Hardwickia binata* and occur in Malegaon and Nandgaon ranges of Nasik district and in some places of Khandesh region. The forests are mostly understocked and blank. The area is maltreated, grazed and burnt and the existing growth is stunted. The grasses are also stunted due to shallow soils. The dominant trees include *Dalbergia lanceolaria*, *Garuga pinnata*, *Hardwickia binata*, *Lagerstroemia parviflora*, *Lannea coromandelica*, *Sterculia urens*, etc.

Some smaller ones include *Acacia chundra*, *Aegle marmelos*, *Albizia amara*, *A. lebeck*, *Anogerissus latifolia*, *Bauhinia racemosa*, *Boswellia serrata*, *Butea monosperma*, *Diospyros melanoxylon*, *Emblica officinalis*, *Grewia tiliaefolia*, *Wrightia tinctoria*, *Zizyphus glaberrima*, etc.

Shrubs include *Cassia auriculata*, *Grewia damine*, *G. flavescens*, *G. tenax*, *Maytenus emarginata*, *Mimosa hamata*, *Rhus mysorensis*, *Securinega leucopyrus*, etc. Bamboos are absent.

e) Dry Bamboo Brakes:

These are dominated by *Dendrocalamus strictus*, which often form dense brakes. Where grazing and other disturbances are frequent, bamboo grows in patches with grasses and other shrubs in between. This type of vegetation is generally found throughout the dry deciduous type in Maharashtra.

The common representative species are *Anogeissus latifolia*, *Boswellia serrata*, *Cochlospermum religiosum*, *Dendrocalamus strictus*, *Lannea coromandelica*, *Sterculia urens*, etc.

5. Tropical thorn forests:

Comparatively drier parts of Desh, Khandesh, Vidarbha and Marathwada, where the mean annual rainfall ranges from 35 to 80 cm and mean annual temperature from 26°C to 27°C, are occupied by this type of vegetation. These forests are blank, scattered, restricted to shallow soils and surrounded by cultivated land on all sides. These are also subjected to heavy grazing, lopping and illicit felling. The trees usually have short boles and the usual height is 6 to 9 m. There is an ill-defined lower storey of smaller trees and large shrubs, mostly spiny and often with other xerophytic characters. Climbers are few and also frequently show xerophytic adaptations. During rainy season various herbaceous plants are also found.

The common trees and shrubs of these forests are *Acacia arabica*, *A. catechu*, *A. chundra*, *A. latronum*, *A. leucophloea*, *Albizia odoratissima*, *Anogeissus latifolia*, *Azadirachta indica*, *Balanites aegyptica*, *Bauhinia racemosa*, *Capparis decidua*, *C. divaricata*, *C. zeylanica*, *Carissa congesta*, *Cassia auriculata*, *Cordia dichotoma*, *Dichrostachys cinerea*, *Dolichandrone falcata*, *Euphorbia ligularia*, *E. nivulia*, *Flacourtia indica*, *Gardenia gummifera*, *Grewia damine*, *G. tiliaefolia*, *Ixora arborea*, *Lantana camara* var. *aculeata*, *Maytenus emarginata*, *Mimosa hamata*, *Mundulea sericea*, *Opuntia dillenii*, *Prosopis spicigera*, *Rhus mysorensis*, *Strychnos potatorum*, *Zizyphus mauritiana*, etc.

The common climbers are *Aspidopterys cordata*, *Cajanus scarabaeoides*, *Capparis moonii*, *C. sepiaria*, *Cardiospermum halicacabum*, *Cocculus hirsutus*, *C. pendulus*, *Cryptolepis buchananii*, *Dioscorea bulbifera*, *D. pentaphylla*, *Mukia madaraspatana*, *Paracalyx scariosus*, *Pergularia daemia*, *Rivea hypocrateriformis*, *Wattakaka volubilis*, etc.

The common herbs met with are *Aeschynomene indica*, *Alysicarpus vaginalis*, *Biophytum sensitivum* var. *candolleianum*, *Cassia pumila*, *Cleome viscosa*, *Corchorus aestuans*, *C. trilocularis*, *Crotalaria mysorensis*, *C. nana*, *C. orixensis*, *C. vestita*, *Glossocardia bosvallea*, *Goniogyna hirta*, *Indigofera cordifolia*, *Justicia simplex*, *Launaea procumbens*, *Linum mysorensis*, *Polygala arvensis*, *P. persicariaefolia*,

Spermacoce hispida, *S. pusilla*, *Triumfetta rotundifolia*, *Zornia gibbosa*, etc.

The common grasses are *Apluda mutuca*, *Aristida funiculata*, *Arundinella pumila*, *Cymbopogon martinii*, *Cynodon dactylon*, *Dichanthium annulatum*, *Digitaria ciliaris*, *Dinebra retroflexa*, *Echinochloa colona*, *Eragrostis pilosa*, *E. unioloides*, *Heteropogon contortus*, *Ischaemum indicum*, *Melanocenchris jacquemontii*, *Sehima nervosum*, *Setaria pumila*, etc.

The ferns like *Actiniopteris radiata*, *Adiantum philippense* and *Chelidanthus farinosa* are commonly seen.

III. MONTANE SUBTROPICAL FORESTS:

6. Subtropical broadleaved hill forests:

These forests are found in the higher ghats of Sahyadris, restricted to patches or narrow strips usually over 900 m altitude. The mean annual rainfall of this region is above 300 cm and the mean annual temperature is around 20°C. The soil is humus rich and the climate is humid. Actually there is no sharp distinction between the moist mixed deciduous type and this type, the latter probably represent the post climax of the former type. Most of the forests of this type have fundamentally been altered by shifting cultivation or lopping, but where properly developed it has dense evergreen elements mixed with the deciduous elements. The trees are usually of low to medium average height (5 to 15 m) with comparatively smaller girth (up to 2 m) and spreading canopies. The representative elements are as follows:

Top storey consists of trees like *Agalala lawii*, *Albizia procera*, *Bombax ceiba*, *Celtis timorensis*, *Cinnamomum macrocarpus*, *C zeylanica*, *Dalbergia lanceolaria*, *Erythrina stricta*, *Ficus nervosa*, *Flacourtia indica*, *Garuga pinnata*, *Lannea coromandelica*, *Ligustrum perrottetii*, *Neolitsea cassia*, *Schleichera oleosa*, *Symplocos beddomei*, *Syzygium cumini*, *Terminalia bellirica*, *T. chebula*, *T. crenulata*, etc.

The members of the second storey are *Artocarpus heterophyllus*, *Atalantia racemosa*, *Bridelia retusa*, *B. squamosa*, *Butea monosperma*, *Callicarpa tomentosa*, *Canthium dicoccum* var. *umbellatum*, *Emblica*

officinalis, *Glochidion hohenackeri*, *Heterophragma quadriloculare*, *Ixora brachiata*, *Lagerstroemia parviflora*, *Macaranga peltata*, *Mallotus philippensis*, *Magnifera indica*, *Memecylon umbellatum*, *Murraya koenigii*, *Nothopodytes nimmoniana*, *Olea dioica*, etc. Two species of bamboo viz. *Bambusa arundinacea* and *Dendrocalamus strictus* also occur here.

The common shrubby elements are *Actinodaphne angustifolia*, *Allophyllus cobbe*, *Boehmeria scabrella*, *Cajanus lineatus*, *Canthium dicoccum*, *Capparis spinosa*, *Carissa congesta*, *Carvia callosa*, *Colebrookea oppositifolia*, *Crotalaria retusa*, *Glochidion hohenackeri*, *Indigodera cassioides*, *Nilgirianthus reticulatus*, *Pavetta crassicaulis*, *P. tomentosa*, *Pogostemon benghalensis*, *Scutia myrtina*, *Solanum giganteum*, *Thelepaepale ixiocephala*, *Zizyphus rugosa*, etc. The climbers are represented by *Acacia sinuata*, *A. torta*, *Clematis wightiana*, *Elaeagnus conferta*, *jasminum malabaricum*, *Piper hookeri*, *P. trichostachyon*, *Rosa multiflora*, *Rubia cordifolia*, *Smilax zeylanica*, *Tylophora dalzellii*, etc.

The herbaceous layer is represented by *Achyranthus aspera*, *Anisochilus carnosus*, *A. verticillata*, *Blepharis asperrima*, *Begonia crenata*, *Canscora decurrens*, *Curculigo orchoides*, *Cynoglossum zeylanicum*, *Euphorbia laeta*, *flemingia strobilifera*, *Hedychium coronarium*, *Hypoxis aurea*, *Leucas deodikarii*, *L. stelligera*, *Pinda concanensis*, *Pluchea senecioides*, *Polygonum plebeium* var. *indica*, *Rungia repens*, *Senecio edgeworthii*, etc.

The common grasses are *Apluda mutica*, *Arundinella pumila*, *Oplismenos burmannii*, *O. compositus*, *Sporobolus coromandelianus*, *Themeda quadrivalvis*, etc. Epiphytic ferns like *Lepisorus thunbergianus* and *Microsorium membranaceum* are frequent on *Mangifera indica* and *Memecylon umbellatum*. The orchids found in this type are *Aerides crispum*, *A. dalzelliana*, *Bulbophyllum fimbriatum*, *Dendrobium aqueum*, *D. barbatum*, *D. crepidatum*, *D. herbaceum*, *Eria dalzellii* and *Oberonia recurva*. Root parasite like *Striga gesneroides* is also available here.

CHAPTER - IV

IUCN REVISED RED DATA CATEGORIES

The revised IUCN Red List Categories prepared by the IUCN Species Survival Commission (SSC) and approved at the 40th Meeting of the IUCN Council, Gland, Switzerland in 30th November 1994 are as follows:

1. Extinct (EX):

A taxon is Extinct when there is no reasonable doubt that the last individual has died. "This can be altered to Possibly Extinct (PE) according to authors opinion".

2. Extinct in the Wild (EW):

A taxon is Extinct in the wild when it is known only to survive in cultivation, in captivity, or as a naturalised population (or populations) well outside the past range. A taxon is presumed extinct in the wild when exhaustive surveys in known and/ or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form. "This can be altered to Possibly Extinct in the Wild according to authors opinion"

3. Critically Endangered (CR):

A taxon is Critically Endangered when it is facing an extremely high risk of extinction in the wild in the immediate future, as defined by any of the criteria (A-E) described on pages 57-58.

4. Endangered (EN):

A taxon is Endangered when it is not Critically Endangered but is facing a very high risk of extinction in the wild in the near future, as defined by any of the criteria (A-E) described on pages 59-60.

5. Vulnerable (VU):

A taxon is Vulnerable when it is not Critically Endangered or Endangered but is facing a high risk of extinction in the wild in the medium

term future, as defined by any of the Criteria (A-E) described on pages 60-61.

6. Low Risk (LR):

A taxon is Low Risk when it has been evaluated and does not qualify for any of the categories Critically Endangered, Endangered or Vulnerable. Taxa included in the Low Risk category can be separated into three subcategories as follows:

a) Conservation Dependent (cd):

Taxa which are the focus of a continuing taxon-specific or habitat-specific conservation programme targeted towards the taxon in question, the cessation of which would result in the taxon qualifying for one of the threatened categories above within a period of five years.

b) Near Threatened (nt):

Taxa which do not qualify for Conservation Dependent, but which are close to qualifying for Vulnerable.

c) Least Concern (lc) :

Taxa which do not qualify for Conservation Dependent or Near Threatened.

7. Data Deficient (DD):

A taxon is Data Deficient when there is inadequate information to make a direct or indirect assessment of its risk of extinction based on its distribution and/ or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance/ or distribution is lacking. Data Deficient is therefore not a category of threat or Low Risk. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate. It is important to make positive use of whatever data are available. In many cases great care should be exercised in choosing between DD and

threatened status. If the range of a taxon is suspected to be relatively circumscribed, if a considerable period of time has elapsed since the last record of the taxon, threatened status may well be justified.

8. Not Evaluated (NE):

A taxon is Not Evaluated when it is/ has not yet been assessed against the criteria.

**THE CRITERIA FOR CRITICALLY ENDANGERED,
ENDANGERED AND VULNERABLE:**

Critically Endangered (CR):

A. Population reduction in the form of either of the following:

1. An observed, estimated, inferred or suspected reduction of at least 80% over the last 10 years or 3 generations, whichever is the longer, based on (and specifying) any of the following:
 - a) direct observation
 - b) a decline in area of occupancy, extent of occurrence and/ or quality of habitat
 - c) actual or potential levels of exploitation
 - d) the effects of introduced taxa, hybridisation, pathogens, Pollutants, competitors or parasite
2. A reduction of at least 80% projected, observed, inferred or suspected to be met within the next 10 years or 3 generations, whichever is the longer based on (and specifying) any of (b), (c), or (d) above.

B. Extent of occurrence estimated to be less than 100 sq km or area of occupancy estimated to be less than 10 sq km, and estimates indicating any two of the following:

1. Severely fragmented or known to exist at a single location.

2. Continuing decline, observed, inferred or projected, in any of the following:
 - a) extent of occurrence
 - b) area of occupancy
 - c) area, extent and/ or quality of habitat
 - d) number of locations or subpopulations
 - e) number of mature individuals
 3. Extreme fluctuations in any of the following:
 - a) extent of occurrence
 - b) area of occupancy
 - c) number of locations or subpopulations
- C. Population estimated to number less than 250 mature individuals and either:
1. An estimated continuing decline at least 25% within 3 years or 1 generation, whichever is longer or
 2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals and population structure in the form of either:
 - a) severely fragmented (i.e. no subpopulations estimated to contain more than 50 mature individuals).
 - b) all individuals are in a single subpopulation.
- D. Population estimated to number less than 50 mature individuals.
- E. Quantitative analysis showing the probability of extinction in the wild is at least 50% within 10 years or 3 generations, whichever is the longer.

Endangered (EN):

A. Population reduction in the form of either of the following:

1. An observed, estimated, inferred or suspected reduction of at least 50% over the last 10 years or 3 generations, whichever is the longer, based on (and specifying) any of the following:
Same as A.1 (a)-A.1 (d) of Critically Endangered.
2. A reduction of at least 50% projected, observed, inferred or suspected to be met within the next 10 years or 3 generations, whichever is the longer, based on (and specifying) any of (b), (c), or (d) above.

B. Extent of occurrence estimated to be less than 5,000 sq km or area of occupancy estimated to be less than 500 sq km, and estimates indicating any two of the following:

1. Severely fragmented or known to exist at no more than 5 locations.
2. Continuing decline, inferred, observed or projected, in any of the following:
Same as B.2 (a) - B.2 (e) of Critically Endangered.
3. Extreme fluctuations in any of the following:
Same as B.3 (a) - B.3 (c) of Critically Endangered.

C. Population estimated to number less than 2,500 mature individuals and either:

1. An estimated continuing decline of at least 20% within 5 years or 2 generations, whichever is longer or
2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals and population structure in the form of either:
 - a) severely fragmented (i.e. no subpopulation estimated to contain more than 250 mature individuals)
 - b) all individuals are in a single subpopulation.

- D. Population estimated to number less than 250 mature individuals.
- E. Quantitative analysis showing the probability of extinction in the wild is at least 20% within 20 years or 5 generations, whichever is the longer.

Vulnerable (VU):

- A. Population reduction in the form of either of the following:
 - 1. An observed, estimated, inferred or suspected reduction of at least 50% over the last 20 years or 5 generations, whichever is the longer, based on (and specifying) any of the following :
Same as A. 1 (a) - A. 1 (d) of Critically Endangered.
 - 2. A reduction of at least 50%, projected, observed, inferred or suspected to be met within the next 20 years or 5 generations, whichever is the longer, based on (and specifying) any of (b), (c) or (d) above.
- B. Extent of occurrence estimated to be less than 20,000 sq km or area of occupancy estimated to be less than 2,000 sq km, and estimates indicating any two of the following:
 - 1. Severely fragmented or known to exist at no more than 10 locations.
 - 2. Continuing decline, inferred, observed, or projected, in any of the following:
Same as B.2 (a) - B. 2 (e) of Critically Endangered.
 - 3. Extreme fluctuations in any of the following:
Same as B.3 (a) - B.3 (c) of Critically Endangered.
- C. Population estimated to number less than 10,000 mature individuals and either:
 - 1. An estimated continuing decline of at least 20% within 10 years or 3 generations, whichever is longer or

2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals and population structure in the form of either
 - a) severely fragmented (i.e. no subpopulation estimated to contain more than 1,000 mature individuals)
 - b) all individuals are in a single subpopulation.
- D. Population very small or restricted in the form of either of the following:
1. Population estimated to number less than 1,000 mature individuals.
 2. Population is characterised by an acute restriction in its area of occupancy (typically less than 100 sq km) or in the number of locations (typically less than 5). Such a taxon would thus be prone to the effects of human activities (or stochastic events whose impact is increased by human activities) within a very short period of time in an unforeseeable future, and is thus capable of becoming Critically Endangered or even Extinct in a very short period.
- E. Quantitative analysis showing the probability of extinction in the wild is at least 10% within 100 years.

Distinction between Extent of occurrence and Area of occupancy:

Extent of occurrence: Area contained within the shortest continuous imaginary boundary which can be drawn to encompass all the known, inferred or projected sites or present occurrence of a taxon, excluding cases of vagrancy. This can often be measured by a minimum convex polygon (the smallest polygon in which no internal angle exceeds 180° and which contains all the sites of occurrence).

Area of occupancy: Area within the 'Extent of occurrence' which is occupied by a taxon, excluding cases of vagrancy.

CHAPTER - V

ENUMERATION OF ENDEMIC AND
THREATENED TAXA

RANANCULACEAE

	<u>Genera</u>	<u>Species + Infraspecific taxa</u>
World	58	1,900
India	28	193
Maharashtra	4	11
Endemic to Maharashtra - 2 species & 1 variety.		

Delphinium malabaricum (Huth) Munz in J. Arnold Arbor. 49: 106, f. 14. 1968; Billore, Fl. Thane 1: 133. 1972 (Ph.D. Thesis, *ined.*); Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 10. 1983 et in J. Econ. Tax. Bot. 5 (1): 155. 1984; Singh & Raghavan in *ibid.* 8(1): 29. 1986; Bachulkar in Rayat Research J. 1(2): 114. 1993; Deshpande *et al.* Fl. Mahabaleshwar 1: 52. 1993; Kothari & Moorthy, Fl. Raigad 2. 1993; Rau in Sharma *et al.* (eds.), Fl. India 1: 97. 1993; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 36. 1997. *D. dasycaulon* Fresen. var. *malabaricum* Huth in Bot. Jahrb. 20: 435. 1895. *D. dasycaulon auct.non*, Fresen. 1837; Hook. f. Fl. Brit. India 1: 25. 1872; Cooke, Fl. Pres. Bombay 1:5.1958 (Repr.ed.).

var. **malabaricum**.

Herbs, erect, perennial, ca 1 m high, covered with white, strigose, deflexed hairs all over. Leaves 3-10 cm across, reniform, shallow to deeply, irregularly lobed, subglabrous above, strigose below on nerves and on margins; petioles 10-25 cm long, sheathed at base. Flowers in terminal racemes; pedicels 5-20 mm long, strigose; lower bracts 2-4 cm long, leafy, trifid; upper bracts 6-10 mm long, linear; bracteoles subulate. Sepals bright blue with a subterminal spot; upper sepal 10-14 x 5-7 mm, ovate; lateral sepals 13-16 x 7-9 mm, elliptic - obovate; lower sepals 11-13 x 5-7 mm, narrowly obovate. Upper petals ca 10 mm long, obtusely bilobed at apex; spur 7-9 mm long; lower petals ca 7 x 5 mm, rounded to oblong; claw ca

5 mm long. Follicles *ca* 1 cm long, strigulose. Seeds with papilose scaly covering.

Fls. & Frts. : August-September.

Illus.: Munz, *op. cit.*

Habitat: On exposed rocky hill slopes.

Distrib.: Endemic to MAHARASHTRA: Ahmednagar (Harishchandragarh), Pune (Junnar, Kamshet, Khandala, Purandhar, Varandha ghat), Raigad (Matheran), Satara (Jarandeshwar, Mahabaleshwar), Thane (Harishchandragarh).

Spec. exam.: Pune: Junnar, Shivneri, *Ansari* 83778, 13.10.1962; *Hemadri* 104600, 21.9.1965; Junnar, Ralegaon hill, *Hemadri* 118053, 24.9.1968; Ganesh caves, *ca* 5 km north of Junnar, *Hemadri* 118134, 27.9.1968; Purandhar, *Raghavan* 117169, 8.10.1969. Satara: Jarandeshwar hill, near Satara Road, *Mishra* 175475, 25.8.1996 (All in BSI).

Status: Vulnerable.

Criteria: Extent of occurrence estimated to be *ca* 8,000 sq km: severely fragmented populations.

Notes: Though this plant is reported from several localities, it has been put into vulnerable category due to its severely fragmented populations. In 1996 a very few individuals were noticed at Jarandeshwar hill of Satara district, whereas at Harishchandragarh it could not be located in 1998 inspite of intensive searching. Land slides and over grazing on the hill slopes are the main causes of its rarity.

It can be identified by its erect and herbaceous habit, alternate leaves, irregular flowers and spurred posterior sepal.

Delphinium malabaricum (Huth) Munz var. ***ghaticum*** Billore in Indian For. 99: 436, f.1-6. 1973; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 10. 1983 et in J. Econ. Tax. Bot. 5 (1): 155. 1984; Singh & Raghavan in *ibid.* 8 (1): 29. 1986; Ahmedullah & Nayar, Endemic Pl.

Indian Reg. 1: 69. 1987; Rau in Sharma *et al.* (eds.), Fl. India 1: 97. 1993; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 36. 1997.

Types: Holotype: India, Maharashtra, Thane, Vihigaon forest range, Dhamni hill, near Mokhada, *Billore* 112948 A, 19.10.1967 (CAL!). Isotypes: 112948 B-D (BSI!). Paratypes: Pune, Khadkalla, 20 miles west of Pune, *Kanitkar s.n.*, 20.9.1890; Cooke, *s.n.*, September, 1892; Manjiri nursery, *Ryan* 1425 A-B, 15.10.1906 (All in BSI!).

Very similar to var. *malabaricum*, but can be distinguished by its bright yellowish tomentum, 10-12 mm long spur, glabrous follicles, and rugulose seeds without scaly covering.

Fls. & Frts. : August-September.

Illus.: Billore, *op. cit.*

Habitat: On exposed rocky slopes along the ghats.

Distrib.: Endemic to MAHARASHTRA: Pune (Khadkalla), Thane (Dhamni hill).

Spec. exam.: Types, as above.

Status: Critically Endangered.

Criteria: Area of occupancy less than 10 sq km: severely fragmented populations.

Notes: This variety has been reported only from its two type localities of Pune and Thane districts so far. Recently during 1996-1998 hectic tours were conducted to different parts of these two districts but it could not be located at any place. At the type localities its distribution also was reported as rare.

Thalictrum dalzellii Hook. Ic. Pl. 9, t. 868. 1852; Hook. f. & Thoms in Hook. f. Fl. Brit. India 1: 13. 1872; Cooke, Fl. Pres. Bombay 1: 4. 1958 (Repr.ed.); Billore, Fl. Thane 1: 136. 1972 (Ph.D. Thesis, *ined.*); Vartak in Jain & Rao (eds.), Ass. Threat. Pl. India 171. 1983; Ahmedullah &

Nayar, Endemic Pl. Indian Reg. 1: 69. 1987; Kulkarni, Fl. Sindhudurg 12. 1988; Ansari, A.A. in Nayar & Sastry (eds.), Red Data Book Indian Pl. 3. 210, f. 1990; Deshpande *et al.*, Fl. Mahabaleshwar 1: 53. 1993; Rau in Sharma *et al.* (eds.), Fl. India 1: 134. 1993; Almeida, M.R., Fl. Maharashtra 1:6. 1996; Anon., India Glob. Threat. Taxa 58. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 36. 1997; Pradhan & Singh, Fl. Ahmednagar 86. 1999.

Herbs, up to 45 cm high, erect; stem and branches glabrous, grooved. Leaves 3-foliolate, uppermost sessile, usually 1-foliolate; leaflets 2.5-6 cm across, mostly suborbicular, cordate or reniform with a deep acute sinus, margins crenately and irregularly lobed and toothed, nerves and veins prominent on both surfaces; petioles up to 5 cm long, deeply grooved, glabrous; stipules membranous. Flowers *ca* 6 mm across, in small leafy panicles crowded at the ends of branches. Sepals 4, petaloid, white. Petals absent. Achenes shortly stalked, narrowly oblong, deeply furrowed, glabrous.

Fls. & Frts. : July-September.

Illus.: Ansari, A.A., *op. cit.*

Habitat: On steep slopes at an altitude of over 1,200 m.

Distrib.: Endemic to Karnataka, MAHARASHTRA: Ahmednagar (Harishchandragarh, Kalsubai), Pune (Purandhar, Raireshwar), Satara (Mahabaleshwar, Panchgani), Sindhudurg (Vengurla). Thane (Harishchandragarh).

Spec. exam.: Ahmednagar: Kalsubai hill, *Mishra* 176986, 9.9.1998 (BSI). Pune: Purandhar, *Santapau* 11419, 8.10.1950; *Irani* 1042, 18.8.1955 (Both in BLAT); *Jain* 4195, 25.7.1956; *Rolla* 88618, 19.7. 1963 (Both in BSI). Satara: Panchgani, *Sedgwick* 7912, August, 1921 (BLAT). Thane: Tokavade range, Harishchandragarh, Kedarnath hill slope, *Billore* 115961, 20.11.1968 (BSI).

Status: Endangered (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Extent of occurrence estimated to be *ca* 3,000 sq km: a) severely fragmented populations, b) declension in the number of subpopulation.

Notes: This species might have been vanished from Sindhudurg district because after Dalzell's collection no one could relocate it from this place even after intensive searching. In its other localities, except Harishchandragarh and Kalsubai its distribution is severely fragmented. At Harishchandragarh and Kalsubai it is to some extent frequent on the hill slopes. Landslide is the major threat of this species.

This species can be distinguished by its non fimbriate stipules and oblong sepals.

Thalictrum obovatum Blatt. in J. Asiat. Soc. Bengal (n.s.) 26: 339. 1930; Deshpande *et al.*, Fl. Mahabaleshwar 1: 53. 1993; Rau in Sharma *et al.* (eds.), Fl. India 1: 138. 1993; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 36. 1997.

Types: Lectotype: India, Maharashtra, Satara, Mahabaleshwar, *Ankadi* P-26, 12.7.1925. Syntype: Mahabaleshwar, *Ankadi* P-26A, 12.7.1925 (Both in BLAT!).

Herbs, erect, up to 45 cm high, glabrous. Leaves 1-2-foliolate at apex, 3-foliolate at base; leaflets *ca* 3 cm across, reniform with a deep sinus, crenate or irregularly lobed or dentate, glabrous; stipules *ca* 1 cm long, oblong, acute, adnate to petiole. Flowers in leafy panicles, crowded at ends of branches, scented. Perianth parts 4-5, obovate, clawed, white. Achenes stipitate, flat.

Fls. & Frts. : July-August.

Habitat: In ghat regions at high altitude

Distrib.: Endemic to MAHARASHTRA: Satara (Mahabaleshwar).

Spec. exam.: Types, as above.

Status: Critically Endangered.

Criteria: Area of occupancy less than 10 sq km: found only at a single location.

Notes: This species is known only by its type collections. During 1996-1998 intensive efforts were made to collect it but in vain. However, further explorations are needed.

Its fimbriate stipules and broadly obovate sepals can differentiate it.

MALVACEAE

	<u>Genera</u>	<u>Species + Infraspecific taxa</u>
World	116	2,300
India	22	93
Maharashtra	15	61
Endemic to Maharashtra - 1 species		

Abutilon ranadei Woodr. & Stapf in Kew Bull. 1894: 99. 1894; Cooke, Fl. Pres. Bombay 1: 101. 1958 (Repr.ed.); Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 4. 1983 et in J. Econ. Tax. Bot. 5 (1): 156. 1984; Singh & Raghavan in *ibid.* 8(1): 30. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 79. 1987; Paul & Nayar in Nayar & Sastry (eds.), Red Data Book. Indian Pl 1: 198, f. 1987 et in Nayar *et al.* (eds.), Fasc. Fl. India 19: 95. 1988; Mistry & Almeida in J. Bombay nat. Hist. Soc. 86 (3): 478. 1989; Bachulkar in Rayat Research J. 1 (2): 113. 1993; Paul in Sharma *et al.* (eds.), Fl. India 3: 273. 1993; Almeida, M.R., Fl. Maharashtra 1: 102. ; Anon., India Glob. Threat. Taxa 2. 1996; Bachulkar & Yadav in J. Bombay nat. Hist. Soc. 94: 591. 1997; Yadav in Pokle *et al.* (eds.), Flow Pl. Syst. Diver. pt. 1: 37. 1997.

Types: Holotype: India, Maharashtra, Ratnagiri, Ambaghat, *Ranade s.n.*(K). Isotypes (CAL, BLAT).

Undershrubs, *ca* 120 cm high; young portion of stem densely pubescent with minute stellate hairs, mature portion glabrous. Leaves 4-20 x 3-15 cm, ovate to round-ovate, cordate at base, acute to acuminate at apex, margins crenate to dentate, 7-11-nerved at base, both surfaces stellate hairy; stipules *ca* 5 mm long, linear, stellate pubescent, deciduous. Flowers

solitary, axillary; pedicels 1.5-3 cm long, densely stellate pubescent. Calyx *ca* 1.5 cm across, campanulate, connate in middle, lobes *ca* 2 x 0.5 cm, stellate hairy. Corolla *ca* 2.5 cm across, campanulate, orange yellow.

Fls. & Frts. : November-January.

Illus.: Paul & Nayar, *op. cit.*

Habitat: On laterite soils in open places.

Distrib.: Endemic to MAHARASHTRA: Pune (Dongarwadi, Shilim, Shirwata, Torna, Vadivale dam catchment area), Ratnagiri (Amba ghat), Satara (Vasota fort); Sindhudurg (Amboli).

Spec. exam.: Ratnagiri: Amba ghat, without Coll. name & number, 18.12.1893, Acc. No. 7115 (BSI); *M.R. Almeida* 17843, March, 1994 (BLAT).

Status: Critically Endangered.

Criteria: Area of occupancy less than 10 sq km: severely fragmented populations.

Notes: Up to 1988 this species was considered to be extinct (Ahmedullah & Nayar, *op. cit.* and Paul & Nayar, *op. cit.*), because after 1901 it could not be recollected either from its type locality or from adjoining areas. However, in 1989 Mistry & Almeida (*op.cit.*) recollected the species from its type locality and proved that it was not extinct. Later in 1993 it was collected from Vasota fort of Satara district (Bachuikar, *op. cit.*), for the first time outside of its type locality. Here the collector noticed *ca* 25 individuals in about 1 sq km area. In 1997 *ca* 20 mature individuals, in vegetative condition were located at its type locality. Here also its area of occupancy not more than 1 sq km. However, Punekar & Kavade (1999, *ined.*) and Jagdale (2000, *ined.*) collected this plant for the first time from Pune district (Dongarwadi, Shirwata and Vadivale dam catchment area). Recently, the species has been collected from two new localities of the same district (Torna fort and Shilim, *Lakshminarasimhan, Diwakar & Prassana* 182301, 7.3.2001 and 182303, 8.3.2001 respectively, *ined.* BSI). In these two localities *ca* 300 mature individuals and *ca* 130 seedlings are distributed in an area of about 3 sq km. This

interesting species is also collected from Sindhudurg district (Amboli, *Diwakar & Moorthy* 182306, 22.3.2001, *ined.* BSI) where *ca* 7 individuals were noticed in about 200 sq m area. This plant bears beautiful and showy flowers and hence, it can be conserved by introduction in gardens as an ornamental plant.

This species can be distinguished by its number of carpels (only 5) and long as well as glabrous staminal tube.

Decaschistia trilobata Wight, *Icon.* t. 88. 1838; Mast. in Hook. f. *Fl. Brit. India* 1:332. 1874; Cooke, *Fl. Pres. Bombay* 1: 109. 1958 (Repr.ed.); Mistry, *Fl. Ratnagiri* 1: 38. 1986 (Ph.D. Thesis, *ined.*); Ahmedullah & Nayar, *Endemic Pl. Indian Reg.* 1: 79. 1987; Kulkarni, *Fl. Sindhudurg* 40. 1988; Nayar *et al.* in Nayar & Sastry (eds.), *Red Data Book Indian Pl.* 2: 150, f. 1988; Paul & Nayar in Nayar *et al.* (eds.), *Fasc. Fl. India* 19: 106. 1988; Almeida in *J. Econ. Tax. Bot. Addl. Ser.* 8 (1), *Fl. Savantwadi* 1: 59. 1990; Paul in Sharma *et al.* (eds.), *Fl. India* 3: 300. 1993; Almeida, M.R., *Fl. Maharashtra* 1:105. 1996. Yadav in Pokle *et al.* (eds.), *Flow. Pl. Syst. Diver.* pt. 1: 37. 1997.

Shrubs, erect, 1-1.5 m high, tomentose and with fulvous stellate hairs. Middle and lower leaves deeply 3-lobed; lobes 4-8 x 1-2.5 cm, lanceolate to oblong-lanceolate, acute or mucronate at apex, margins dentate, prominently nerved and veined beneath; petioles very short; stipules *ca* 2 cm long, linear-subulate, often bi-or tri-fid. Flowers axillary, solitary or clustered; pedicels *ca* 6 mm long; bracteoles equal or shorter than the half of the calyx. Corolla *ca* 5 cm in diameter, yellow with purple centre, hairy outside. Capsules 8-10 x 10-15 mm, densely hairy. Seeds reniform, smooth.

Fls. & Frts. : October-February.

Illus.: Wight, *op. cit.* ; Nayar *et al.*, *op. cit.*

Habitat: Along roadsides and in open areas at high altitudes.

Distrib.: Endemic to Goa, Karnataka, Kerala, Tamil Nadu, MAHARASHTRA: Kolhapur (Dajipur, Radhanagari), Ratnagiri (Kumbharli ghat), Sindhudurg (Amboli, Phonda ghat, Ramghat).

Spec. exam.: Kolhapur: Along road sides, from Kadamwadi to Radhanagari, *Mishra* 176870, 28.8.1997. Sindhudurg: Amboli, Chaukul Road, *Kulkarni* 107965, 9.11.1965; Amboli, way to Hiranyakeshi, *Kulkarni* 119092, 27.10.1969; Ram ghat top, near Klagotre, *Kulkarni* 120018, 10.2.1970; Amboli, Mahadevgad, *Kulkarni* 121555, 9.10.1970 (All in BSI).

Status: Low Risk.

Notes: This species was considered as rare and included in the Red Data Book (*op. cit.*). However, from recent explorations it has been realised that it is one of the common shrubs particularly in Kolhapur and Sindhudurg districts. Hence, it has been excluded from threatened categories.

Its deeply 3-lobed leaves and bracteoles much shorter than calyx can distinguish this species.

TILIACEAE

	<u>Genera</u>	<u>Species + Infraspecific taxa</u>
World	50	725
India	8	53
Maharashtra	5	36

Erinocarpus nimmonii Grah. ex Dalz. & Gibs. Bombay Fl. 27. 1861; Mast. in Hook. f. Fl. Brit. India 1: 394. 1874; Cooke, Fl. Pres. Bombay 1: 155. 1958 (Repr.ed.); Nayar in Bull. Bot. Surv. India 22 (1-4): 19. 1980; Kulkarni, Fl. Sindhudurg 50. 1988; Ahmedullah & Nayar in Nayar & Sastry (eds.), Red Data Book Indian Pl. 3: 257, f. 1990, Almeida in J. Econ. Tax. Bot. Addl. Ser. 8(1), Fl. Savantwadi 1: 68. 1990; Daniel & Chandrabose in Sharma *et al.* (eds.), Fl. India 3: 490. 1993; Deshpande *et al.*, Fl. Mahabaleshwar 1: 96. 1993; Kothari & Moorthy, Fl. Raigad 40. 1993; Almeida, M.R., Fl. Maharashtra 1: 152. 1996; Anon., India Glob. Threat. Taxa 26. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 37. 1997. 'Chaora' 'Cher.

Trees, deciduous, 5-9 m tall. Leaves ca 12 cm across, broadly ovate to orbicular, 3-5-lobed, usually cordate at base, glandular dentate, hairy on

nerves beneath, 2 glands on either side of leaf-base; petioles 5-8 cm long; stipules ovate- acuminate to linear-lanceolate. Flowers in terminal lax panicles, sometimes axillary, solitary, pedicels jointed; bracts *ca* 10 x 7 mm, broadly elliptic, rusty pubescent. Sepals 5, *ca* 3 x 0.3 cm, oblong in bud, becoming linear-lanceolate at maturity. Petals 5, *ca* 2.5 x 0.7 cm, ovate-spathulate, glandular near base, yellow. Fruits *ca* 5 x 3.5 cm, woody, triquetrous, winged on angles, spinescent. Seeds 1 in each locule.

Fls. & Frts. : August-December.

Illus.: Ahmedullah & Nayar, *op. cit.*.

Habitat: In moist deciduous to semi-evergreen forests.

Distrib.: Endemic to Goa, Gujarat, Karnataka, Tamil Nadu, MAHARASHTRA: Kolhapur, Nasik, Pune, Raigad, Satara, Sindhudurg, Thane.

Spec. exam.: Kolhapur: Nagalbet, 15 km from Chandgad, *Kulkarni* 131587, 10.8.1971. Nasik: Sawarna, *Cherian* 111406, 15.9.1967. Pune: Khandala, *Wadhwa* 64067, 31.8.1960; Bhoma hill, Rolla 78881, 8.3.1962; Ambavane forest, *Reddi* 95920, 2.2.1964. Raigad: Neral-Matheran Rly. line, *Wadhwa* 64127, 4.8.1960; Mahad, Varandha ghat, *Kothari* 144105, 15.10.1970; Roha, Sanegaon forest, *Kothari* 155967, 27.9.1978; On way from Pachhad to Raigad fort, *Mishra* 176961, 8.10.1997. Satara: Koyna, *Kochhar* 157995, 30.11.1978; Khambil-Chorghe ghat, *Deshpande* 162578, 26.9.1983; Morgiri, *Deshpande* 166612, 5.12.1983. Sindhudurg: Keraude, near Dukanwadi, *Kulkarni* 106448, 13.11.1965; Ramghat, *Kulkarni* 120491, 27.5.1970; Phonda ghat, *Kulkarni* 121440, 4.10.1970. Thane: Jawahar, Sakharshet forest, *Billore* 111761, 4.9.1967; Podgha range, Dighashi R.F., *Billore* 116275, 21.7.1968; Vada range, Doha R.F., *Billore* 116638, 11.9.1968.

Status: Low Risk.

Notes: This species is widely distributed throughout the Western Ghats. In Maharashtra also it is quite common. Hence it has been excluded from Red list categories as mentioned in Red Data Book. (*op. cit.*).

MALPIGHIACEAE

	<u>Genera</u>	<u>Species + Infraspecific taxa</u>
World	68	1,100
India	4	25
Maharashtra	3	7

Aspidopterys canarensis Dalz. in Hook. Kew J. Bot. 3: 37. 1851; Hook. f. Fl. Brit. India 1: 420. 1874; Woodr. in J. Bombay nat. Hist. Soc. 11: 265. 1897; Cooke, Fl. Pres. Bombay 1: 168. 1958 (Repr.ed.); Blatt. in J. Bombay nat. Hist. Soc. 34 (4): 894. 1931; Srivastava in J. Econ. Tax. Bot. 6(1): 61. 1985 et in Nayar & Sastry (eds.), Red Data Book India Pl. 1: 194, f. 1987; Almeida, M.R., Fl. Maharashtra 1: 181. 1996; Anon. India Glob. Threat. Taxa 8. 1996; Srivastava in Hajra *et al.* (eds.), Fl. India 4: 3, f. 1. 1997; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 38. 1997. *A. glomerata* Wight, Icon. t. 1986. 1853.

Shrubs, climbing; branches glabrous. Leaves 5.5-10.5 x 2.5-6 cm, elliptic-lanceolate, acute or rounded at base, acuminate at apex, margins repand, glabrous when old; petioles 3-8 mm long, channeled, glabrous. Flowers in axillary, 5-10-flowered fascicles; pedicels 4-5 mm long, slender, puberulent, rusty, non-articulated. Sepals *ca* 1 x 0.75 mm, ovate, obtuse. Petals *ca* 4 x 2 mm, oblong white. Samara 3.5 - 4 x 3-3.5 cm, suborbicular, membranous, pale yellowish-brown, truncate at top; nucleus with a dorsal wing.

Fls. & Frts. : March-June.

Illus.: Srivastava, *op. cit.*

Habitat: Along ghats (800-2000 m) in shady areas of evergreen forests.

Distrib.: Endemic to Karnataka, Kerala, Tamil Nadu, MAHARASHTRA: Ratnagiri (Kumpta).

Spec. exam.: Ratnagiri, Kumpta, M.R. Almeida *s.n.*, March, 1994 (BLAT).

Status: Critically Endangered (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Area of occupancy less than 10 sq km: found only at a single location.

Notes: This species was first collected and described from Bombay (Maharashtra) by Dalzell. But except the type specimen it was not collected later from any part of Maharashtra. Hence, Srivastava in Red Data Book (*op. cit.*) raised doubt about its survival in this state. But recently in 1994, M.R. Almeida (*op. cit.*) collected this plant from a single spot of Ratnagiri district. However, during the consultation of index cards in B S I, two other localities of this species viz. Sinhadgad and Khadakvasla in Pune district were recorded (Raghavan 64703 & 64710, 17.9.1960). But surprisingly these two specimens could not be traced. Due to lack of representative specimens these two localities have not been considered here.

This species differs from others in its nucleus of samara with additional wing on dorsal surface.

CELASTRACEAE

	<u>Genera</u>	<u>Species + Intraspecific taxa</u>
World	94	1,300
India	13	67
Maharashtra	10	21
Endemic to Maharashtra - 1 species		

Maytenus puberula (Laws.) Loes. in Eng. & Prantl, Nat. Pflanzenf. (ed.2) 206: 136. 1942; Billore, Fl. Thane 1: 251. 1972 (Ph.D. Thesis, *ined.*); Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 7. 1983 et in J. Econ. Tax. Bot. 5(1): 157. 1984; Singh & Raghavan in *ibid.* 8(1): 30. 1986; Almeida in J. Econ. Tax. Bot. Addl. Ser. 8(1), Fl. Savantwadi 1: 94. 1990; Almeida, M.R., Fl. Maharashtra 1: 243, f. 1996. *Gymnosporia puberula* Laws. in Hook. f. Fl. Brit. India 1: 619. 1875; Cooke, Fl. Pres. Bombay 1: 246. 1958 (Repr.ed.).

Shrubs; branches unarmed, puberulous. Leaves 5-7 x 2.5-3 cm, obovate, tapering and acute at base, acute or acuminate at apex, margins serrate-crenate, glabrous above, hispid on nerves and veins beneath; petioles 3-6 mm long. Flowers in slender, 2.5-5 cm long dichotomous cymes, which are axillary or fascicled at the ends of short branches; pedicels slender; bracts lanceolate, acute. Calyx deeply divided, lobes suborbicular. Petals 2 mm long, elliptic, obtuse. Fruits *ca* 8 mm long, obovoid.

Fls. & Frts. : July-December.

Illus.: Almeida, *op. cit.*

Habitat: Along forest margins.

Distrib.: Endemic to Karnataka, MAHARASHTRA: Pune (Purandhar), Raigad (Pratapgarh fort), Sindhudurg (Amboli, Ramghat), Thane (Deodal forest bassein, Manoli forest, Parol forest, Tungar, Virar).

Spec. exam.: Pune: Purandhar hill side, *Ryan* 469, 20.12.1905 (BSI). Raigad: Pratapgarh fort, *Bhide* 1209, 21.11.1902. Sindhudurg: Amboli, *Almeida* 3081, 13.10.1980 (Both in BLAT). Thane: Deodal forest basin, *Ryan* 1022, 5.7.1903; Parab forest, *Ryan* 1024, 9.7.1903; Thane, *Talbot* 5155, 20.8.1907 (All in BSI).

Status: Endangered (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Extent of occurrence estimated to be *ca* 5,000 sq km: a) severely fragmented populations, b) declension in the number of subpopulations.

Notes: From Pratapgarh and Purandhar this species was last collected in 1902 and 1905 respectively. Later, though these two places were botanized several times, it could not be recollected. It seems the plant might have been vanished from these two places. Hence, these two localities have not been considered during measuring the extent of occurrence. However, in the recent years this species was collected from several localities of Sindhudurg (*Almeida, op.cit.*) and Thane districts (*M.R. Almeida, op. cit.*).

It can be distinguished by its unarmed nature, membranaceous leaves and dichotomous cymes.

Salacia brunoniana Wight & Arn. Prodr. 105. 1834; Lawson in Hook. f. Fl. Brit. India 1: 626. 1875; Cooke, Fl. Pres. Bombay 1: 251. 1958; Raju in J. Biol. Sci. 8: 57. 1965; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 5. 1983 et in J. Econ. Tax. Bot. 5(1): 157. 1984; Singh & Raghavan in *ibid.* 8(1): 30. 1986; Kulkarni, Fl. Sindhudurg 79. 1988; Almeida in J. Econ. Tax. Bot. Addl. ser. 8(1), Fl. Savantwadi 1: 96. 1990; Almeida, M.R., Fl. Maharashtra 1: 247. 1996.

Shrubs, scandent; branches terete. Leaves oblong or elliptic, acute at base, acuminate or subobtusate at apex, margins minutely serrate, coriaceous, black when dry; petioles *ca* 6 mm long. Flowers 1 or 2 from an axillary tubercle; pedicels almost equalling the petioles. Calyx with 5 short, blunt teeth. Petals ovate from a broad base, sessile, coriaceous, greenish, somewhat persistent, margins entire and incurved (when dried).

Fls. : January-March.

Habitat: In forests at high altitude.

Distrib.: Endemic to MAHARASHTRA: Sindhudurg (Amboli, Ramghat).

Status: Critically Endangered.

Criteria: Area of occupancy less than 10 sq km: found only at a single location.

Notes: Earlier this species was collected from Ramghat by Dalzell & Gibson (Cooke, *op.cit.*) and later from Amboli (S.M. Almeida 5204, BLAT & M.R. Almeida 2922, BNHS), the two adjoining places. Here, its distribution was reported as rare.

Its scandent nature and 1-2 flowers from axillary tubercles can distinguish this species.

RHAMNACEAE

	<u>Genera</u>	<u>Species + Infraspecific taxa</u>
World	58	900
India	15	68
Maharashtra	8	24
Endemic to Maharashtra - 2 varieties.		

Ventilago madraspatana Gaertn. var. **fructifida** Sant. in Kew Bull. 1949: 340. 1949 et in Rec. Bot. Surv. India 16 (1), Fl. Khandala 42. 1967 (3rd Rev. ed.); Ban. & Mukh. in Indian For. 96: 208. 1970; Bhandari & Bhansali in Nayar *et al.* (eds.), Fasc. Fl. India 20: 87. 1990.

Types: Holotype: India, Maharashtra, Pune, Khandala, *Garade 1*, 22.3.1905 (College of Science, Poona). Isotypes & Paratypes: Khandala, *Garade 2,3 & 41* (BLAT!).

Shrubs, climbing; branches grey or ferruginous puberulous. Leaves *ca* 7 x 3.8 cm, elliptic to oblong-lanceolate, bluntly acuminate, crenate from half way above, glabrescent, midvein hairy, lateral nerves 6-8 pairs. Flowers minute, fascicled in axillary panicles; bracts caducous; bracteoles subglomerulate-linear. Calyx lobes 5, triangular, keeled within at apex, villous outside, glabrous inside. Petals *ca* 1 mm long, obovate above, membranaceous. Fruits *ca* 5.5 x 1 cm, globose, glabrescent, leathery, apex bifid and divergent, splitting comes down for about 1 cm. Seed 1 per chamber, *ca* 4 mm in diameter globose, brownish-black.

Fls. & Frts. : March-May.

Illus.: Endemic to MAHARASHTRA: Pune (Khandala).

Spec. exam.: Pune: Khandala, ravine below Echo point, *Santapau* 12767, 5.5.1951; Khandala, Water pipe, *Irani* 4972, 25.5.1960 (Both in BLAT).

Status: Critically Endangered.

Criteria: Area of occupancy less than 10 sq km: found only at a single location.

Notes: This variety is reported only from Khandala of Pune district so far. Here its distribution is also very much fragmented. Elimination of its host trees due to deforestation is responsible for its present status.

This variety differs from the typical variety in having the wing of the fruits deeply bifid at apex.

Ziziphus rugosa Lam. var. *glabra* Bhandari & Bhansali in Nayar *et al.* (eds.), Fasc. Fl. India 20: 109. 1990.

Type: India, Maharashtra, Raigad, Matheran, *Irani* 2891, 12.2.1959 (BLAT!).

Shrubs or small trees, 3-6 m tall; young parts fulvous tomentose; spines solitary, recurved, tomentose except tips. Leaves dark green, closely serrate, acute at apex, glabrous on both surfaces except a few hairs on nerves beneath, basally 3-nerved. Flowers in *ca* 30 cm long terminal or axillary panicles; peduncles densely tomentose; pedicels 5- 7 mm long, densely tomentose. Calyx lobes 5, 1.5-2 mm long, pubescent outside. Disc and ovary glabrous. Drups 6-12 mm long, ovoid to globose, fleshy. Seeds compressed, black.

Fls. & Frts. : January-February

Distrib.: Endemic to MAHARASHTRA: Pune (Khandala), Raigad (Matheran).

Spec. exam.: Pune: Khandala, Lon. Hone soldiers Cr. Field, *Santapau* 3618, 4.3.1944 (BLAT).

Status: Data Deficient.

Notes: This variety has been described based on herbarium specimens deposited at BLAT. However, sufficient field information for determining its actual status is lacking. Hence, further explorations are needed.

This variety can be differentiated by its acute, serrate and almost glabrous leaves (few hairs on nerves beneath) as well as glabrous disc and ovary.

FABACEAE

	<u>Genera</u>	<u>Species + Infraspecific taxa</u>
World	800	19,000 spp.
India	198	1248 spp
Maharashtra	72	345
Endemic to Maharashtra - 11 species & 3 varieties (Including Caesalpiaceae and Mimosaceae).		

Alysicarpus luteo-vexillatus Naik & Pokle in J. Econ. Tax. Bot. 7(3): 670, f. 1. 1985; Sanjappa, Legumes India 79. 1991; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 41. 1997; Naik, Fl. Marathwada 1: 245. 1998.

Types: Holotype: India, Maharashtra, Parbhani, Yeldari, *Madhukar* 5473 a. *Isotypes:* 5473 b-c (All in MUA!).

Herbs, annual, erect or decumbent, much branched, 15-40 cm long. Leaves 1.5 - 3.5 x 0.8-1.2 cm, elliptic-oblong, obtuse or rounded at apex, glabrous above, hispid beneath; petioles 2-3 mm long; stipules 3-3.5 mm long, ovate. Flowers in leaf-opposed, slender, lax racemes, reaching up to 15 cm long; bracts *ca* 3.5 mm long, deciduous; pedicels 1-2 mm long. Calyx *ca* 4 mm long, 5-partite. Corolla slightly exerted beyond the calyx; standard broadly ovate or orbicular, uniformly yellow or with red, narrow margins; wings and keels pink in colour. Pods 1-1.5 cm long, 2-4-jointed; joints longer than broad, faintly rugose, conspicuously 4-winged.

Fls. & Frts. : September-November.

Illus.: Naik & Pokle, *op.cit.*

Habitat: On gravelly slopes of hills and in drier parts.

Distrib.: Endemic to MAHARASHTRA: Throughout Marathwada region.

Spec.exam.: Types, as above.

Status: Vulnerable.

Criteria: Extent of occurrence estimated to be *ca* 12,000 sq km: severely fragmented populations.

Notes: This species is probably of recent origin and slowly getting established in this state. So far it is restricted only in the Marathwada region and according Naik (by personal communication) its distribution is very much sporadic.

It can be differentiated by its yellow standard petal and faintly rugose pods with joints that are longer than broad and capiously 4-winged.

Alysicarpus narimanii S.M. Almeida & M.R. Almeida in J. Bombay nat. Hist. Soc. 85 (2): 394, f.2. 1988.

Types: Holotype: India, Maharashtra, Pune, Khandala, *Santapau* 2982, 18.10.1943. Paratype: Bombay, Trombay, *Shah* 10593, 22.9.1962 (All in BLAT!).

Herbs, erect or decumbent, slender, branched, 50-90 cm high; stems striate, with 2 prominent ribs, hairy. Leaves 2-3 x 0.5-0.8 cm, ovate to linear-oblong, rounded at base, shortly mucronate at apex, hairy on margins and on both sides of mid-vein; petioles *ca* 5 mm long, slender; stipules 2-2.5 cm long, linear-lanceolate, acuminate. Flowers in axillary and terminal, slender racemes; bracts 5-7 x *ca* 2 mm, broadly ovate; pedicels *ca* 2 mm long, slender. Calyx tubular; sepals 5, 5-7 x *ca* 1 mm, linear-oblong. Corolla dark straw coloured, membranous. Pods 3-3.5 cm long, 4-6-jointed; joints flat, compressed, sometimes quadrangular. Seeds rounded, brown, smooth.

Fls. & Frts. : September-October.

Illus.: S.M. Almeida & M.R. Almeida, *op.cit.*

Distrib.: Endemic to MAHARASHTRA: Bombay (Trombay), Pune (Khandala).

Spec.exam.: Types, as above.

Status: Data Deficient.

Notes: This species was described in 1988, based on Santapau's collection from Khandala. Thereafter, there is no report of this plant and its distribution pattern is also unknown. Efforts were made to collect it during 1996-1997 but in vain. It needs further explorations before categorisation.

It can be distinguished by its distantly arranged flowers on rachis, acuminate sepals with bulbous-based hairs that almost cover the entire pod and pods reticulately veined except on triangular prolongation from apical segment.

Alysicarpus salim-alli S.M. Almeida & M.R. Almeida in J. Bombay nat. Hist. Soc. 85 (2): 400, f. 4. 1988.

Types: Holotype: India, Maharashtra, Nasik, Leni hill, *Blatter* 9376, September, 1917. Isotype: Leni hill, *Blatter* 10034*, September, 1917 (Both in BLAT!).

Herbs, erect, branched, up to 50 cm high. Leaves *ca* 4.2 x 1.6 cm, oblong, rounded at base, obtuse at apex, hairy on both surfaces; petiole 3-4 mm long, densely hairy; stipules 1-1.5 x 0.3-0.4 cm, lanceolate, acuminate at apex. Flowers in leaf opposed and terminal lax racemes; rachis 3-11 cm long, densely hairy; bracts 1-1.5 x 0.4-0.5 cm; pedicels *ca* 6 mm long, sparsely hairy. Sepals 5, *ca* 1 cm long, hairy at apex. Petals 5; standard 7-8 x 2-3 mm, broadly ovate, glandular. Pods 8-10 mm long, 2-3-jointed, almost covered by calyx.

Fls. & Frts.: September.

Illus.: S.M. Almeida & M.R. Almeida, *op.cit.*.

Distrib.: Endemic to MAHARASHTRA: Nasik (Leni hill).

Spec.exam.: Types, as above.

* In the protologue of this species, specimen *Blatter* 10034 is designated as 'isotype'. This cannot be 'isotype' as the collection is different from that of the holotype (*Blatter* 9376). Hence, this one is paratype only.

Status: Data Deficient.

Notes: This species was described in 1988, based on herbarium specimen collected by Blatter from Nasik district. But, sufficient field information is lacking, for its categorisation. Hence, more explorations are needed.

This species differs from its allied species [*A. scariosa* (Syn. *A. rugoso* DC. var. *styracifolia* Baker)] in its lax racemes in which flowers are remotely arranged.

***Alysicarpus tetragonolobus* Edgw. var. *pashanensis* S.M. Almeida & M.R. Almeida in J. Bombay nat. Hist. Soc. 85 (2): 402, f. 5. 1988.**

Types: Holotype: India, Maharashtra, Pune, Pashan lake, *Panthaki* 2009, 12.11.1954. (BLAT!). Isotype, (BLAT!).

Herbs, erect, branched, 20-30 cm high; stems striate, hairy on one side. Leaves 2.5-3.5 x ca 0.5 cm, rounded at base, acute at apex, hairy on margins and both sides of mid vein; petioles 2-3 mm long, stipellate; stipules 5-7 x ca 2 mm, triangular, acuminate at apex. Flowers few in terminal racemes. Corolla straw coloured, shining; standard ca 8 x 3 mm, broadly ovate, membranous. Pods exserted, 3-5-jointed; joints oblong, rough, with irregularly folded thick ribs.

Fls. & Frts. : November.

Illus.: S.M. Almeida & M.R. Almeida, *op.cit.*.

Distrib.: Endemic to MAHARASHTRA: Pune (Pashan).

Spec.exam.: Types, as above.

Status: Data Deficient.

Notes: This variety was described in 1988, based on herbarium specimen collected by Panthaki from Pashan near Pune city. But due to paucity of sufficient field information, it cannot be categorised. Efforts were made to collect it during 1997-1998 but yielded nothing. However, it needs further explorations.

It can be differentiated from the typical variety by its uniform sepals, standard petal without any coloured patch, staminal tube striate and not adhering to standard petal and pods not distinctly 4-angled.

Crotalaria decasperma Naik in Indian For. 92: 760, f. 1966; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 10. 1983 et in J. Econ. Tax. Bot. 5 (1): 157. 1984; Singh & Raghavan in *ibid.* 8(1): 30. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 95. 1987; Sanjappa, Legumes India 119. 1991; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 39. 1997; Naik, Fl. Marathwada 1: 258. 1998.

Types: Holotype: India, Maharashtra, Osmanabad, Ghatangri, ca 4 km north of Osmanabad town, Naik 976 A, 15.11.1964. Isotypes: 976 B-C (All in CAL!).

Herbs, erect, up to 90 cm high. Stems, leaves and calyx covered with long, spreading, bulbous based white hairs. Leaves up to 4 x 0.5 cm, oblong to linear-lanceolate, rounded or narrowed at base; obtuse or acute and mucronate at apex, stipules ca 4 mm long, linear. Flowers in short or long terminal racemes; bracts ca 5 mm long, linear. Upper calyx lobes connate at base, segments subulate, 10-11 x 1.5-2 mm. Corolla golden yellow, slightly exceeding the calyx; standard hairy at tip on the back. Pods 10-15 x 5-6 mm, glabrous, 8-15-seeded.

Fls. & Frts. : September-November.

Illus.: Naik, *op. cit.*

Habitat: Along gulleys on hill slopes.

Distrib.: Endemic to MAHARASHTRA: Beed (Sindkhedraja hill), Hingoli (Aundah), Osmanabad (Ghatangri, Pandara, Ramling forest), Parbhani (Jintoor-Chandan Dara hill).

Spec. exam.: Beed: Sindkhedraja hill, Janardhanan 100324, 5.9.1964. Hingoli: Aundah foothill, Mishra 177658, 31.10.1998. Osmanabad: Ghatangri, Mishra 177679, 10.11.1998; Ramling forest, Mishra 177683, 10.11.1998; Pandara, near Tuljapur, Mishra 177684, 11.11.1998. Parbhani: Jintoor-Chandan Dara hill, Rolla 90853, 30.8.1963 (All in BSI).

Status: Vulnerable.

Criteria: Extent of occurrence estimated to be *ca* 6,000 sq km: severely fragmented populations.

Notes: This species is restricted only in the Marathwada region of Maharashtra. One specimen from Pune district, deposited in BSI, was misidentified as *C. decasperma* Naik. The distribution of this species in this region is very much sporadic. Soil erosion through the gulleys and excessive grazing are the major possible threats of this species.

It can easily be identified by its white hairs throughout, stipulate leaves and pods having 8-15 seeds.

Crotalaria fillipes Benth. var. *trichophora* (Benth. ex Baker) Cooke, Fl. Pres. Bombay 1: 292. 1902 et 1: 312. 1958 (Repr.ed.); Ansari & Thothathri in Nayar & Sastry (eds.), Red Data Book Indian Pl. 2: 110. 1988; Sanjappa, Legumes India 120. 1991; Ansari in J. Econ. Tax. Bot. 16 (1): 162. 1992; Kothari & Moorthy, Fl. Raigad 90. 1993. *C. trichophora* Benth. ex Baker in Hook. f. Fl. Brit. India 2: 67. 1876; Rothe in J. Econ. Tax. Bot. 8(1): 233. 1986.

Herbs, prostrate, slender, copiously branched, clothed with long, coarse, silky, yellow-brown hairs. Leaves simple, alternate, 0.6-2.5 x 0.2-1.3 cm, ovate-oblong, obtuse or subacute at apex, exstipulate. Flowers solitary or in leaf opposed or in extra-axillary racemes; peduncles thread like, longer than leaves; bracts and bracteoles 1-3 mm long, linear or linear-lanceolate. Calyx 5-lobed; lobes linear, sparingly hairy. Corolla scarcely exerted, yellow; vexillum 4-5 mm long, orbicular. Pods 6-10 mm long, oblong, glabrous, greenish. Seeds 6-8, dark brown.

Fls. & Frts. : September-December.

Habitat: Open areas in forests on hilltops among grasses.

Distrib.: Endemic to Bengal, Bihar, MAHARASHTRA: Ahmednagar (Taranga hills), Beed (Pangri), Nagpur, Pune (Junnar), Raigad (Matheran), Satara (Mahabaleshwar), Thane (Sawa).

Spec. exam.: Ahmednagar: Waranghushi, Taranga hills, *Wadhwa* 128382, 11.10.1970. Pune: Bailghat, Jambe, 12 km south-west of Junnar, *Hemadri* 117813, 18.9.1968. Satara: Mahabaleshwar, Lingmala, *Mishra* 175660, 2.10.1996. Thane: Sawa range, Sawa R.F., *Billore* 113209, 23.10.1967 (All in BSI). Konkan, *Stocks s.n.* without date (CAL).

Status: Low Risk.

Notes: This variety is sporadically but widely distributed throughout Maharashtra as well as Bengal and Bihar. Hence, it has been excluded from threatened category as mentioned in the Red Data Book (*op.cit.*).

It can be differentiated from the typical variety by its densely hairy, stout stem and 6-10 mm long pods.

Crotalaria lutescens Dalz. in Hook. J. Bot. & Kew Gard. Misc. 2: 34. 1843; Baker in Hook. f. Fl. Brit. India 2: 74. 1876; Cooke, Fl. Pres. Bombay 1: 318. 1958 (Repr.ed.); Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 1987; Ansari & Thothathri in Nayar & Sastry (eds.), Red Data Book Indian Pl. 2: 113, f.1988; Kulkarni, Fl. Sindhudurg 110. 1988; Almeida in J. Econ. Tax. Bot. Addl. Ser. 8 (1), Fl. Savantwadi 1: 124. 1990; Sanjappa, Legumes India 123, 1991; Anon., India Glob. Threat. Taxa 20. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 41. 1997. Pradhan & Singh, Fl. Ahmednagar, 184. 1999. *C. peduncularis* Dalz. & Gibs. Bombay Fl. 55. 1861 non Graham, 1839.

Herbs or undershrubs, erect, sparingly branched, 50-100 cm high. Leaves simple, alternate, subsessile, variable, 2-7.5 x 0.4-1.7 cm, linear, linear-lanceolate or elliptic-lanceolate, acute at base, acute or acuminate at apex, apiculate, exstipulate. Flowers in long, slender, lax racemes; pedicels cernuous; bracts and bracteoles small, 1-2 mm long, hairy, persistent. Calyx lobes linear, long-acuminate, glabrous. Corolla exserted, yellow; vexillum ca 1.8 cm long, ovate-cordate or ovate-oblong, hairy on the back. Pods up to 5 cm long, cylindric, oblong, glabrous but pubescent when young; style persistent. Seeds numerous.

Fls. & Frts. : September-January.

Illus.: Ansari & Thothathri, *op.cit.*.

Habitat: On low hills and coastal plains among grasses.

Distrib.: Endemic to Goa, Karnataka, MAHARASHTRA: Ahmednagar (Kalsubai), Kolhapur (University Campus), Nagpur, Ratnagiri (Khed), Sindhudurg (Deobag, Khaskilwada, Ramghat, Savantwadi, Vengurla).

Spec. exam.: Ahmednagar: Kalsubai hill, *Wadhwa* 128283, 8.10.1970. Ratnagiri: Palgarh, near Khed, *Mishra* 176947, 5.10.1997; Sindhudurg: Ramghat, *Kulkarni* 119414, 3.11.1969; Malwan, *Kulkarni* 121247, 28.9.1970 & 121350, 1.10.1970; Kolegaon, near Savantwadi, *Kulkarni* 121704, 16.10.1970 (All in BSI).

Status: Low Risk.

Notes: In Red Data Book (*op.cit.*) this species is included as rare, but due to its wide range of distribution in Maharashtra (over 20,000sq km), it has been excluded from threatened category. In Ratnagiri and Sindhudurg districts it is quite common.

This species can be distinguished by its exstipulate leaves and glabrous pods much longer than calyx.

Crotalaria naikiana Zate in Indian J. For. 5(1):35, f. 1, 1982; Singh and Raghavan in J.Econ. Tax. Bot. 8(1): 30, 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 96, 1987; Samaddar & Roy, Add. Ele. Indian Fl. 1: 94, 1997; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1.: 39, 1997; Naik, Fl. Marathwada 1: 263, 1998.

Types: Holotype: India, Maharashtra, Nanded, Kinwat, Ambadi, *Zate* 924 a, 7.9.1979. Isotypes: 924 b-d (All in MUA!).

Herbs, erect, 50-60 cm high, clothed all over with short, appressed, grey hairs. Leaves exstipulate, petiole *ca* 2 mm long; lamina 2.5 - 7.5 x 1-2 cm, oblanceolate, glabrescent above, densely silky beneath, tapering at base, obtuse and retuse or apiculate at apex. Racemes terminal, up to 15 cm long; pedicels 4-6 mm long; bracts linear, minute; bracteoles 2, *ca* 4 mm long, linear. Calyx densely silky; tube 2-3 mm long; lobes subequal, 9-10 x 2-3 mm. Corolla 8-10 mm long, yellow; standard dorsally pubescent at apex. Pods oblong, glabrous, included within calyx, 2-4-seeded. Seeds reniform, yellow, shining.

Fls. & Frts. : September-November.

Illus.: Zate, *op. cit.*

Habitat: On hill slopes in forest openings.

Distrib.: Endemic to Madhya Pradesh, MAHARASHTRA: Nanded (Kinwat).

Spec.exam.: Types, as above.

Status: Vulnerable (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Area of occupancy *ca* 1,000 sq km: severely fragmented populations.

Notes: This species is restricted only on the hills at Kinwat. In 1998 extensive efforts were made to locate it, but were unsuccessful. According to Naik (by eprsonal communication) its distribution is severely fragmented in this region (only *ca* 3 mature individuals per sq km). However, further explorations have to be made to locate it.

It can be identified by its exstipulate leaves, distinct upper calyx lobes and 2-4-seeded, glabrous pods included within the calyx.

Flemingia gracilis (Mukherjee) Ali in *Biologia* 12: 78. 1966; Kothari & Moorthy in *J. Bombay nat. Hist. Soc.* 80 (1): 259. 1983; Ahmedullah & Nayar, *Endemic Pl. Indian Reg.* 1: 99. 1987; Kothari in Nayar & Sastry (eds.), *Red Data Book Indian Pl.* 3: 137, f. 1990; Sanjappa, *Legumes India* 175. 1991; Kothari & Moorthy, *Fl. Raigad* 98, f. 1993; Anon., *India Glob. Threat. Taxa* 28. 1996; Yadav in Pokle *et al.* (eds.), *Flow. Pl. Syst. Diver.* pt. 1: 41. 1997. ***Moghania gracilis*** Mukherjee in *Bull. Bot. Soc. Bengal* 6 (1): 22. 1952; Sant. in *Rec. Bot. Surv. India* 16 (1), *Fl. Khandala* 74. 1967 (3rd. Rev. ed.); Reddi in *Bull. Bot. Surv. India* 11: 145. 1969.

Herbs, prostrate or trailing, hairy. Leaves trifoliolate; leaflets 2.4-7.5 x 1.5-4.4 cm, ovate-lanceolate, acute, apiculate, densely pubescent, glaucous and nigro-punctate beneath. Flowers deep violet, 3-6 in terminal, capitulate clusters.

Fls. & Frts. : September-October.

Illus.: Kothari, *op.cit.*; Kothari & Moorthy, *op.cit.*, 1993.

Habitat: On rocky slopes and plateaux up to an altitude of *ca* 600 m with grasses.

Distrib.: Endemic to Karnataka, MAHARASHTRA: Pune (Khandala, Lonavla), Raigad (Matheran).

Spec.exam.: Raigad: Matheran, Porcupine point, Kothari 147387 24.9.1976 (BSI).

Status: Endangered (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Area of occupancy less than 500 sq km: found only at 3 locations.

Notes: This species was described by Mukherjee based on collection from Castle Rock (Karnataka) by Bell in 1918 and by Santapau from Khandala in 1942. Later, it was collected from Sakarpathar plateau-Lonavla by Reddi in 1964. Last collection was by Kothari from Matheran in 1979.

It can easily be identified by its leaves nigro-punctate beneath and capitate inflorescence.

Flemingia nilgheriensis (Baker) Wight ex Cooke, Fl. Pres. Bombay 1: 393. 1902 et 1: 419. 1958 (Repr.ed.); Bole & Almeida in J. Bombay nat. Hist. Soc. 78: 562. 1981; Vartak in Jain & Rao (eds.), Ass. Threat. Pl. India 172. 1983; Raghavan & Singh in J. Econ. Tax. Bot. 5(1): 157. 1984; Mistry, Fl. Ratnagiri 1: 171. 1986 (Ph.D. Thesis, *ined.*); Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 99. 1987; Kulkarni, Fl. Sindhudurg 123. 1988; Sanjappa, Legumes India 177. 1991; Deshpande *et al.*, Fl. Mahabaleshwar 1: 179. 1993; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 39. 1997. *F. vestita* Benth. ex Baker var. *nilgheriensis* Baker in Hook. f. Fl. Brit. India 2: 230. 1876; Mukherjee in Bull. Bot. Soc. Bengal 6: 22. 1952. *F. procumbens* Wight, Ic. Pl. Ind. Or. t. 987.

1845, non Roxb. 1832. *Moghania nilgheriensis* (Baker) H. Li in Amer. J. Bot. 31: 225. 1944.

Herbs, diffuse; stems branched, clothed with long, spreading hairs. Leaves trifoliolate; leaflets 1.2 - 2.5 x 0.8 - 1.2 cm, ovate-oblong or oblong-elliptic, acute or acuminate at apex, hairy on both surfaces; stipules *ca* 9 x 3 mm, ovate-oblong, acute, hairy. Flowers in terminal heads; peduncles 1.2 - 1.6 cm, densely hairy; bracts *ca* 8 x 2.4 mm, lanceolate, acute, hairy. Calyx 9-10 cm long, densely fulvous-hairy. Corolla 1-1.2 cm long, equal to or slightly longer than calyx, dull purple. Pods *ca* 4 mm long, ovoid or subglobose, glabrous, smooth. Seed 1, ellipsoid.

Fls. & Frts. : August-November.

Illus.: Wight, *op. cit.*

Habitat: On rocky plateau at an altitude of more than 1,000 m.

Distrib.: Endemic to Goa, Karnataka, Tamil Nadu, MAHARASHTRA: Ahmednagar (Kalsubai), Ratnagiri (Gothane), Satara (Kas, Mahabaleshwar), Sindhudurg (Phonda ghat).

Spec.exam.: Ratnagiri: Devrukh, Gothane plateau, *Mishra* 176931, 2.10.1997 (BSI).

Status: Endangered (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Extent of occurrence estimated to be *ca* 4,000 sq km: found only at 4 locations (excluding Phonda ghat).

Notes: From Sindhudurg district this species was reported only by Cooke based on Dalzell's collection. Thereafter, no one has reported it from this district. Hence, this district has not been considered as its locality during the estimation of its extent of occurrence. At Gothane plateau and Kas plateau it is somewhat common. Uncontrolled grazing is the major reason of its rarity.

It can be differentiated by its leaves not nigro-punctate beneath and capitate inflorescence.

Flemingia rollae (Billore & Hemadri) A. Kumar in J. Econ. Tax. Bot. 4: 232. 1983; Singh & Raghavan in *ibid.* 8(1): 30. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 99. 1987; Sanjappa, Legumes India 178. 1991; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 47. 1997; Pradhan & Singh, Fl. Ahmednagar 192. 1999. *Moghania rollae* Billore & Hemadri in J. Econ. Tax. Bot. 3(3): 617, f. 1-9. 1982.

Types: Holotype: India, Maharashtra, Ahmednagar, Bari, near Kalsubai hill, Panshet forest, *Wadhwa* 128313 A, 9.10.1970 (CAL!). Isotypes: 128313 B-F (BSI!), G(K), H(BLAT!), J(MH). Paratypes: Ahmednagar, Kalsubai hill, *Patwardhan* 1200 A-C, 13.10.1970; Thane, Harishchandragarh, Taramati hill, *Billore* 115683 A-F. 18.11.1968 (All in BSI!).

Herbs, 30-60 cm high; stems erect, clothed with long, whitish or yellowish hairs. Leaves alternate, palmately trifoliate; leaflets 2-4.5 x 2-2.5 cm, elliptic-lanceolate to elliptic or ovate-lanceolate or obovate-lanceolate, acute or subacute at apex, hairy on both sides; stipules foliaceous, 1-2 x 0.3-0.5 cm, broadly ovate-lanceolate or lanceolate. Flowers in globose, capitate, terminal, many flowered racemes; peduncles 2-4 cm long; bracts numerous, *ca* 1.3 x 0.3 cm, ovate-lanceolate. Flowers *ca* 1.5 x 1 cm or more. Calyx 1-3 cm long, 5-lobed, densely ciliate outside intermixed with glandular hairs. Corolla slightly exserted, bluish-purple; standard obovate or orbicular. Pods *ca* 5 x 3 mm, ellipsoid, dark reddish-brown, rugulose, 1-seeded. Seeds ovoid or ellipsoid, dark brownish-black.

Fls. & Frts. : August-November.

Illus.: Billore & Hemadri, *op.cit.*.

Habitat: On hilly regions over 1,200 m altitude.

Distrib.: Endemic to MAHARASHTRA: Ahmednagar (Kalsubai), Thane (Harishchandragarh).

Spec.exam.: Types, as above.

Status: Endangered.

Criteria: Area of occupancy less than 500 sq km: found only at 2 locations.

Notes: This species is confined only at two nearby places of Ahmednagar and Thane districts. In both these localities its distribution is reported as rare and sporadic.

It can be differentiated from its allied species [*F. nilgheriensis* (Baker) Wight ex Cooke] by its robust nature, broader and longer, lanceolate-acuminate stipules and longer capitula.

Galactia tenuiflora (Willd.) Wight & Arn. var. *minor* Baker in Hook. f. Fl. Brit. India 2: 192. 1876; Cooke, Fl. Pres. Bombay 1: 393. 1958 (Repr.ed.); Kulkarni, Fl. Sindhudurg 124. 1988; Sanjappa, Legumes India 180. 1991. *Leucodictyon malvensis* Dalz. & Gibs. Bombay Fl. 73. 1865.

Twiners; stems filiform. Leaflets 1.2 - 2.4 x 0.6-1.2 cm, oblong, membranous, grey silky beneath, obtuse or apiculate at apex. Flowers in axillary, short-peduncled racemes, solitary or in pairs. Corolla 6-8 mm long, purple. Pods 2.4 - 3 cm long, glabrous or faintly puberulous, obliquely constricted between seeds. Seeds 4-5.

Fls. & Frts. : October-December.

Habitat: On rocky ground.

Distrib.: Endemic to MAHARASHTRA: Sindhudurg (Malwan).

Status: Data Deficient.

Notes: This variety is known only by the collections of Stocks and Dalzell. Thereafter, neither any collection nor any information necessary for its categorisation is available .

It can be distinguished by its slender stems, oblong leaflets with grey silky beneath and glabrous 4-5 seeded pods.

Indigofera deccanensis Sanjappa in J. Econ. Tax. Bot. 4: 282. 1983; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 99. 1987; Sanjappa, Legumes India 188. 1991 et in Hajra *et al.* (eds.), Fasc. Fl. India 21: 51, f. 19. 1995; Yadav in Pokle *et al.* (eds.), Flow. Fl. Syst. Diver. pt. 1: 39. 1997; Naik, Fl. Marathwada 1: 279. 1998. *I. torulosa* Wadood Khan in Indian For. 108: 516, f. 1. 1982, non E. Meyer, 1836.

Types: Holotype: India, Maharashtra, Beed, Sautada, *Wadood Khan* 539 a., 18.12.1979. Isotypes: 539 b-d (All in MUA!).

Undershrubs, suffruticose, *ca* 1 m high, covered all over with appressed hoary tomentum. Leaves trifoliolate; leaflets 1-2.5 x 0.7-1 cm, elliptic, obtuse, mucronate; stipules 1-3 mm long, linear-lanceolate. Racemes axillary, slender, 2-4 cm long, 10-20-flowered; pedicels 5-7 mm long. Calyx *ca* 2 mm long, lobes subulate. Corolla 5-7 mm long, pink or pale rose. Pods 1.5 - 3.2 cm long, angular, torulose to moniliform, appressed hoary tomentose, divaricate, straight or slightly curved, shortly beaked, often 2-5-seeded, rarely 1-seeded. Seeds yellow, spindle shaped, angular.

Fls. & Frts. : July-November.

Illus.: Wadood Khan, *op.cit.*; Sanjappa, *op. cit.*, 1995.

Habitat: On open gravelly slopes of hills and along banks of rivers between 500-800 m altitude.

Distrib.: Endemic to MAHARASHTRA: Beed (Sautada), Pune (Katraj ghat).

Spec.exam.: Pune: Katraj ghat, *Puri* 2906, August, 1956 (BSI).

Status: Vulnerable.

Criteria: Area of occupancy *ca* 1,500 sq km: severely fragmented populations.

Notes: This species is reported only from Beed and Pune districts so far. From Pune it was collected only once in 1956. According to Naik (by personal communication) it is very much infrequent in Beed district, and its distribution is severely fragmented (*ca* 2 mature individuals per sq km).

It can be differentiated from its allied species by its always trifoliolate leaves; spreading tomentum on branches, leaves and pods as well as straight, torulose and less constricted pods having 2-5 seeds.

Indigofera santapau Sanjappa in Bull. Bot. Surv. India 25: 202, f. 1983; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 99. 1987; Sanjappa, Legumes Indian 194. 1991 et in Hajra *et al.* (eds.), Fasc. Fl. India 21: 117, f. 50. 1995; Karthikeyan *et al.* in Mudgal & Hajra (eds.), Maharashtra - in Fl. Div. Cons. Strat. India 3. 1997; Yadav in Pokle *et al.* (eds.), Flow Pl. Syst. Diver. pt. 1: 39. 1997.

Types: Holotype: India, Maharashtra, Pune, Purandhar, Vazirghad, *Santapau* 11397, 9.10.1950. Paratypes: Purandhar, around Vazirghad fort, *Santapau* 7174, 2.9.1945 & 5339, 22.10.1945 (All in BLAT!).

Herbs, annual, 15-35cm high; stem and branches reddish. leaves pinnately trifoliate, alternate, petiolate; leaflets 2.5-4 x 1.2 - 1.8cm, obovate or obovate oblong, cuneate at base, rounded and mucronate at apex, pubescent; stipules 2.5-3mm long, subulate, pubescent outside. Racemes 4-8mm long, axillary, sessile, 6-12- flowered. Flowers 5 mm long; pedicels 1-1.5 mm long, pubescent and glandular; bracts 1 mm long, pubescent and glandular outside. Calyx 2 mm long, pubescent and glandular outside, 5-lobed. Corolla salmon red, standard *ca* 4 mm long. Pods 1-2 x *ca* 0.25 cm, subcylindric, straight, 3-4-seeded, tomentose, glandular. Seeds *ca* 1.5 x 1 mm, oblong, smooth, shining, dark brown.

Fls. & Frts. : September-October.

Illus.: Sanjappa, *op.cit.* 1983 & 1995.

Habitat: On exposed hill slopes at an altitude of *ca* 1,500 m.

Distrib.: Endemic to MAHARASHTRA: Pune (Purandhar).

Spec.exam.: Types, as above.

Status: Critically Endangered.

Criteria: Area of occupancy less than 10 sq km: found only at a single location.

Notes: This species was described in 1983 based on herbarium specimens, collected by Santapau. Thereafter, it has not been recollected.

It can be identified by its pinnately trifoliolate leaves; exstipellate leaflets, gland-dotted beneath and 3-4-seeded pods, covered with glands.

Indigofera trifoliata L. var. **duthiei** (Drum. ex Naik) Sanjappa, Legumes India 196. 1991 et in Hajra *et al.* (eds.), Fasc. Fl. India 141. 1995. *I. duthiei* Drum. ex Naik in Proc. Ind. Acad. Sci. 71: 227, f. 1970; Sanjappa in J. Econ. Tax Bot. 5(5): 1031. 1984; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 99. 1987; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 41. 1997; Naik, Fl. Marathwada 1: 279. 1998. 'Barbada'

Types: India, Maharashtra, Osmanabad, Ram-Ling forest, 16 km north of Osmanabad town, Naik 1319, 16.10.1966 (MUA!).

Annuals, woody, much branched, 30-60 cm high. Leaves trifoliolate; petioles *ca* 1 cm long; leaflets 10-15 x 4-7 mm, oblanceolate, rounded or emarginate and minutely apiculate at apex, sparsely hairy above, densely hairy beneath; stipules minute. Racemes short, 4-8-flowered; pedicels very short. Sepals *ca* 1 mm long, triangular, acute, hairy. Corolla dark pink; standard *ca* 2 mm in diameter, densely hairy on back. Pods 8-10 x *ca* 2 mm, deflexed, more or less 4-gonous, appressedly white hairy with 4 narrow wings. Seeds 2-4, compressed, pale olive-green.

Fls. & Frts. : September-December.

Illus.: Drum. ex Naik, *op.cit.*.

Habitat: In pasture land, in fields and on hill slopes.

Distrib.: Endemic to Madhya Pradesh, MAHARASHTRA: Throughout Marathwada region.

Spec.exam.: Aurangabad: Khuldabad, Rolla 71367, 4.11.1961 (BSI); Mhaismal, Pokle 3177, 21.9.1978 (MUA). Chanda (Chandrapur): Silori, Duthie 9422, 1.12.1889 (CAL).

Status: Low Risk.

Notes: This variety is common in Marathwada region and sometimes it grows as a weed in cultivated field also. According to Naik (by personal

communication) the number of mature individuals of this variety is *ca* 6 per sq m.

It differs from typical variety in having 1-4-seeded and narrowly winged pods.

Indigofera trita L. var. **purandharensis** Sanjappa in Bull. Bot. Surv. India 26: 117, f. 3.1984 et Legumes India 197. 1991 et in Hajra *et al.* (eds.), Fasc. Fl. India 21: 150, f. 56. 1995; Samaddar & Roy, Add. Ele. Indian Fl. 1: 216. 1997.

Types: Holotype: India, Maharashtra, Pune, Purandhar, *Santapau* 11398, 9.10.1950 (BLAT!).

Undershrubs, erect, 50-150 cm high. Leaves 2.5-5 cm long, pinnately trifoliolate; petioles 1.2 - 2.5 cm long; leaflets 1-3.5 x 0.5 - 2 cm, obovate or oblong, sometimes ovate or elliptic, rounded at base and apex, sometimes emarginate at apex, fine adpressed grey pubescent on both surfaces; stipules small, setaceous. Recemes more than 4.5 cm long, axillary, 10-20-flowered. Flowers more than 5 mm long; pedicels short; bracts small, caducous. Calyx 2-2.5 mm long, adpressed white pubescent outside. Corolla pink; standard *ca* 5 x 1.5-2 mm, orbicular or obovate, fine adpressed white pubescent outside. Pods *ca* 2.5 x 0.4 cm, deflexed, straight, fine adpressed white pubescent, up to 10-seeded. Seeds 1.5 - 2 x *ca* 1 mm, oblong, smooth, yellow or reddish-brown.

Fls. & Frts. : September-December.

Illus.: Sanjappa, *op.cit.*, 1984 & 1995.

Habitat: On slopes of dry hills between 800 and 900 m.

Distrib.: Endemic to MAHARASHTRA: Pune (Purandhar).

Spec.exam.: Pune, Purandhar, Vazirghad, *Santapau* 8368, 20.9.1945; 8326-7, 29.12.1945 & 22021, 13.10.1957; *Shah* 9259-60, 13.10.1957 (All in BLAT).

Status: Critically Endangered.

Criteria: Area of occupancy less than 10 sq km: found only at a single location.

Notes: This variety was described in 1984 based on herbarium specimen collected by Santapau. It was last collected in 1957 from type locality only.

It differs from the typical variety in its longer racemes and flowers as well as shorter, broader, compact and deflexed pods.

Nogra dalzellii (Baker) Merr. in Trans. Amer. Phil. Soc., ser. 2, 24: 201. 1935; Panigrahi in Bull. Bot. Surv. India 15: 142. 1976; Ahmedullah & Pradeep in Nayar & Sastry (eds.), Red Data Book Indian Pl. 3: 145. 1990; Sanjappa, Legumes India 220. 1991; Anon., Indian Glob. Threat. Taxa 44. 1996. *Grona dalzellii* Baker in Hook. f. Fl. Brit. India 2: 191. 1876; Cooke, Fl. Pres. Bombay 1: 392. 1958 (Repr.ed.). *Galactia simplicifolia* Dalz. in Hook. J. Bot. Kew Gard. Misc. 3: 209. 1851. non Spreng. 1827. *Grona simplicifolia* Raizada in Indian For. 84: 486. 1958. *Nogra simplicifolia* (Dalz.) Raizada in Indian For. 93: 755. 1967; Bole & Almeida in J. Bombay nat. Hist. Soc. 78: 563. 1981; Deshpande *et al.* Fl. Mahabaleshwar 1: 186. 1993.

Types: Syntype: India, Konkan (fruiting), *Dalzell s.n.* & Konkan (flowering), *Stocks s.n.* (Both in K).

Herbs, twining; stems brown, hairy. Leaves unifoliolate, petiolate; leaflets 4.5 - 11.5 x 3.5-10 cm, ovate, acute, base cordate, glabrous above, hairy beneath; stipules ovate, acute, hairy, caducous. Flowers in dense, 10-18 cm long racemes; bracts *ca* 6 mm long, ovate, acuminate, deciduous; bracteoles *ca* 6 mm long, narrowly ovate-lanceolate, densely hairy. Calyx 6-8 mm long, hairy. Corolla *ca* 1.2. cm long, blue. Pods 5-7 x *ca* 0.8 cm, clothed with brownish hairs. Seeds 8-10, compressed.

Fls. & Frts. : September-November.

Habitat: In deciduous or moist deciduous forests in the hills at considerably high altitude.

Distrib.: Endemic to Karnataka, MAHARASHTRA: Satara (Mahabaleshwar, Panchgani), Thane (Harishchandragarh).

Spec. exam.: Satara: Panchgani *Woodrow s.n.*, October, 1885; *Cooke s.n.*, October, 1889 (Both in BSI); *Nana* 7562, October, 1920; *Sedgwick* 7601, October, 1920; Mahabaleshwar, *Acland* 346, October, 1924 (All in BLAT). Thane: Tokavada range, Harishchandragarh, Kedarnath hill slope, *Billore* 115623, 18.11.1968 (BSI).

Status: Endangered (Regionally in Maharashtra) Not Evaluated (In India).

Criteria: Area of occupancy less than 500 sq km; found only at 3 locations.

Notes: In Maharashtra this species is very much sporadically distributed and restricted to only Mahabaleshwar-Panchgani area and Harishchandragarh hill. From Mahabaleshwar-Panchgani area it was last collected in 1924, whereas from Harishchandragarh in 1968. Loss of its habitats due to deforestation is one of the major causes for its present status.

It can be distinguished by its flowers in dense, usually sessile heads and bracteoles as long as calyx.

Smithia agharkarii Hemadri in *Indian For.* 97: 67, f. 4-8. 1971; Raghavan & Singh in Jain & Sastry (eds.), *Pl. Cons. Bull.* 3: 12. 1983 et in *J. Econ. Tax. Bot.* 5(1): 157. 1984; Singh & Raghavan in *ibid.* 8(1): 30. 1986; Ahmedullah & Nayar, *Endemic Pl. Indian Reg.* 1: 101. 1987; Kulkarni, *Fl. Sindhudurg* 133. 1988; Sharma & Kulkarni in Nayar & Sastry (eds.), *Red Data Book Indian Pl.* 2. 131. 1988; Almeida in *J. Econ. Tax. Bot. Addl. Ser.* 8(1), *Fl. Savantwadi* 1: 142. 1990; Sanjappa, *Legumes India* 246. 1991; Deshpande *et al.*, *Fl. Mahabaleshwar* 1: 191. 1993; Anon., *Indian Glob. Threat. Taxa* 56. 1996; Yadav in Pokle *et al.* (eds.), *Flow. Pl. Syst. Diver. Pt. 1*: 39. 1997.

Types: Holotype: India. Maharashtra, Pune, Dhak Khilla, ca 27 km west of Junnar, *Hemadri* 107486 A, 29.9.1965 (CAL!). Isotypes: 107486 B (BSI!), C(K), D(L). Paratypes: Pune, Khandala, hill top adjoining Tata's power station, *Hemadri* 85171 A-L, 3.10.1969; Satara, Panchgani road, *Cooke s.n.* September, 1891; Mahabaleshwar, Dhobi falls, *Mahajan* 24749, 15.10.1967 (All in BSI).

Herbs, erect or suberect, annual, 9-20 cm high; stems dichotomously branched, bristly in upper portion. Leaves pinnately compound; leaflets 2-3 pairs, subsessile, 5-13 x 2-5 mm, oblong, obtuse, narrowed at base, bristle-tipped at apex, glabrous above, sparsely strigose beneath. Inflorescence axillary and terminal, simple raceme, with 2-6 flowers; peduncles 0.5-1.5 cm long, clothed with bristly hairs; pedicels 1-2 mm long; bracts 2.5-3 mm long, ovate; bracteoles 2. Calyx bilipped, 4-5 mm long, reaching up to 9 mm in fruit, green, equal. Petals 6-8 mm long, yellow, standard with 2 red spots. Pods straw yellow to brownish when dried, glabrous, 3-5-jointed; joints 3-4 mm in diameter, folded and orbicular. Seeds, reniform, smooth, yellowish-brown, dorsally compressed.

Fls. & Frts. : September-October.

Illus.: Hemadri, *op. cit.*

Habitat: Open areas on rocky plains in the hills.

Distrib.: Endemic to MAHARASHTRA: Pune (Junnar, Khandala), Satara (Mahabaleshwar), Sindhudurg (Amboli).

Spec. exam.: Sindhudurg: Amboli, Chaukul Road, *Kulkarni* 121645, 12.10.1970 (BSI).

Status: Vulnerable.

Criteria: Extent of occurrence estimated to be *ca* 9,000 sq km: found only at 4 locations.

Notes: Though this species occurs in the high ranges of Western Ghats from Junnar to Amboli, its pattern of distribution is fragmented and sporadic. After its description its localities are gradually increasing and there are great possibilities of getting this plant from other localities having similar habitat and ecological conditions.

It can be differentiated by its extremely unequal pair of bracteoles, membranous calyx with anastomosing veins and larger joints of fruits.

Smithia oligantha Blatt. in J. Asiat. Soc. Bengal (n.s.) 26: 342. 1930; Karthikeyan *et al.* in Rec. Bot. Surv. India 21(2): 164. 1981; Sanjappa, Legumes India 247. 1991.

Type: India. Maharashtra, Bombay Harbour, Uran, *Hallberg* 14567.

Herbs, erect; stems *ca* 6 cm high, branched. Leaves abruptly pinnate; leaflets 2 pairs, *ca* 6.5 x 3.5 mm, obovate, rounded at apex, margins bristly; petioles *ca* 2 mm long, purplish; stipules *ca* 2x1 mm, triangular. Flowers solitary or 2 together; bracts similar to stipules but smaller; bracteoles 2, *ca* 2 x 1 mm, elliptic-oblong. Calyx 2-lipped; lower lip *ca* 6x4 mm, ovate, acute, entire, fringed with hairs along margins, a long bristle on midrib; upper lip *ca* 4 mm long, suborbicular; calyx in fruit *ca* 9x6 mm, almost globose. Corolla white, turning yellowish; standard petal *ca* 9 x 4.5 mm, clawed, with a few long hairs along midrib, on back. Pods shortly stalked; joints *ca* 10, *ca* 4 mm in diameter, suborbicular.

Fls. & Frts. : January.

Habitat: On moist ground in water courses.

Distrib.: Endemic to MAHARASHTRA: Bombay (Uran).

Status: Data Deficient.

Notes : This species is known only by its type collection from Bombay. However, the type specimen also could not be traced in Indian Herbaria. Due to paucity of information it could not be categorised.

Sphenostyllis bracteata (Baker) Gillett in Kew Bull. 20: 103. 1966; Billore, Fl. Thane 1: 366. 1972 (Ph.D. Thesis, *ined.*); Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 12. 1983 et in J. Econ. Tax. Bot. 5(1): 157. 1984; Singh & Raghavan in *ibid* 8(1): 1986; Sanjappa, Legumes India 252. 1991; Deshpande *et al.*, Fl. Mahabaleshwar 1: 193. 1993. *Dolichos bracteatus* Baker in Hook. f. Fl. Brit. India 2: 210. 1876, non Wall. *Dolichos ghaticus* Sant. & Panthaki in J. Bombay nat. Hist. Soc. 53: 502. 1955; Cooke, Fl. Pres. Bombay 1: 406. 1958 (Repr.ed.). 'Tapti-Singh' 'Bhenri' 'Ran-chauli'.

Types: Holotype: India, Konkan (the coast between Bombay and Goa), *Stocks s.n.* (K). Isotype (BM).

Climbers, robust, perennial, glabrous. Leaflets *ca* 15 cm long, broadly ovate, cuneate at base, acute or obtuse at apex, glabrous; stipules *ca* 1.2

cm long, oblong, acute. Racemes long peduncled, reaching 30 cm or more in length; bracts minute, linear-lanceolate, deciduous; pedicels 6-12 mm long; bracteoles as long as calyx. Calyx 6-8 mm long. Carolla ca 2.5 cm long, reddish. Pods 12-15 cm long, linear, 10-12-seeded.

Fls. & Frts. : August - October.

Habitat: Climbing on bushes along ghats.

Distrib.: Endemic to MAHARASHTRA: Pune (Bhimashankar, Junnar, Khandala, Lonavla, Purandhar, Sinhadgad), Satara (Mahabaleshwar), Thane (Mokhada).

Spec. exam.: Pune: Khandala, *Sedgwick* 7944, October, 1921; *Santapau* 8274, 2.10.1943 and 5007-9, 2.10.1944; Purandhar, *Santapau* 7164, 1.9.1945, 8274, 27.12.1945 & 11510-3, 13.10.1950; Khandala, *Panthaki* 1585-6, 27.9.1954 (All in BLAT); Bhimashankar, *Puri* 9307, 4.11.1956; Lonavla, *Ansari* 87795, 29.8.1963; Junnar, Malvaddara, near Bhivandikhurd, *Hemadri* 107435, 28.9.1965; Lonavla, *Hemadri* 85188, 4.10.1969 (All in BSI). Satara: Mahabaleshwar, *Bole* 450, 22.10.1951; *Panthaki* 1483, 6.9.1954 (Both in BLAT). Thane: Vihigaon range, Dhamni hill, near Mokhada, *Billore* 112919, 19.10.1967 (BSI).

Status: Vulnerable.

Criteria: Extent of occurrence estimated to be ca 7,500 sq km: found only at 8 locations.

Notes: This species is sporadically distributed along the Sahyadri ranges from Mokhada to Mahabaleshwar. From Pune and Satara districts it has been reported several times but from Thane it was reported only once in 1967.

It can be distinguished by its robust nature, large flowers and linear pods with 10-12 seeds.

Vigna khandalensis (Sant.) Raghavan & Wadhwa in *Curr. Sci.* 41: 429. 1972; Raghavan & Singh in Jain & sastry (eds.), *Pl. Cons. Bull.* 3: 12. 1983 et in *J. Econ. Tax. Bot.* 5 (1): 157. 1984; Singh & Raghavan in *ibid.* 8(1): 31. 1986; Ahmedullah & Nayar, *Endemic Pl. Indian Reg.* 1:

102. 1987; Singh & Kulkarni in Nayar & Sastry (eds.), Red Data Book Indian Pl. 3: 153, f. 1990; Lakshminarasimhan & Sharma, Fl. Nasik 187, t. 12. 1991; Sanjappa, Legumes India 274. 1991; Bachulkar in Rayat Research J. 1 (2): 115. 1993; Deshpande *et al.*, Fl. Mahabaleshwar 1: 196 1993; Kothari & Moorthy, Fl. Raigad 118. 1993; Anon., India Glob. Threat. Taxa 61. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 39 1997; Pradhan & Singh, Fl. Ahmednagar 211. 1999. *Phaseolus khandalensis* Sant. in Kew Bull. 1948: 276. 1948. *P. grandis* Dalz. & Gibs., Bombay Fl. 72. 1861, non Benth. 1852; Baker in Hook. f. Fl. Brit. India 2: 202. 1876; Cooke, Fl. Pres. Bombay 1: 400. 1958 (Repr.ed.). *Vigna grandis* (Dalz. & Gibs.) Verdc. in Kew Bull. 23: 464. 1969, non Benth. 1852. 'Badmung', 'Sambar'

Herbs or undershrubs, erect, up to 2 m high; stems 5-angled, strigose when young. Leaves trifoliolate; leaflets 6-10 x ca 5 cm, broadly ovate or ovate-oblong, oblique at base, terminal one 3-lobed, laterals 2-lobed; stipules large, 2-4 cm broad, foliaceous, obovate-oblong, ciliate. Flowers in spicate racemes on stout 15-20 cm long peduncles; pedicels short; bracts broadly ovate, acute, deciduous. Calyx ca 3 mm long, hairy outside. Corolla ca 8 mm long, pale yellow. Pods 3-6 x 0.5-0.6 cm, cylindrical, dark green. Seeds 5-10, ca 4 mm long, subcylindric, dark brown-black.

Fls. & Frts. : September-November.

Illus.: Singh & Kulkarni, *op.cit.*; Lakshminarasimhan & Sharma, *op.cit.*

Habitat: Open situations along ghats in semi-evergreen forests.

Distrib.: Endemic to Gujarat, Karnataka, Tamil Nadu, MAHARASHTRA: Ahmednagar (Kalsubai), Nasik (Swarna), Pune (Junnar, Khed, Paud, Sinhagad), Raigad (Varandha ghat), Satara (Mahabaleshwar, Panchgani).

Spec.exam.: Ahmednagar: Kalsubai hills, *Wadhwa* 128277, 8.10.1970. Nasik: Swarna, *Cherian* 111553, 21.9.1967. Pune: Sinhagadh, *Patil* 4775, 30.9.1956; Paud, *Jain* 8267, 18.10.1956; Khed, southern slope of Shinga hill, *Janardhanan* 75904, 23.11.1961; Khed, northern slope of Vahagaon hill, *Janardhanan* 76442, 10.12.1961; Shivneri hill, Junnar, *Ansari* 83734, 12.10.1962; Junnar, Shivli-Ustad, *Hemadri* 104289, 30.10.1964; Junnar,

Malvanddara, near Bhivadekhurd, *Hemadri* 107553, 1.10.1965; Sinhagadh, *Mishra* 176981, 26.9.1997 (All in BSI).

Status: Vulnerable (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Extent of occurrence estimated to be *ca* 6,500 sq km: severely fragmented populations.

Notes: This species occurs only in the higher ghats of the Sahyadri ranges and is sporadically distributed from Swarna (Nasik district) to Mahabaleshwar. Only at Sinhagadh it is somewhat common. Seeds of this plant are edible.

It can easily be identified by its erect habit and large as well as foliaceous stipules.

Vigna trilobata (L.) Verdc. var. *pusilla* Naik & Pokle in J. Econ. Tax. Bot. 7(3): 670, f. 2. 1985; Sanjappa, Legumes India 276. 1991; Naik, Fl. Marathwada 1: 315, f. 41. 1998. *Phaseolus trilobus* auct. mult. non Ait. 1789; Baker in Hook. f. Brit. India 2: 201. 1876, *p. p.*; Naik, Fl. Osmanabad 108. 1979, *p. p.* 'Moogi'.

Types: Holotype: India, Maharashtra, Beed, Sautada, *Rothe* 6229a, 27.10.1983. *Isotypes:* 6229 b-f (All in MUA).

Herbs, annual, twining or trailing, 15-100 cm long, much branched, hispid. Leaves pinnately trifoliolate; leaflets 1.5 - 3 x 1.2-2.5 cm, deeply trilobed, ovate, spatulate, subacute or obtuse at apex; petioles 2-3 cm long; stipules 2-3 mm long, hispid. Flowers 5-10 in dense, terminal clusters on slender peduncles much longer than leaves; bracts 2-2.5 mm long, oblong-lanceolate, hispid; bracteoles 1-1.5 mm long. Calyx 1-1.5 mm long, campanulate, 5-lobed, hispid. Petals yellow, clawed; standard *ca* 2 x 3 mm. Pods 1.5-2 x 0.2-0.25 cm, slightly compressed, 5-10-seeded, hairy. Seeds *ca* 2 x 1 mm, truncate at both ends, brown.

Fls. & Frts. : August-January.

Illus.: Naik & Pokle, *op.cit.*; Naik, *op.cit.*

Habitat: In variety of situations, mostly on gravelly soil.

Distrib.: Endemic to Diu, MAHARASHTRA: Throughout Maharashtra.

Spec. exam.: Ahmednagar: 10 miles from city, *Puri* 6708, 1.9.1956. Akola: Kinhiraja Road, *Kamble* 150257, 30.8.1977. Aurangabad: behind Mukhbara temple, *Rolla* 76887, 4.11.1961; Mhaismal, *Mishra* 177639, 28.10.1998. Dhule: Pataskar 117606, 5.10.1968. Osmanabad: Ghatangri hill, *Janardhanan* 100612, 12.9.1964; Ramling forest, *Mishra* 177678, 9.11.1998. Pune: Parvati Mandir base, *Ansari* 64217, 9.9.1960. Sholapur: Naldurg slope, *Pataskar* 100688, 12.9.1964. Yavatmal: Drug tank, *Karthikeyan* 156502, 21.9.1978 (All in BSI).

Status: Low Risk.

Notes: Till date this variety was considered to be endemic to Maharashtra (Sanjappa, 1991). However, Naik & Pokle (1985) speculated its distribution in the Deccan and other dry parts of India also. In BSI, many specimens of this variety identified as *Phaseolus trilobus* Ait. have been screened which were collected from different parts of Maharashtra as well as from Diu. Hence, now it cannot be considered as endemic to Maharashtra. In Maharashtra it is very common in Deccan and Marathwada region.

It differs from the typical variety in its densely hairy nature, smaller leaflets with spatulate lobes, smaller stipules and flowers, and appressedly pubescent pods with 4-5 seeds.

CAESALPINIACEAE

Cassia kolabensis Kothari, Moorthy & Nayar in Proc. Indian Acad. Sci. (Pl. Sci.) 90: 199, f. 1-9. 1981; Singh & Raghavan in J. Econ. Tax. Bot. 8(1): 30. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 92. 1987 Sanjappa, Leg. India 17. 1991; Kothari & Moorthy, Fl. Raigad 130, f. 1993; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 39. 1997.

Types: Holotype: India, Maharashtra, Kolaba (Presently Raigad district), Alibag Division, Pen to Khopoli, *Kothari* 14761A, 27.9.1976 (CAL!). Isotypes: 14761 B (BSI!), C (Wageningen). Paratypes: Raigad,

Roha Division, Pali Range, reserve forest near Sarasgarh fort, *Kothari* 147910 A, 8.10.1976 (CAL!), B (BSI!); Alibag Division, Pejari forest, near Bundhan village, *Kothari* 147643A, 1.10.1976 (K), B (MH).

Herbs, 30-50 cm high; stems reddish-brown, whitish tomentose. Leaves imparipinnate, 2.5-3.5 cm long; stipules 6-7 mm long, lanceolate; petioles 3-4 mm long, tomentose; petiolar gland 2.5 mm long, stalked; leaflets 5-9; lateral leaflets 2-4 pairs, 10-14 x 3-4 mm, linear-oblong, unequal and obliquely truncate at base, apex obliquely rotundate apiculate or aristate, margins entire or sparsely, minutely ciliate, upper surface glabrous, lower surface ciliate along nerves; terminal leaflet 12-15 x 7-9 mm, elliptic-oblong or ovate-oblong, apiculate at apex. Flowers 2 to 3 or rarely solitary in supra axillary inflorescence; pedicels 2-2.5 mm long. Sepals 5, 4-4.5 x 1.5-2 mm, elliptic-lanceolate, outer surface pubescent. Petals 5, *ca* 4.5 x 2.5-3 mm, unequal, obovate. Pods 2.8-3.2 x 0.4-0.5 cm, flatly compressed, pilose. Seeds 4-8, compressed, black, smooth.

Fls. & Frts. : August-October.

Illus.: *Kothari et al., op. cit.*

Habitat: In open as well as hilly forests and along road-sides.

Distrib.: Endemic to MAHARASHTRA: Raigad (Matheran, Pejari forest, Pen to Khopoli, Sanegaon forest, Sarasgad), Thane (Yeur forest).

Spec. exam.: Thane: Yeur forest, *Billore* 115377, 25.9.1968 (BSI).

Status: Endangered.

Criteria: Extent of occurrence estimated to be *ca* 2,000 sq km: fragmented populations.

Notes: This species is reported from type localities of Raigad district and also from Thane district so far. From Thane district it was collected earlier but was rightly identified only after its description.

The species can be distinguished by its imparipinnate leaves bearing 5-9 leaflets, possessing petiolar gland and having 5 fertile stamens.

LYTHRACEAE

	<u>Genera</u>	<u>Species + Infraspecific taxa</u>
World	26	580
India	9	51
Maharashtra	5	25
Endemic to Maharashtra - 1 species		

Rotala floribunda (Wight) Koehne in Verh. Bot. Vereins Prov. Brandenburg 19 (Sit. 2. 41): 49. 1877; C.D. K. Cook in Boissiera 29: 43, f. 6. 1979; Mistry, Fl. Ratnagiri 1: 259. 1986 (Ph.D. Thesis, *ined.*); Deshpande *et al.* Fl. Mahabaleshwar 1: 243. 1993; Anon., India Glob. Threat. Taxa 53. 1996. *Nimmonia floribunda* Wight in Madras J. Lit. Sci. 5: 312, t. 20. 1837. *Ammannia floribunda* (Wight) C.B. Cl. in Hook. f. Fl. Brit. India 2: 567. 1879; Cooke, Fl. Pres. Bombay 1: 539. 1958 (Repr.ed.).

Herbs, 15-30 cm long; stems reddish. Lower leaves 2.5- 5 x 0.2 - 0.4 cm, oblong, obtuse or acute at apex; upper leaves 0.6-1.2 x ca 0.1 cm, linear, acute at apex. Flowers in dense, terminal racemes; peduncles filiform; pedicels very short; bracts 1 to each flower, 4-5 mm long, linear-lanceolate, acute, 1-nerved; bracteoles ca 2 mm long, linear. Calyx 2.5 - 3 mm long; teeth triangular, acute. Petals ca 2 mm long, oblong- obovate, bright rose coloured. Capsules ellipsoid, 2-valved. Seeds ellipsoid, brownish-yellow.

Fls. & Frts. : October - February.

Habitat: On wet rocks along ghats.

Distrib.: Endemic to MAHARASHTRA: Ratnagiri (Gothane), Satara (Mahabaleshwar).

Spec. exam.: Ratnagiri: Gothane, *Mistry* 1693, 16.9.1984 (BLAT). Satara: Mahabaleshwar, *Bhide* 1212, 21.11.1902; *Talbot* 4519, 20.10.1905; *Mahajan s.n.*, 25.2.1956; *Ansari* 67667, 12.10.1960 (All in BSI); *Santapau* 23606, 29.12.1960 (BLAT); *Kanodia* 87069, 19.2.1964 (BSI); *M.R. Almeida* 236, 28.1.1964 (BLAT).

Status: Endangered

Criteria: Area of occupancy up to 300 sq km; found only at 2 locations.

Notes: Though this species is to some extent frequent at Mahabaleshwar, it has been put into threatened category due to its localised distribution. At Gothane plateau it was located only once at a single spot.

This species can be differentiated by its dimorphic style and stamens.

Rotala ritchei (C.B.Cl.) Koehne in Bot. Jahrb. 4: 386. 1883; C.D.K. Cook in Boissiera 29: 71, f. 14 A-E. 1979; Janardhanan in Bull. Bot. Surv. India 21 (1-4): 230, f.1-9. 1979; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 8. 1983 et in J. Econ. Tax. Bot. 5 (1): 158. 1984; Singh & Raghavan in *ibid.* 8 (1): 31. 1986; Goel in J. Econ. Tax. Bot. 9 (1): 83. 1987; Janardhanan in Nayar & Sastry (eds.), Red Data Book Indian Pl. 1: 190. 1987; Mathew Thom. & Ahmedullah in Bull. Bot. Surv. India 31 (1-4): 161. 1989; Anon., India Glob. Threat. Taxa 53. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 40. 1997. *Ammannia ritchei* C.B. Cl. in Hook. f. Fl. Brit. India 2: 566. 1879; Cooke, Fl. Pres. Bombay 1: 540. 1958 (Repr.ed.).

Types: Holotype: India, Mysore (Karnataka), Belgaum, *Ritchei s.n.* (K).

Herbs, annual, slender, reaching up to 30 cm high with flowering branch apices emerging out of water; stems pale pinkish, angled. Leaves 7-10 x 3-4 mm, ovate-elliptic to obovate, narrowed towards base, obtuse or rounded at apex. Flowers solitary, shortly pedicelled; bracteoles 2, lateral, subulate. Calyx *ca* 2 mm long, tubular-campanulate, 4-toothed. Petals 4, *ca* 1 mm long, slightly exerted, rose coloured. Capsules reaching up to 3 mm long, ellipsoid, much exerted, 4-celled. Seeds 2-3 per cell, *ca* 0.8 mm long, ellipsoid, rounded on back.

Fls. & Frts. : September - October.

Illus.: Janardhanan, *op. cit.*

Habitat: In the shallow margins of seasonal fresh water ponds.

Distrib.: Endemic to Karnataka, Tamil Nadu, MAHARASHTRA: Pune (Chakan-Alandi Road).

Spec. exam.: Pune: Khed taluka, Kochala cha talao, on Chakan-Alandi Road, *Janardhanan* 68579, 16.8.1966 & 92784, 8.10.1966 (Both in BSI).

Status: Critically Endangered (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Area of occupancy less than 10 sq km; found only at a single location.

Notes: After the type collection from Karnataka State, this species was first recollected nearly a century afterwards from Pune district by *Janardhanan (op.cit.)* in 1966. But now it is doubtful whether it is occurring here or not. Because after 1966 no one could locate this plant from the particular locality on Chakan-Alandi road or adjoining. Presently the habitat of this locality has also been destructed due to different developmental activities. Hence, efforts to be continued to locate this species in the adjoining areas. If it will be rediscovered, some protective measures must be taken immediately for its conservation.

This species can be distinguished by its elliptic leaves, axillary-solitary flowers and 4-valved capsules.

BEGONIACEAE

	<u>Genera</u>	<u>Species + Infraspecific taxa</u>
World	5	920
India	1	55
Maharashtra	1	7
Endemic to Maharashtra - 1species		

Begonia concanensis A. DC. Prodr. 15(1): 314. 1864; C.B. Cl. in Hook. f. Fl. Brit. India 2: 653. 1879; Cooke, Fl. Pres. Bombay 1: 585. 1958 (Repr.ed.); Sant. in Rec. Bot. Surv. India 16 (1), Fl. Khandala 106. 1967 (3rd Rev. ed.); Vartak in Jain & Rao (eds.), Ass. Threat. Pl. India 173. 1983; Almeida in J. Econ. Tax. Bot. Addl. Ser. 8(1), Fl. Savantwadi

1: 191. 1990; Kothari & Moorthy, Fl. Raigad 170, f. 1993; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 40. 1997.

Herbs, succulent, *ca* 30 cm high; stems simple, glabrous. Leaves 5-12 x 3-9.5 cm, ovate, cordate at base, acute or subacute at apex, margins serrate or undulate-dentate and denticulate, palmately 7-9-nerved, with few hairs on nerves above; petioles of radical leaves *ca* 14.5 cm long and cauline leaves 2.5-6 cm long; stipules *ca* 4 mm long, ovate-lanceolate, glabrous. Flowers rosy, unisexual, on elongated, dichotomous, glabrous peduncles; pedicels hairy; bracts *ca* 6 mm long, lanceolate. Male flowers: sepals 2, *ca* 1.2 cm long, broadly elliptic; petals 2, *ca* 6 mm long, obovate-oblong. Female flowers: perianth segments 5, outer segments broadly ovate or suborbicular, hairy outside. Capsules 3-winged, one wing larger than the other two. Seeds ellipsoid.

Fls. & Frts. : August-October.

Illus.: Kothari & Moorthy, *op. cit.*

Habitat: Slopes of hills.

Distrib.: Endemic to Karnataka, MAHARASHTRA: Kolhapur, Pune (Lonavla, Sinhagadh), Raigad (Panvel), Sindhudurg (Amboli).

Spec. exam.: Pune: Lonavla, near Bhushi village, Reddy 986652, 19.8.1964; Ravine above Bhushi lake, Reddy 98786, 28.9.1964; Singhagadh hill top, Ansari 87812, 29.8.1963; Mishra 175423, 17.8.1996 (All in BSI).

Status: Vulnerable (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Extent of occurrence estimated to be *ca* 9,000 sq km: found only at 5 locations.

Notes: In Maharashtra this species is sporadically distributed at 5 localities of 4 districts. In 1996 only a very few mature individuals (*ca* 100) of this species were noticed at Sinhagadh. Habitat destruction due to urbanisation is the major reason of its rarity.

It can be distinguished by its rosy flowers and 3-celled capsules with unequal wings.

Begonia phrixophylla Blatt. & McC. in J. Indian Bot. Soc. 10: 27, f. 1-5. 1931; Sharma & Kulkarni in Nayar & Sastry (eds.), Red Data Book Indian Pl. 2: 74. 1988; Deshpande *et al.*, Fl. Mahabaleshwar 1: 260. 1993; Anon., India Glob. Threat. Taxa 9. 1996.

Types: Holotype: India, Maharashtra, Satara, Mahabaleshwar, along road to Lodwick point, *McCann* 2915, 22.8.1930. Cotypes: *McCann* 2916, 2919 & 2923, 22.8.1930 (All in BLAT!).

Herbs, up to 40 cm high. Leaves *ca* 19 x 24 cm, broadly ovate or almost round, deeply cordate and slightly oblique at base, subacuminate at apex, densely bristly, palmately 7-nerved; petioles 15-26 cm long; stipules 8-10 mm long, ovate-lanceolate, acuminate, hairy. Flowers rosy, unisexual on dichotomous, elongated peduncles; peduncles up to 17 cm long, hairy, flesh-coloured; bracts up to 2.7 x 1 cm, oblong-acuminate. Male flowers: sepals 2, orbicular, concave; petals 2, broadly ovate. Female flowers: perianth segments 5, 2 outer subpetaloid, broadly ovate or orbicular, 3 inner smaller. Capsules 3-winged, trigonous, hispid.

Fls. & Frts.: August-October.

Illus.: Blatt. & McC., *op. cit.*

Habitat: Along the ghats.

Distrib.: Endemic to MAHARASHTRA: Satara (Mahabaleshwar).

Spec. exam.: Types, as above.

Status: Critically Endangered.

Criteria: Area of occupancy less than 10 sq km: found only at a single location.

Notes: This species is known only by its type collections from Mahabaleshwar. Thereafter, this area has been botanized frequently by different workers, but, it could not be relocated. However, more explorations are needed to locate it. It should be conserved immediately after rediscovery, to prevent its extinction.

This species can be differentiated by its tuberous nature and rose coloured flowers.

Begonia trichocarpa Dalz. in Kew J. Bot. 3: 230. 1851; C.B. Cl. in Hook. f. Fl. Brit. India 2: 653. 1879; Cooke, Fl. Pres. Bombay 1: 585. 1958 (Repr.ed.); Bachulkar in Rayat Research J. 1(2): 113. 1993; Yadav in Pokle *et al.* (eds.), Flow. Pl. syst. Diver. pt. 1: 40. 1997.

Herbs, succulent, 30-40 cm high; stems glabrous or nearly so. Leaves 5-12 x 3.5-7 cm, ovate, acute or subacute at apex, margins irregularly sinuate-dentate, lacerate and denticulate, palmately 7-9-nerved, hairy on both sides; petioles of radical leaves 9.5-19.5 cm long and cauline leaves 2.5-5 cm long; stipules 1.2-1.5 cm long, ovate-lanceolate. Flowers white, unisexual on large 4-6-flowered peduncles; pedicels slender, hairy; bracts 6-8 mm long, ovate. Male flowers: sepals 2, 1.6-1.8 cm long, broadly elliptic or suborbicular; petals 1.2-1.6 cm long, obovate, oblong. Female flowers: perianth segments 5, inner narrower, outer denticulate. Capsules with 3, almost equal wings. Seeds ellipsoid.

Fls. & Frts. : August-October.

Habitat: On open hill slopes, at high altitude.

Distrib.: Endemic to Karnataka, Kerala, MAHARASHTRA: Kolhapur (Borbet, Gagangarh), Satara (Mahabaleshwar, Vasota), Sindhudurg (Amboli).

Spec. exam.: Kolhapur: Borbet, ca 10 km south-east from Ganganbawda, *Mishra* 176848, 24.8.1997; Gagangarh, near Gaganbawda, *Mishra* 176861, 26.8.1997 (Both in BSI).

Status: Endangered (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Extent of occurrence estimated to be ca 800 sq km: found only at 4 locations.

Notes: Among the different localities of this species in Maharashtra, only at Borbet of Kolhapur district it is to some extent common but localised in a small area. Whereas, at other localities like Gagangarh and Amboli a very few individuals were noticed. At Mahabaleshwar also its distribution is reported as rare.

This species can be identified by its pure white flowers and 3-celled capsules with unequal wings.

APIACEAE

	<u>Genera</u>	<u>Species + Infraspecific taxa</u>
World	418	3225
India	72	288
Maharashtra	9	17
Endemic to Maharashtra	4 species.	

Heracleum dalgadianum Almeida in Indian For. 111(3): 158, f. 1-5. 1985 et in J. Econ. Tax. Bot. Addl. ser. 8(1), Fl. Savantwadi 1: 195. 1990; Mukherjee & Constance, Umbelliferae (Apiaceae) India 242. 1993.

Types: Holotype: India, Maharashtra, Sindhudurg, Amboli, S.M. Almeida SMA- 2815, 11.9.1980. Isotypes: 2815 B & C. Paratypes: Amboli, M.R. Almeida 1627 A-F, 2.10.1981 (All in BLAT!).

Herbs, perennial, up to 150 cm high, erect. Leaves radical and cauline; leaflets 1-2 pairs with an odd leaflet, 8-10 x 4-5 cm, ovate-lanceolate, oblique at base, long acuminate at apex, serrate, softly hairy on lower surface, terminal leaflet 3-lobed. Flowers in terminal, compound, branched umbel; rays 4-10, 4-7 cm long, hairy, striate, bracteate; bracts 1-1.5 cm long, linear-lanceolate, hairy. Sepals 5, small, linear. Petals 5, oblong-lanceolate, long acuminate, yellow. Fruits 8-10 x 6-8 mm, obovate-orbicular, dorsally compressed.

Fls. & Frts. : September-October.

Illus.: Almeida, *op. cit.*

Habitat: On hill slopes.

Distrib.: Endemic to MAHARASHTRA: Sindhudurg (Amboli).

Spec. exam.: Types, as above.

Status: Critically Endangered.

Criteria: Area of occupancy less than 10 sq km: found only at a single location.

Notes: This species is known only by its type collections from Amboli of Sindhudurg district so far. Here its distribution was reported as rare.

It can be distinguished by its oblique, acuminate and hairy leaves as well as pubescent, ovate-orbicular and dorsally compressed fruits with slender, white and uniform carpophore.

Pimpinella rollae Billore & Hemadri in Indian For. 108: 712, f. 1-7, t. 1982; Singh & Raghavan in J. Econ. Tax. Bot. 8 (1): 31. 1986; Ahmedullah & Nayar. Endemic Pl. Indian Reg. 1: 116. 1987; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 40. 1997. Pradhan & Singh, Fl. Ahmednagar 269. 1999.

Types: Holotype: *Billore* 115986A, 15.7.1969 (CAL!). Isotypes: 115986 B-E (BSI!), F-G (CAL!), H (K), I(L), J(GH), K(US), L(MO), M(LE), N(BLAT!) [These Holotype and Isotypes raised from the seeds of *Billore* 115489 A-J, designated as paratypes]. Paratypes: India, Maharashtra, Thane, Harishchandragarh, Kedarnath hill slopes, *Billore* 115489 A, 17.11.1968 (CAL!), B-F (BSI!), G (K), H (L), I(BLAT!), J(MH).

Herbs, 15-50 cm high. Leaves 3-foliolate; leaflets ovate-lanceolate, margins white ciliate and dentately dissected or 2-3-nately lobed; petiole 1-4.5 cm long, slender. Flowers in terminal or leaf-opposed, simple or compound umbels; primary rays 1-2, up to 3.5 cm long, filiform; secondary rays 1-5, up to 3 cm long, filiform; pedicels 2-10 mm long; bracts 2-5, 0.3-2.5 cm long, leafy, linear-lanceolate; bracteoles up to 5, 1-10 x 0.5-2 mm, linear-lanceolate. Calyx obsolete. Petals 5, 1-1.5 x 0.5-1 mm, obcordate, white. Fruits 2.5 - 4 x 2-3 mm, laterally compressed, globose-subglobose.

Fls. & Frts.: July-November.

Illus.: Billore & Hemadri, *op. cit.*

Habitat: In open areas, along hill slopes.

Distrib.: Endemic to MAHARASHTRA: Ahmednagar (Harishchandragarh), Thane (Harishchandragarh).

Spec. exam.: Ahmednagar: Harishchandragarh, *Mishra* 177605, 12.9.1998 (BSI).

Status: Critically Endangered.

Criteria: Area of occupancy less than 10 sq km: found only at a single location.

Notes: This species was known only by type collections from Harishchandragarh. Recently in 1998 it was recollected from the same locality. Though the authors of this species (Billore and Hemadri) speculated its possible distribution on some other isolated peaks like Bhimashankar, Kalsubai, Khandala, Pratapgarh etc., still it could not be located at any of these places. At Harishchandragarh also its distribution is fragmented.

It can be distinguished by its bracteate and bracteolate flowers as well as 3-4 vittate fruits.

Pimpinella tomentosa (Dalz. & Gibs.) C.B. Cl. in Hook. f. Fl. Brit. India: 689. 1879; Cooke, Fl. Pres. Bombay 1: 602. 1958 (Repr.ed.); Billore, Fl. Thane 1: 464. 1972 (Ph.D. Thesis, *ined.*); Lakshminarasimhan & Sharma, Fl. Nasik 236. 1991; Deshpande *et al.*, Fl. Mahabaleshwar 1: 270. 1993; Mukherjee & Constance, Umbelliferae (Apiaceae) India 149. 1993; Pradhan & Singh, Fl. Ahmednagar 269. 1999. *Heracleum tomentosum* Dalz. & Gibs. Bombay Fl. 108; 1861.

Types: Bombay, Dalzell.

Herbs, 50-200 cm high, erect, slender, profusely branched, densely hirtellous. Basal leaves rosulate, leaflets ovate, spinous-serrate to acutely laciniate; upper cauline leaves pinnatifid or reduced to bladeless sheaths. Flowers on mostly leaf opposed peduncles; rays 4-10, 1.5-2.5 cm long, hirsutulous; umbellets 5-15-flowered; mature pedicels 2.5 - 4 mm long.

Calyx obsolete. Petals ovate, white. Fruits 3.5 – 4.5 x 1.5-2 mm, compressed, rounded to cordate at base, narrowed toward apex.

Fls. & Frts. : August – December.

Habitat: Along ghats of ca 1,500 m altitude.

Distrib.: Endemic to MAHARASHTRA: Ahmednagar, Bombay, Dhule, Nasik, Pune, Satara, Thane.

Spec. exam.: Ahmednagar: Kalsubai, *Wadhwa* 128226, 7.10.1970; *Mishra* 176987, 9.9.1998. Nasik: Daityacha dongar, *Cherian* 98394, 9.9.1968; Saptashringi, *Lakshminarasimhan* 165255, 15.8.1983. Pune: Sinhagadh, *Ansari* 87823, 29.8.1963; Bhimashankar, *Janardhanan* 81709, 8.10.1962; Durga khills, near Junnar, *Hemadri* 104205, 29.10.1964. Satara: Mahabaleshwar, *Mahajan* 24708, 14.10.1957; *Ansari* 67592, 11.10.1960; Wai-Panchgani ghat, *A.S. Rao* 77912, 6.8.1962; Panchgani, *Mishra* 175629, 1.10.1996. Thane: Vihigaon range, Dhamni hill, *Billore* 112941, 19.10.1967 (all in BSI).

Status: Low Risk.

Notes: Though this species is endemic only to Maharashtra State, it is quite common and abundant throughout the Western Ghats. Hence, it has not been put into threatened category.

It can be distinguished by its 2-3-pinnate basal leaves, ebracteate flowers and size of fruits.

***Pinda concanensis* (Dalz.) P.K. Mukherjee & Constance** in Kew Bull. 41(1): 226, f. 1. 1985; Lakshminarasimhan & Sharma, Fl. Nasik 237. 1991; Deshpande *et al.*, Fl. Mahabaleshwar 1: 270. 1993. Pradhan & Singh, Fl. Ahmednagar 270. 1999. *Heracleum concanense* Dalz. in Hook. J. Bot. Kew Gard. Misc. 2: 260. 1850; C.B. Cl. in Hook. f. Fl. Brit. India 2: 716. 1879; Cooke, Fl. Pres. Bombay 1: 608. 1958 (Repr.ed.); Kulkarni, Fl. Sindhudurg 189. 1988; Almeida in J. Econ. Tax. Bot. Addl. Ser. 8 (1): Fl. Savantwadi 1: 195. 1990. *H. pinda* Dalz. & Gibs. Bombay Fl. 107. 1861; C.B. Cl. *op. cit.* 717; Cooke, *op. cit.* 608; Deshpande, *et al. op. cit.* 265. *H. grandiflorum* Dalz. & Gibs. *op. cit.* 108. 'Panda'

Types: Holotype: Bombay Presidency, *Dalzel* (K). Isotype (CAL!).

Herbs, 40-120 cm high, erect, slender, sparsely branched above, hirsute to hispidulous. Leaves ternate-pinnate or bipinnate; leaflets ovate-lanceolate to ovate, serrate and often lobed; cauline leaves reduced upward, the uppermost often reduced to oblong-oval, bladeless sheaths. Peduncles 2-10 cm long, slender, or some times abortive; rays usually 4-10, 1-5 cm long, hispidulous; umbellets 6-12-flowered; mature pedicels 2-5 mm long. Calyx teeth small, ovate. Petals oval with a narrower inflexed apex, white with coloured veins. Fruits strongly compressed dorsally, oval or elliptic, rounded at base and apex.

Fls. & Frts. : July-August.

Habitat: Along ghats at an altitude in between 600-1,200 m.

Distrib.: Endemic to MAHARASHTRA: Ahmednagar, Nasik, Pune, Raigad, Ratnagiri, Satara, Sindhudurg, Thane.

Spec. exam.: Ahmednagar: Harishchandragarh, *Wadhwa* 127555, 24.9.1970; Ratangarh, *Wadhwa* 128058, 2.10.1970; Harishchandragarh, *Mishra* 177610, 12.9.1998. Nasik: Anjaneri hill, *Lakshminarasimhan* 165107; 27.7.1983. Pune: Khandala, *Wadhwa* 64037, 2.8.1960; Khubi fata, on way from Narayan gaon to Malshej ghat, *Mishra* 175495, 3.9.1996. Raigad: Matheran, *Wadhwa* 67391, 27.9.1960. Satara: Mahabaleshwar, *Wadhwa* 109432, 13.8.1966; Koyna, *Kochhar* 153623, 4.9.1978; Mahabaleshwar, *Mishra* 175413, 14.7.1996 & 175433, 18.8.1996. Thane: Washala range, near Igatpuri, *Billore* 110560, 27.8.1967.

Status: Low Risk.

Notes: Though this species is endemic only to Maharashtra state, it has been categorised into Low Risk because it is one of the most common herbs throughout the Western Ghats. The tubers of this plant are edible.

It can be distinguished by its exterior petal of marginal flowers grossly dilated, lateral fruit ribs projecting but unwinged and vittae extending to base of fruit.

Polyzygus tuberosus Dalz. in Hook. J. Bot. & Kew Gard. Misc. 2: 260. 1850, C.B. Cl. in Hook. f. Fl. Brit. India: 698. 1879; Cooke, Fl. Pres. Bombay 1: 603. 1958 (Repr.ed.); Nayar in Bull. Bot. Surv. India 22 (1-4): 22. 1980; Mukh. in Jain & Rao (eds.), Ass. Threat. Pl. India 204. 1983; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 8. 1983 et in J. Econ. Tax. Bot. 5 (1): 158. 1984; Singh & Raghavan in *ibid.* 8(1): 31. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 116. 1987; Kulkarni, Fl. Sindhudurg 191. 1988; Singh & Kulkarni in Nayar & Sastry (eds.), Red Data Book Indian Pl. 3: 21, f. 1990; Deshpande *et al.* Fl. Mahabaleshwar 1: 272. 1993; Kothari & Moorthy, Fl. Raigad 176. 1993; Mukherjee & Constance, Umbelliferae (Apiaceae) India 247. 1993. Anon.; India Glob. Threat. Taxa 50. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. Pt. 1: 40. 1997.

Herbs, 20-50 cm high, glabrous; stems erect, sparingly branched, angular with tuberous roots. Leaves decompose, triternate, triangular-ovate or deltoid, hispidulous, ultimate leaflets pinnatisect; leaflets 1-4 x 0.5-3 cm, lanceolate-ovate; petioles 7-10 cm long. Flowers white, small, in axillary and terminal compound umbels; primary umbels 3-8-rayed; secondary umbels 6-12-flowered. Fruits *ca* 3 mm long, ovoid, dorsally compressed, many ribbed.

Fls. & Frts. : June-October.

Illus.: Singh & Kulkarni, *op. cit.*

Habitat: On open plateau and slopes in hilly regions.

Distrib.: Endemic to Karnataka, MAHARASHTRA: Kolhapur (Dajipur Bison Sanctuary), Pune (Katraj, Khandala), Raigad (Matheran), Ratnagiri (Dapoli), Satara (Jarandeshwar, Koyna), Sindhudurg (Malwan).

Spec. exam.: Kolhapur: Dajipur Bison Sanctuary, *Mishra* 176873, 29.8.1997; Pune: Khandala, *Chibber* 77, October, 1907; *Puri* 4704, 15.7.1957; Katraj, *Puri* 2339, 16.6.1956. Satara: Koyna, *Vasavada* 5017, 11.7.1956; Jarandeshwar hill, *Mishra* 175468, 25.8.1996 (All in BSI).

Status: Vulnerable (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Extent of occurrence estimated to be *ca* 19,000 sq km: severely fragmented populations.

Notes: Though this species occurs in several districts of Maharashtra, its distribution is very much sporadic every where. Hence, it has been grouped into vulnerable category.

It can be distinguished by its exterior petal of marginal flowers slightly dilated, lateral fruit ribs thin winged and vittae extending only part way to base of fruit.

RUBIACEAE

	<u>Genera</u>	<u>Species + Infraspecific taxa</u>
World	630	10,400
India	113	616
Maharashtra	38	92
Endemic to Maharashtra - 1 species.		

Neanotis sahyadrlica Billore & Mudaliar in J. Econ. Tax. Bot. 3: 321, f. 1-4. 1982; Singh & Raghavan in *ibid.* 8(1): 31. 1986; Ahmedullah & Nayar, Endemic Pl. India Reg. 1: 161. 1987; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 40. 1997; Pradhan & Singh, Fl. Ahmednagar 284. 1999.

Types: Holotype: India, Maharashtra, Thane, Harishchandragarh, slopes of Taramati dongar, *Billore* 115664 A, 18.9.1968 (CAL!). Isotypes: 115664 B-C (BSI!), D(K), E(MH). Paratypes: Thane, Washala range, Ajoba dongar, *Billore* 111944 A-B, 17.10.1967 (BSI!), C(CAL!), D(L), E(MO).

Herbs, erect, 30-40 cm high; stems terete, fleshy, glabrous, pale white to straw-coloured. Leaves 2.5-6.3 x 0.7-2.2 cm, lanceolate or elliptic-lanceolate, narrowed towards base, acute to acuminate or shortly mucronate at apex, nerves 4-7-pairs; petioles 5-10 mm long. Flowers in cymes either terminal or arising from upper axils; peduncles 0.7-3 cm long; bracteoles 1-2 mm long, subulate. Calyx *ca* 2 mm long; lobes 0.75-1.5 x 0.5-1 mm, broadly ovate-triangular, glabrous. Corolla bluish-white or whitish; tube 2.5-3 mm long; lobes 2-2.5 x *ca* 0.75 mm, ovate, subacute. Capsules 3-4 x

3.5-3 mm, subcompressed, glabrous, blackish. Seeds 4-12, *ca* 1 x 0.75 mm, broadly ellipsoid, black.

Fls. & Frts. : October-November.

Illus.: Billore & Mudaliar, *op. cit.*

Habitat: Along higher slopes of hills.

Distrib.: Endemic to MAHARASHTRA: Ahmednagar (Harishchandragarh), Thane (Harishchandragarh).

Spec. exam.: Types, as above.

Status: Critically Endangered.

Criteria: Area of occupancy less than 10 sq km: found only at a single location.

Notes: Though the authors of this species (Billore & Mudaliar) expected its possible occurrence on some isolated peaks like Kalsubai, Ratangarh etc., it is restricted only to its type locality so far. Here its distribution is also fragmented.

This species can be distinguished by its very shortly petioled leaves, characteristic broadly ovate-triangular calyx lobes and large number of seeds per capsule.

ASTERACEAE

	<u>Genera</u>	<u>Species + Infraspecific taxa</u>
World	1,314	21,000
India	166	803
Maharashtra	60	143
Endemic to Maharashtra - 2 species & 1 variety.		

Blumea venkataramanii Rolla Rao & Hemadri in *Curr. Sci.* 42 (19): 693. 1973; Raghavan & Singh in Jain & Sastry (eds.), *Pl. Cons. Bull.* 3:

9. 1983 et in *J. Econ. Tax. Bot.* 5 (1): 159. 1984; Singh & Raghavan in *ibid.* 8(1): 31. 1986; Ahmedullah & Nayar, *Endemic Pl. Indian Reg.* 1: 198. 1987; Rao *et al.*, *Fl. Ind. Enum. Aster.* 19. 1988; S. Kumar in Hajra *et al.* (eds.), *Fl. India* 13: 142. 1995; Yadav in Pokle *et al.* (eds.), *Flow. Pl. Syst. Diver.* pt. 1: 40. 1997.

Types: Holotype: India, Maharashtra, Pune, Pune-Bombay Road, near Vadgaon Hemadri 118174 A, 12.12.1968 (CAL!). Isotypes: 118174 B-C (BSI!). Paratypes: Pune, around Pavna dam site, near Vadgaon, Hemadri 110794 A-C 20.12.1968 (BSI!), D(K), E(L), F(LE), G(BLAT!), H(MH); Pune, Vadgaon, Hemadri 108788 A-B, 5.1.1971 (BSI!), C(CAL!), D(K), E(L), F(LE), G(MO), H(MH), I(BLAT!); Pune, Ralegaon hills; near Junnar, Hemadri 68582, 6.2.1969; Vanewadri, near Junnar, Hemadri 68588 A-D, 5.2.1969 (All in BSI!).

Herbs, annual, 20-100 cm high, erect, aromatic; stems clothed by simple or glandular hairs. Lower most leaves up to 20 x 5 cm, spatulate, elliptic-obovate, or oblanceolate, at base decurrent, forming a false prominent wing, margins irregularly dentate or serrate, hairy on both surfaces; upper most leaves smaller, oblong-lanceolate or spatulate with decurrent base. Heads 6-12 x ca 10 mm, terminal and lateral, pedunculate, solitary or in clusters; involucre bracts 3-4 seriate. Outer florets ca 3 mm long, 3-lobed, yellow, female. Pappus as long as corolla, white. Achenes minute, 4-angled, minutely hairy, cupular at apex.

Fls. & Frts. : December-February.

Illus.: Rolla Rao & Hemadri, *op. cit.*

Habitat: On the bunds of cultivated fields and on hills.

Distrib.: Endemic to MAHARASHTRA: Pune (Junnar, Vadgaon).

Spec. exam.: Types, as above.

Status: Endangered.

Criteria: Area of occupancy up to 100 sq km: found only at 2 locations.

Notes: Though, the authors of this species (Rolla Rao & Hemadri) speculated its possible distribution up to Gujarat and Karnataka, it has not been reported outside of its type localities so far. At its type localities it is distributed sporadically.

This species can easily be differentiated by its decurrent leaves, forming wings on stem.

Cyathocline lutea Law ex Wight in Calc. J. Nat. Hist. 7: 158. 1847; Hook. f. Fl. Brit. India 3: 246. 1881; Cooke, Fl. Pres. Bombay 2: 71. 1958 (Repr.ed.); Sant. in Rec.Bot. Surv. India 16 (1), Fl. Khandala 125. 1967 (3rd Rev. ed.); Billore, Fl. Thane 1: 520. 1972 (Ph.D. Thesis, *ined.*); Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 10. 1983 et in J. Econ. Tax. Bot. 5(1): 159. 1984; Singh & Raghavan in *ibid.* 8(1): 31. 1986; Rao *et al.* Fl. Ind. Enum. Aster. 32. 1988; Singh & Kulkarni in Nayar & Sastry (eds.), Red Data Book Indian Pl. 3: 44, f. 1990; Lakshminarasimhan & Sharma, Fl. Nasik 264. 1991; Hajra in Hajra *et al.* (eds.), Fl. India 12: 110. 1995; Anon., India Glob. Threat. Taxa 21. 1996; Pradhan & Singh, Fl. Ahmednagar 305. 1999. *C. flava* C.B. Cl., Comp. Ind. 57. 1876. (non Wight).

Herbs, 7.5-22.5 cm high, pubescent; stems slender, many from base. Leaves mostly radical, stellately spreading, 2.5-5 x 0.3-0.4 cm, linear, revolute, glandular, bipinnatifid; cauline leaves few, alternate, segments minute. Heads 3-4 mm across, in subscorpioid cymes, yellow; involucrel bracts *ca* 2.5 mm long, linear-oblong, subobtuse, hairy on back. Achenes *ca* 2.5 mm long, oblong, slender, thin, shining, smooth.

Fls. & Frts. : October-January.

Illus.: Wight, Ic. t. 1150. 1846; Singh & Kulkarni, *op. cit.*

Habitat: In open plateau on hills in wet situations.

Distrib.: Endemic to Karnataka, Kerala, Tamil Nadu, MAHARASHTRA: Ahmednagar (Harishchandragarh), Nasik (Ambewadi), Pune (Bhimashankar, Junnar, Khed, Lonavla, Khandala, Sinhadagadh), Thane (Sadrya ghat).

Spec. exam.: Ahmednagar: Harishchandragarh, *Wadhwa* 127843, 28.9.1970. Nasik: Ambewadi forest, near Igatpuri, *Lakshminarasimhan*

166019, 9.10.1983. Pune: Sinhgadh, *Puri* 363, 11.4.1956; Khed taluka, Bhovargiri, *Janardhanan* 70070, 23.12.1960; Khed taluka, Singa hill, *Janardhanan* 75923, 27.11.1961; Lonavla, *Ansari* 32884, 18.11.1961; *Rolla* 85210, 25.12.1962; *Reddi* 101057, 27.10.1964; Durga Khilla, near Junnar, *Hemadri* 104201, 29.10.1964; Bhivadi Khurd, near Junnar, *Hemadri* 107571, 2.10.1965; Malwadi village, before Durga khilla, west of Junnar, *Mishra* 176811, 21.11.1996. Thane: Tokavada range, Sadrya ghat, *Billore* 115470, 15.11.1968 (All in BSI).

Status: Endangered (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Extent of occurrence estimated to be *ca* 4,000 sq km: severely fragmented populations.

Notes: Though this species occurs at several places In Maharashtra, its distribution is very much sporadic. In 1996 a very few individuals were noticed at a single spot near Durga Khilla at Junnar but at Khandala and Sinhgadh it could not be located in spite of intensive searching.

This species, can easily be identified by its bright yellow flowers.

Cyathocline purpurea (Buch.-Ham. ex D. Don) O. Ktze. var. **alba** Sant. in Kew Bull. 1948: 490. 1949 et Fl. Purandhar 65. 1958 et in Rec. Bot. Surv. India 16 (1), Fl. Khandala 124. 1967 (3rd Rev. ed.); Rao *et al.*, Fl. Ind. Enum. Aster. 32. 1988; Hajra in Hajra *et al.* (eds.), Fl. India 12: 111. 1995.

Types: Holotype: India, Maharashtra, Pune, Khandala, *Santapau* 8094, 26.11.1945. Paratypes: Khandala, *Santapau* 8883, 11.5.1946 (BLAT!).

Herbs, strongly aromatic, glandular-hairy, 12-60 cm high; stems usually purplish or purple tinged, branched from base. Leaves pinnatisect; cauline leaves deeply incised; lower obovate; upper all pinnatifid, segments toothed to lobed, glabrescent or thinly hairy. Heads *ca* 5 mm across, pure white, in terminal, rounded, paniced corymbs; involucrel bracts 2- seriate, linear-lanceolate, acute, pilose. Corolla of marginal florets *ca* 1.5 mm and of disk florets *ca* 2 mm long. Achenes minute, pappus absent.

Fls. & Frts. : November-May.

Habitat: In rice fields, after the harvest.

Distrib.: Endemic to MAHARASHTRA: Pune (Khandala, Purandhar), Raigad (Panvel), Sindhudurg (Amboli).

Spec. exam.: Pune: Purandhar, *Santapau* 5592-5, 23.12.1944 & 8169, 22.12.1945. Raigad: Panvel, *M.R. Almeida* 2243, 3.10.1972. Sindhudurg: Amboli, *M.R. Almeida* 1594, 23.11.1971 (All in BLAT).

Status: Vulnerable.

Criteria: Extent of occurrence estimated to be ca 11,500 sq km: found only at 4 locations.

Notes: Earlier this variety was considered to be endemic to Pune district only. But later M.R. Almeida collected it from Raigad and Sindhudurg districts also. At its type locality it was reported as abundant, but localised in a small area. In other places its distribution is sporadic.

This variety can easily be distinguished by its pure white flowers.

Cyathocline purpurea (Buch.-Ham. ex D. Don) O. Ktze. var. ***bicolor*** Sant. in Kew Bull. 1948: 490. 1949 et in Rec. Bot. Surv. India 16(1), Fl. Khandala 125. 1967 (3rd Rev. ed.); Rao *et al.*, Fl. Ind. Enum. Aster. 33. 1988; Hajra in Hajra *et al.* (eds.), Fl. India 12: 111. 1995.

Types: Holotype: India, Maharashtra, Pune, Khandala, *Santapau* 3421, 24.12.1943 (BLAT!). Isotypes: *Santapau* 3422-3* (BLAT!, K).

This variety is very much similar to typical variety and so also to var. *alba* but can be differentiated by its heads which are white on the centre and purple in the periphery. The cauline leaves of this variety are also much smaller than the other two varieties.

Fls. & Frts. : November-March.

* In the protologue of this species, specimen *Santapau* 3422 & 3433 are designated as 'isotype'. However, these can not be 'isotype' as the collections are different from that of the holotype (*Santapau* 3421). These are paratypes only.

Habitat: In rice fields.

Distrib.: Endemic to MAHARASHTRA: Pune (Khandala).

Spec. exam.: Pune: Khandala, *Santapau* 3494, 29.12.1943; 8093, 26.11.1945 & 13815-8, 5.11.1951 (All in (BLAT).

Status: Critically Endangered.

Criteria: Area of occupancy less than 10 sq km: found only at a single location.

Notes: This variety is known only by its type collections from Khandala so far. Though, reported as common, it was localised only in the rice fields of St. Xavier's Villa.

Nanothamnus sericeus Thoms. in J. Linn. Soc. 9: 342, t. 3. 1867; Hook. f. Fl. Brit. India 3: 273. 1881; Cooke, Fl. Pres. Bombay 2:83. 1958 (Repr.ed.); Sant., Rec. Bot. Surv. India 16 (1), Fl. Khandala 130. 1967 (3rd Rev.ed.); Nayar in Bull. Bot. Surv. India 22 (1-4): 20.1980; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 198. 1987; Rao *et al.* Fl. Ind. Enum. Aster. 32. 1988; Singh & Kulkarni in Nayar & Sastry (eds.), Red. Data Book Indian Pl. 3: 46. 1990; Lakshminarasimhan & Sharma, Fl. Nasik 272. 1991; S. Kumar in Hajra *et al.* (eds.), Fl. India 13: 153. 1995; Anon., India Glob. Threat. Taxa 43. 1996; Pradhan & Singh, Fl. Ahmednagar 317. 1999. '*Burand*'

Herbs, prostrate or ascending, 15-20-cm long, highly branched, cottony woolly. Leaves alternate, 1-5 cm long, lower oblanceolate, upper lanceolate, rigid, acutely serrate, subsessile, conspicuously nerved, woolly on both surfaces. Heads subterminal or axillary in dense clusters, 2-5 mm across, yellow, disciform, subsessile. Involucral bracts multiseriate; outer *ca* 6 x 1.5 mm, lanceolate, scaly, glandular hairy; inner *ca* 4 x 1 mm, hairy at apex, outer surface hyaline. Marginal florets 3.8 - 4 x *ca* 1 mm, inner florets *ca* 3 x 0.4 mm. Achenes *ca* 0.8 mm long, oblong, 5-8 ribbed.

Fls. & Frts. : February-April.

Illus.: Thoms., *op. cit.*.

Habitat: On gravelly soil in open situations among grasses.

Distrib.: Endemic to Karnataka, Tamil Nadu, MAHARASHTRA: Ahmednagar (Ghatghar, Kalsubai), Nasik (Igatpuri), Pune (Ambavane, Bhimashankar, Junnar, Khandala, Paud), Thane (Phugula round).

Spec. exam.: Nasik: Devgad round, near Igatpuri, Lakshminarasimhan 163930, 7.5.1983. Pune: Bhimashankar, Puri 12602, 30.3.1957; Janardhanan 72121, 22.4.1961 & 76602, 6.4.1962; Paud, Rolla 87209, 19.3.1963; Ambavane, Reddy 96058, 27.3.1964; Dhak range, near Junnar, Hemadri 104489, 3.6.1965. Thane: Washala range, Phugula round, near Igatpuri, Billore 116166, 5.6. 1968 (All in BSI).

Status: Endangered (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Extent of occurrence estimated to be *ca* 4,000 sq km: severely fragmented populations.

Notes: In Maharashtra this species has been reported from several localities of four districts. However, everywhere its distribution is sporadic.

It can be distinguished by its disciform heads, narrow involucre bracts and 2-lipped bisexual flowers.

Phyllocephalum hookeri (C.B. Cl.) Uniyal in Fl. India 13: 339. 1995; *Centratherum hookeri* C.B. Cl., Comp. Ind. 3. 1876; Hook. f. Fl. Brit. India 3: 228. 1881; Cooke, Fl. Pres. Bombay 2: 63. 1958 (Repr.ed.).

Herbs, up to 60 cm high, erect; stems ashy pubescent, grooved. Leaves up to 5.5 x 1.2 cm, linear-lanceolate, acute, obscurely toothed, somewhat pubescent on both surfaces. Heads 1.2-1.8 cm across, subcorymbose; peduncles hoary pubescent. Outer involucre bracts ovate-oblong, subacute, dense pubescent; intermediate linear, longer than outer ones, tip reflexed; innermost linear, longest, scarious, tips reflexed. Pappus single, straw-coloured, deciduous. Corolla red. Achenes *ca* 3 mm long, linear-oblong, 10-ribbed.

Fls. & Frts. : November.

Distrib.: Endemic to MAHARASHTRA: Pune (Cooke, *op. cit.*)

Status: Data Deficient.

Notes: Cooke included this species in his Flora based on collections by Law from Konkan and by Woodrow from Pune. However, the exact locality was not mentioned and even in later period it could not be recollected from any place. Due to paucity of sufficient information this species has been put into Data Deficient. It needs further intensive explorations. Its herbarium specimens also could not be traced in the Indian Herbaria.

It can be distinguished by its leaves not white beneath, outer involucre bracts shorter than inner and single pappus.

APOCYNACEAE

	<u>Genera</u>	<u>Species + Intraspecific taxa</u>
World	215	2,100
India	47	119
Maharashtra	16	22

Beaumontia jerdoniana Wight, Icon. t. 1314-1315. 1848; Hook. f. Fl. Brit. India 3: 661. 1882; Cooke, Fl. Pres. Bombay 2: 201. 1958 (Repr.ed.); Vartak in Jain & Rao (eds.), Ass. Threat. Pl. India 174. 1983; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 118. 1987; Kulkarni, Fl. Sindhudurg 247. 1988; Almeida in J. Econ. Tax. Bot. Addl. Ser. 8 (1), Fl. Savantwadi 1: 250. 1990.

Shrubs, scandent, woody. Leaves 10-20 x 4-12 cm, oblong-ovate, coriaceous, acute at base, abruptly and shortly acuminate at apex, rusty tomentose in young stage, later glabrous, main nerves 8-15 pairs; petioles ca 1 cm long. Flowers in terminal rusty pubescent cymes; bracts ovate, acute, deciduous. Calyx with many glands at the base inside; segments 2-2.5 cm long, narrowly lanceolate, acute, pubescent. Corolla 7-10 cm long, infundibuliform, white; tube pubescent outside; lobes ca 2.5 cm long, obovate-oblong. Fruits 18-22 cm long, cylindrical, glabrous. Seeds 1-2 cm long, ovate-lanceolate, compressed.

Fls. & Frts. : November-January.

Illus.: Wight, *op. cit.*

Habitat: In evergreen and semi-evergreen forests.

Distrib.: Endemic to Karnataka, MAHARASHTRA: Sindhudurg (Hiranyakeshi).

Spec. exam.: Karnataka, N. Kanara, *Irani* 1528, 26.12.1955 (BLAT).

Status: Critically Endangered (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Area of occupancy *ca* 1 sq km: found only at a single location.

Notes: In Maharashtra this species occurs only at Hiranyakeshi near Amboli ghat and here its distribution is severely fragmented.

It can be distinguished by its leaves nearly glabrous beneath and corolla varying from broadly companulate to funnel-shaped.

ASCLEPIADACEAE

	<u>Genera</u>	<u>Species + Infraspecific taxa</u>
World	347	2,850
India	57	260
Maharashtra	27	69
Endemic to Maharashtra - 17 species		

Bidaria khandalense (Sant.) Jagtap & Singh in *Biovigyanam* 16 (1): 62. 1990; Kothari & Moorthy, *Fl. Raigad* 237, f. 1993; Jagtap & Singh in *J. Econ. Tax. Bot.* 22 (1): 232. 1998 et in *Fasc. Fl. India* 24:67.1999. *Gymnema khandalense* Sant. in *Kew Bull.* 1948: 486. 1949; Sant. & Irani in *Uni. Bombay Bot. Mem.* 4: 49. 1962; Sant. in *Rec. Bot. Surv. India* 16 (1), *Fl. Khandala* 152. 1967 (3rd Rev. ed.); Kothari & Moorthy in *J. Bombay nat. Hist. Soc.* 80 (1): 259. 1983; Raghavan & Singh in Jain &

Sastry (eds.), Pl. Cons. Bull. 3: 6. 1983 et in J. Econ. Tax. Bot. 5(1): 159. 1984; Singh & Raghavan in *ibid.* 8(1): 31. 1986; Kothari in Nayar & Sastry (eds.), Red Data Book Indian Pl. 3: 37, f. 1990; Anon., India Glob. Threat. Taxa 30. 1996.

Types: Holotype: India, Maharashtra, Pune, Khandala, Duke's nose, *Santapau* 5434, 1.11.1944. Paratypes: Khandala, *Santapau* 5796 & 5798-9, 20.1.1945 (All in BLAT!).

Climbers, woody. Leaves opposite, petiolate, 8-12x7-9 cm, broadly-ovate to elliptic-oblong, acute, densely pubescent when young. Flowers in lateral umbellate cymes; peduncles and pedicels pubescent when young. Calyx 5-lobed, lobes *ca* 1.5 mm long. Corolla *ca* 5 mm across, pubescent, yellow; tube *ca* 2 mm long; lobes *ca* 2 x 1 mm, ovate. Corona of 5 hairy processes. Follicles usually solitary, 8-10 x *ca* 0.5 cm, cylindrical, straight or curved, greenish-brown, pubescent. Seeds 10-12x3-4 mm; coma *ca* 4 cm long, silky-white.

Fls. & Frts. : October-January.

Illus.: Kothari, *op. cit.*; Kothari & Moorthy, *op. cit.* (*Gymnema khandalense*).

Habitat: On hill slopes at an altitude of *ca* 550 m and in moist deciduous forests.

Distrib.: Endemic to MAHARASHTRA: Pune (Khandala, Karli), Raigad (Roha).

Spec. exam.: Pune: Karli, *Gammie* 15074, 15.5.1902 (BSI); Khandala, *Santapau* 5436-7, 1.11.1944; 11713-8, 26.10.1950 & 15347, 21.12.1952 (All in BLAT).

Status: Critically Endangered.

Criterion: Number of mature individuals less than 50.

Notes: After 1952 this species could not be recollected from Khandala even after intensive searching. Hence, once it was thought possibly Extinct (Raghavan & Singh, *op.cit.*, 1983). But, later it was reported from Masadi

forest of Raigad district (Kothari & Moorthy, 1983). In 1997, only four mature individuals in vegetative condition were observed in this forest. Deforestation is the major reason for its present status. It should be conserved immediately to avoid extinction.

This species can be distinguished by broadly ovate and densely puberulous leaves; orbicular calyx lobes and corolla puberulous on both sides.

Brachystelma malwanense Yadav & N.P. Singh in Kew Bull. 48 (1): 59, f. 1. 1992; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 41. 1997; Jagtap & Singh in J. Econ. Tax. Bot. 22 (1): 232. 1998 et in Fasc. Fl. India 24: 186. 1999.

Types: Holotype: India, Maharashtra, Sindhudurg, Chowk, ca 5 km east of Malwan, Yadav 4678, 10.3.1990 (CAL!). Isotypes: 4678B (BSI!), 4678C (K).

Herbs, erect, tuberous, perennial; stems 9-30 cm high, terete, hispid. Leaves opposite, sessile or subsessile, 4-9 x 0.5-2.5 cm, lanceolate or narrowly elliptic, acute at apex. Rachis 1-3 cm long, bearing usually 4 flowers in whorls at each node. Flowers small; pedicels 3-5 mm long, puberulous; bracts 1-2 mm long, subulate. Calyx 5-partite, sepals 1-2 mm long, puberulous. Corolla divided into five almost to base, dark purple and variously variegated inside, greenish purple outside; tube ca 1.5 mm long; lobes 6-10 mm long, hairy on inner side. Outer corona ca 2.2 mm in diameter, 5-lobed, hairy; inner corona 5 dark purple, glabrous. Follicles in pairs, 10-15 cm long, tapering at apex. Seeds comose.

Fls. & Frts. : February - April.

Illus.: Yadav *et al.*, *op. cit.*

Habitat: Crevices in laterite in the Konkan area under bushes.

Distrib.: Endemic to MAHARASHTRA: Sindhudurg (Malwan).

Spec. exam.: Types, as above.

Status: Critically Endangered.

Criteria: Area of occupancy up to 4 sq km: found only at a single location.

Notes: It is newly described species and according to Yadav (by personal communication) it is sparsely distributed in its habitat (5-10 mature individuals per sq km). Hence, until its further report from other localities, this habitat needs to be protected for its conservation.

This species can easily be differentiated from its allied species (*B. edulis* Coll. & Hemsl.) by its larger size, broader leaves, longer flowering internodes and corolla lobes with purple hairs.

Brachystelma naorojii P. Tetali, D.K. Kulk., S. Tetali & Kumb. in *Rheedea* 8(1): 75, f.1. 1998; Jagtap & Singh in *Fasc. Fl. India* 24: 187. 1997.

Types: Hootype: India, Maharashtra, Satara, Gavadewadi near Pandav Dhara, 3 km South from Shindewadi Phata on Pune- Satara National Highway, P. Tetali 72A, July, 1993 (AHMA!). Paratypes: Gavadewadi, P. Tetali 17895 & 17896 (K).

Herbs, erect, perennial; stems 30-55 cm high, glaucous green, sparingly pubescent. Leaves opposite-decussate, sessile, 1.5-9x0.5-4 cm, lanceolate, ovate-oblong or ovate-lanceolate, acuminate at apex, margins ciliate. Flowers 2 on either side of the scale leaf; pedicels 5-7 mm long. Calyx 5-partite, lobes 5, 1.5-2 mm long. Corolla deeply 5-fid, lobes 9-10 mm long, thickly hairy on the inner side, green turning to brick red, reddish-violet and finally to reddish purple. Corona cupular, 5-lobed, lobes with long white hairs, margins dark purple, lower portion of corona white, 2.3-3 x ca 3 mm, sparsely hairy, obtusely 5-angled, coronal lobes produced into 5 inner lobes incumbent and adpressed on the stamen. Follicles single or in pairs, ca 6 cm long, tapering towards apex. Seeds 8-10 mm long, dark brown with light brown margins; coma up to 2 cm long, silky-white.

Fls. & Frts.: May-June.

Illus.: P. Tetali *et al.*, *op.cit.*

Habitat: On partially degraded hill slopes and open hilltops among grasses.

Distrib.: Endemic to MAHARASHTRA: Satara (Gavadewadi).

Spec. exam.: Type, as above

Status: Critically Endangered.

Criteria: Area of occupancy less than 10 sq km: severely fragmented population.

Notes: This species has been described very recently based on collection in 1993. It has been known by personal communication with the collector cum senior author of this species that in 1993 its number of mature individuals were hardly *ca* 100 and were sporadically distributed in an area of not more than 10 sq km. However, this number is gradually decreasing and in 1999 the author himself could not locate it at the exact spot. Where from the type specimens were collected, though it was surviving in the adjacent places. It is facing tremendous threats because presently its habitat is exclusively used for cattle grazing and also the entire area has been declared as D-category industrial zone by Maharashtra State in order to promote industrial growth. In this situation it is to be suggested to take some necessary steps for the conservation of this species simultaneously.

This species can be identified by its green flowers turning to brick red, reddish-violet and ultimately to reddish-purple, large cupular corona with dark purple corona lobes and follicles up to 6 cm long.

Ceropegia attenuata Hook. Ic. Pl. ser. 2: 5, t. 867. 1852; Dalz. & Gibs. Bombay Fl. 154. 1861; Hook. f. Fl. Brit. India 4: 67. 1883; Cooke, Fl. Pres. Bombay 2: 239. 1958 (Repr.ed.); Blatt. in J. Bombay nat. Hist. Soc. 36 (3): 534. 1933; Sant. & Irani in Bull. Bot. Soc. Bengal 12 (1 & 2): 7, t. 1, f. A; t.2., f. A. 1958; Sant. & Irani, Uni. Bombay Bot. Mem. 4: 26. 1962; Shah in Bull. Bot. Surv. India 4: 236. 1962; Panigrahi & Joseph in Bull. Bot. Surv. India 8: 149. 1967; Sant. in Rec. Bot. Surv. India 16(1), Fl. Khandala 155. 1967 (3rd Rev.ed.); Kammathy *et al.* in *ibid.* 9: 221. 1968; Billore, Fl. Thane 1: 578. 1972 (Ph.D. Thesis, *ined.*); Kulkarni & Thite in J. Bombay nat. Hist. Soc. 74: 600. 1979; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 9. 1983; Ansari in Fasc. Fl. India 16: 9, t. 3(9), f. 2. 1984; Singh & Raghavan in J. Econ. Tax. Bot. 8(1): 31. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1:

120. 1987; Ansari in Nayar & Sastry (eds.), Red Data Book Indian Pl. 1: 49, f. 1987; Kulkarni, Fl. Sindhudurg 257. 1988; Almeida in J. Econ. Tax. Bot. Addl. Ser. 8 (1), Fl. Savantwadi 1: 257. 1990; Kothari & Moorthy, Fl. Raigad 233. 1993; Anon., India Glob. Threat. Taxa 15. 1996; Yadav in Pokle *et al.* (eds.), Flow Pl. Syst. Diver. pt. 1: 41. 1997; Yadav, S.S., Geobios new Rep. 16: 6. 1997; Jagtap & Singh in J. Econ. Tax. Bot. 22(1): 232. 1998. et in Fasc. Fl. India 24: 25. 1999. *C. angustifolia* Dalz. in Hook. Kew Jour. Bot. 2: 259. 1850, *non. C. angustifolia* Wight. 'Tilori' 'Kaper halda'

Types: India, Maharashtra, Malwan, *Dalzell s.n.* (K).

Herbs, erect, tuberous, 10-20 cm high. Leaves opposite, minutely petiolate, 3-15 x 0.4-1 cm, linear to linear-lanceolate, acute at apex, base narrow, pubescent when young. cymes shortly pedunculate, 1-2-flowered; peduncles pubescent. Calyx small, hairy. Corolla 5-7.5 cm long; tube up to 3.8 cm long, pale yellowish-green, slightly inflated in the lower 1/3 part, narrowed above, enlarging near the mouth; lobes up to 3.7 cm long, pale purple in upper half, merging to pale green below, margins hairy all along, pubescent inside in the upper 3/4 part. Outer corona of 5, bifid, ciliate lobes; inner linear, erecto-divergent. Fruits 5-8 cm long.

Fls. & Frts. : July-October.

Illus.: Sant. & Irani, *op. cit.* 1958; Ansari, *op. cit.* 1987.

Habitat: Exposed rocky areas on hill tops and gentle slopes among grasses.

Distrib.: Endemic to Goa, Karnataka, Rajasthan, MAHARASHTRA: Bombay (Borivli, Trombay), Pune (Khandala), Raigad (Matheran), Sindhudurg (Amboli, Malwan, Vengurla), Thane (Kasara, Mumbra).

Spec.exam.: Bombay: Trombay, *Merchant* 1196, 1.8.1959. Pune: Khandala, *Santapau* 137.16, 3.8.1941; 850, 5.9.1942; 2258, 24.7.1943 & 2430-1, 22.8.1943 (All in BLAT); *Ansari* 32781, 3.7.1961 (BSI). Raigad: Matheran, *Irani* 4206-7, 13.7.1959; 4244, 22.7.1959; 4276-8, 29.7.1959; 4330, 6.8.1959; 4502, 3.9.1959 & 5528, 10.10.1960. Thane: Mumbra, *Shenoy* 4797, 9.10.1954; *Irani* 231-2, 7.10.1954 & 2085, 1.8.1956 (All in BLAT); Washala range, Kasara, *Billore* 115319, 23.9.1968 (BSI).

Status: Vulnerable (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Extent of occurrence estimated to be *ca* 15,000 sq km: severely fragmented populations.

Notes: This species is mainly confined to Bombay, Pune, Raigad and Thane districts of Maharashtra. Long back it was reported from Malwan by Cooke and from Vengurla by Dalzell in Sindhudurg district. Later it has not been collected from these two places. Recently in 1990, Almeida has reported it from Amboli of the same district, where its distribution was noted as rare. Tubers of this species are edible.

It can be distinguished by its hairy stem, linear-lanceolate leaves, 1-2 flowered cymes, 5-7.5 cm long corolla, corolla lobes almost equal to tube, tube slightly inflated at base and glabrous inside.

Ceropegia evansii McC. in J. Bombay nat. Hist. Soc. 45: 209. 1945 et in Mem. Soc. Broter 12: 67. 1957; Sant., Fl. Purandhar 80. 1958; Sant. & Irani in Bull. Bot. Soc. Bengal 12 (1 & 2): 11, t. 1, f.D, t, f.C. 1958 et Uni. Bombay Bot. Mem. 4: 3. 1962; Sant. in Rec. Bot. Surv. India 16(1), Fl. Khandala 157. 1967 (3rd Rev.ed.); Venkatarreddi in Bull. Bot. Surv. India 11: 253. 1971; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 9. 1983; Ansari in Fasc. Fl. India 16: 15, t. 3 (10). 1984; Singh & Raghavan in J. Econ. Tax. Bot. 8(1): 31. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 120. 1987; Ansari in Nayar & Sastry (eds.), Red Data Book Indian Pl. 1: 54, f. 1987; *Anon.*, India Glob. Threat. Taxa 15. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 41. 1997; Yadav, S.S. *et al.* in Geobios new Rep. 16: 7. 1997; Jagtap & Singh in J. Econ. Tax. Bot. 22(1): 232. 1998 et in Fasc. Fl. India 24: 222. 1999.

Types: Paratypes: India, Maharashtra, Pune, Khandala, *Santapau* 919 A, 920 B, 921 C & 922 D, 13.9.1942; 2261 & 2262, 24.7.1943 (All in BLAT!)

Herbs, twining, tuberous; stems glabrous. Leaves opposite, up to 18.5 x 10 cm, ovate to ovate-lanceolate, base rounded, almost glabrous. Cymes few flowered; peduncles 1-5 cm long, hairy; pedicels 1-2 cm long, glabrous; bracts subulate. Calyx *ca* 6 mm long, glabrous. Corolla *ca* 4 cm long; tube *ca* 2.8 cm long, base inflated, narrowed in the middle, expanding upwards;

lobes 1-1.2 x 0.8-0.9 cm, broadly ovate or ovate-oblong, folded on back. Outer corona of 5, deltoid, bifid, hairy lobes; inner linear, erect. Follicles up to 12.5 cm long, first erect, then divaricate.

Fls. & Frts. : July-October.

Illus.: Sant. & Irani, *op. cit.* 1958; Ansari, *op.cit.* 1987.

Habitat: On slopes in low, mixed deciduous forests.

Distrib.: Endemic to MAHARASHTRA: Pune (Khandala, Lonavla, Ratnagiri (Amba ghat).

Spec.exam.: Pune: Khandala, *Santapau* 137.24, 20.7.1941; 137.22, 1.8.1941; 637A-D, 1.8.1942; 821 A-B, 2.9.1942; 826 A-D, 4.9.1942; 830, 5.9.1942; 4582, 3.8.1944; 6803-5, 21.7.1945; 6879, 4.8.1945; 6922-7, 17.8.1945 & 7438, 2.10.1945; *Irani* 1165 A-C, 10.9.1955 & 1990, 10.6.1956; *Bhoma, Irani* 2168, 9.8.1956. (All in BLAT). Mulshi taluka, Kate Pani Forest, *Reddi* 93331, 27.7.1964 (BSI).

Status: Critically Endangered.

Criteria: Area of occupancy less than 10 sq km: severely fragmented population.

Notes: Earlier this species was collected several times by Santapau and Irani from Khandala and adjoining. However, after Reddi's collection on 1964, it has not been reported from Pune district. Recently in 1997 a very few individuals were noted growing at Amba ghat of Ratnagiri district. Tubers of this plant are edible.

This species can be differentiated by its corolla of *ca* 4 cm long; subcylindric, corolla tube which is longer than lobes and broadly ovate lobes, which are pubescent inside.

Ceropegia huberi Ansari in Bull. Bot. Surv. India 10(2): 219. (1968) 1969; Kulkarni & Thite in J. Bombay nat. Hist. Soc. 74: 600. 1979; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 6. 1983; Ansari in Fasc. Fl. India 16: 17, t. 3 (12). 1984; Mistry, Fl. Ratnagiri 1: 390. 1986 (Ph.D. Thesis, *ined.*); Singh & Raghavan in J. Econ. Tax. Bot.

8(1): 31. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 122. 1987; Ansari in Nayar & Sastry (eds.), Red Data Book Indian Pl. 1: 58, f. 1987; Goel in J. Econ. Tax. Bot. 9(1): 74. 1987; Mistry & Almeida in J. Bombay nat. Hist. Soc. 86(3); 478. 1989; Bachulkar in Rayat Research J. 1 (2): 113. 1993; Anon., India Glob. Threat. Taxa 15. 1996; Samaddar & Roy, Add. Ele. Indian Fl. 1: 69. 1997; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 41. 1997; Yadav, S.S. *et al.* in Geobios new Rep. 16: 7. 1997; Jagtap & Singh in J. Econ. Tax. Bot. 22 (1): 232. 1998 et in Fasc. Fl. India.24: 225.1999. '*Kharpudi*'.

Types: Holotype: India, Maharashtra, Ratnagiri, Amba ghat, *Ansari* 105001 A, 29.8.1967 (CAL!). Isotype 105001 C (BSI!). Paratypes: Amba ghat, *Ansari* 105033 E-L, 29.8.1967 (BSI!).

Herbs, twining, perennial. Leaves opposite, petiolate, 5-12 x 1.5 - 4.8 cm, ovate to lanceolate, acuminate. Cymes many flowered; peduncles and pedicels hairy; bracts subulate, 2-3 mm long. Calyx 5 partite, *ca* 3 mm long. Corolla *ca* 1.2 cm long, white; tube *ca* 5 mm long, slightly inflated near base, narrowed towards mouth; lobes *ca* 7 x 10 mm, ovate, broader than long, glabrous, the sides jointed in the upper 2/3 part forming a circular, flattened head. Outer corona *ca* 0.7 mm long, 5-lobed, entire, glabrous; inner *ca* 2 mm long, 5-lobed, hairy on the dorsal side, creamy yellow, convergent at apex. Follicles *ca* 6 cm long, in pairs (immature), tapering at both ends, glabrous. Seeds many, *ca* 5 x 3 mm, ovate, oblong, coma *ca* 10 mm long.

Fls. & Frts. : August-October.

Illus.: Ansari, *op.cit.* 1984 & 1987.

Habitat: In rocky crevices and gravelly slopes at an altitude of *ca* 1000 m.

Distrib.: Endemic to MAHARASHTRA: Kolhapur (Gaganbawda), Ratnagiri (Amba ghat), Satara (Vasota fort).

Spec.exam.: Kolhapur: Gaganbawda, Karul ghat, *Mishra* 176854, 25.8.1997. Ratnagiri: Amba ghat, *Shevade s.n.* 4.8.1909 (Both in BSI); *Mistry* 1266, without date (BLAT).

Status: Endangered.

Criteria: Extent of occurrence estimated to be *ca* 350 sq km: found only at three locations.

Notes: After its type collection from Ratnagiri district, Kulkarni & Thite (1977) reported it from Ganganbawda of Kolhapur district. Thereafter, Bachular (1993) reported it from Vasota fort of Satara district also. In 1997, only 15 and 35 mature individuals were counted at Gaganbawda and Amba ghat respectively.

This species can easily be identified by its *ca* 1.2 cm long corolla, subcylindric corolla tube which is shorter than lobes and broadly ovate-cordate lobes.

***Ceropegia jainii* Ansari & Kulkarni in Bull. Bot. Surv. India 22 (1-4): 221, f. 1-4. (1980) 1982; Ansari in Fasc. Fl. India 16: 18, t. 3 (13). 1984; Singh & Raghavan in J. Econ. Tax. Bot. 8 (1): 32. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 122. 1987; Ansari in Nayar & Sastry (eds.), Red Data Book Indian Pl. 2: 43. 1988; Kulkarni, Fl. Sindhudurg 258. 1988; Bachulkar in Rayat Research J. 1(2): 113. 1993; Anon., India Glob. Threat. taxa 15. 1996; Samaddar & Roy, Add. Ele. Indian Fl. 1: 71. 1997; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 41. 1997; Jagtap & Singh in J. Econ. Tax. Bot. 22 (1): 232. 1998. et in Fasc. Fl. India. 24, 226. 1999.**

Types: Holotype: India, Maharashtra, Ratnagiri, Amboli ghat (Presently in Sindhudurg district), *Kulkarni* 121885 A, 13.8.1971 (CAL!). Isotypes: 121885 B-C (BSI!), D (CAL!), E(K), F (BLAT!).

Herbs, erect, 6-10 cm high. Leaves opposite, shortly petiolate, 2-4 x 0.5-1 cm, elliptic-linear, hairy above and along the margins. Cymes unflowered; pedicels 4-6 mm long, hairy; bracts 1.5-2 mm long. Calyx *ca* 2.5 mm long, glabrous. Corolla up to 2 cm long, curved, purplish-brown; tube 9-10 mm long, pale green with longitudinal purple lines within, base globose inflated, narrowed in the middle, expanding near mouth; lobes 9-10 mm long, linear-oblong, glabrous above. Outer corona of 5, bidentate, ciliate lobes, *ca* 1.5 mm long; inner *ca* 2.5 mm long, erect, linear.

Fls. & Frts. : August-September.

Illus.: Ansari & Kulkarni, *op. cit.*; Ansari, *op.cit.*

Habitat: On rocky beds along the banks of rivulets at an altitude of *ca* 1,000 m.

Distrib.: Endemic to MAHARASHTRA: Satara (Chalakeswadi, Kas), Sindhudurg (Amboli).

Spec. exam.: Satara: Kas plateau, *Mishra* 176845, 22.8.1997. Sindhudurg: Amboli ghat, Moose plateau, *Kulkarni* 131615, 13.8.1971 (Both in BSI).

Status: Critically Endangered.

Criteria: Area of occupancy up to 6 sq km: severally fragmented populations.

Notes: This species could not be recollected from its type locality after type collection. Later it was reported from Chalakeswadi plateau and Kas plateau of Satara district (Bachulkar, 1993). In 1997, only 35 mature individuals were counted at Kas plateau. Tubers of this plant are edible.

This species can be distinguished by its elliptic leaves up to 2 cm long, flowers with ovate corolla lobes which are pilose inside at base and equal to tube.

Ceropegia lawii Hook.f. Fl. Brit. India 4: 67. 1883; Cooke, Fl. Pres. Bombay 2: 240. 1958 p.p. (Repr.ed.); Blatt. in J. Bombay nat. Hist. Soc. 36 (3): 534. 1933; Sant., Fl. Purandhar 80. 1958; Sant. & Irani in Bull. Bot. Soc. Bengal 12 (1 & 2): 8. 1958; Puri & Mahajan in Bull. Bot. Surv. India 2: 127. 1960; Sant. & Irani, Uni. Bombay Bot. Mem. 4: 27. 1962; Sant. in Rec. Bot. Surv. India 16 (1), Fl. Khandala 156. 1967 (3rd Rev. ed.); Venkatarreddi in Bull. Bot. Surv. India 11: 253. 1971; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull.3: 9.1983; Ansari in Fasc. Fl. India 16: 19, t. 3(15), f. 10.1984; Bole & Almeida in J. Bombay nat. Hist. Soc. 81 (2): 370. 1984; Raghavan & Singh in J. Econ. Tax. Bot. 5(1): 159. 1984; Singh & Raghavan in *ibid.* 8(1): 31. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 122. 1987; Ansari in Nayar & Sastry (eds.), Red Data Book Indian Pl. 1: 60, f. 1987; Anon., India Glob. Threat. Taxa 15. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1:

41. 1997; Yadav, S.S. *et al* in *Geobios* new Rep. 16: 7. 1997; Jagtap & Singh in *J. Econ. Tax. Bot.* 22(1): 232. 1998 *et in* *Fasc. Fl. India* 24. 228. 1999. 'Kharpudi', 'Tilori'

Types: Holotype: India, Maharashtra, Concan (Konkan), *Ceropegia* n. 25, *Stocks, Law* (K).

Herbs, erect, tuberous; stems pubescent above. Leaves opposite, petiolate, ovate-lanceolate, usually rounded at base, puberulous above. Cymes many flowered; peduncles and pedicels hairy. Corolla 1.8-4 cm long; tube 1.5 - 3.1 cm long, inside a ring of hairs at the bottom of inflated base, rest glabrous; lobes 5-9 x 3-5 mm, ovate-cordate, hairy or glabrous inside. Outer corona of 10 obtuse lobes, hairy; inner linear, erect, 3-4 times as long as outer.

Fls. & Frts. : August-October.

Illus.: Ansari, *op. cit.* 1984 & 1987.

Habitat: On hill tops and slopes at an altitude of *ca* 1,000 m.

Distrib.: Endemic to MAHARASHTRA: Ahmednagar (Harishchandragarh), Kolhapur (Ganganbawda), Pune (Purandhar, Rareshwar, Sinhagadh).

Spec. exam.: Ahmednagar: Harishchandragarh, *Mishra* 177614, 12.9.1998. Kolhapur: Gaganbawda, Karul ghat, *Mishra* 176855, 25.8.1997; Bhuibawda ghat, *Mishra* 176858, 26.8.1997. Pune: Sinhagadh, *Jain* 5679, 9.8.1956; *Puri* 5681, 9.8.1956; *Ansari* 87804, 29.8.1963; Purandhar, top portion of Vazirgarh, *Rolla* 88649, 20.7.1963; Sinhagadh, *Ansari* 97574, 7.8.1964; 99846, 12.8.1964; 99973, 26.8.1964; Purandhar, *Reddi* 97574 A, 6.8.1965; 101207, 13.8.1965; Sinhagadh, *Ansari* 104820, 15.7.1966; *Mishra* 175430, 17.8.1996 (All in BSI).

Status: Endangered.

Criteria: Extent of occurrence estimated to be *ca* 5,000 sq km: a) severely fragmented populations, b) declension in the number of mature individuals.

Notes: Earlier this species was reported only from Ahmednagar and Pune districts. In 1997, it was collected from Bhuibawda ghat and Karul ghat of Kolhapur district, where ca 150 mature individuals were noticed. At Sinhadh the number of individuals were counted as 10 and 6 in 1996 and 1997 respectively. In 1998, only 110 individuals were traced at Harishchandragarh of Ahmednagar district. Tubers of this plant are edible.

This species can be distinguished by its ovate-lanceolate leaves, ca 4 cm long corolla, narrow corolla tube with slightly inflated base, ovate-cordate lobes, and inner corona 3-4 times longer than outer.

Ceropegia maccannii Ansari in Bull. Bot. Surv. India 22 (1-4): 227, f. 1-4. (1980) 1982; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 9. 1983; Ansari, in Fasc. Fl. India 16: 22, t. 3 (16). 1984; Raghavan & Singh in J. Econ. Tax. Bot. 5 (1): 159. 1984; Singh & Raghavan in *ibid.* 8(1): 31. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 122. 1987; Ansari in Nayar & Sastry (eds.), Red Data Book Indian Pl. 2: 47, f. 1988; Anon., India Glob. Threat. Taxa 16. 1996; Samaddar & Roy, Add. Ele. Indian Fl. 1: 73. 1997; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 41. 1997; Jagtap & Singh in J. Econ. Tax. Bot. 22 (1): 232. 1998 et in Fasc. Fl. India 24: 230. 1999. *C. lawii* auct. plur. non Hook. f. Fl. Brit. India 4: 67. 1883; Cooke, Fl. Pres. Bombay 2: 240. 1958 (Repr.ed.); Sant. & Irani in Bull. Bot. Soc. Bengal 12: 8. 1958, .p.p.; Hemadri in Bull. Bot. Surv. India 10(2): 125, t. 1, f. 3 & 3A. 1968; Venkatareddi in Willdenowia 5(1): 32, t. 1 & 2. 1968; Ansari & Kulkarni in Indian For. 97: 689, t.2, f. B3. 1971. '*Kharpudi*'.

Types: Holotype: India, Maharashtra, Pune, Sinhadh hill, Ansari 97574 A, 7.8.1964 (CAL!). Isotypes: 9754 B-C (BSI!), D(CAL!), E(K), F(BLAT!).

Herbs, erect, tuberous; stems 30-100 cm high, pubescent above. Leaves opposite, petiolate, 9-12 x 4-6 cm, ovate to lanceolate, base mostly acute, acute or acuminate at apex. Cymes 6-10-flowered; peduncles up to 3.5 cm long, hirsute; pedicels 6-10 mm long, hairy; bracts 3-4 mm long. Calyx 4-5 mm long, hairy on dorsal side. Corolla 1.7-2.3 cm long; tube 1.5-2 cm long, purplish outside, dark purple with inconspicuous, greenish-white streaks inside, base largely inflated with a ring of hairs at the bottom inside; lobes 2-3 x ca 2 mm, obovate, creamy-white outside, yellowish-orange inside. Outer corona of 5, shortly bifid, hairy along margins and

inside; inner *ca* twice as long as outer, subspathulate, hairy, erect-divergent. Follicles in pairs, 1-5 x 0.5 cm, glabrous. Seeds small, comose.

Fls. & Frts. : July-October.

Illus.: Ansari, *op.cit.* 1982 & 1988.

Habitat: On hill tops and slopes in open areas.

Distrib.: Endemic to MAHARASHTRA: Ahmednagar (Harishchandragarh), Pune (Purandhar, Sinhagadh).

Spec. exam.: Pune: Purandhar, Santapau 7125&7127-8, 31.8.1995 (BLAT); Sinhagadh, Ansari 87804, 29.8.1963; Mishra 175429, 17.8.1996 & 176976, 10.8.1997 (All in BSI).

Status: Endangered.

Criteria: Extent of occurrence estimated to be *ca* 400 sq km: a) severely fragmented populations, b) declension in the number of mature individuals.

Notes: At Sinhagadh of Pune district the number of mature individuals of this species were counted as 33 and 28 in 1996 and 1997 respectively. At Harishchandragarh of Ahmednagar district it could not be located in 1998. Tubers of this plant are edible.

This species can be differentiated by its *ca* 2.3 cm long corolla, corolla tube not enlarging at mouth but largely inflated in lower half, *ca* 3 mm long lobes and erecto-divergent inner corona which is *ca* twice longer than outer.

Ceropegia mahabalei Hemadri et Ansari in *Indian For.* 97(2): 105, t. 1 (b), f. 1-4. 1971; Raghavan & Singh in Jain & Sastry (eds.), *Pl. Cons. Bull.* 3: 9. 1983; Ansari in *Fasc. Fl. India* 16: 24, t. 3 (17). 1984; Raghavan & Singh in *J. Econ. Tax. Bot.* 5(1): 159. 1984; Singh & Raghavan in *ibid.* 8(1): 31. 1986; Ahmedullah & Nayar, *Endemic Pl. Indian Reg.* 1: 122. 1987; Ansari in Nayar & Sastry (eds.), *Red Data Book Indian Pl.* 2: 49, f. 1988; Anon., *India Glob. Threat. Taxa* 16. 1996; Yadav in Pokle *et al.* (eds.), *Flow. Pl. Syst. Diver.* pt. 1: 41. 1997; Jagtap & Singh in *J. Econ.*

Tax. Bot. 22 (1): 232. 1998 et in Fasc. Fl. India 24: 232. 1999. '*Gauti kharpudi*'

Types: Holotype: India, Maharashtra, Pune, Ralegaon hills, ca 10 km west of Junnar, *Hemadri* 118070 A, 25.9.1968 (CAL!). Isotypes: 118070 B-F (BSI!), G(CAL!), H(K), I(L), J(GH), K(US), L(MO), M(LE), N(BLAT!), O(MH). Paratypes: Ralegaon hills, *Hemadri* 107266 A-B, 23.9.1965; Bhivadekhurd, 16-17 km west of Junnar, *Hemadri* 107573 A-B, 2.10.1965 & 117938 A-D, 21.9.1968 (All in BSI!).

Herbs, erect, 20-65 cm high, tuberous; stems hairy. Leaves opposite, sessile, 3-15 x 0.3-1 cm, linear to linear-lanceolate, hairy above. Cymes 1-flowered; peduncles 1-3 mm long, hairy; pedicels 5-10 mm long, hairy; bracts 5-15 mm long, subulate. Calyx 5-partite, lobes 1-1.75 cm long, hairy. Corolla 5.5-10 cm long; tube 3.5-6.5 cm long, base largely inflated, narrowed in the neck, enlarging towards mouth, glabrous inside; lobes 1.75-3.5 cm long, linear, elongated above from ovate deltoid base, hairy within, connate at tips to form a beaked crown. Outer corona of 5, bidentate, glabrous lobes; inner linear, erect. Follicles in pairs, ca 4 cm long (immature), narrowed at apex, glabrous. Seeds many, ca 5 x 2.5 mm, ovoid; coma ca 6 mm long, white.

Fls. & Frts. : August-October.

Illus.: Hemadri & Ansari, *op.cit.*; Ansari, *op.cit.* 1988.

Habitat: On steep exposed slopes of the hills among grasses at an altitude of ca 1,000 m.

Distrib.: Endemic to MAHARASHTRA: Pune (Junnar).

Spec.exam.: Types, as above.

Status: Critically Endangered.

Criteria: Area of occupancy less than 10 sq km: found only at a single location.

Notes: So far this species is known only from its type locality, the two nearby places of Junnar taluka (can be considered as a single locality).

After type collections in 1965 and 1968, Yadav (*ined.*) collected it in 1998 from the same place where *ca* 10 individuals were located in about 1 sq km area. Overgrazing, degradation of grasslands and narrow distribution of the species are the main threats to the species. The species also has a narrow range of tolerance and is very specific in its requirements (ecological). Tubers of this plant are edible.

It can be distinguished by its larger corolla, corolla lobes always shorter than tube which form a narrow beak, much inflated base of corolla tube, glabrous outer corona and straight as well as non divergent inner corona.

Ceropegia media (Huber) Ansari in Bull. Bot. Surv. India 11 (1 & 2): 199. (1969) 1971; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull 3: 9. 1983; Ansari in Fasc. Fl. India 16: 24, t. 4 (18), f. 13. 1984; Singh & Raghavan in J. Econ. Tax. Bot. 8(1): 31. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 122. 1987; Bachulkar in Rayat Research J. 1 (2): 113. 1993; Anon., India Glob. Threat. Taxa 16. 1996; Yadav in Pokle *et al.* (eds.), Flow Pl. Syst. Diver. pt. 1: 41. 1997; Jagtap & Singh in J. Econ. Tax. Bot. 22 (1): 232. 1998 et in Fasc. Fl. India. 24: 232. 1999. *C. evansii* McC. var. *media* Huber in Mem. Soc. Broter. 12: 67, t. 3, f. 33b. 1957; Sant. & Irani in Bull. Bot. Soc. Bengal 12 (1 & 2): 12. 1958 et in Univ. Bombay Bot. Mem. 4: 32. 1962; Janardhanan, Fl. Bhimashankar 705. 1966; Venkatarreddi in Bull. Bot. Surv. India 11: 253. 1971.

Types: Holotype: India, Maharashtra, Pune, Bhimashankar, *Irani* 1194, 19.9.1955. *Isotypes*: 1194 A-B. *Paratypes*: Bhimashankar, *Irani* 1196 A-C, 19.8.1955 (All in BLAT!).

Herbs, twining, tuberous; stems glabrous. Leaves opposite, petiolate, 5-15 x 1.5 cm, linear-lanceolate, puberulous above. Cymes 2-4-flowered; peduncles 1-2 cm long, pubescent; pedicels up to 1 cm long, hairy; bracts & bracteoles 1-4 mm long, linear-lanceolate, glabrous. Corolla *ca* 2.8 cm long; tube *ca* 2 cm long, base slightly inflated, glabrous inside; lobes *ca* 8 x 2.5 mm, oblong, glabrous. Outer corona 2-2.5 mm long, 5 lobed, lobes entire or notched in the middle, glabrous outside, hairy inside, dark purple; inner of 5 linear thin lobes, 1-1.75 mm long, 'L'-shaped.

Fls. & Frts.: July-October.

Illus.: Ansari, *op. cit.* 1984.

Habitat: In open forests and on slopes at an altitude between 500-1500 m.

Distrib.: Endemic to MAHARASHTRA: Ahmednagar (Kalsubai), Pune (Bhimashankar, Khandala, Lonavla, Purandhar, Raireshwar, Rajgad, Sinhagadh), Satara (Kas, Kumbharli ghat, Mahabaleshwar, Panchgani).

Spec. exam.: Ahmednagar: Kalsubai, *Mishra* 176999, 9.9.1998 (BSI). Pune: Purandhar, *Santapau* 7085-9, 30.8.1945 & 7123, 31.8.1945; *Irani* 1039, 12.8.1955; Khandala, *Irani* 2169, 9.9.1956 (All in BLAT); Sinhagadh, *Ansari* 97555, 7.8.1964 & 99835, 12.8.1964; Ambavane, *Reddi* 101211, 6.8.1965; Bhivadekhurd, 24 km west of Junnar, *Hemadri* 117940, 21.9.1968. Satara: Kas plateau, *Mishra* 176844, 22.8.1997 (All in BSI).

Status: Vulnerable.

Criteria: Extent of occurrence estimated to be ca 7,000 sq km: severely fragmented populations.

Notes: Earlier this species was reported only from Pune and Satara districts. However, in 1998 it has been reported for the first time from Kalsubai hill of Ahmednagar district also, where only 5 mature individuals were noticed. In 1997 only 2 and 15 members of this species were located at Panchgani and Kas plateau respectively.

This species can be distinguished by its linear-lanceolate leaves, ca 2.8 cm long corolla which is slightly curved, base of corolla tube depressed and glabrous inside, linear corolla lobes and shortly bifid outer corona.

Ceropegia noorjahaniae Ansari in J. Bombay nat. Hist. Soc. 69: 250, f. 1-5. 1972; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 9. 1983; Ansari, in Fasc. Fl. India 16: 26, t. 4 (19). 1984; Raghavan & Singh in J. Econ. Tax. Bot. 5 (1): 159. 1984; Singh & Raghavan in *ibid.* 8(1): 159. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 122. 1987; Ansari in Nayar & Sastry (eds.), Red Data Book Indian Pl. 2: 52, f. 1. 1988; Bachulkar in Rayat Research J. 1(2): 113. 1993; Deshpande *et al.*, Fl. Mahabaleshwar 1: 361. 1993; Anon., India Glob. Threat. Taxa 16. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 41. 1997; Jagtap & Singh in J. Econ. Tax. Bot. 22 (1): 232. 1998 et in Fasc. Fl. India 24: 233. 1999.

Types: Holotype: India, Maharashtra, Satara, Wai-Panchgani ghat, *Ansari* 104880 A, 5.8.1970 (CAL!). Isotypes: 104880 B-D. (BSI!), E (CAL!), F(K), G(L), H(BLAT!), I(MH), J(LE), K(M). Paratypes: Wai-Panchgani ghat, *Ansari* 105098 A-B, 16.7.1969 (BSI!).

Herbs, erect 15-40 cm high, tuberous; stems pubescent above. Leaves opposite, linear-narrowly elliptic, hairy above. Cymes 3-4-flowered; peduncles 3-4 mm long; pedicels 6-7 mm long, glabrous; bracts 2-2.5 mm long, subulate. Calyx 5 partite, lobes *ca* 4 mm long, glabrous. Corolla 2-2.7 cm long, slightly curved, glabrous; tube 1.2-1.4 cm long, subcylindric, base inflated, glabrous inside; lobes 9-13 mm long, linear-oblong above; from ovate-deltoid base. Outer corona of 5, obtusely bifid or emarginate lobes, cupular; inner of 5 erect, *ca* 3 mm long, linear-subclavate. Follicles in pairs, *ca* 9 cm long, glabrous. Seeds many, *ca* 3.5 x 2.5 mm, ovate; coma *ca* 2 cm long.

Fls. & Frts.: July-September.

Illus.: *Ansari, op.cit., 1972 & 1988.*

Habitat: Along ghat slopes in well drained rocky-gravelly soil over 1,000 m altitude.

Distrib.: Endemic to MAHARASHTRA: Satara (Jarandeshwar, Kartikswami, Munavale, Pateshwar, Wai-Panchgani ghat, Yaveteshwar).

Spec.exam.: Satara: Jarandeshwar hill near Satara road, *Mishra* 175465, 25.8.1996 (BSI).

Status: Endangered.

Criteria: Extent of occurrence estimated to be *ca* 500 sq km: severely, fragmented populations.

Notes: Though this species has been reported from several localities, all these are situated in a small part of Satara district. In 1996, only 19 mature individuals were located at Jarandeshwar hill.

This species can easily be identified by its up to 2.7 cm long corolla, glabrous corolla lobes and outer corona and erect inner corona with straight apex.

Ceropegia oculata Hook. in Bot. Mag. t. 4093. 1844; Dalz. & Gibs., Bombay Fl. 151. 1861; Hook.f. Fl. Brit. India 4: 72. 1883; Cooke, Fl. Pres. Bombay 2: 242. 1958 (Repr.ed.); Blatt. in J. Bombay nat. Hist. Soc. 36 (3): 535. 1933; Sant., Fl. Purandhar 80. 1958; Sant. & Irani in Bull. Bot. Soc. Bengal 12 (1 &2): 12. 1958 et in Univ. Bombay Bot. Mem. 4: 33. 1962; Sant. in Rec. Bot. Surv. India 16(1), Fl. Khandala 156. 1967 (3rd Rev. ed.); Vartak in Jain & Rao (eds.), Ass. Threat. Pl. India 175. 1983; Ansari in Fasc. Fl. India 16: 26, t. 4 (20). 1984; Mistry, Fl. Ratnagiri 1: 391. 1986 (Ph.D. Thesis, *ined.*); Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 122. 1987; Ansari in Nayar & Sastry (eds.), Red Data Book Indian Pl. 1: 62, f. 1987; Kulkarni, Fl. Sindhudurg 259. 1988; Mistry & Almeida in J. Bombay nat. Hist. Soc. 86 (3): 478. 1989; Bachulkar in Rayat Research J. 1 (2): 114. 1993; Deahpande *et al.*, Fl. Mahabaleshwar 1: 361. 1993; Kothari & Moorthy, Fl. Raigad 234. 1993; Anon., India Glob. Threat. Taxa 16. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 41. 1997; Yadav, S.S. *et al.* in Geobios new Rep. 16: 7. 1997; Jagtap & Singh in J. Econ. Tax Bot. 22 (1): 232. 1998 et in Fasc. Fl. India 24: 234. 1999.

Types: Bot. Mag. t. 4093.

Herbs, twining, tuberous. Leaves opposite, petiolate, 4.5-9 x 1.7 - 4.8 cm, broadly ovate or ovate-oblong at apex, base rounded, acuminate, sparsely hairy above. Cymes 4-8-flowered; peduncles white hairy; pedicels glabrous. Corolla *ca* 6.5 cm long; tube *ca* 5 cm long, base inflated, narrowed in the neck, mouth funnel shaped, glabrous inside; lobes *ca* 1.5 cm long, linear-oblong above from ovate base. Outer corona of 5 shortly bifid glabrous lobes; inner erect, linear-clavate. Follicles in pair.

Fls. & Frts. : July-October.

Illus.: Ansari, *op. cit.* 1987.

Habitat: On slopes of open deciduous forests and scrub jungles.

Distrib.: Endemic to Kerala, Tamil Nadu, MAHARASHTRA: Ahmednagar (Harishchandragarh), Kolhapur (Panhala), Pune (Junnar, Khandala, Purandhar, Sinhadh), Raigad (Matheran), Ratnagiri (Mirya), Satara (Jarandeshwar, Kas, Mahabaleshwar, Tapola, Yaveteshwar), Sindhudurg (Amboli, Hanumanghat Rai), Thane, (Dahisar, Mumbra).

Spec. exam.: Kolhapur: Panhala, *Mishra* 176834, 21.8.1997. Pune: Purandhar, *Rolla* 88651, 20.7.1963; Sinhagadh, *Ansari* 95772, 7.8.1964; 99834, 12.8.1964; 101501, 26.8.1964; 101569 & 101584, 10.9.1964; *Reddi* 101212, 6.8.1965; 101206 & 101208, 13.8.1965; Bhivande-khurd, *Hemadri* 117939, 21.9.1968; Jalwada, on way to Nane ghat from Junnar, *Mishra* 175609, 5.9.1996 (All in BSI). Raigad: Matheran, *Irani* 4331-2, 6.8.1959; 4365, 13.8.1959; 5041, 20.7.1960; 5401-2, 17.9.1960 & 5439, 24.9.1960 (All in BLAT). Satara: Yaveteshwar ghat, *Mishra* 175442, 24.8.1996. Sindhudurg: Hanuman ghat Rai, Dukanwadi, *Kulkarni* 121145, 7.6.1970 (All in BSI). Thane: Mumbra, *Shenoy* 3706, 9.7.1954; 3779-80, 21.7.1954; 4055-6, 12.8.1954 & 4059-60, 23.9.1954 (All in BLAT); *Billore* 116485, 9.9.1968 (BSI).

Status: Low Risk.

Notes: This species is sporadically but widely distributed in the western part of Maharashtra from Thane to Sindhudurg district. Its extent of occurrence estimated to be *ca* 30,000 sq km. Tubers of this species are edible.

It can be distinguished by its more than 4 cm long corolla; corolla tube much inflated at base, funnel-shaped above and glabrous inside and oblong corolla lobes which are shorter than tube and hairs within as well as along margins.

Ceropegia odorata Nimmo (in *Grah. Cat. Bombay Pl.* 118. 1839, *nom. nud.*) ex Hook.f. *Fl. Brit. India* 4: 75. 1883; Rao in *J. Bombay nat. Hist. Soc.* 46: 742. 1947; Sant. in *ibid.* 47: 775. 1948 et in *ibid.* 48: 613. 1949; Sant. & Irani in *Bull. Bot. Soc. Bengal* 12 (1 & 2): 10. 1958 et in *Univ. Bombay Bot. Mem.* 4: 29. 1962; Sabnis & Bedi in *Kew Bull.* 25 (1): 57, f. 1-6. 1971; Ansari in *Bull. Bot. Surv. India* 24 (1-4): 190, t. 1. 1982; Raghavan & Singh in Jain & Sastry (eds.), *Pl. Cons. Bull.* 3: 6. 1983; Ansari in *Fasc. Fl. India* 16: 26, t. 4 (21). 1984; Raghavan & Singh in *J. Econ. Tax. Bot.* 5(1): 159. 1984; Singh & Raghavan in *ibid.* 8(1): 31. 1986; Ahmedullah & Nayar, *Endemic Pl. Indian Reg.* 1: 122. 1987; Ansari in Nayar & Sastry (eds.), *Red Data Book Indian Pl.* 1: 64. 1987; Yadav in Pokle *et al.* (eds.), *Flow. Pl. Syst. Diver.* pt. 1: 41. 1997; Yadav, S.S. *et al.* in *Geobios new Rep.* 16: 7. 1997; Jagtap & Singh in *J. Econ. Tax. Bot.* 22 (1): 232. 1998 et in *Fasc. Fl. India* 24: 234. 1999.

Types: Lectotype: India, Maharashtra, Concan (Konkan), Salsette Island (Bombay), *Stocks in Stocks & Law* 239 (K).

Herbs, twining, slender, tuberous; stem mostly glabrous. Leaves opposite, petiolate, 7.5-10 x 1.2-1.8 cm, lanceolate, acuminate, hairy above. Cymes few to many flowered; peduncles 0.6-1.8 cm long, hirsute; pedicels very short, usually glabrous. Calyx *ca* 6 mm long, recurved. Corolla 3-4 cm long, bright yellow, fragrant; tube 1.8 - 2 cm long, inflated near base; lobes 1.2 - 2 cm long, linear, glabrous. Outer corona of 5, entire lobes, glabrous; inner linear or elongate-triangular, erect, divergent at apex.

Fls. & Frts.: August-October.

Illus.: Sabnis & Bedi, *op. cit.*

Habitat: Open area in forests and steep hilly slopes among bushes on gravelly soils.

Distrib.: Endemic to Gujarat, Rajasthan, MAHARASHTRA: Amravati (Tarubanda), Bombay (Salsette island).

Spec. exam.: Amravati, Melghat, Tarubanda forest, *Ansari* 149304.

Status: Critically Endangered (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Area of occupancy less than 10 sq km: severely fragmented populations.

Notes: After its type collection from Bombay during 19th Century, it was reported from Melghat of Amravati district by Ansari in 1965. During this long gap it has also been reported from Gujarat and Rajasthan. At Melghat hardly a few mature individuals were observed, whereas from Bombay it could not be recollected after type collection.

This species can be identified by its linear-lanceolate leaves, fragrant flowers, subsylindric corolla tube which is hairy inside at base and linear corolla lobes.

Ceropegia panchganiensis Blatt. & McC. in *J. Bombay nat. Hist. Soc.* 36 (3): 534. 1933; Ansari in *Bull. Bot. Surv. India* 22 (1-4): 199, f. 1-

4. 1980; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3:9. 1983; Ansari in Fasc. Fl. India 16: 27, t. 4 (22), f. 16. 1984; Raghavan & Singh in J. Econ. Tax. Bot. 5 (1): 159. 1984; Singh & Raghavan in *ibid.* 8 (1): 31. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 122. 1987; Ansari in Nayar & Sastry (eds.), Red Data Book Indian Pl. 1: 66, f. 1987; Deshpande *et al.*, Fl. Mahabaleshwar 1: 362. 1993; Anon., India Glob. Threat. Taxa 16. 1996; Yadav in Pokle *et al.*, (eds.), Flow. Pl. Syst. Diver. pt. 1: 41. 1997; Yadav, S.S. *et al.* in Geobios new Rep. 16: 7. 1997; Jagtap & Singh in J. Econ. Tax. Bot. 22 (1): 232. 1998 et in Fasc. Fl. India 24: 235. 1999. 'Kharpudi' 'Khartundi'

Type: Neotype: India, Maharashtra, Satara, Lingmala, near Mahabaleshwar, *Ansari* 105090A 20.6.1968 (CAL!).

Herbs, erect, up to 50 cm high, tuberous; stems pubescent above. Leaves opposite, petiolate, 5-9 x 3.5-4.5 cm, ovate, rounded or subcordate at base, acute at apex, puberulous above. Cymes 2-4-flowered; peduncles 5-15 mm long, hairy; pedicels 8-15 mm long, hairy; bracts many, 2-3 mm long. Sepals 5, 5-7 mm long. Corolla 2.5-3.5 cm long; tube 2.2 - 2.8 cm long, base inflated, inside a ring of hairs at bottom, above narrow cylindrical; lobes *ca* 6 mm long, yellowish within, elliptic-ovate or obovate, glabrous. Outer corona *ca* 1 mm long, shortly bifid, hairy lobes; inner *ca* 2 mm long, erect, clavate, hairy.

Fls. & Frts.: July - September.

Illus.: Ansari, *op. cit.* 1980, 1984 & 1987.

Habitat: In open areas of semievergreen forests among shrubs at an altitude of over 1000 m.

Distrib.: Endemic to MAHARASHTRA: Satara (Mahabaleshwar).

Spec. exam.: Satara: Mahabaleshwar, *Santapau* 13094-6, 16.8.1951 & 13940, 25.11.1951; *Irani* 2005 & 2007, June, 1956 (All in BLAT); *Mishra* 175412, 14.7.1996 (BSI).

Status: Critically Endangered.

Criterion: Area of occupancy *ca* 5 sq km: severely fragmented populations.

Notes: As there was no type or any other authentic specimen in any of the herbarium, Ansari (1968) designated its Neotype, based on collection from Lingmala of Mahabaleshwar. Thereafter, several specimens wrongly identified as *C. lawii* Hook.f. deposited at BLAT from Mahabaleshwar by Irani and Santapau were corrected as *C. panchganiensis* Blatt. & McC. by Ansari. In 1996, this plant was collected from Kate's point of Mahabaleshwar, where *ca* 50 individuals were counted. In the hills around Panchgani also *ca* 50 individuals were located by Yadav (*ined*). At Lingmala it could not be relocated. Restricted distribution, narrow range of tolerance and habitat destruction are the major threats of this species. Tubers of this plant are also edible. This plant needs immediate protection for conservation.

This species can be distinguished by its ovate leaves, cylindric corolla tube which is slightly inflated in lower part but not enlarging at mouth and erect inner corona which is *ca* twice longer than outer.

Ceropegia rollae Hemadri in Bull. Bot. Surv. India 10(2): 123, t. 1, f. 2A et f. 1-6. (1968) 1969; Rao in Notes R.B.G. Edinb. 37 (1): 95. 1978; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 10. 1983; Ansari in Fasc. Fl. India 16: 29, t. 4 (23). 1984; Raghavan & Singh in J. Econ. Tax. Bot. 5 (1): 159. 1984; Singh & Raghavan in *ibid.* 8 (1): 31. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 122. 1987; Ansari in Nayar & Sastry (eds.), Red Data Book Indian Pl. 2: 54, f. 1988; Anon., India Glob. Threat. Taxa 16. 1996; Samaddar & Roy, Add. Ele. Indian Fl. 1: 75. 1997; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 41. 1997; Jagtap & Singh in J. Econ. Tax. Bot. 22 (1): 232. 1998 et in Fasc. Fl. India. 24: 237. 1999. '*Kharpudi*'.

Types: Holotype: India, Maharashtra, Pune, Dhak Khilla, near Junnar, Hemadri 107472 A, 29.9.1965 (CAL!). Isotypes: 107472 B-C & G-L (BSI!). Paratypes: Durga Khilla, *ca* 30 km west of Junnar, Hemadri 107547 A-B & E-L, 1.10.1965 (BSI!).

Herbs, erect, tuberous; stems 30-100 cm high, pubescent. Leaves opposite, petiolate, 2.5-6 x 2-4 cm, broadly ovate, acute at apex, bulbous hairy above and along margins. Cymes many flowered; pedicels hairy; bracts 3-5 mm long, linear, subulate. Calyx divided to base, sepals 3-5 mm long, sparsely hairy. Corolla 2.3-2.5 cm long; tube 1.5-2.5 cm long, glabrous outside, base slightly inflated, inside a ring of hairs at bottom;

lobes 8-13 x *ca* 2.5 mm long, linear, oblong, glabrous. Outer corona saucer shaped of 5 short, entire or notched lobes, ciliate; inner of 5 erect processes, *ca* 3 mm long. Follicles paired, linear, many seeded.

Fls. & Frts.: August - October.

Illus.: Hemadri, *op.cit.*; Ansari, *op. cit.* 1988.

Habitat: On hill tops and slopes among grasses at an altitude of over 1,000 m.

Distrib.: Endemic to MAHARASHTRA: Ahmednagar (Harishchandragarh), Pune (Junnar).

Spec.exam.: Pune: Malshej ghat, near Junnar, *Mishra* 175500, 3.9.1996 (BSI).

Status: Critically Endangered.

Criteria: Extent of occurrence estimated to be *ca* 100 sq km: severely fragmented populations.

Notes: This species is distributed in a small pocket in the border of Ahmednagar and Pune districts. In 1996, a very few individuals were noticed in the surroundings of Junnar. It needs immediate protection to avoid extinction.

This species can be differentiated by its broadly ovate leaves, subsylindric corolla tube which is slightly enlarge at mouth, linear-oblong corolla lobes and linear inner corona which is *ca* 3 times longer than outer.

Ceropegia sahyadrice Ansari & Kulkarni in Indian For. 97 (12): 688, t.1, f. 1-4, t. 2, f. A (1, 2). 1971; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 10. 1983 et in J. Econ. Tax. Bot. 5 (1): 159. 1984; Ansari in Fasc. Fl. India 16: 29, t. 4 (24). 1984; Mistry, Fl. Ratnagiri, 1: 391. 1986 (Ph.D. Thesis, *ined.*); Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 122. 1987; Ansari in Nayar & Sastry (eds.), Red Data Book Indian Pl. 1: 69, f. 1987; Kulkarni, Fl. Sindhudurg 259. 1988; Mistry & Almeida in J. Bombay nat. Hist. Soc. 86 (3): 478. (1989) 1990; Lakshminarasimhan & Sharma, Fl. Nasik 302. 1991; Bachulkar in Rayat Research J. 1 (2):

114. 1993; Anon., India Glob. Threat. Taxa 16. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1. 41. 1997; Yadav, S.S. *et al.* in Geobios new Rep. 16: 7. 1997; Jagtap & Singh in J. Econ. Tax. Bot. 22 (1): 232. 1998, et in Fasc. Fl. India 24: 238, 1999. *C. lawii* auct. non. Hook. f. Fl. Brit. India 4: 67. 1883; Cooke, Fl. Pres. Bombay 2: 240. 1958 (Repr. ed.); Sant. & Irani in Bull. Bot. Soc. Bengal 12 (1 & 2): 8. 1958 *p.p.* *C. Panchganiensis* auct. non. Blatt. & McC. in J. Bombay nat. Hist. Soc. 36: 534. 1933; Venkatareddi in Willdenowia 5 (1): 32. 1968; Hemadri in Bull. Bot. Surv. India 10(2): 125. 1968.

Types: Holotype: India, Maharashtra, Ratnagiri, Ambolighat (Presently in Sindhudurg district), Kulkarni 108643 A, 30.8.1967 (CAL!). Isotypes: 108643 B-C (BSI!), D(CAL!), E(K), F(L), G (BLAT!), H(MH), I(LE), J(MO), K(GH). Paratypes: Pune, Sinhadagadh, Garade 57 A-C, 30.7.1902 (BSI!); Khandala, Blatter *et al.* 27424; July, 1919 (BLAT!); Sindhudurg, Ambolighat, Pataskar 102141, 18.9.1964 (BSI).

Herbs, erect, 30-100 cm high, tuberous; stems, pubescent above. Leaves opposite, 4-11 x 2-8 cm, ovate or ovate-lanceolate, cordate or rounded at base. Cymes few to many flowered; peduncles 1-5.5 cm long, hairy; pedicels 10-17 mm long, hairy; bracts 5-7 x ca 1 mm, linear. Sepals 5-7 mm long, glabrous. Corolla slightly curved, tube up to 4.4. cm long, base inflated with a ring of hairs inside at bottom, rest glabrous; lobes up to 11 x 8 mm, ovate, subcordate, glabrous. Outer corona 1.5 - 1.75 mm long, saucer shaped, 5-lobed, lobes entire or notched, hairy; inner 5-6 mm long, erect, slender, yellow, sparsely hairy at base. Follicles in pairs, up to 1.5 cm long, many seeded.

Fls. & Frts. : August - October.

Illus.: Ansari & Kulkarni, *op.cit.* ; Ansari, *op. cit.* 1987.

Habitat: On crest and slopes of hills at an altitude of about 1,000 m.

Distrib.: Endemic to MAHARASHTRA: Nasik (Anjaneri hill), Pune (Ambavane, Khandala, Lonavla, Sinhadagadh), Ratnagiri (Gothane), Satara (Vasota), Sindhudurg (Amboli ghat).

Spec.exam.: Nasik, Anjaneri hill top, Lakshminarasimhan 162112, 27.7.1983. Pune: Sinhadagadh, Mishra 176975, 10.8.1997 (Both in BSI).

Ratnagiri: *Mistry* 1191, without date (BLAT). Sindhudurg: Amboli, Mahadevgad, *Mishra* 176912, 4.9.1997 (BSI).

Status: Vulnerable.

Criteria: Extent of occurrence estimated to be ca 11,000 sq km: severely fragmented populations.

Notes: After its recent discovery from Nasik, Ratnagiri and Satara districts, its range of distribution extended in the ghat regions from Nasik to Sindhudurg district of Maharashtra. However, the number of mature individuals of this species are very less and distributed sporadically. In 1997 only ca 110 mature individuals were found at Amboli ghat, whereas at Sinhgadh hardly ca 20 plants were noticed.

This species can easily be identified by its ovate-lanceolate leaves, 3.5-5.5 cm long corolla, broad corolla tube with largely inflated base and broadly ovate to obovate corolla lobes.

Ceropegia santapauli Wadhwa & Ansari in Bull. Bot. Surv. India 10(1): 95. (1968) 1969; Raghavan & Singh in Jain & Sastry (eds.), Pl. cons. Bull. 3: 10. 1983; Ansari in Fasc. Fl. India 16: 30, t. 4(25), f. 17. 1984; Raghavan & Singh in J. Econ. Tax. Bot. 5(1): 159. 1984; Singh & Raghavan in *ibid.* 8(1): 31. 1986; Mistry, Fl. Ratnagiri 1: 392. 1986 (Ph.D. Thesis, *ined.*); Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 122. 1987; Ansari in Nayar & Sastry (eds.), Red Data Book Indian Pl. 2: 56, f. 1988; Deshpande *et al.*, Fl. Mahabaleshwar 1: 362. 1993; Anon., India Glob. Threat. Taxa 16. 1996; Samaddar & Roy, Add. Ele. Indian Fl. 1: 76. 1997; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 41. 1997; Jagtap & Singh in J. Econ. Tax. Bot. 22 (1): 232. 1998 et in Fasc. Fl. India 24: 238. 1999. '*Khartundi*'.

Types: Holotype: India, Maharashtra, Satara: Mahad ghat, near Mahabaleshwar, *Wadhawa* 109640 A, 19.8.1966 (CAL!). Isotypes: 109640 D & I-L. Paratypes: Mahad ghat, *Wadhawa & Ansari* 109651 B-D & G-O, 13.9.1966. (All in BSI!).

Herbs, twining, perennial; stems glabrous or sparingly hairy. Leaves opposite, petiolate, 4-8.5 x 1-4 cm, ovate-acuminate, bulbous hairy, margins ciliolate. Cymes 4-9-flowered; peduncles & pedicels pubescent; bracts

2-3 mm long, subulate. Calyx 5 partite, *ca* 3.5 mm long. Corolla up to 1.5 cm long; tube *ca* 1 cm long, inflated at base; lobes up to 5 mm long, orbicular, inflexed and connate at tips forming a subglobose head. Corona uni-seriate of 5, elongated, conical, pale yellow processes, hairy outside, convergent at apex. Follicles in pair, up to 7 cm long, many seeded.

Fls. & Frts. : August - October.

Illus.: Ansari, *op.cit.* 1984 & 1988.

Habitat: On hill slopes along the ghat ranges among grasses at an altitude of over 1,000m.

Distrib.: Endemic to MAHARASHTRA: Ratnagiri (Tikleshwar temple near Devrukh), Satara (Kumbharli ghat, Mahad ghat).

Spec.exam.: Ratnagiri: *Mistry* 256 & 1283, without date (BLAT). Satara: Kumbharli ghat, near Koyna, *Kochhar* 158502, 4.8.1979; Mahad ghat, near Mahabaleshwar, *Mishra* 175432, 18.8.1996 (All in BSI).

Status: Endangered.

Criteria: Extent of occurrence estimated to be *ca* 400 sq km: severely fragmented populations.

Notes: This species is very much sporadically distributed in a small pocket of two adjoining districts viz. Ratnagiri and Satara. In 1996, only 17 mature individuals were noticed at Mahad ghat near Mahabaleshwar. Tubers of this plant are edible. Land slides are the major reason of its rarity.

It can be distinguished by its corolla up to 1.5 cm long; orbicular corolla lobes which are shorter than tube and glabrous inside and by uniseriate, hairy corona.

Ceropegia vincaefolia Hook. in Bot. Mag. t. 3740. 1839, *emend.* Ansari in Bull. Bot. Surv. India 13 (3 & 4): 187. 1971 (1974); Srivastava in J. Indian Bot. Soc. 38 (2): 187. 1959; Billore, Fl. Thane 1: 580. 1972 (Ph.D. Thesis, *ined.*); Ansari in Fasc. Fl. India 16: 31, t. 4 (26), 1984; Bole & Almeida in J. Bombay nat. Hist. Soc. 81 (2): 370. 1984;

Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 127. 1987; Ansari in Nayar & Sastry (eds.), Red Data Book Indian Pl. 2: 59, f. A-B. 1988; Deshpande *et al.* Fl. Mahabaleshwar 1: 362. 1993; Bachulkar in Rayat Research J. 1(2): 114. 1993; Kothari & Moorthy, Fl. Raigad 234. 1993; Anon., India Glob. Threat. Taxa 16. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 41. 1997; Jagtap & Singh in J. Econ. Tax. Bot. 22 (1): 232. 1998 et in Fasc. Fl. India. 24: 240. 1999. *C. hirsuta* Wt. & Arn. var. *vincaefolia* (Hook.) Hook. f. Fl. Brit. India 4: 72. 1883; Cooke, Fl. Pres. Bombay 2: 242. 1958 (Repr.ed.). *C. stocksii* Hook. f. Fl. Brit. India 4: 72. 1883; Blatt. in J. Bombay nat. Hist. Soc. 36 (3): 536. 1933; Cooke, Fl. Pres. Bombay 2: 243. 1958 (Repr.ed.). *C. polyantha* Blatt. & McC. in J. Bombay nat. Hist. Soc. 34: 936. 1931 et in *ibid.* 36: 535. 1933. *C. oculata* Hook. var. *subhirsuta* Huber in Mem. Soc. Broter. 12: 65, t. 3, f. 31b. 1957, *p.p.*; Sant. & Irani in Bull. Bot. Soc. Bengal 12: 13. 1958 et in Univ. Bombay Bot. Mem. 4: 34. 1962. '*Khapar Khutti*'

Types: Bot. mag. t. 3740.

Herbs, twining, tuberous; stems glabrous. Leaves opposite, petiolate, *ca* 18 x 10 cm, ovate to ovate-lanceolate, cordate, acuminate, puberulous above. Cymes many flowered; peduncles 7-11 cm long, hirsute; pedicels *ca* 2 cm long, glabrous; bracts 1-1.4 cm long, linear, subulate, glabrescent. Calyx 1.5 - 2 cm long, linear-subulate. Corolla 3-8 cm long; tube 1.6-4.5 cm long, base inflated, abruptly narrowed above, funnel shaped at mouth; lobes 1.5 - 3.5 cm long, linear-oblong above from ovate-deltoid base, pubescent inside and hairy on margins. Outer corona of 5 lobes, entire, emarginate or shortly bifid, hairy; inner *ca* 4 mm long, ligulate, oblanceolate, glabrous. Follicles *ca* 15 cm long, glabrous. Seeds *ca* 7 x 4 mm, ovate-oblong; corona *ca* 3 cm long.

Fls. & Frts. : August-October.

Illus.: Ansari, *op.cit.* 1988.

Habitat: In open forests and hill slopes at an altitude between 500-1,500 m.

Distrib.: Endemic to MAHARASHTRA: Dhule (Kalapani), Pune (Sinhagadh), Raigad (Karjat, Neral), Satara (Kas, Mahabaleshwar, Vasota), Thane (Mumbra, Takmak hill).

Spec. exam.: Dhule: Kalapani, *Pataskar* 105722, 15.8.1965 & 105809, 16.8.1965. Pune: Sinhadh, *Bhide*, s.n. 31.8.1907; *Kulkarni* s.n., 16.8.1909; *Puri* 5685 & 5689, 9.8.1956; *Ansari* 99983, 26.8.1964 & 101583, 10.9.1964; *Reddi* 101210, 23.7.1965 (All in BSI). Raigad: Karjat, *Irani* 2119, 17.8.1956; Neral-Jummapatti, *Irani* 4616, 21.9.1959 & 5155 A, 2.9.1960 (All in BLAT); Karjat-Thakawadi hill, *Rolla* 81582, 18.9.1962 (BSI). Satara: Mahabaleshwar, *Santapau* 11806, 7.11.1950 (BLAT); *Ansari* 67507, 10.10.1960; Kas plateau, *Mishra* 176977, 25.9.1997 (Both in BSI). Thane: Mumbra, *Shenoy* 3779-80, 21.7.1954 (BLAT); Dahisar, Takmak foot hill, *Billore* 116748, 16.9.1968; Mumbra, *Billore* 116485 A, August, 1969 (Both in BSI).

Status: Endangered.

Criteria: The probability of extinction in the wild is 30% within 5 years.

Notes: Though the extent of occurrence of this species is ca 32,000 sq km and distributed from Dhule to Satara district of Maharashtra, its probability of extinction is very high. At Kas plateau and Sinhadh only 29 and 17 mature individuals were counted in 1996. However, this number dropped down to 25 and 15 respectively in 1998. Assuming the same pace of disappearance in all the localities, its probability of extinction in the wild within 5 years has been determined, which necessitates to place it in Endangered category. Tubers of this plant are edible.

A stray report of this species in Bihar was made by Srivastava (1959) but there is no any further report from this state. Hence, there is some doubt about the identity of this specimen and needs reexamination.

This species can easily be identified by its ovate to ovate-lanceolate and cordate leaves, corolla tube funnel-shaped above and inflated base completely hairy within; lobes almost equal to tube, hairy and inner corona oblanceolate-rhomboid, erect-divergent.

Frerea indica Dalz. in *J. Linn. Soc.* 8: 10, t. 3. 1865; Hook. f. *Fl. Brit. India* 4: 76. 1883; Cooke, *Fl. Pres. Bombay* 2: 243. 1958 (Repr.ed.); Blatt. in *J. Bombay nat. Hist. Soc.* 36 (3): 536. 1933; McC. in *ibid.* 41 (1): 143. 1939; Bombay in *ibid.* 41 (3): 679. 1940; Sant. in *ibid.* 50: 427. 1951; Sant. & Irani in *Univ. Bombay Bot. Mem.* 4: 44, t. 7. 1962;

Raghavan in *Curr. Sci.* 45 (1): 36. 1976; Rao in *Notes R.B.G. Edinb.* 37 (1): 95. 1978; Nayar in *Bull. Bot. Surv. India* 22 (1-4): 19. 1980; Jain & Sastry, *Threat. Pl. India* 41. 1980; Raghavan & Singh in Jain & Sastry (eds.), *Pl. Cons. Bull.* 3: 11. 1983; Vajravelu & Daniel in Jain & Sastry (eds.), *Mat. Cat. Threat. Pl. India* 28. 1983; Bole & Almeida in *J. Bombay nat. Hist. Soc.* 81(2): 371. 1984; Mukehrjee & Garg in *J. Econ. Tax. Bot.* 5(4): 968. 1984; Raghavan & Singh in *ibid* 5(1): 159. 1984; Singh & Raghavan in *ibid.* 8 (1): 31. 1986; Ahmedullah & Nayar, *Endemic Pl. Indian Reg.* 1: 127. 1987; Goel in *J. Econ. Tax. Bot.* 9(1): 77. 1987; Nayar & Sastry in *Red Data Book Indian Pl.* 1: 72. 1987; Deshpande *et al.*, *Fl. Mahabaleshwar* 1: 363. 1993; Kothari & Moorthy, *Fl. Raigad* 232. 1993; Kumbhojkar *et al.* in *Indian J. For.* 16 (1): 85. 1993; Anon., *India Glob. Threat. Taxa* 16. 1996; Tetali *et al.* in *J. Bombay nat. Hist. Soc.* 94: 115. 1997a et in *Curr. Sci.* 73 (7): 563. 1997b; Yadav in Pokle *et al.* (eds.), *Flow Pl. Syst. Diver.* pt. 1: 41. 1997; Jagtap & Singh in *J. Econ. Tax. Bot.* 22(1): 232. 1998; Chakraverty in *Proc. 86th session Indian Sci. Cong., Abstracts* 13. 1999; Jagtap & Singh in *Fasc. Fl. India* 24: 243. 1999. *Caralluma frerei* Rowley in *Nat. Cact. & Succ. J.* 30: 78. 1958. '*Shindal makudi*'.

Types: Plate by Dalz. in *J. Linn. Soc. Lond.* 8: 10, t. 3. 1885.

Herbs, trailing, succulent, perennial. Leaves opposite, fleshy, subsessile, 3-5 x 1-2.5 cm, elliptic-oblong, shining, glabrous. Flowers extra-axillary, solitary, bracteate; pedicels ca 5 mm long, glabrous. Calyx 5-lobed, ca 3 x 1.5 mm, glabrous. Corolla rotate, ca 2.2. cm across, 5-lobed, purple with pale yellow spots, fringed with fine deep purple hairs on edges. Outer corona 1-2 mm long, 5-lobed, bowl shaped; inner ca 1.5 mm long, 5-lobed. Follicles paired or single, 6.3 - 8.2 cm long, curved at apex. Seeds many, ca 8 x 3.5 mm; coma silky white, 1.3 mm long.

Fls. & Frts.: September-January.

Illus.: Sant. & Irani, *op.cit.*

Habitat: Along steep slopes of hills on gravelly soils at an altitude of ca 1,000 m.

Distrib.: Endemic to MAHARASHTRA: Ahmednagar (Randha falls), Pune (Junnar, Purandhar), Raigad (Shivthalgadh), Satara (Mahabaleshwar, Sajjangad).

Spec. exam.: Ahmednagar: Randha falls, near Bhandardara, Mishra, 177000, 10.9.1998. Pune: College garden, Garade, s.n., 4.1.1904; Ganeshkhind B. Barden, *Paranjpe s.n.*, 14.6.1908; Junnar, Shivneri, Puri 2619, 24.6.1956; Purandhar, top portion of the Vazirgarh, Rolla 88641, 20.7.1963 (All in BSI).

Status: Critically Endangered.

Criteria: Area of occupancy up to 7 sq km: a) severely fragmented populations, b) declension in the number of subpopulations.

Notes: Earlier this species was reported only from Pune, Raigad and Satara districts. But from Hewre (near Junnar) and Mahabaleshwar it could not be recollected after first report in 1865 and 1924 respectively. In 1998, it has been collected for the first time from Ahmednagar district, where hardly 10 mature individuals were located on steep slopes by the sides of the water falls. Here its area of occupancy is ca 100 sq m. Recently it has been recollected from Sajjangad and Purandhar where ca 700 and 230 individuals were noticed (*Diwakar & Moorthy* 182305, 21.3.2001 and *Diwakar, Prassana & Moorthy* 182307, 24.3.2001, BSI). According to the latest collectors, in these two places the total area of occupancy of this species is ca 6 sq km. IUCN declared this species as one of the twelve most endangered plants on earth. But gradual increasing of its new localities, which are generally inaccessible in normal course does not warrant it to be so much threatened. There is a possibility of its occurrence in other areas and extensive field surveys are needed.

Amongst different threats such as fire, grazing and landslides, the most dangerous threat for this species is infestation by caterpillars of the plain and striped tiger as well as by *Aphis* sp. (*Tetali et al.*, 1997a). Chemical treatments for controlling this pest populations have also been suggested, which can be followed for its *ex situ* conservation. However, for its *in situ* conservation it has been suggested that *Euphorbia neriifolia* L., its most preferred associate, to be grown together. *E. neriifolia* has some repellence to certain larvae and it has been presumed that this factor combined with thorny habit of this plants protects *F. indica* from plain tiger (*Tetali et al.* 1997b).

In 1998, one live plant of this species was collected from Randha falls, cuttings of which have been introduced in the experimental garden of BSI, Pune. Now it is thriving well.

This species can easily be identified by its pendulous nature and succulent stem.

Heterostemma deccanense (Talb.) Swarupanandan & Mangaly in Bot. J. Linn. Soc. 101 (2): 255, f. 2 C-E. 1989; Jagtap & Singh in J. Econ. Tax. Bot. 22 (1): 232. 1998 et in Fasc. Fl. India 24:249. 1999. *Oianthus deccanensis* Talb., For. Fl. Bombay Pres. & Sind 2: 260. 1911; Blatt. & McC. in J. Bombay nat. Hist. Soc. 31: 533. 1926; Blatt. in *ibid.* 36 (3): 533. 1933; Sant. & Irani, Univ. Bombay Bot. Mem. 4: 64. 1962; Cherian & Pataskar in Bull. Bot. Surv. India 11: 390. 1971; Billore, Fl. Thane 1: 587. 1972 (Ph.D. Thesis, *ined.*); Sant. & Henry, Dicot. Fl. Pl. India 118. 1973; Nayar in Bull. Bot. Surv. India 22 (1-4): 21. 1980; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 7. 1983 et in J. Econ. Tax. Bot. 5 (1): 160. 1984; Singh & Raghavan in *ibid.* 8(1): 31. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 127. 1987; Raghavan & Sharma in Nayar & Sastry (eds.), Red Data Book Indian Pl. 1: 74. 1987; Lakshminarasimhan & Sharma, Fl. Nasik 304. 1991.

Type: India, Maharashtra, Deccan ghats, 18 miles west of Poona (Pune), Talbot *s.n.*

Undershrubs, climber; stems densely pubescent along two lines. Leaves opposite, petiolate, 7.2-13.8 x 2.7-8.2 cm, narrowly ovate-lanceolate to broadly ovate, apex acute, base rounded, truncate or cordate, acute at apex, pubescent. Flowers lateral in umbellate cymes, 3-4-flowered; peduncles & pedicels pubescent; bracts *ca* 1.5 x 0.5 mm, glabrescent. Calyx 5-lobed, lobes *ca* 2 x 1 mm, ovate, pubescent outside, glandular within. Corolla urceolate, *ca* 7 mm long, deep purple; tube *ca* 5.5. mm long, hairy outside; lobes 5, *ca* 1.5 x 0.5 mm, ovate, glabrous. Corona uniseriate, *ca* 3 mm long, 5-lobed, fleshy.

Fls. & Frts. : August-January.

Illus.: Swarupanandan & Mangaly, *op.cit.*.

Habitat: On rocky, exposed areas along ghats.

Distrib.: Endemic to Kerala, MAHARASHTRA: Nasik (Deodongra-Deoli temple), Pune (Pashan), Thane (Tungar hill).

Spec. exam.: Nasik: Deodongra-Deoli temple, *Cherian* 112668, 29.9.1967 (BSI). Pune: Pashan, *Saldanha* 1411, 1.9.1954. Thane: Tungar hill, *Das* 364-70, 16.8.1959 (All in BLAT).

Status: Vulnerable (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Extent of occurrence estimated to be *ca* 6,000 sq km: found only at three locations.

Notes: Earlier this species was considered to be endemic to Maharashtra State only. Later Sasidharan reported it from Kerala also. From Maharashtra it was lastly collected from Nasik district in 1967.

It can be distinguished by its urceolate corolla and entire coronal scales with rounded tips.

Heterostemma urceolatum Dalz. in Hook's Kew J. 4: 295. 1852; Dalz. & Gibs. Bombay Fl. 152. 1861; Swarupanandan & Mangaly in Bot. J. Linn. Soc. 101 (2): 256. 1989; Jagtap & Singh in J. Econ. Tax. Bot. 22 (1): 232. 1998 et in Fasc. Fl. India 24: 254. 1999. *Oianthus urceolatus* (Dalz.) Benth. in Hook. Ic. Pl. t. 1191. 1876; Hook. f. Fl. Brit. India 4: 49. 1883; Woodrow in J. Bombay nat. Hist. Soc. 12: 167. 1898; Cooke, Fl. Pres. Bombay 2: 236. 1958 (Repr.ed.); Talbot, For. Fl. Bombay Pres. & Sind. 2: 259. 1911; Blatt. in J. Bombay nat. Hist. Soc. 36 (3): 533. 1933; Sant. & Irani, Univ. Bombay Bot. Mem. 4: 65. 1962; Billore, Fl. Thane 1: 588. 1972 (Ph.D. Thesis, *ined*); Nayar in Bull. Bot. Surv. India 22 (1-4): 21. 1980; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 8. 1983 et in J. Econ. Tax. Bot. 5 (1): 160. 1984; Singh & Raghavan in *ibid.* 8(1): 31. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 127. 1987; Goel in J. Econ. Tax. Bot. 9 (1): 81. 1987; Kothari & Moorthy, Fl. Raigad 240. 1993; Bachulkar *et al.* in Indian Bot. Repr. 14 (1+2): 59. 1995; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 42. 1997. '*Nihadi*'.

Type: India, Karnataka, Belgaum, *Dalzell s.n.* (K).

Undershrubs, climber; stem densely pubescent along two lines. Leaves opposite, petiolate, 7.3 - 15.7 x 5.3 - 7.5 cm, ovate or ovate-lanceolate, base subcordate, acute, at apex, pubescent above, glabrous

beneath except nerves. Cymes axillary, 4-5-flowered; peduncles & pedicels pubescent; bracts *ca* 1.5 x 0.5 mm, glabrous. Calyx 5-lobed, lobes *ca* 4 x 1.5 mm, sparingly pubescent outside, glandular within. Corolla purplish-red; tube *ca* 13.5 mm long, *ca* 8 mm across; lobes *ca* 1.5 x 1.5 mm, ovate, acute, minute hairy outside. Corona 5-lobed, *ca* 2.5 x 2 mm, apex acuminate, fleshy.

Fls. & Frts. : July- September.

Illus.: Benth. *op.cit.*.

Habitat: In hilly forests.

Distrib.: Endemic to Karnataka, MAHARASHTRA: Raigad (Revdanda), Satara (Chandkhana, Ramdongar) Thane (Talegaon hill, Takmak hill).

Spec.exam.: Thane: Dahisar, Bhitola, Takmak hill, *Billore* 116720, 16.9.1968; Phugala round, Talegaon ghat top, near Igatpuri, *Billore* 116774, 20.9.1968 (Both in BSI).

Status: Endangered (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Area of occupancy less than 500 sq km: found only at three locations.

Notes: In Maharashtra this species was first reported from Raigad district by Dalzell. There is no further report from this district. Later it was collected from Thane district, where its distribution was reported as rare. Recently it has been reported from Satara district and here also it is very much sporadic.

It can be distinguished by its ovoid-urceolate corolla and coronal scales 3-toothed at tips.

Seshagiria sahyadrica Ansari & Hemadri in *Indian For.* 97 (3): 126, 1-9. 1971 et in *Bull. Bot. Surv. India* 13: 357. 1973; Rao in *Notes R.B.G. Edinb.* 37 (1): 95. 1978; Nayar in *Bull. Bot. Surv. India* 22 (1-4): 22. 1980; Raghavan & Singh in Jain & Sastry (eds.), *Pl. Cons. Bull.* 3: 12. 1983 et

in J. Econ. Tax. Bot. 5(1): 160. 1984; Singh & Raghavan in *ibid.* 8(1): 31. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 127. 1987; Ansari in Nayar & Sastry (eds.), Red Data Book Indian Pl. 2: 62, f. 1988; Jagtap & Singh in Res. J. Pl. Environ. 5(2): 92. 1989; Almeida in J. Econ. Tax. Bot. Addl. Ser. 8(1), Fl. Savantwadi 1: 262. 1990; Bachulkar in Rayat Research J. 1(2): 115. 1993; Deshpande *et al.* Fl. Mahabaleshwar 1: 368. 1993; Anon., India Glob. Threat. Taxa 16. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 42. 1997; Yoganarasimhan *et al.* in J. Econ. Tax. Bot. 21 (2): 471. 1997; Jagtap & Singh in *ibid.* 22 (1): 233. 1998 et in Fasc. Fl. India. 24: 53. 1999. 'Khobardoda'

Types: Holotype: India, Maharashtra, Pune, Sinhagadh hill, *Ansari* 87750A, 28.6.1963 (CAL!). Isotypes: 87750 B-C (BSI!), D(CAL!), E(K), F(L). *Paratypes:* Pune, Bhivade Khurd-Durga khilla, *Hemadri* 94360A-B, 26.6.1964; Satara; Gureghar, near Panchgani, *Ansari* 105077 A-D, 20.6.1968 (All in BSI!).

Undershrubs, twining; stems pubescent along two lines. Leaves opposite, petiolate, 9-9.5 x 3.5-4.5 cm, ovate-oblong, acuminate at apex, cordate at base with rounded lobes, glabrous. Flowers axillary, in subumbellate cymes; peduncles and pedicels hairy; bracts *ca* 1.5 x 0.5 mm, pubescent outside. Calyx 5-lobed, lobes *ca* 3 x 1.5 mm, pubescent outside. Corolla rotate, lobes 5, *ca* 14 x 3 mm, ovate, glabrous. Corona staminal, outer cupular, 5-lobed, *ca* 1.5 mm long; inner 5-lobed, *ca* 1.5 x 1 mm, oblong, fleshy. Follicles ovate-lanceolate, warty. Seeds many, ovoid; coma up to 2.5 cm long, white.

Fls. & Frts.: May-October.

Illus.: Ansari & Hemadri, *op.cit.* 1971; Ansari, *op.cit.*

Habitat: On gravelly soil in open areas along hill slopes of moist deciduous forests at an altitude of *ca* 1,000 m.

Distrib.: Endemic to Karnataka, MAHARASHTRA: Ahmednagar (Bhandardara), Pune (Junnar, Sinhagadh), Satara (Panchgani, Yaveteshwar ghat), Sindhudurg (Amboli).

Spec.exam.: Satara: Gureghar, near Panchgani, *Ansari* 108791, 28.6.1968; Yaveteshwar ghat, *Mishra* 175619, 1.7.1996 (Both in BSI).

Status: Vulnerable (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Extent of occurrence estimated to be *ca* 6,000 sq km: found only at six locations.

Notes: Earlier this species was considered to be endemic to Maharashtra state only. But later it has been reported from Karnataka also (Yoganarasimhan, *et al.* 1997). In Maharashtra it is sparsely distributed along the ghat regions from Bhandardara of Ahmednagar district to Amboli of Sindhudurg district. At Yaveteshwar ghat of Satara district *ca* 25 mature individuals were found in 1996. but there is a possibility of getting this plant from other places through intensive searching.

This species can be differentiated by its ovate-oblong and cordate leaves, completely glabrous corolla with deeply divided corolla lobes, fleshy & gibbous inner corona and glabrous follicles with warty protuberances.

GENTIANACEAE

	<u>Genera</u>	<u>Species + Infraspecific taxa</u>
World	80	1,200
India	22	188
Maharashtra	7	27

Endemic to Maharashtra - 1 species & 1 variety.

Canscora concanensis C.B. Cl. in Hook. f. Fl. Brit. India 4: 104. 1883; Cooke, Fl. Pres. Bombay 2: 258. 1958 (Repr.ed.); Ahuja & Cherian in J. Bombay nat. Hist. Soc. 66: 655, f. 1-4. 1969; Billore, Fl. Thane 2: 601. 1972 (Ph.D. Thesis, *ined.*); Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 6. 1983 et in J. Econ. Tax. Bot. 5 (1): 160. 1984; Singh & Raghavan in *ibid.* 8 (1): 31. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 117. 1987; Goel in J. Econ. Tax. Bot. 9 (1): 73. 1987; Lakshminarasimhan & Sharma, Fl. Nasik 307. 1991; Deshpande *et al.*, Fl. Mahabaleshwar 1: 373. 1993; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 42. 1997.

Herbs, annual, erect, up to 22 cm high; stems quadrangular, obscurely winged. Leaves opposite, 1.6-2.6 x 0.6-1.7 cm, membranous, 3-nerved; upper ovate, rounded at base, acute at apex; lower elliptic, attenuated at base, acute at apex. Flowers in weak, terminal, dichotomous cymes; pedicels *ca* 5 mm long, filiform; bracts small, linear-lanceolate. Calyx *ca* 1 cm long, tubular, 4-toothed, winged. Corolla bluish-purple, tube as long as lobes, lobes obovate. Capsules *ca* 5 mm long, oblong, elliptic, 2-valved. Seeds numerous, minute, ovoid, finely reticulate.

Fls. & Frts. : August-September.

Habitat: In open grasslands and on rocky slopes.

Distrib.: Endemic to Gujarat, MAHARASHTRA: Kolhapur (Kagal) Nasik (Igatpuri, Kumbhala, Peint), Satara (Koyna), Thane (Kasara R.F., Mumbra, Shahapur, Tansa lake, Wada).

Spec. exam.: Nasik: Khumbhala, near Peint, *Cherian* 111320, 12.9.1968. Satara: Koyna, Kochhar 152531, 30.8.1978. Thane: Shahapur. *Rolla* 81515, 16.9.1961; Kasara R.F., Vinchu Chinal slope, *Billore* 116790, 20.9.1968; Washala, on way from Phugala village to Vinchu Khangal, *Mishra* 177619, 18.9.1998 (All in BSI).

Status: Vulnerable (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Extent of occurrence estimated to be *ca* 17,500 sq km: fragmented populations.

Notes: Ahuja & Cherian (*op. cit.*) reported this species from Thane and Nasik districts after a long gap. Later it was collected from Kolhapur and Satara districts also. In Thane district it is somewhat common, whereas in other places its distribution is sporadic.

This species can easily be identified by its strongly 4-winged calyx.

Canscora diffusa (Vahl) R. Br. ex. Roem & Schult. var. ***tetraptera*** Naik & Pokle in J. Econ. Tax. Bot. 7(3): 673, f. 3. (1985) 1986; Naik, Fl. Marathwada 2: 559. 1998.

Types: Holotype: India, Maharashtra, Aurangabad, Nagapur, Pokle 319, (MUA!).

Herbs, annual, ca 15-20 cm high, erect; stems 4-angled, branches slender. Leaves 1.2-3 x 0.8-1.5 cm, broadly ovate-lanceolate, glabrous, conspicuously 3-nerved; upper leaves subtending inflorescence 1-1.5 x 1-1.2 cm, broadly ovate, acute, 5-nerved. Flowers in dichotomous or apparently unilateral cymes; pedicels 8-12 mm long, slender; bracts 6-8 mm long, linear. Calyx 10-12 mm long, conspicuously 4-winged; sepals 1.5-2 mm long, subulate, 3-nerved. Corolla slightly longer than calyx; tube 10-12 mm long; petals unequal, 2-3 x 1.5-2.5 mm, obtuse or rounded at apex. Capsules 5-6 x 1.5-2 mm, oblong. Seeds numerous, ovoid, brown, granular.

Fls. & Frts. : October-January.

Illus.: Naik & Pokle, *op. cit.*

Habitat: In exposed situations on rocky soil.

Distrib.: Endemic to MAHARASHTRA: Aurangabad (Nagapur).

Spec. exam.: Type, as above.

Status: Endangered.

Criteria: Area of occupancy less than 500 sq km: found only at a single location.

Notes: Though this variety is reported as common, it is confined only to its type locality and is known only by type collection. However, there are some doubts regarding the separate entity of this variety, because the experts at Rijksherbarium, Leiden, opined that it may be considered within the broad variable range of *C. diffusa*. (Naik & Pokle, *op.cit.*).

This variety differs from the typical one in having winged stems, flowers being arranged in unilateral cymes and larger as well as conspicuously 4-winged calyx.

Canscora khandalensis Sant. in Kew Bull. 1948: 485. 1949 et in Rec. Bot. Surv. India 16(1), Fl. Khandala 162. 1967 (3rd Rev.ed.); Billore, Fl. Thane 2: 603. 1972 (Ph.D. Thesis, *ined.*); Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 9. 1983 et in J. Econ. Tax. Bot. 5(1): 160. 1984; Singh & Raghavan in *ibid.* 8 (1): 31. 1986; Deshpande *et al.*, Fl. Mahabaleshwar 1: 374. 1993; Kothari & Moorthy, Fl. Raigad 247. 1993.

Types: Holotype: India, Maharashtra, Pune, Khandala, *Santapau* 5015, 2.10.1944 (BLAT). Paratypes: Khandala, *Santapau* 2663, 11.9.1943; 2756, 30.9.1943; 2779, 1.10.1943 & 5073, 3.10.1944 (All in BLAT!).

Herbs, erect, 10-25 cm high; stems slender, quadrangular. Leaves 1.7-6 x 0.8-2.5 cm, sessile or subsessile, ovate, elliptic or lanceolate, attenuated towards base, subacute or obtuse at apex. Flowers in dichotomous cymes; pedicels 1.5-10 mm long, quadrangular, obscurely winged; bracts minute, ovate, acute. Calyx 9-10 mm long, sharply quadrangular, 4-keeled; teeth *ca* 1.5 mm long, triangular, acute. Corolla 10-13 mm long, pale-rose; tube 6-7 mm long; lobes obtuse. Capsules *ca* 7 x 3 mm, cylindrical, membranous.

Fls. & Frts. : September-October.

Habitat: On rock crevices in hilly forests.

Distrib.: Endemic to MAHARASHTRA: Pune (Ambavane, Junnar, Khandala), Raigad (Matheran, Raigad fort), Satara (Mahabaleshwar), Thane (Takmak hill).

Spec. exam.: Pune: Khandala, *Santapau* 13374, 15.9.1951; 13420, 17.9.1951; 14961, 20.9.1952; 21173-4, 27.9.1954; 21196, 8.9.1956 & 23537, 14.10.1960. (All in BLAT); Junnar, Shivneri fort, *Rolla* 83579, 10.10.1962; Ambavane, *Reddi* 99037, 6.9.1964; Durga khilla, near Junnar, *Hemadri* 117877, 20.9.1968 (All in BSI). Raigad: Matheran, *Irani* 4510-1, 11.9.1959 & 4574, 21.9.1959. Satara: Mahabaleshwar, *Santapau* 33245, 13.9.1959 (All in BLAT). Thane: Dahisar range, Takmak hill, *Billore* 116737, 16.9.1968 (BSI).

Status: Vulnerable.

Criteria: Extent of occurrence estimated to be *ca* 9,000 sq km: severely fragmented populations.

Notes: This species is distributed in several localities of only four districts. However, everywhere its distribution is very much sporadic.

It can be distinguished by its strongly keeled sepals as well as large flowers and capsules.

BORAGINACEAE

	<u>Genera</u>	<u>Species + Infraspecific taxa</u>
World	154	2,500
India	43	209
Maharashtra	9	34

Heliotropium cornutum Johnst. in Contrib. Gray Herb. (n.s.) 92: 90. 1930; Arora & Banerjee in Bull. Bot. Surv. India 8: 341, f. A-J. 1966 (1967); Kulkarni & Wadhwa in J. Bombay nat. Hist. Soc. 70: 235. 1973; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 132. 1987; Kulkarni, Fl. Sindhudurg 277. 1988; Almeida in J. Econ. Tax. Bot. Addl. Ser. 8 (1), Fl. Savantwadi 1: 275. 1990; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 42. 1997.

Types: India, Karnataka, Mangalore, *Hohenacker* 82 (BM).

Herbs, strigosely hairy; stems 15-25 cm long, prostrate or ascending. Leaves 3-8 x 1.5-2.5 mm, ovate to oblong-lanceolate, attenuate to somewhat rounded at base, subacute at apex, appressed hairy. Flowers in extra-axillary, few-flowered cymes; pedicels up to 1.5 mm long, hirsute. Calyx deeply 5-partite, lobes *ca* 4 x 1.5 mm, ovate-lanceolate, acute. Corolla infundibuliform, white; tube *ca* 3 mm long; lobes 5, *ca* 1 mm long, ovate to ovate-oblong, sparsely hairy outside. Fruits 3-5 x *ca* 2 mm, quadrangular, densely villous.

Fls. & Frts. : April-May

Illus.: Arora & Banerjee, *op. cit.*

Habitat: In open situations and in fallow fields in plains and on ghat tops.

Distrib.: Endemic to Karnataka, MAHARASHTRA: Sindhudurg (Charatha, Kankavli, Kudal).

Spec. exam.: Sindhudurg: Bhadgaon, ca 18 km from Ghotge, Ansari & Kulkarni 107868, 12.6.1968; Shivapur Rai, near Dukanwad, Kulkarni 121038, 4.6.1970; Kumbhavde, ca 15 km from Kankavli, Kulkarni 128713, 14.4.1971; Kerunde, ca 21 km from Savantwadi, Kulkarni 128739, 16.4.1971 (All in BSI).

Status: Endangered (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Extent of occurrence estimated to be ca 400 sq km: severely fragmented populations.

Notes: Earlier this species was considered to be endemic to Karnataka state only. However, in 1973 Kulkarni & Wadhwa reported it from Maharashtra also, where it is sporadically distributed in Sindhudurg district.

This species can be distinguished by its prostrate or ascending nature and quadrangular fruits with blunt, cornate processes.

CONVOLVULACEAE

	<u>Genera</u>	<u>Species + Infraspecific taxa</u>
World	58	1,650
India	28	184
Maharashtra	16	69
Endemic to Maharashtra - 4 species		

Argyrela boseana Sant. & Patel in Trans. Bose Res. Inst. Calcutta 22: 35, t. 3. 1958; Raghavan & Singh in J. Econ. Tax. Bot. 8 (1): 160. 1984; Almeida in J. Econ. Tax. Bot. Addl. Ser. 8(1), Fl. Savantwadi 277. 1990; Deshpande *et al.*, Fl. Mahabaleshwar 1: 386. 1993; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 42. 1997. *A. hookeri sensu* Cooke, Fl. Pres. Bombay 2: 325. 1958 (Repr.ed.) *non* C.B. Cl. 1883.

Shrubs, climbing; stems grooved, glabrescent or softly pubescent. Leaves 13-23 x 9-20 cm, broadly ovate, broad at base, shortly acuminate at apex, margins entire, glabrous; petioles 5-13 cm long. Flowers in axillary cyme; rachis long; pedicels short; bracts lanceolate, subacute, foliaceous, hairy. Sepals *ca* 1.5 cm long, ovate-lanceolate, hairy on the back. Corolla campanulate, 7-9 cm long, pink, hairy outside. Fruits *ca* 1.5 cm across, globose.

Fls. & Frts. : July-December.

Illus.: Santapau & Patel, *op. cit.*.

Habitat: Along hill tracts and in plains.

Distrib.: ENDEMIC to MAHARASHTRA: Satara (Fitzgerald ghat, Kas, Koyna, Mahabaleshwar), Sindhudurg (Amboli, Chaukul, Kalambis).

Spec. exam.: Satara: Mahabaleshwar, *Santapau* 11828, 7.11.1950; 13221, 19.8.1951 & 22744. 14.9.1958; *Bole* 397, 21.10.1951; 1774, 14.7.1958; 1880, 6.1.1959; 2100, 1.7.1959 & 2143, 13.7.1959; *Patel* 767-8, 6.9.1959; 1128-31, 21.12.1954 & 1145-8, 22.12.1954; *Kapadia* 2084-5, 15.7.1954 (All in BLAT).

Status: Endangered.

Criteria: Extent of occurrence estimated to be *ca* 1,500 sq km: found only at 5 locations.

Notes: Though this species is somewhat common in its localities, it has been kept under Endangered category due to its localised distribution. In Sindhudurg district it occurs at three adjoining places, which can be considered as a single locality.

This species can be distinguished by its cordate, minutely pilose leaves becoming glabrescent beneath and flowers in elongate cymes.

Ipomoea clarkei C.B. Cl. in Hook.f. Fl. Brit. India 4: 734. 1886 (under editions and corrections *I. stocksii* in error for *I. clarkei*, in Hook. f. *op. cit.* 207. 1883). Cooke, Fl. Pres. Bombay 2: 314. 1958 (Repr.ed.); Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 11. 1983 et

in J. Econ. Tax. Bot. 5(1): 160. 1984; Singh & Raghavan in *ibid.* 8(1): 32. 1986; Goel in *ibid.* 9(1): 79. 1987; Singh & Kulkarni in Nayar & Sastry (eds.), Red Data Book Indian Pl. 3: 99. f. 1990; Lakshminarasimhan & Sharma, Fl. Nasik 325, f. 23. 1991; Anon., India Glob. Threat Taxa 36. 1996.

Herbs, climbing, annual; stems slender, wiry. Leaves 5-8.5 x 3-6 cm, broadly ovate, deeply cordate at base, finely acuminate at apex, entire, hairy on both sides; petioles 2.5-6 cm long. Peduncles 1-3-flowered, 1.8-3.5 cm long, slender; pedicels 0.6-3 cm long; bracts minute, lanceolate. Sepals *ca* 8 mm long, linear-lanceolate, acute, sparsely hairy. Corolla *ca* 3.5 cm long, infundibuliform, bright yellow. Capsules *ca* 1.2 x 1 cm, ovoid, glabrous. Seeds cuneate, puberulous, dark brown.

Fls. & Frts. : September.

Illus.: Lakshminarasimhan & Sharma, *op. cit.*

Habitat: On gravelly, rocky substrata or on rocks along hill slopes.

Distrib.: Endemic to Malabar (?), MAHARASHTRA: Nasik (Igatpuri, Zari), Pune (Junnar) Thane (Bhitola, Kasara).

Spec. exam.: Nasik: Zari, *Cherian* 111530, 20.9.1967. Pune: Tulja hills, West of Junnar, *Kanitkar s.n.*, September, 1891; Dhak Khilla, near Junnar, *Hemadri* 117993, 23.9.1968. Thane: Kasara, along national highway, *Billore* 110553, 26.8.1967 & 116794, 20.9.1968; Bhitola, Tak-mak hill slopes, *Billore* 116718, 16.9.1968 (All in BSI).

Status: Endangered.

Criteria: Extent of occurrence estimated to be up to 5,000 sq km: severely fragmented populations.

Notes: This species is reported only from a few localities of three districts in Maharashtra so far. Everywhere its distribution is very much sporadic. However, recently during 1996-1998 efforts were made to recollect it, but were unsuccessful.

This species can be distinguished by its leaves longer than broad and not white wooly beneath, minute bracts not enclosing the flowers, hairy sepals and yellow flowers.

Ipomoea salsettensis Sant. & Patel in Trans. Bose Res. Inst. Calcutta 22: 34, t. 2. 1958; Singh & Raghavan in J. Econ. Tax. Bot. 8(1): 32. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 131. 1987; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 42. 1997.

Types: Holotype: India, Maharashtra; Bombay, Borivli, *Patel* 1509, 21.9.1955 (BLAT!). Paratypes: Borivli, *Patel* 823, 921, 923 & 1524 (BLAT).

Subshrubs, twining, with subterranean rhizome, most parts tinged with dark red; stems glabrous, woody at lower parts. Leaves 3-15.5 x 3.5-15 cm, broadly ovate or orbicular, entire or 3-5 lobed, deeply cordate at base, shortly acuminate and mucronate at apex, glabrous; petioles 5-8 cm long, glabrous. Cymes 3-6-flowered, rarely 1-flowered; peduncles *ca* 7 cm long, glabrous, warted; pedicels *ca* 15 mm long, clavate, elongated at fruiting; bracts 5-7 mm long, oblong, obtuse and mucronate. Calyx 10-12 mm long, tubular; outer sepals 10-15 mm long, obovate-oblong; inner broader, smooth. Corolla 8-10 cm long, salver-shaped, white; tube 5-5.5 cm long, slender; limb 4-6 cm in diameter. Capsules 15-17 mm in diameter, depressed-globose, glabrous, 4-valved.

Fls. & Frts.: September.:

Distrib.: Endemic to MAHARASHTRA: Bombay (Bhandup, Borivli, Trombay, Vihar lake).

Spec. exam.: Bombay: Vihar lake, *Blatter* 22183, November, 1917; Borivli, *Patel* 917-20 & 924, 30.10.1954; Bhandup, *Patel* 1525-8, 8.10.1955; Borivli, *Herbert* 1037, 19.11.1955 & 2659, 8.11.1956; Trombay, *Santapau* 23353-4, 15.2.1960 (All in BLAT).

Status: Endangered.

Criteria: Extent of occurrence estimated to be *ca* 5,00 sq km: severely fragmented populations.

Notes: This species occurs at several localities of Bombay only and its distribution is very much sporadic. It was last collected from Trombay in 1960.

It can be differentiated from its allied species (*I. maximam* Don), by its larger flowers and broadly obovate-oblong sepals.

Merremia rhyncorhiza (Dalz.) Hall. f. in Engl. Bot. Jahrb. 16: 552. 1893; Cooke, Fl. Pres. Bombay 2: 307. 1958; Almeida in J. Econ. Tax. Bot. Addl. Ser. 8(1), Fl. Savantwadi 1: 288. 1990. *Ipomoea rhyncorhiza* Dalz. in Hook. J. Bot. & Kew Gard. Misc. 3: 179. 1851; C.B.Cl. in Hook. f. Fl. Brit. India 4: 214. 1883.

Herbs, twining stems slender, filiform. Leaves 3.5-5 cm in diameter, deeply palmately cut in to 5-7 segments; segments oblong, pinnatifid or lobed; petioles 2.5 - 3.5 cm long, filiform. Peduncles 1-2-flowered, 5-10 cm long, filiform, glabrous; pedicels 3-9 mm long; bracts 3-4 mm long, lanceolate. Sepals unequal, oblong-lanceolate, glabrous, outer 2 *ca* 9 mm long, inner 3 *ca* 2.4 cm long. Corolla 2.4-3 cm long, yellow. Capsules oblong with persistent sepals.

Fls. & Frts. : July-November.

Habitat: On rocky substratum in open areas on hilly slopes.

Distrib.: Endemic to Karnataka, MAHARASHTRA: Sindhudurg (Amboli, Chaukul).

Status: Endangered (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Area of occupancy up to 20 sq km: found only at a single location.

Notes: Earlier this species was considered to be endemic to only Karnataka state. However, Almeida (*op. cit.*) collected it from two adjoining places (can be considered as a single locality) of Sindhudurg district. Here its distribution is reported as rare. The tubers of this species are eaten by the natives, which may be the one of the causes of its rarity.

This species can be identified by its tuberous roots, 5-7-lobed leaves and solitary flowers.

Operculina tansaensis Sant. & Patel in Trans. Bose Res. Inst. Calcutta 22: 33, t. 1. 1958; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 131. 1986; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 42. 1997.

Types: Holotype: India, Maharashtra, Bombay, Tansa lake, *Patel* 1619, 18.12.1955. *Isotypes*: *Patel* 1613-5*, 1618* & 1620* (All in BLAT!):

Subshrubs, twining, perennial; stems retrosely puberulous-tomentose, glabrescent on aging. Leaves 9.5-25 x 3.5-13.5 cm, ovate to lanceolate-ovate, cordate at base, acute or shortly acuminate and mucronate at apex, dense and adpressedly pilose above, more or less sericeo-tomentose below. Cymes branched, few to many flowered; peduncles 0.7-5 cm long, pubescent-tomentose; pedicels 10-15 mm long in flowers, *ca* 3 cm in fruits, clavate and flattened upwards, glabrous; upper bracts *ca* 1.8 x 1.5 cm, broadly ovate or suborbicular; lower flower-bearing bracts 2.3 - 2.8 x 1.7-2 cm, obovate. Calyx 2-2.5 cm long in flowers and 3-3.5 cm long in fruits; sepals subequal, outer one longer than inner two. Corolla 4-4.5 cm long; tube narrow, included in calyx. Capsules 1.6 - 1.8 cm in diameter, depressed, quadrangular, glabrous. Seeds 4 or less, 7-8 mm long, broadly ovate, glabrous.

Fls. & Frts.: December.

Illus.: Sant. & Patel, *op. cit.*

Distrib.: Endemic to MAHARASHTRA: Bombay (Tansa lake).

Spec. exam.: Types, as above.

Status: Critically Endangered.

Criteria: Area of occupancy less than 10 sq km: found only at a single location.

* In the protologue of this species, specimens, *Patel* 1613-5, 1618 & 1620 are designated as 'isotypes'. These cannot be 'isotypes' as the collections are different from that of the holotype (*Patel* 1619). Hence, these are paratypes only.

Notes: This species is known only by its type collections from Bombay. Later it has not been recollected so far. However, further explorations are needed.

It can be distinguished by its tomentose stems, petioles, leaves and peduncles; peduncles larger than petioles; persistent bracts; pale yellow or white corolla and glabrous seeds.

SCROPHULARIACEAE

	<u>Genera</u>	<u>Species + Infraspecific taxa</u>
World	222	4,450
India	62	368
Maharashtra	25	71
Endemic to Maharashtra - 2 species		

Bonnayodes limnophiloides Blatt. & Halib. in J. Ind. Bot. Soc. 2: 46, f. 2. 1921; Nayar in Bull. Bot. Surv. India 22 (1-4): 19. 1980.

Type: Holotype: India, Maharashtra, Pune, Lonavla, Bhushi lake, *Blatter & Hallberg* 9450, October, 1918 (BLAT!).

Herbs, annual, erect or ascending; stems strongly branched, more or less quadrangular. Leaves opposite, uppermost attaining 15 mm in length, generally divided up to the base into 2-3 linear segments. Flowers axillary, generally single, occasionally 2; pedicels up to 10 mm long, erect, sometimes recurved in fruiting, glabrous, reddish. Calyx *ca* 5 mm long, divided nearly to base into 5 lobes; lobes linear-subulate, subequal, glabrous, reddish. Corolla 8-9 mm long, bell-shaped; tube cylindrical, attaining half of the entire corolla; posterior lip shorter than anterior. Capsules half the length of ovary, twice longer than broad, scarious. Seeds numerous, minute, subcylindrical or falcate.

Fls. & Frts.: October.

Illus.: Blatt. & Halib., *op.cit.*

Habitat: Bottom of the dried lake.

Distrib.: Endemic to MAHARASHTRA: Pune (Lonavla).

Spec. exam.: Type, as above.

Status: Critically Endangered.

Criteria: Area of occupancy up to 1 sq km: found only at a single location.

Notes: This species is known only by its type collection deposited at BLAT. Later the type locality has been botanized several times but it could not be relocated. Recently also during 1996-1998, efforts were made to trace it but in vain. However, further explorations are needed.

Limnophila polystachyoides Blatt. in J. Asiat. Soc. Bengal (n.s.) 26: 352. 1930; Sant. in J. Bombay nat. Hist. Soc. 49: 34. 1950; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 11. 1983 et in J. Econ. Tax. Bot. 5(1): 160. 1984; Singh & Raghavan in *ibid.* 8(1): 33. 1986.

Type: India, Bombay Pres. (Maharashtra), Salsette, near Maroli, *McCann & Blatter* 12345, December, 1916 (BLAT!).

Herbs, *ca* 90 cm high, erect or ascending; stems stout, finely muriculate. Lower leaves all capillaceo-multifid; upper ones opposite or in whorls of 3, *ca* 2 x 0.7 cm, lanceolate to linear, acute, entire, serrulate, 3-nerved. Flowers in terminal spikes of *ca* 6 cm long; bracteoles *ca* 1 mm long, triangular, acute. Calyx *ca* 3.5 mm long, divided half-way down. Corolla at least twice the length of calyx, white, wooly inside. Capsules 4-5 mm long, entirely enclosed by calyx, ovoid, minutely papillose, glabrous, shining. Seeds *ca* 0.5 mm long, elongate, broader at apex, brown, finely tuberculate.

Fls. & Frts. : December-March.

Habitat: In Pools.

Distrib.: Endemic to Karnataka, MAHARASHTRA: Bombay (Salsette island).

Spec. exam.: Karnataka: Dharwar, *Sedgwick* 1954 & 1997, December, 1916 & 3727, March, 1918 (All in BLAT).

Status: Endangered (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Area of occupancy *ca* 100 sq km; found only at a single location.

Notes: Earlier this species was considered to be endemic to only Maharashtra state. But this time several specimens of this species from Karnataka state have also been traced at BLAT. In Maharashtra so far it is known from its type locality and only by its type collection.

Lindernia estaminodiosa (Blatt. & Hallb.) Mukh. in J. Indian Bot. Soc. 24: 133. 1945; Sant. in J. Bombay nat. Hist. Soc. 49: 40. 1950; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 11. 1983; Shivarajan & Mathew in J. Bombay nat. Hist. Soc. 80: 134. 1983; Singh & Raghavan in J. Econ. Tax. Bot. 8(1): 33. 1986; Almeida in J. Econ. Tax. Bot. Addl. ser. 8(1), Fl. Savantwadi 1: 300. 1990. *Bonnaya estaminodiosa* Blatt. & Hallb. in J. Bombay nat. Hist. Soc. 25: 416. 1918.

Types: India, Maharashtra, Bombay, *Blatter* 1517, November, 1916 (BLAT).

Herbs, *ca* 6 cm high; stems stout, quadrangular, sparingly branched. Leaves opposite, *ca* 30 x 5 mm, linear, shallowly serrate, margins hairy, sessile. Flowers in lax, terminal and lateral racemes; pedicels up to 7 mm long (in fruit), stout, flat above, convex below; bracts of about same length as pedicels, broader at base, keeled, acuminate. Calyx 4-6 mm long, divided nearly to base; lobes 5, subequal, subulate, margins and midrib birstly. Corolla *ca* 5.5 mm long, white, lower lip spotted with pink, tube *ca* 3 mm long, straight. Capsules *ca* 10 mm long. Seeds ovoid-globose, rugose with numerous circular depressions in rows.

Fls. & Frts. : September-December.

Habitat: In cultivated fields and wet low land.

Distrib.: Endemic to Karnataka, MAHARASHTRA: Bombay, (Borivli, Goregaon, Mahim, Malad), Raigad (Karjat, Matheran), Sindhudurg (Charatha), Thane (Mumbra).

Spec. exam.: Bombay: Malad, *Shah* 4958, 17.9.1955; 6165, 22.10.1955; 6617, 24.12.1955; 7515, 1.9.1956; 7890, 28.10.1956; 7934, 10.11.1956; 8038, 25.11.1956 & 9319-20, 10.10.1957; Goregaon, *Tavakari* 1940, 10.10.1958. Raigad: Matheran, *Irani* 5611, 2.11.1960. Thane: Mumbra, *Shenoy* 1367, 15.11.1953 (All in BLAT).

Status: Vulnerable (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Extent of occurrence estimated to be *ca* 8,000 sq km: severely fragmented populations.

Notes: Earlier this species was considered to be endemic to only Maharashtra state. But later it was reported from Karnataka state also (*Shivarajan op. cit.*). In Maharashtra it is sparsely distributed in several localities of four districts.

It can be distinguished by the absence of staminodes and colour of flowers.

Lindernia quinqueloba (Blatt. & Hallb.) Mukh. in J. Indian Bot. Soc. 24: 133. 1945; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 11. 1983 et in J. Econ. Tax. Bot. 5 (1): 160. 1984; Singh & Raghavan in *ibid.* 8(1): 33. 1986. *Bonnaya quinqueloba* Blatt. & Hallb. in J. Bombay nat. Hist. Soc. 25: 417. 1918.

Type: India, Maharashtra, Bombay, Bhandup, Salsette, *Blatter* 1518, November, 1916 (BLAT).

Herbs, *ca* 6.5 cm high, erect. Leaves opposite, *ca* 30 x 5 mm, linear, shallowly serrate, margins hairy; lowest leaves subentire. Flowers in terminal or lateral racemes, lowest flowers axillary; pedicels up to 7 mm long, stout, flat above, convex below; bracts of about same length as pedicels, broader at base, keeled acuminate. Calyx 4-5 mm long, divided nearly to base; lobes 5, subequal, linear-lanceolate, acute, margins hairy. Corolla *ca* 6 mm long, white, lower lip spotted with pink-purple; tube *ca* 3 mm long, cylindrical, hairy outside. Capsules *ca* 9 mm long, tapering, acute, minutely striate. Seeds irregularly ellipsoidal, rugose, with minute, circular depressions.

Fls. : November.

Habitat: In rice fields.

Distrib.: Endemic to MAHARASHTRA: Bombay (Bhandup).

Status: Critically Endangered.

Criteria: Area of occupancy less than 10 sq km: found only at a single location.

Notes: After the type collection in 1916, this species could not be recollected either from its type locality or from any other place. However, more explorations are needed.

It can be distinguished by the absence of leaf-opposed flowers below the raceme and by the shape and colour of the corolla.

Striga sulphurea Dalz. & Gibs. Bombay Fl. 182. 1861; Hook. f. Fl. Brit. India 4: 300. 1884; Cooke. Fl. Pres. Bombay 2: 376. 1958 (Repr.ed.); Sant. in J. Bombay nat. Hist.Soc. 49: 44. 1950 et in Rec. Bot. Surv. India 16(1), Fl. Khandala 184. 1967 (3rd Rev.ed.).

Herbs, erect, slender; stems quadrangular. Leaves 1.8-3.6 x 0.09-0.15 cm, linear, acute at apex, 1 or 2 small teeth on each margin, scabrous, sessile. Flowers mostly axillary, subsessile or with very short pedicels; bracteoles small, subulate. Calyx ca 1.2 cm long, with 15 ribs; teeth linear, star shaped. Corolla yellow; tube as long as calyx, pubescent towards top; upper lip broad, truncate; lower lip 3-lobed. Capsules up to 6 mm long, oblong. Seeds ca 0.6 mm long, cuneate-oblong, truncate at one end.

Fls. & Frts.: September - December.

Habitat: On wet rocks in hilly region.

Distrib.: Endemic to Gujarat, MAHARASHTRA: Pune (Junnar, Khandala, Sinhagadh), Kolhapur (Gaganbawda).

Spec. exam.: Pune: Sinhagadh, *Ansari* 101523, 10.9.1964 (BSI).

Status: Vulnerable (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Extent of occurrence estimated to be ca 7,000 sq km: found only at 4 locations.

Notes: In Maharashtra this species is very much sporadically distributed only in two districts. From Kolhapur it has been reported by Nayar, *et al.* (*ined.*).

It can be differentiated by its yellow flowers and calyx nearly as long as the corolla tube.

Torenia bicolor Dalz. in Hook. J. Bot. & Kew Gard. Misc. 3: 38. 1851; Hook. f. Fl. Brit. India 4: 278. 1884; Cooke, Fl. Pres. Bombay 2: 364. 1958 (Repr.ed.); Saldanha in Bull. Bot. Surv. India 8: 129. 1966; Kulkarni, Fl. Sindhudurg 306. 1988; Almeida in J. Econ. Tax. Bot. Addl. Ser. 8(1), Fl. Savantwadi 1: 305. 1990.

Type: Dalz. (K).

Herbs, annual, decumbent; stems diffuse, quadrangular, ciliate on ridges. Leaves 1.2-2.4 x 0.9-1.2 cm, triangular-ovate, subcordate, at base, acute at apex, truncate, margins serrate, sparsely hairy; petioles ca 1 cm long, pubescent. Flowers axillary, 1-3 together; pedicels well developed, ca 2 cm long in flower, up to 3 cm long in fruit. Calyx ca 1.2 cm long in flower, up to 2 cm long in fruit, 5-ribbed, 2-lipped, glabrous. Corolla up to 3 cm long; tube slightly curved, deep purple; upper lip erect, deep purple, lower lip 3-lobed. Capsules ca 1 cm long, narrow, elongated, included. Seeds numerous, minute, subspherical, foveolate.

Fls. & Frts. : July-November.

Habitat: In open, moist places along the ghats and in plains.

Distrib.: Endemic to Goa, Karnataka, Kerala, MAHARASHTRA: Sindhudurg (Amboli, Chaukul, Danoli, Vengurla).

Spec. exam.: Sindhudurg: Danoli to Amboli ghat, Pataskar 102074, 17.9.1964; Chaukul, Solia jungle, Kulkarni 119172, 29.10.1969; Jungle near Savantwadi, Kulkarni 121666, 14.10.1970 (All in BSI).

Status: Endangered (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Extent of occurrence estimated to be ca 300 sq km: severely fragmented populations.

Notes: This species occurs in four states but in Maharashtra only in Sindhudurg district. From Vengurla it has not been recollected after Cooke. However, at other localities it is sporadically distributed.

ACANTHACEAE

	<u>Genera</u>	<u>Species + Infraspecific taxa</u>
World	364	4,300
India	92	500
Maharashtra	45	149
Endemic to Maharashtra	7 species	

Barleria gibsonioides Blatt. in J. Bombay nat. Hist. Soc. 32: 733, t. 1. 1928; Sant. in Univ. Bombay Bot. Mem. 2: 64. 1952; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 4. 1983 et in J. Econ. Tax. Bot. 5(1): 160. 1984; Singh & Raghavan in *ibid.* 8(1): 33. 1986; Sharma & Kulkarni in Nayar & Sastry (eds.), Red Data Book Indian Pl. 2: 1. 1988; Deshpande *et al.*, Fl. Mahabaleshwar 2: 436. 1995; Anon., India Glob. Threat. Taxa. 9. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 42. 1997.

Types: Lectotype: India, Maharashtra, Satara, below Godowli, 3 miles from Panchgani, *Blatter* 1, October, 1927. Syntypes: Panchgani, *Blatter* 2-7, October, 1927 (All in BLAT).

Shrubs, ca 1 m high; stems quadrangular, obscurely winged. Leaves variable in size, ca 20 x 10 cm, broadly ovate or almost rounded, rounded or tapering at base, apex obtuse or acuminate at apex, leathery or papery, margins finely spinous hairy, rest glabrous, main nerves up to 7 pairs. Flowers in dense, imbricate, terminal, ca 10 cm long spikes, rarely solitary, axillary; bracts up to 10 cm long, foliaceous, broadly elliptic-lanceolate, acute; bracteoles up to 20 x 2 mm, linear, boat shaped. Sepals up to 5 x

2.5 cm, ellipsoid to narrowly linear-lanceolate. Corolla 6-10 cm long, minutely glandular hairy on margins and tube. Capsules oblong, tip conical, shining, smooth. Seeds 4, disc shaped, glabrous.

Fls. & Frts.: September-December.

Illus.: Blatt., *op. cit.*

Distrib.: Endemic to MAHARASHTRA: Satara (Panchgani).

Status: Possibly Extinct.

Notes: This species could not be recollected since its type collection of over 70 years either from its type locality or elsewhere even after intensive explorations. Recently during 1996-1998 also efforts were made to locate it but were unsuccessful.

It can be identified by its unarmed nature, 4-seeded capsules and glabrous seeds.

Barleria grandiflora Dalz. in Hook. Kew J. Bot. 2: 339. 1850; C.B. Cl. in Hook. f. Fl. Brit. India 4: 488. 1884; Cooke, Fl. Pres. Bombay 2: 463. 1958 (Repr.ed.); Sant. in Univ. Bombay Bot. Mem. 2: 62. 1952; Mistry, Fl. Ratnagiri 1: 484. 1986 (Ph.D. Thesis, *ined.*); Almeida in J. Econ. Tax. Bot. Addl. Ser. 8(1), Fl. Savantwadi 1: 316. 1990.

Shrubs, erect. Leaves 12-17 x 3.5 -5.5 cm, elliptic-lanceolate, acutely tapering at base, acuminate at apex, main nerves 8-10 pairs. Flowers axillary, solitary; bracteoles *ca* 1.2 cm long, linear-ligulate. Outer Sepals 4-6 x 1.2-3.5 cm, ovate-oblong, subequal, acute or subobtuse; inner sepals *ca* 2 cm long, linear, densely hairy. Corolla 8.5-11.5 cm long, white; lobes *ca* 3.2 cm long, obovate, subacute. Capsules *ca* 3.5 cm long, oblong, glandular-pubescent. Seeds *ca* 9 x 6 mm, broadly elliptic, glabrous.

Fls. & Frts. : November-February

Habitat: Along hills of Western Ghats.

Distrib.: Endemic to Karnataka, MAHARASHTRA: Ratnagiri (Amba ghat), Sindhudurg (Talkat ghat).

Status: Critically Endangered (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Area of occupancy less than 10 sq km: found only at a single location.

Notes: This species was reported from Sindhudurg district only by Dalzell (Cooke, *op. cit.*). Thereafter, no one could locate it from this district. Later Mistry reported it from Ratnagiri district, where its distribution was recorded as rare.

This species is often confused with *B. lawii*, but can easily be distinguished by its large corolla and acute or subacute corolla lobes.

Dicliptera ghatica Sant. in Univ. Bombay Bot. Mem. 2: 80, f. 1952 et in Rec. Bot. Surv. India 16 (1), Fl. Khandala 207. 1967 (3rd Rev.ed.); Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 10. 1983 et in J. Econ. Tax. Bot. 5 (1): 160. 1984; Singh & Raghavan in *ibid.* 8 (1): 33. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 148. 1987; Sharma & Kulkarni in Nayar & Sastry (eds.), Red Data Book Indian Pl. 2: 2. 1988; Anon., India Glob. Threat. Taxa 23. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. syst. Diver. pt. 1: 43. 1997.

Type: Holotype: India, Maharashtra, Pune, Khandala, Meroli, *Santapau* 1915, 20.4.1943 (BLAT!).

Herbs, erect; stems and branches subtetragonal, densely woolly-tomentose. Leaves ovate, acute or subacuminate, more or less pubescent on both sides, margins ciliate. Flowers in axillary and terminal umbels or cymes; peduncles 1-3.5 cm long, woolly-tomentose; pedicels 1-2.5 cm long, slender, woolly-tomentose; bracts 5-7 mm long, linear, hairy. Calyx divided nearly to base; segments subulate, densely hairy. Corolla up to 1.7 cm long, pinkish. Capsules obovoid, obtuse to rounded and minutely apiculate at apex, densely hairy. Seeds minutely tuberculate.

Fls. & Frts. : April-June.

Illus.: Sant., *op. cit.*

Habitat: In forest clearings.

Distrib.: Endemic to MAHARASHTRA: Pune (Khandala).

Spec. exam.: Type, as above.

Status: Critically Endangered.

Criteria: Area of occupancy less than 10 sq km: found only at a single location.

Notes: This species is known only by its single type collection. Later it could not be recollected from any place in spite of intensive searching. However, field explorations and searching of this species to be continued and as soon as it will be traced, to be conserved immediately.

It can be distinguished by its densely woolly-tomentose nature and umbellate or cymose inflorescence.

Dicliptera nasikensis Lakshminarasimhan & Sharma in J. Econ. Tax. Bot. 7: 481, f. 1-9b, t.1. (1985) 1986 et Fl. Nasik 361, f. 25. 1991.

Types: Holotype: India, Maharashtra, Nasik, Satana range, Dangsaundane round, *Lakshminarasimhan* 163977 A, 20.5.1983 (CAL!).
Paratypes: Dangsaundane round, *Lakshminarasimhan* 167696 A-F, 17.5.1985 (BSI!).

Herbs, suffruticose, up to 28 cm high, hairy. Leaves 5-10 x 4-5 mm, elliptic-ovate, pubescent, acute at apex, main nerves 3-4. Flowers in lax axillary and terminal panicles; bracts 5-7 x 2.5-5.5 mm, ovate, acute; bracteoles 4-7 x 0.5 - 1.5 mm, linear-lanceolate. Calyx deeply 5-partite, segments 3-6 x 0.5-1 mm, linear-lanceolate. Corolla up to 1.5 cm long, pinkish with dark spots inside; tube 4.5- 8 x 1-1.5 mm; limb deeply 2-lipped. Capsules 5-7 x 2-3 mm, ellipsoid, beaked. Seeds 4 per capsule, 1.5 - 2 mm across, orbicular, base minutely notched.

Fls. & Frts.: April-May.

Illus.: Lakshminarasimhan & Sharma, *op. cit.*

Habitat: In fallow land at an altitude of ca 675 m.

Distrib.: Endemic to MAHARASHTRA: Nasik (Satana).

Spec. exam.: Types, as above.

Status: Critically Endangered.

Criteria: Area of occupancy up to 10,000 sq m: found only at a single location.

Notes: This species is reported two times, only from its type locality by the original author so far. Hardly twelve mature individuals were noticed in this area. The other drier parts of the district having similar ecological conditions, were also explored without getting any success. Hence, until its further report from other areas, the type locality should be protected for its conservation. Excessive grazing at its habitat may be the one of the major reasons of its rarity.

It can be distinguished by its hairy nature and glochidiate, tubercled seeds.

Hypoestis lanata Dalz. in Hook., Kew J. Bot. 2: 343. 1850; C.B.Cl. in Hook. f. Fl. Brit. India 4: 557. 1885; Cooke, Fl. Pres. Bombay 2: 477. 1958 (Repr.ed.); Sant. in Univ. Bombay Bot. Mem. 2: 76. 1952; Raghavan & Singh in Jain & Sastry (eds.) Pl. Cons. Bull. 3: 7. 1983 et in J. Econ. Tax. Bot. 5 (1): 160. 1984; Singh & Raghavan in *ibid.* 8(1): 33. 1986; Mistry, Fl. Ratnagiri 1: 497. 1986 (Ph.D. Thesis, *ined*); Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 149. 1987; Kothari in Nayar & Sastry (eds.), Red Data Book Indian Pl. 3: 2. 1990; Kothari & Moorthy, Fl. Raigad 308. 1993; Yadav in Pokle, *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 41. 1997.

Types: Concan (Konkan), Dalzell (K).

Undershrubs; stems geniculate, ascending. Leaves 7-15 x 3-6.5 cm, elliptic-lanceolate, acute at base, decurrent along petiole, acuminate at apex, entire. flowers in axillary and terminal, woolly-tomentose, ca 15 cm long spikes; bracts ca 1 cm long, linear, subacute, densely glandular hairy; bracteoles ca 8 mm long, linear, acute, glandular hairy. Calyx ca 6 mm long, pubescent. Corolla ca 2.4 cm long, light purple, pubescent outside.

Capsules 1-1.5 cm long, with a long solid stalk, pubescent, narrowly clavate, pointed. Seeds 2, *ca* 3 x 2 mm, oblong, rounded at apex, tuberculate.

Fls. & Frts. : October-February.

Habitat: Along hills of Konkan.

Distrib.: Endemic to MAHARASHTRA: Raigad (Roha), Ratnagiri (Dapoli).

Spec. exam.: Ratnagiri, Dapoli, Kherdi hill, *Acland* 916, December, 1921 (BLAT).

Status: Possibly Extinct.

Notes: After the description of this species in 1850 based on collection from Konkan, Law collected it in 1851 from Bombay. However, they did not mention the precise locality of this plant. Dalzell & Gibson reported this plant from Roha of Raigad district (Cooke, *op. cit.*) also. Lastly it was collected from Dapoli of Ratnagiri district. Thereafter, during a long time span of over seventy years, it could not be recollected even after intensive searching. Recently in 1997 its localities have been thoroughly explored again without getting any success. However, further explorations are needed for confirming its status.

It can be differentiated by its terminal, paniced inflorescence and linear bracts larger than calyx segments.

Lepidagathis bandraensis Blatt. in J. Asiatic Soc. Bengal (n.s.) 26: 347. 1930; Sant. in Univ. Bombay Bot. Mem. 2: 75. 1952; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 5. 1983 et in J. Econ. Tax. Bot. 5(1): 160. 1984; Singh & Raghavan in *ibid.* 8(1): 33. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 149. 1987; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 43. 1997; Naik, Fl. Marathwada 2: 682. 1998.

Types: India, Maharashtra, Bombay, Bandra, *Hallberg* 74501.

Herbs, prostrate, perennial; branches many, 15-30 cm long, quadrangular. Leaves sessile, 1.5-6 x 0.2-0.6 cm, linear to elliptic-

lanceolate, mucronate, 3-nerved. Flowers in dense, unilateral, ovoid, 2-3 cm long spikes; bracts densely imbricate, outer ones barren, hairy, inner ones fertile, glabrous; bracteoles dimorphous. Calyx 5-partite, 9-10 mm long; segments unequal, acute, all densely soft hairy. Corolla 10-12 mm long, pale purple with brown spots, limb longer than tube. Capsules 9-10 mm long, oblong, compressed, glabrous. Seeds 2, 2-3 mm long, densely covered with hygroscopic hairs.

Fls. & Frts.: November-March.

Habitat: On gravelly slopes of hills.

Distrib.: Endemic to MAHARASHTRA: Bombay (Bandra), Nanded (Kinwat).

Spec. exam.: Nanded, Kinwat, *Zate* 529 (MUA).

Status: Critically Endangered.

Criteria: Area of occupancy less than 10 sq km: a) found only at a single location, b) declension in the number of subpopulation.

Notes: This species could not be recollected from its type locality after its type collection. Even its type specimen might have perished and not existing in any of the herbaria including Blatter Herb., Bombay. Hence, once this species was considered as apparently extinct (Raghavan & Singh, 1983). However, recently it has been reported from Kinwat of Nanded district (Naik, 1998). Here its distributon is severely fragmented. It needs immediate conservation measures.

This species can easily be distinguished by its dimorphous bracts and bracteoles.

Lepidagathis lutea Dalz. in Hook. Kew J. Bot. 2: 139. 1850; C.B. Cl. in Hook. f. Brit. India 4: 517. 1885; Cooke, Fl. Pres. Bombay 2: 471. 1958 (Repr.ed.); Sant. in Univ. Bombay. Bot. Mem. 2: 73. 1952; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 7. 1983 et in J. Econ. Tax. Bot. 5(1): 160. 1984; Singh & Raghavan in *ibid.* 8(1): 33. 1986; Mistry, Fl. Ratnagiri 1: 501. 1986 (Ph.D. Thesis, *ined.*); Goel in J. Econ. Tax. Bot. 9(1): 80. 1987; Kulkarni, Fl. Sindhudurg 332. 1988.

Types: India, Maharashtra, Ratnagiri, Malwan (presently in Sindhudurg district), *Dalzell*, 1850.

Herbs, with woody rootstock; stems numerous, suberect, filiform, quadrangular. Leaves sessile, 2.5-5 x 0.25-0.4 cm, linear, base slightly tapering, apex acute or subobtuse, 3-nerved. Flowers 1-3, in velvety-pubescent spikes and in subradical congested globe; bracts 1.2-4.2 cm long, spinous pointed, softly hairy; bracteoles *ca* 1.2 cm long, ovate or obovate, spinous pointed, silky-hairy. Calyx up to 1.2 cm long, silky-hairy, 5-partite. Corolla *ca* 1.2 cm long, yellow. Capsule *ca* 6 mm long, ovoid-lanceolate. Seeds 2, with long, hygroscopic, mucilaginous hairs.

Fls. & Frts. : November-March.

Habitat.: On bare laterite flats in open situations.

Distrib.: Endemic to Goa, MAHARASHTRA: Kolhapur (Gaganbawda), Ratnagiri (Dapoli, Jangal east of Ratnagiri), Sindhudurg (Achra, Devgad, Malwan).

Spec. exam.: Ratnagiri: Dapoli, *Acland* 946, January, 1922 (BLAT). Sindhudurg: Achra. *Kulkarni* 120229, 22.9.1970; Devgad, *Kulkarni* 120333 & 120367-8, 28.2.1970 (All in BSI).

Status: Low Risk.

Notes: Though the extent of occurrence of this species estimated to be *ca* 5,000 sq km, it is one of the common species and frequently distributed throughout the coastal region of Ratnagiri and Sindhudurg districts. Hence, it has been excluded from threatened categories as mentioned earlier (*Raghavan & Singh, 1983, op.cit.*).

This species can be identified by its softly hairy bracts with straight apical spines, 5-partite calyx with spinous-pointed segments and 2-seeded capsules.

Nilgirianthus ciliatus (Nees) Bremek. in *Verh. Ned. Acad. Wet.* 2, 40: 172. 1944; Sant. in *Univ. Bombay Bot. Mem.* 2: 40. 1952; *Kulkarni*, *Fl. Sindhudurg* 336. 1988; Almeida in *J. Econ. Tax. Bot. Addl. Ser.* 8(1), *Fl. Savantwadi* 1: 327. 1990. *Strobilanthes ciliatus* Nees in *Wall. Pl. As.*

Rar. 3: 85. 1832; Bedd. Ic. t. 211. 1874; C.B. Cl. in Hook. f. Fl. Brit. India 4: 439. 1884; Cooke, Fl. Pres. Bombay 2: 446. 1958 (Repr.ed.).

Shrubs, 1-2 m high; stems and branches glabrous, fimbriate at nodes. Leaves 8-14 x 3-5 cm, ovate or lanceolate, attenuated at base, acuminate at apex, margins crenate, glabrous, lineolate above, main nerves 6-7 pairs. Flowers in axillary, slender, deflexed, 2.5-7.5 cm long spikes; bracts *ca* 6 mm long, ovate, subacute, glabrous, lineolate; bracteoles *ca* 4 mm long, linear, subobtusate, glabrous, lineolate. Calyx *ca* 6 mm long; segments subequal, linear, subobtusate. Corolla 1.2-1.5 cm long, bluish-purple with dark purple throat; lobes *ca* 3 mm long, oblong, rounded at apex.

Fls. & Frts. : October-November.

Illus.: Bedd., *op. cit.* (*Strobilanthes ciliatus*).

Habitat: In deciduous forests along the ghats and at base.

Distrib.: Endemic to Karnataka, Kerala, Tamil Nadu, MAHARASHTRA: Sindhudurg (Ramghat, Tirali).

Spec. exam.: Sindhudurg: Tirali, 6 km from Bhedshi, *Ansari* 108413, 19.2.1966; way to Ramghat from Bhedshi, *Kulkarni* 119372, 2.11.1969 (Both in BSI).

Status: Endangered (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Extent of occurrence estimated to be up to 300 sq km: found only at 2 locations.

Notes: This species is mainly distributed in southern parts of Deccan Peninsula. However, Cooke (*op.cit.*) first reported it from Savantwadi of Maharashtra, and so far it is confined only to this area. Later workers like Ansari and Kulkarni also collected this plant from the same area and reported its distribution as occasional. Here it might have been introduced from the neighbouring state Karnataka.

It can be identified by its long and slender peduncles, glabrous bracts and bracteoles shorter than calyx.

Nilgirlanthus membranaceus (Talb.) Bremek. in Verh. Ned. Acad. Wet. 2, 40: 280. 1944; Sant. in Univ. Bombay Bot. Mem. 2: 43. 1952; Almeida in J. Econ. Tax. Bot. Addl. Ser. 8(1), Fl. Savantwadi 1: 328. 1990; Kothari & Moorthy, Fl. Raigad 300. 1993. *Strobilanthes membranaceus* Talb. Trees & Shrubs of Bombay (ed. 2) 261. 1902; Cooke, Fl. Pres. Bombay 2: 449. 1958 (Repr.ed.); Talb. For. Fl. Bombay Pres. & Sind 2: 327, f. 444. 1911.

Types: India, Karnataka, N.Kanara.

Shrubs, stout; branches subquadrangular, grooved. Leaves 5-15 x 2.5-10 cm, broadly ovate, acuminate at apex, oblique, crenate-serrate, hispidulous and strongly lineolate on upper surface with bulbous-based, 2-4-celled hairs; lateral nerves 6-8 pairs. Flowers in axillary, simple, ovoid heads; peduncles grooved, jointed; bracts ca 1.2 cm long, scarious, viscous-hairy outside; bracteoles 0. Calyx deeply divided almost to base; segments subequal, obovate. Corolla ca 1.2 cm long, white, lobes obtuse. Capsules ca 7 mm long, oblong, pointed, glabrous. Seeds 4, yellow, glabrous, shining.

Fls. & Frts. : November-February.

Illus.: Talb., *op. cit.* 1911 (*Strobilanthes membranaceus*).

Habitat: In hilly forests.

Distrib.: Endemic to Karnataka, MAHARASHTRA: Kolhapur (Dajipur), Raigad (Matheran), Sindhudurg (Amboli).

Spec. exam.: Raigad: Matheran, Puri 10925, 28.1.1957 (BSI).

Status: Vulnerable (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Area of occupancy up to 1,000 sq km: found only at 3 locations.

Notes: In Maharashtra this species was first located at Matheran of Raigad district by Irani and Puri. Later this plant was collected from Amboli of Sindhudurg district (Almeida, *op. cit.*) and Saurai Sada to Dajipur Bison

Sanctuary of Kolhapur district (Nayar *et al.*, *ined.*). In these two districts it has been reported as occasional.

This species can easily be distinguished from others by its rugose, hispidulous, softly membranous leaves.

Nilgirianthus reticulatus (Stapf) Bremek. in Verh. Ned. Akad. Wet. 2, 50: 173. 1944; Sant. in Univ. Bombay Bot. Mem. No. 2: 41. 1952; Billore, Fl. Thane 2: 739. 1972 (Ph.D. Thesis, *ined.*); Nayar in Bull. Bot. Surv. India 22 (1-4): 21. 1980; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 12. 1983 et in J. Econ. Tax. Bot. 5(1): 161. 1984; Singh & Raghavan in *ibid.* 8(1): 33. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Region 1: 151. 1987; Kulkarni, Fl. Sindhudurg 337. 1988; Lakshminarasimhan, Fl. Nasik 376. 1991; Deshpande *et al.*, Fl. Mahabaleshwar 2: 451. 1995; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 43. 1997; Pradhan & Singh, Fl. Ahmednagar 428. 1999. *Strobilanthes reticulatus* Stapf in Kew Bull. 1894: 347. 1894; Cooke, Fl. Pres. Bombay 2: 442. 1958 (Repr.ed.); Talb. For. Fl. Bombay Pres. & Sind 2: 324, f. 443. 1911. '*Karvi*'

Shrubs, small; stems shortly strigose, subquadrangular. Leaves 2.5-7.5 x 2-3.7 cm, ovate, base rounded or subcordate, acute at apex, subentire, densely lineolate and with short stiff hairs on upper surface, strigose on nerves and veins beneath, main nerves 6-8 pairs. Flowers in ovate, shortly pedunculate, *ca* 1.8 cm long spikes; bracts up to 1.2 cm long, ovate; bracteoles 0. Calyx *ca* 8 mm long, deeply divided. Corolla *ca* 2.4 cm long, bluish. Capsules *ca* 10 x 3 mm, oblong, tapering at both ends.

Fls. & Frts. : October-March.

Illus.: Talb. *op. cit.* (*Strobilanthes reticulatus*).

Habitat: On exposed slopes rocky plateaus at an altitude of over 900 m.

Distrib.: Endemic to MAHARASHTRA: Ahmednagar (Ghatghar, Panshet forest, Ratangarh), Nasik (Trimbak), Pune (Ambavane, Bhimashankar, Junnar), Satara (Mahabaleshwar), Sindhudurg (Amboli ghat), Thane (Harishchandragarh).

Spec. exam.: Ahmednagar: Ratangarh, *Wadhwa* 128169, 5.10.1970; Panshet forests, *Wadhwa* 128311, 9.10.1970. Nasik: Trimbak, Brahmagiri, *Lakshminarasimhan* 165941, 4.10.1983. Pune: Bhimashankar, near Hanuman talao, *Janardhanan* 81829, 10.10.1962; Ambavane, *Reddi* 99160, 10.9.1964 & 101191, 27.11.1964; Junnar, Dhak forest, *Hemadri* 107473, 29.9.1965. Sindhudurg: Amboli ghat, *Kulkarni* 108670, 3.9.1968. Thane: Harishchandragarh, *Billore* 115514, 17.11.1968 (All in BSI).

Status: Low Risk.

Notes: Though this species is endemic to Maharashtra state, it is quite common throughout the Sahyadri ranges at an high altitude.

It differs from others in its number of stamens (2).

Nilgirianthus warreensis (Dalz.) Bremek. in Verh. Ned. Akad. Wet. 2, 40: 173. 1944; Sant. in Univ. Bombay Bot. Mem. 2: 41. 1952; Kulkarni, Fl. Sindhudurg 338. 1988; Almeida in J. Econ. Tax. Bot. Addl. Ser. 8 (1), Fl. Savantwadi 1: 328. 1990. Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 42. 1997. *Strobilanthes warreensis* Dalz. in Hook. Kew J. Bot. 2: 341. 1850; C.B.Cl. in Hook. f. Fl. Brit. India 4: 439. 1884; Cooke, Fl. Pres. Bombay 2: 447. 1958 (Repr.ed.); Bedd. Ic. t. 197. 1874.

Shrubs, 1-2 m high; stems woody, glabrous, obtusely angled. Leaves 5-10 x 3-5 cm. lanceolate or ovate, base decurrent, acuminate at apex, margins crenate, lineolate on both sides, main nerves 7 pairs. Flowers in axillary, pedunculate, 2.5 - 7.5 cm long spikes; bracts 6-8 mm long, elliptic-oblong, densely clothed with gland-tipped hairs; bracteoles *ca* 6 mm long, linear, obtuse, gland-tipped hairy. Calyx *ca* 8 mm long (in flower), divided nearly to base; segments linear, subacute. Corolla 8-12 mm long, white; lobes oblong, rounded at apex, spotted with purple at base. Capsules 1.2 - 1.8 cm long, ovoid. Seeds 4, elliptic-oblong, yellow.

Fls. & Frts. : October-April.

Illus.: Bedd., *op. cit.* (*Strobilanthes warreensis*).

Habitat: Along the edges of deciduous forests.

Distrib.: Endemic to Karnataka, MAHARASHTRA: Sindhudurg (Bhedshi, Konal, Mulas, Ramghat).

Spec. exam.: Sindhudurg: Khanale, 8 km from Bhedshi, *Ansari* 108456, 20.2.1966; Konal R.F., 15 km from Bhedhi, *Kulkarni* 129416A, 30.4.1971 (Both in BSI).

Status: Endangered (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Extent of occurrence estimated to be *ca* 300 sq km: found only at 4 locations.

Notes: Though this species is reported to be somewhat common, it is restricted to a small pocket of Sindhudurg district, along the boarder of Maharashtra and Karnataka states. Hence, its four different locations can also be considered as a single locality.

It can be distinguished by its glandular hairy bracts, 4-seeded capsules and glabrous seeds.

Rungia crenata T. Anders. in J. Linn. Soc. 9: 518. 1867; C.B. Cl. in Hook. f. Fl. Brit. India 4: 547. 1885; Cooke, Fl. Pres. Bombay 2: 478. 1958 (Rep.ed.); Sant. in Univ. Bombay Bot. Mem. 2: 76. 1952; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 8. 1983; Singh & Raghavan in J. Econ. Tax. Bot. 8(1): 33. 1986; Mistry, Fl. Ratnagiri 1: 514. 1986 (Ph.D. Thesis, *ined.*); Almeida in J. Econ. Tax. Bot. Addl. Ser. 8(1), Fl. Savantwadi 1: 331. 1990.

Herbs, erect, 2.5-3.5 cm high, branched; stems and branches slender, terete or obscurely quadrangular. Leaves 2.5-6.5 x 1-2.5 cm, elliptic-lanceolate, base acute, subacute at apex, lineolate, sparsely bulbous based hairy. Flowers in 1-sided, dense, terminal or axillary, sessile or pedunculate spikes; bracts dimorphic, 5-12 x 2.5-3mm, elliptic-oblong or broadly obovate, mucronate, hairy; bracteoles *ca* 4 mm long, elliptic-oblong, pubescent. Calyx *ca* 4 mm long, divided nearly to base, densely hairy. Corolla *ca* 12 mm long, blue, hairy outside. Capsules 2.5 - 3 mm long, ovoid, acute, pubescent at apex. Seeds *ca* 1.2 x 0.8 mm, ellipsoid.

Fls. & Frts. : September-February.

Habitat: Midbelt to crest of ghats in shady places.

Distrib.: Endemic to Goa, Karnataka, MAHARASHTRA: Kolhapur (Gaganhawda, Rangna, Dajipur), Ratnagiri, Sindhudurg, (Amboli, Tilari).

Spec. exam.: Sindhudurg: Amboli, *S.M. Almeida* 86, 24.5.1977; 1071, 27.12.1977 & 1275, 29.12.1977; *M.R. Almeida* 2127, 22.12.1981 (All in BLAT).

Status: Low Risk.

Notes: Raghavan & Singh (1983) reported this species as rare, because that time it was known only by very few old collections from Ratnagiri district of Maharashtra, Karnataka and Goa. However, later workers found it as very common and frequent in Kolhapur (Nayar *et al. ined.*) and Sindhudurg districts (Almeida, 1990) respectively. Hence, it has been excluded from threatened categories.

It can be identified by its erect nature and dimorphic bracts.

Rungia linifolia Nees in Wall. Pl. As. Rar. 3: 110. 1832; C.B.Cl. in Hook. f. Fl. Brit. India 4: 548. 1885; Cooke, Fl. Pres. Bombay 2: 479. 1958 (Repr.ed.); Sant. in Univ. Bombay Bot. Mem. 2:77.1952; Vajravelu & Daniel in Jain & Sastry (eds.) Mat. Cat. Threat. Pl. India 31. 1983; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 152. 1987; Yadav in Pokle *et al* (eds.), Flow. Pl. Syst. Diver. pt. 1: 43. 1997. *Justicia linifolia* Wall. Cat. 2447, 1830. *Rostellularia gracilis* Wight, Ic. t. 1541. 1850.

Herbs, suberect, 15-30 cm high; stems slender, branches filiform. Leaves 1-2.5 x 0.6-1.2 cm, elliptic-lanceolate, base usually tapering. acute or subobtusate at apex, lineolate, main nerves 4-6 pairs. Flowers in narrow, pedunculate, terminal, slender, quadrifarious, 1-4 cm long, secund spikes; bracts *ca* 3 x 1.2 mm, elliptic-lanceolate, acute, mucronate, herbaceous, minutely pubescent; bracteoles *ca* 2.4 x 0.6 mm, linear-lanceolate. Calyx *ca* 2.5 mm long, divided almost to base, minutely pubescent. Corolla *ca* 8 mm long, pale purple, slightly pubescent outside. Capsules oblong, hispid.

Fls. & Frts. : October-February.

Illus.: Wight, *op. cit.* (*Rostellularia gracilis*).

Habitat: In forest clearings.

Distrib.: Endemic to Karnataka, Rajasthan, MAHARASHTRA; Kolhapur (Kagal).

Spec. exam.: Karnataka: Chikmagalur, *Raghavan* 86993, 27.2.1963. Shimoga, Jog falls, *Puri* 2070, 6.5.1956 (Both in BSI).

Status: Critically Endangered (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Area of occupancy less than 10 sq km; found only at a single location.

Notes: Earlier this species was known only from Karnataka state. According to Santapau (1952), it is a rare plant and he did not see it in the field. However, Raghavan in his herbarium sheet, mentioned that it is common all over the forest paths. Recently, during the consultation of herbarium specimens in BSI, one sheet of this species has been traced, which was collected from Rajasthan (*J.A.V.* 29238). Here also its distribution was reported as common. In Maharashtra, this plant has been collected from Kagal of Kolhapur district, the border between Karnataka and Maharashtra state (Nayar *et al. ined.*). Here, its distribution is very much infrequent. It may be newly introduced to this state.

It can be distinguished by its perfectly 1-sided spikes and herbaceous, uniform bracts.

Synnema anomalum (Blatt.) Sant. in *Rec. Bot. Surv. India* 16 (1), Fl. Khandala 194. 1967; (3rd Rev.ed.), Raghavan & Singh in Jain & Sastry (eds.), *Pl. Cons. Bull.* 3: 5. 1983 et in *J. Econ. Tax. Bot.* 5 (1): 161. 1984; Singh & Raghavan in *ibid.* 8 (1): 33. 1986; Ahmedullah & Nayar, *Endemic Pl. Indian Reg.* 1: 153. 1987. *Cardanthera anomala* Blatt. in *J. & Proc. As. Soc. Bengal* 1930 (n.s.) 26: 350. 1930; Sant. in *Univ. Bombay Bot. Mem.* 2: 14, 1952 et in *Rec. Bot. Surv. India* 16 (1), Fl. Khandala 173. 1960. *Synnema anomala* (Blatt.) Raiz. in *Indian For.* 94. 451. 1968.

Herbs, prostrate; stems subquadrangular. Leaves *ca* 2.8 x 1.1 cm, subsessile, obtuse at apex, subentire, strongly ciliate, upper surface hairy, midrib of lower surface with a few, long, stiff hairs. Flowers *ca* 5 mm

long, white, distinct, solitary, axillary, sessile. Capsules *ca* 7 x 1.2 mm, minutely pubescent at tip. Seeds 10-12, in two rows, more or less tetragonal, light brown, margins hygroscopically hairy, sometimes also the surfaces partly.

Fls. & Frts.: October-December.

Distrib.: Endemic to MAHARASHTRA: Bombay (Selsette Island), Pune (Khandala).

Status: Possibly Extinct.

Notes : This species was collected only by Hallberg from Salsette island and Khandala. Thereafter, over 70 years have passed, but it could not be recollected from any of its locality. The type specimens of this species might have also been perished, because these could not be traced in any of the Indian herbarium or in Kew. According to Santapau (1967), it is very doubtful if the plant belongs to this genus at all. He also could not locate this plant at Khandala.

It can be identified by its procumbent and creeping habit, single stamen and staminode and number of seeds per capsule.

LAMIACEAE

	<u>Genera</u>	<u>Species + Infraspecific taxa</u>
World	221	5,600
India	72	435
Maharashtra	23	76
Endemic to Maharashtra	1 species	

Leucas deodikaril Billore & Hemadri in Indian For. 96: 858, f. 1-4. 1970; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 11. 1983 et in J. Econ. Tax. Bot. 5 (1): 161. 1984; Singh & Raghavan in *ibid.* 8 (1): 33. 1986; Lakshminarasimhan & Sharma, Fl. Nasik 390. 1991; Pradhan & Singh, Fl. Ahmednagar 443. 1999.

Types: Holotype: India, Maharashtra, Pune, Dhak Khilla, ca 27 km west of Junnar, *Hemadri* 117970 A, 22.9.1968 (CAL!). Isotypes: 117970 B-F (BSI!), G (K), H(L), I(BLAT!) & J (MH). Paratypes: Thane: Vinchu Cha nal, near Igatpuri, *Billore* 116170 A-E, 5.6.1968; 110557 A-B, 27.8.1968 & 116796 A-B, 21.9.1968; Harishchandragarh, Kedarnath hill slopes, *Billore* 115621 A-B, 18.11.1968 (All in BSI!); *Billore* 115985 A-O, 21.9.1968, raised from the root stocks of *Billore* 116170 A-E and deposited as 115985 A-C (BSI!), D-E (CAL!), F(K), G(L), H(GH), I(US), J(MO) & K(LE); Pune: Junnar, Malvandar, near Bhivade Khurd, *Hemadri* 107555 A-B, 1.10.1965; Junnar, Bail ghat near Tambe, *Hemadri* 117830 A-B, 18.9.1968; Junnar, Bhivade Khurd, *Hemadri* 117933 A-B, 21.9.1968 & 118025, 23.9.1968; Junnar, Ghatghar, *Hemadri* 12058 A-B, 5.12.1969; Khed, Ras Cha jungle, near Gadad, *Janardhanan* 76249 A-B (All in BSI!).

Herbs or small undershrubs, perennial, up to 100 cm high, erect; stems 2-5 mm thick, obtusely quadrangular, clothed with greyish, deflexed, strigose hairs. Leaves 5-16 x 3-7.5 cm, (including petiole), broadly ovate or ovate-lanceolate, base rounded-truncate, and somewhat narrow, acute at apex, margins crenate, finely strigose on both sides. Flowers in axillary, congested cymes; peduncles up to 7 mm long; pedicels either absent or very short; bracts 3-12 x 1-2 mm, linear to oblanceolate, hairy along margins and midrib. Calyx 0.9-1.4 cm long, ca 10-ribbed; teeth 10, unequal. Corolla ca 1.6 cm long, bilabiate, white. Nutlets 4, 1.75-2 mm long, obovoid, brownish glabrous with rough surfaces.

Fls. & Frts. : September-December.

Illus.: *Billore & Hemadri, op. cit.*

Habitat: Shady areas in the forests as an undergrowth or among thickets on the exposed ghats at an altitude of over 750 m.

Distrib.: Endemic to MAHARASHTRA: Ahmednagar (Harishchandragarh, Kalsubai), Nasik (Ambewadi), Pune (Junnar, Khed), Thane (Harishchandragarh, Vinchu cha nal).

Spec. exam.: Ahmednagar: Harishchandragarh, Panchnai, *Wadhwa* 127682, 26.9.1970; Kalsubai, *Mishra* 176985, 9.9.1998. Nasik: Ambewadi, near Igatpuri, *Lakshminarasimhan* 167524, 16.9.1984 (Both in BSI).

Status: Endangered.

Criteria: Extent of occurrence estimated to be *ca* 300 sq km; found only at 4 locations.

Notes: Many specimens of this species designated as paratypes, were collected several times mainly from Pune and Thane districts. Later it was also reported from Nasik district. Though it is not that much infrequent in its localities, confined to a small area at the boundaries of four districts.

This species can be distinguished by its characteristic strigose indumentum all over and obtusely 4-angled stem.

Pogostemon salicifolius (Dalz. ex Hook.f.) El Gazzar & L. Watson in *Taxon* 16: 187. 1967; Press in *Bull. Brit. Mus. nat. Hist. (Bot.)* 10: 73. 1982; Raghavan & Singh in *J. Econ. Tax. Bot.* 5 (1): 161. 1984; Deshpande *et al.*, *Fl. Mahabaleshwar* 2: 487. 1995; Bhatt & Ingrouille in *Bull. nat. Hist. Mus. Lond. (Bot.)* 27 (2): 110. 1997. *Dysophylla salicifolia* Dalz. ex Hook. f. *Fl. Brit. India* 4: 638. 1885; Cooke, *Fl. Pres. Bombay* 2: 539. 1958 (Repr.ed.); Mukh. in *Rec. Bot. Surv. India* 14: 79. 1940; Raghavan & Singh in Jain & Sastry (eds.), *Pl. Cons. Bull.* 3: 6. 1983; Singh & Raghavan in *J. Econ. Tax. Bot.* 8(1): 33. 1986.

Type: Holotype: *Dalzell s.n.* (K).

Herbs, erect, 30-60 cm high; stems and branches reddish, younger parts pubescent with adpressed hairs. Leaves 2.5-9.5 x 0.3-0.8 cm, linear-lanceolate, acute at apex and base, subentire or distantly serrate, adpressedly hairy when young, gland-dotted. Flowers in dense, slender, villous spikes of 2.5-10 cm long; bracts *ca* 4 mm long, narrowly lanceolate, acute, hairy. Calyx 2-2.5 mm long, villous; teeth erect, triangular, almost as long as the tube. Corolla *ca* 3 mm long, purple; tube slightly exserted; lobes subequal, oblong, obtuse, sparsely hairy, Nutlets *ca* 0.8 mm long, ellipsoid, smooth and shiny.

Fls. & Frts. : January-April.

Illus.: Wight, *Ic. t.* 1445. 1849 (*Dysophylla salicifolia*).

Habitat: Along water courses.

Distrib.: Endemic to Karnataka, MAHARASHTRA: Satara (Koyna, Mahabaleshwar).

Spec. exam.: Satara: Mahabaleshwar, *Sedgwick* 4645, November, 1918; *Nana* 7347, May, 1920; *Santapau* 12408-11 & 12423, 8.4.1951; *Bole* 1874, 6.1.1959 (All in BLAT); Koyna, on way to Jangli Jaigad, *Kochhar* 154359, 11.2.1979 (BSI).

Status: Endangered (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Area of occupancy less than 500 sq km: found only at 2 locations.

Notes: This species is reported only from two localities of Satara district so far, where its distribution is recorded to be sporadic.

It can be distinguished by its densely bristly stems and leaves, petioled leaves with acute base, minute calyx teeth and subequally 4-lobed corolla.

AMARANTHACEAE

	<u>Genera</u>	<u>Species + Infraspecific taxa</u>
World	71	850
India	20	60
Maharashtra	12	34
Endemic to Maharashtra - 2 species		

Achyranthes coynei Sant. in Kew Bull. 1948: 488. 1949 et in Rec. Bot. Surv. India 16 (1), Fl. Khandala 224. 1967 (3rd Rev. ed.); Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 4. 1983 et in J. Econ. Tax. Bot. 5 (1): 161. 1984; Singh & Raghavan in *ibid.* 8(1): 34. 1986; Sharma & Kulkarni in Nayar & Sastry (eds.), Red Data Book Indian Pl. 2: 8, f. 1988; Almeida in J. Econ. Taxa. Bot. Addl. Ser. 8 (1), Fl. Savantwadi 1: 351. 1990; Kothari & Moorthy, Fl. Raigad 338, 1993; Anon., India Glob. Threat. Taxa 2. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 44. 1997.

Types: Holotype: India, Maharashtra, Pune Khandala, *Santapau* 8074, 26.9.1945 (BLAT!). Isotypes: *Santapau* 8069, 8070 & 8073 (BLAT!).

8071 (K), 8072 (Arnold Arbor., U.S.A.). Paratypes: Khandala, *Santapau* 5945-7, 29.1.1945 & 8649, 16.2.1936; *Blatter* 27553-5, October, 1918 (All in BLAT!).

Shrubs, perennial, much branched, erect, 3-3.5 m tall, stems woody, young parts pubescent. Leaves many, deciduous; lower 20 x 9 cm or more, decreasing upwards in size, elliptic or lanceolate, acute or cuneate at base, acute or acuminate at apex, glabrous above and pubescent beneath, 10-12-nerved; petioles up to 3 cm long, pubescent. Flowers initially erect, then deflexed. Inflorescence 5-6 cm long, densely pubescent; bracts ovate, persistent. Perianth *ca* 1 cm long, green, margins scarious. Capsules 5 mm long with persistent style and perianth. Seeds solitary, brown.

Fls. & Frts. : Throughout the year.

Illus.: Sharma & Kulkarni, *op. cit.*

Habitat: In densely shaded hilly forests.

Distrib.: Endemic to MAHARASHTRA: Pune (Khandala), Raigad (Matheran), Sindhudurg (Amboli), Thane (Tungar).

Spec. exam.: Pune: Khandala, *Santapau* 1155548-51, 18.5.1953 & 22090-2, 4.12.1957. Raigad: Matheran, *Irani* 4811-2, 11.9.1959 & 4859, 3.2.1960. Sindhudurg: Amboli, *Almeida* 1201, 29.12.1977; *M.R. Almeida* 972, 17.12.1980. Thane: Tungar, *Das* 4422, 27.10.1961 (All in BLAT).

Status: Endangered.

Criteria: Extent of occurrence estimated to be *ca* 5,000 sq km: found only at 4 locations.

Notes: Sharma & Kulkarni in Red Data Book (*op. cit.*) mentioned Khandala as the only locality of this species. They might have overlooked the specimens collected from Thane, Raigad and Sindhudurg districts, all deposited at BLAT. However, everywhere its distribution is rare and populations severely fragmented. Hence, it has been categorised as Endangered. It needs immediate protection.

This species can be distinguished by its perennial nature and large, woody habit as well as compact arrangement of flowers on the rachis.

Amaranthus caturus Heyne ex Hook.f. Fl. Brit. India 4: 720.1885; Naik, Fl. Osmanabad 284. 1979; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 71. 1987; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 44. 1997; Naik, Fl. Marathwada 2: 745. 1998.

Herbs, erect, 1-2 m tall, branched; stems striate, pubescent. Leaves 5-15 x 2-5 cm, lanceolate or rhomboid, cuneate and decurrent at base, acute and cuspidate at apex, entire, glabrous above, minutely pubescent beneath; petioles 4-10 cm long. Flowers in axillary clusters as well as in 30-45 cm long, terminal, nodding panicles; bracts 2.5 - 3 mm long, ovate-lanceolate, acuminate or aristate; bracteoles similar to bracts but shorter and narrower. Tepals 2-2.5 mm long, lanceolate, transparent with green midrib, shortly awned. Fruits 1-1.5 mm in diameter, globose, circumsciss.

Fls. & Frts. : August-November.

Habitat: On waste land around villages.

Distrib.: Endemic to Deccan(?), MAHARASHTRA: Osmanabad.

Status: Endangered.

Criteria: Area of occupancy up to 400 sq km: found only at a single location.

Notes: In Maharashtra this species occurs only at Osmanabad town and adjoining villages. Here its distribution is reported as rare.

It can be differentiated by its flowers in axillary clusters as well as in long terminal, spiciform panicles and long, curved, feathery stigmas.

LAURACEAE

	<u>Genera</u>	<u>Species + Infraspecific taxa</u>
World	45	2,500
India	17	212
Maharashtra	9	19

Litsea wightiana (Nees) Bth. & Hook. f. Gen. Pl. 3: 162. 1880; Hook. f. Fl. Brit. India 5: 177. 1886; Cooke, Fl. Pres. Bombay 3: 33. 1958 (Repr.ed.); Puri & Mahajan in Bull. Bot. Surv. India 2: 131. 1960; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 66. 1987; Deshpande *et al.*, Fl. Mahabaleshwar 2: 513. 1995. *Cylicodaphne wightiana* Nees in Wall. Pl. As. Rar. 2: 68. 1829.

Trees, ca 8 m tall. Leaves 7-15 x 2.5-6 cm, elliptic or elliptic-lanceolate, acute at base, obtuse, acute or acuminate at apex, glabrous and light green above, brownish or purplish and rusty tomentose beneath, main nerves 8-15 pairs; petioles 8-16 mm long, stout. Flowers in axillary, 3-7 cm long racemes; pedicels 6-8 mm long, stout; bracts 4, coriaceous. Perianth silky tomentose. Fruits 1-2 cm long, ellipsoid.

Fls. & Frts. : August-November.

Illus.: Wight, Ic. t. 1833. 1852 (*Cylicodaphne wightiana*).

Habitat: In semi-evergreen forests.

Distrib.: Endemic to Karnataka, Tamil Nadu, MAHARASHTRA: Satara (Mahabaleshwar)

Spec.exam.: Satara: Mahabaleshwar, Arthersheet point, *Ansari* 67600, 11.10.1960; Along Mahad road ghat, *Ansari* 67669, 12.10.1960 (Both in BSI).

Status: Critically Endangered (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Area of occupancy less than 10 sq km: severely fragmented populations.

Notes: Though this species has been reported also from Karnataka and Tamil Nadu, in Maharashtra it occurs only at Mahabaleshwar and adjoining. Different developmental activities at its habitat are the main causes of its rarity.

This species can be differentiated by its leaves with rusty-tomentose under surface, persistent and well developed perianth segments and stamens (no.12) with hairy filaments.

LORANTHACEAE

	<u>Genera</u>	<u>Species + Infraspecific taxa</u>
World	70	1300
India	9	49
Maharashtra	7	18
Endemic to Maharashtra - 1 species		

Scurrula stocksii (Hook.f.) Dans. in Verh. Koninkl. Akad. Wetensch. Amsterdam 29 (6): 106. 1933; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 7. 1983; Mistry, Fl. Ratnagiri 2: 574. 1986 (Ph.D. Thesis, *ined.*); Singh & Raghavan in J. Econ. Tax. Bot. 8 (1): 34. 1986; Kulkarni, Fl. Sindhudurg 384. 1988. *Loranthus stocksii* Hook.f. Fl. Brit. India 5: 213. 1886; Cooke, Fl. Pres. Bombay 3: 40. 1958 (Repr.ed.); Almeida in J. Econ. Tax. Bot. Addl. Ser. 8(1), Fl. Savantwadi 1: 370. 1990.

Herbs, parasitic, woody; stems and branches lenticellate. Leaves 1.9-5 x 1.2-3.5 cm, elliptic-oblong, buff tomentose when young, subcordate or rounded at base, obtuse at apex. Flowers axillary, solitary or 2-3 together on short peduncles; bracts *ca* 6 mm long, oblong, obtuse, orange-red hairy. Calyx *ca* 3 mm long, subglobose, orange-red hairy. Corolla up to 1.5 cm long, split on one side; tube cylindric, slightly curved; lobes 4. Fruits *ca* 5 mm long, pyriform, tomentose.

Fls. & Frts. : November-January.

Habitat: Parasites in moist deciduous or semi-evergreen forests.

Distrib.: Endemic to MAHARASHTRA: Ratnagiri (Kelshi, on way to Ghodavli), Sindhudurg (Savantwadi).

Status: Critically Endangered.

Criteria: Area of occupancy less than 10 sq km: a) found only at a single location, b) declension in the number of sub-populations.

Notes: From Sindhudurg district this species was reported only by Cooke based on collection by Kanitkar. Thereafter, it could not be traced

in this district in spite of intensive searching. It means the species might have been vanished from this district. Later, Mistry located it at a single spot in Ratnagiri district. Here its population was severely fragmented. Destruction of its habitat mainly due to deforestation is the major threat of this species.

It can be distinguished by its sessile flowers and oblong bracts.

EUPHORBIACEAE

	<u>Genera</u>	<u>Species + Intraspecific taxa</u>
World	321	7,950
India	84	523
Maharashtra	37	118
Endemic to Maharashtra - 5 species		

Epiprinus mallotiformis (Muell.- Arg.) Crozatin in J. Arnold Arbor. 23: 52. 1942. *Symphyllia mallotiformis* Muell.-Arg. in Linnaea 14: 156. 1865; Sharma & Kulkarni in Indian J. For. 4(1): 66. 1981; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 181. 1987. *Adenochloena indica* (Bedd.) Bedd. ex Hook. f. Fl. Brit. India 5: 418. 1889; Cooke, Fl. Pres. Bombay 3: 111. 1958 (Repr.ed.).

Trees, 5-10 m tall; young parts puberulous, bark whitish. Leaves 8-15 x 3-8 cm, elliptic-oblong, coriaceous, rounded or cordate at base, abruptly acuminate at apex, margins entire, main nerves 6-8 pairs; petioles 0.6-10 cm long; stipules lanceolate. Flowers in lateral and terminal spikes; peduncles 5-15 cm long, puberulous; bracts minute. Male flowers numerous, greenish-yellow. Female flowers few at the base of spikes. Capsules 1.5 - 2.2 cm in diameter, ovoid, 3-lobed, green.

Fls. & Frts.: October-December.

Illus.: Bedd. Fl. Sylvat. t. 261. 1872.

Habitat: In semi-evergreen or moist deciduous forests.

Distrib.: Endemic to Karnataka, Kerala, MAHARASHTRA: Kolhapur (Amba).

Spec. exam.: Kolhapur: Shahuwadi taluka, Manoli forest on Amba-Vishalgad road, *Sharma* 162371, 3.3.1980 (BSI).

Status: Critically Endangered (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Area of occupancy less than 10 sq km; found only at a single location.

Notes: Earlier this species was considered as endemic to Karnataka and Kerala. However in 1981, *Sharma & Kulkarni (op.cit.)* recorded it for the first time from Kolhapur district of Maharashtra. According to *Kulkarni*, a very few individuals were located in this region.

This species can be distinguished by its elliptic-oblong and obtuse leaves as well as both lateral and terminal spikes having densely clustered flowers.

Euphorbia concanensis *Janarthanam & Yadav* in *Rheedea* 5(2): 148, f. 1. 1995; *Yadav* in *Pokle et al. (eds.), Flow. Pl. Syst. Diver. pt. 1: 44. 1997.*

Types: Holotype: India, Maharashtra, Sindhudurg, Achirne, between Phonda and Vaibhavadi, *Janarthanam & Yadav* 1002, 20.9.1993 (CAL!). Isotypes (BSI!, MH).

Herbs, perennial, decumbent, 10-30 cm long; stems slender, red at base, green above. Leaves 5-11 x 3-5 mm, oblong, oblique at base, acute to obtuse at apex, margins serrulate; petioles up to 1 mm long; stipules triangular, toothed. Cyathia terminal, solitary; peduncles up to 7 mm long, glabrous; involucre turbinate, red, glabrous; glands 4, transversely oblongoid, brown, limbs of glands prominent, obovate, wavy in outline, rosy-pink. Male flowers numerous. Ovary of female flowers triquetrous. Capsules *ca* 2 x 3 mm, ovoid, trigonous, distinctly keeled. Seeds 3, *ca* 1.1 x 0.8 mm, tetragonous, truncate at base, rounded or slightly pointed at apex, grey.

Fls. & Frts. : August-November.

Illus.: *Janarthanam & Yadav, op. cit.*

Habitat: On laterite rocks and red soils, amidst grasses.

Distrib.: Endemic to MAHARASHTRA: Sindhudurg (Achirne).

Spec. exam.: Sindhudurg: Achirne, 8 km from Vaibhavadi, *Mishra* 176825, 20.8.1997. (BSI).

Status: Critically Endangered.

Criteria: Area of occupancy up to 10 sq km: found only at a single location.

Notes: This is a newly described species. Though it is somewhat common at its type locality, it has been put into threatened category due to its very much localised distribution. However, there is a probability of getting this plant from other places also. Hence more exploration are needed.

This species can be distinguished by the prominent ridges along the sutures and absence of wings on capsules.

Euphorbia katrajensis Gage in Kew Bull. 1914: 236. 1914; Sant. in Bull. Bot. Soc. Bengal 8:14. 1954; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 11. 1983 et in J. Econ. Tax. Bot. 5(1): 162. 1984; Singh & Raghavan in *ibid.* 8(1): 34. 1986; Mistry, Fl. Ratnagiri 2: 602. 1986 (Ph.D. Thesis, *ined.*); Goel in *ibid.* 9(1): 77. 1987; Singh & Kulkarni in Nayar & Sastry (eds.), Red Data Book Indian Pl. 3: 120, f. 1990; Anon., India Glob. Threat. Taxa 28. 1996.

Herbs, erect, 20-45 cm high; stems terete, brownish-green, glabrous. Leaves 2.5-6 x 0.3-0.8 cm, oblong-elongate or broadly linear, unequal at base, obtuse at apex, margins serrulate, membranous, lower surface glaucous or subglaucous; stipules broad with acuminate teeth. Cyathia solitary, axillary; pedicels up to 3 mm long; glands 4, sessile, obconic-elliptic, appendiculate; limbs of glands unequal, 2-3 mm wide, crenulate at apex, white, the lower two pale pink outside. Male flowers few with plumose bracteoles. Ripe capsules *ca* 3 mm across, 3-lobed. Seeds broadly ovoid, reddish-brown.

Fls. & Frts. : September-October.

Illus.: Singh & Kulkarni, *op.cit.*

Habitat: Along slopes of ghats.

Distrib.: Endemic to MAHARASHTRA: Dhule (Kodsapani forest), Pune (Junnar, Katraj ghat, Sinhagadh), Ratnagiri (Sangameshwar), Thane (Kasara R.F., Khutal).

Spec. exam.: Dhule: Kodsapani forest, beyond Palasner, *Rolla* 92397, 26.9.1963 (BSI). Pune: Katraj, *Vartak* 5477, 9.8.1956 (BLAT); Sinhagadh, *Ansari* 97547, 7.8.1964 & 99980, 26.8.1964; Junnar, Ganesh Caves, *Hemadri* 118144, 27.9.1968. (All in BSI). Ratnagiri: Sangameshwar, *Mistry* 463, 8.10.1983 (BLAT). Thane: Washala range, Kasara R.F., *Billore* 116776, 20.9.1968 (CAL); Khutal, Takavada range, *Billore* 115419, 14.11.1968 (BSI, CAL).

Status: Vulnerable.

Criteria: Extent of occurrence estimated to be up to 20,000 sq km: severely fragmented populations.

Notes: This species was first reported from Katraj ghat of Pune district. Thereafter, it was collected from Junnar and Sinhagadh of the same district as well as from Dhule, Ratnagiri and Thane districts also. However, everywhere its distribution is reported as rare.

This species can be distinguished by its axillary and solitary cyathia as well as unequal and 2-3 mm wide limbs of glands.

Euphorbia khandalensis Blatt. & Hallb. in J. Ind. Bot. Soc. 2: 48, f. 3. 1921; Sant. in Bull. Bot. Soc. Bengal 8: 3. 1954 et in Rec. Bot. Surv. India 16(1), Fl. Khandala 242. 1967 (3rd Rev. ed.); Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 11. 1983; Singh & Raghavan in J. Econ. Tax. Bot. 8 (1): 34. 1986.

Herbs; rhizomes up to 30 cm long, cylindrical, entirely underground. Roots immediately below leaves. Leaves radical, up to 33 x 11 cm, oblanceolate or obovate or oblong, sometimes oblique, cuneate at base, obtuse or retuse at apex, petiole up to 5 cm long. Inflorescence up to 18 cm long; peduncles up to 9 cm long, fleshy, end in dichotomy; bracts in

dichotomies, 5-6 mm long, broad triangular to semi-cylindrical or semi-amplexicaulis; involucre in dichotomies, sessile, terminal. Capsules of 3-cocci, 2-valvate; cocci almost rounded, narrowly keeled. Seeds *ca* 3 mm in diameter, perfectly spherical, black and white variegated.

Fls. & Frts. : January-May.

Habitat: On exposed rocky ground.

Distrib.: Endemic to MAHARASHTRA: Pune (Khandala), Raigad (Matheran).

Spec. exam.: Pune: Khandala, *Santapau* 6880, 23.1.1942; 6884, 21.3.1942; 504, 14.6.1942; 2012, 2.5.1943; 2058, 5.6.1943; 2242, 24.7.1943; 4127, 30.4.1944; 4190, 15.5.1944; 4358-9, 28.5.1944; 9976, 24.3.1949 & 10725, 15.3.1950. Raigad: Matheran, *Irani* 4142, 22.6.1959 & 4896, 2.3.1960 (All in BLAT).

Status: Endangered.

Criteria: Area of occupancy less than 500 sq km: found only at 2 locations.

Notes: After the type collection of this species in 1918, Santapau recollected it several times only from its type locality. Though it was abundant at that particular spot, he did not find it elsewhere. Later, in 1960 it was collected from Raigad district, where its distribution was reported as rare.

This species can be distinguished by its under ground stems, reddish involucre, broadly triangular bracts, styles connate only at base and spherical seeds.

Euphorbia panchganiensis Blatt. & McC. in J. Asiat. Soc. Bengal (n.s.) 26: 353. 1930; Sant. in Bull. Bot. Soc. Bengal 8: 4. 1954; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 11. 1983; Singh & Raghavan in J. Econ. Tax. Bot. 8(1): 34.1986; Kulkarni, Fl. Sindhudurg 398. 1988; Singh & Kulkarni in Nayar & Sastry (eds.), Red Data Book Indian Pl. 3: 122, f. 1990; Deshpande *et al.*, Fl. Mahabaleshwar 2: 537. 1995; Anon., India Glob. Threat. Taxa 28. 1996.

Herbs, succulent, 5-8 cm high with cylindrical underground root-stock. Leaves broadly or narrowly lanceolate, oblong or oblanceolate, radical, green, red, purple or mottled, margins wavy, appear after flowering. Cymes up to 6 cm long, stout, fleshy, reddish or purple or greenish all over except the lobes of involucre which are pink or whitish, dichotomous; bracts very variable, rigid, usually turning white, margins wavy; involucre *ca* 6 mm across, lobes spatulate, fimbriate, pink; glands broadly oblong. Capsules *ca* 4 x 7 mm, compressed or rounded. Seeds globose, smooth, grey when dry.

Fls. & Frts. : February-September.

Illus.: Singh & Kulkarni, *op. cit.*

Habitat: In open, gravelly, dry situations among grasses.

Distrib.: Endemic to MAHARASHTRA: Pune (Purandhar), Satara (Mahabaleshwar, Panchgani), Sindhudurg (Achre).

Spec. exam.: Pune: Purandhar, *Santapau* 6168, May, 1945. Satara: Mahabaleshwar, *Santapau* 22739, 14.9.1958 & 22774, 15.9.1958; *Bole* 2208-9, 15.7.1959; 1981, 17.7.1959 & 1698, 1.8.1958 (All in BLAT); Panchgani plateau, *Kanodia* 87068, 19.2.1964. Sindhudurg: Achre, Kaziwada Sada, *Kulkarni* 120257, 23.2.1970 (Both in BSI).

Status: Endangered.

Criteria: Extent of occurrence estimated to be *ca* 3,500 sq km; found only at 4 locations.

Notes: After the description of this species from Satara district, it has been reported from Pune and Sindhudurg districts also. However, everywhere it is distributed sporadically.

It can be distinguished by its numerous cymes, purple or pink bracts of different shape, styles connate to the middle and globose seeds.

Jatropha nana Dalz. in Dalz. & Gibs. Bombay Fl. 229. 1861; Hook. f. Fl. Brit. India 5: 382. 1887; Cooke, Fl. Pres. Bombay 3: 94. 1958 (Repr.ed.). '*Kirkundee*'

Undershrubs, 30-45 cm high, glabrous. Leaves 7-12 cm long, broadly ovate, entire or 3-lobed; lobes ovate, obtuse or subacute, middle one largest, margins entire; petioles 0.3-2.4 cm long. Flowers in terminal, paniculate cymes; bracts lanceolate, acute. Male flowers: Calyx *ca* 3 mm long, glabrous with ovate, subobtuse lobes; corolla *ca* 6 mm long, glabrous outside with obovate, cuneate segments. Female flowers: Calyx 3-4 mm long, glabrous with lanceolate, subacute segments; corolla *ca* 9 mm long with obovate-oblong, free petals which are glabrous outside and glandular-hairy at the base inside. Capsules *ca* 9 mm long, obovoid-oblong, flattened at top.

Fls. & Frts.: May-August.

Habitat: On gentle slopes in hills.

Distrib.: Endemic to MAHARASHTRA: Pune (Bowdhan, Chaturshingi hill, Ghodnadi, Katraj, Parvati hill, Pethghat).

Spec. exam.: Pune: Bowdhan, *ca* 8 miles west of Pune, *Kanitkar s.n.*, 2.5.1890; Chaturshingi hill, *Garade* 458, 17.6.1902; Pune, *Bhide s.n.*, 9.8.1905; Katraj ghat, *Puri* 2368, 16.6.1956; Bowdhan hill slope, near Pune, *Vasavada* 5076, 22.7.1956; Ghodnadi, near Pune, *S.B.R.* 7756, 14.8.1956; Chaturshingi hill, *Paranjpye s.n.*, 16.7.1960; Khed taluka, Pethghat, *Janardhanan* 71979, 8.8.1961; Parvati hill, near Pune city, *Mishra* 177687, 26.7.1999 (All in BSI).

Status: Endangered.

Criteria: Extent of occurrence estimated up to 1,000 sq km: severely fragmented populations.

Notes: This species occurs along the hills in the surroundings of the Pune city. However, its distribution is very much sporadic and after 1961 it has been collected this time from the Parvati hill, where *ca* 100 mature individuals were noticed.

It can be distinguished by its small height and leaves without gland-tipped hairs on margins.

ORCHIDACEAE

	<u>Genera</u>	<u>Species + Infraspecific taxa</u>
World	735	17,000
India	185	1,309
Maharashtra	35	114
Endemic to Maharashtra	2 species	

Habenaria caranjensis Dalz. in Hook. J. Bot. & Kew Gard. Misc. 2: 262. 1850 et in Dalz. & Gibs. Bombay Fl. 267. 1861; Hook. f. Fl. Brit. India 6: 166. 1890; Cooke, Fl. Pres. Bombay 3: 228. 1958 (Repr.ed.); Sant. & Kap., Orch. Bombay 41. 1966; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 5. 1983; Singh & Raghavan in J. Econ. Tax. Bot. 8(1): 34. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 248. 1987; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 45. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 45. 1997.

Type: India, Maharashtra, island of Carauja, near Bombay, Dalzell.

Lower leaves somewhat rounded, upper oblong-lanceolate, 3-nerved. Bracts acuminate, shorter than ovary. Flowers small, yellow. Upper sepals rounded; petals ovate, obtuse. Lip 3-partite; mid-lobe oblong, obtuse; lateral ones shorter, cuneate, truncate at apex. Spur clavate, shorter than ovary.

Distrib.: Endemic to MAHARASHTRA: Bombay (Carauja).

Status: Possibly Extinct.

Notes: The above description of the species was given by Dalzell in the 'Bombay Flora' of Dalzell & Gibson. There are no specimens in Herb. Kew and the plant does not appear to have been collected by any botanist subsequently other than Dalzell. Santapau & Kapadia (*op.cit.*) stated that the original locality given by Dalzell is the island of 'Carauja near Bombay' But there is no place with such a name near Bombay. There is, however, a place called Karanja or Caranja on the sea coast across the harbour of Bombay, which seems to be the locality of Dalzell's collection.

Habenaria foliosa A. Rich. in Ann. Sci. Nat. 2, 15: 71, t. 3A. 1841; Karthikeyan *et al.*, Fl. Ind. Enum. Monocot. 143. 1989; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 36. 1996. *H. digitata* var. *foliosa* (A. Rich.) Hook.f. Fl. Brit. India 6: 135. 1890; Cooke, Fl. Pres. Bombay 3: 220.1958 (Repr.ed.). *H. gibsonii* var. *foliosa* (A. Rich.) Sant. & Kap. in J. Bombay nat. Hist. Soc. 56: 194, t. 2, f.6. 1959 et Orch. Bombay 14, t. 2, f. 6. 1966; Sant. in Rec. Bot. Surv. India 16 (1), Fl. Khandala 269. 1967 (3rd Rev. ed.); Deshpande *et al.*, Fl. Mahabaleshwar 2: 573. 1995. *H. spencei* Blatt. & McC. in J. Bombay nat. Hist. Soc. 36: 17. 1932.

var. foliosa

Herbs, terrestrial, 15-30 cm high; stems leafless at base, vaginate. Leaves 3.5-5 x 1.5-2.5 cm, elliptic-lanceolate, acute, sheathing at base, decreasing in size above. Racemes dense flowered; bracts ovate, acute, convolute at base. Flowers greenish or dirty white, scentless; sepals ovate, dorsal one ovate-oblong; petals linear; spur 1.5 cm long, inflated. Capsules ellipsoid, shortly beaked.

Fls. & Frts. : July-October.

Illus.: Sant. & Kap. *op. cit.*

Habitat: Undergrowth in forest areas, often on sloping ground.

Distrib.: Endemic on Karnataka, Tamil Nadu, MAHARASHTRA: Pune (Khandala, Khadakvasla), Satara (Fitzeraid ghat, Mahabaleshwar).

Spec. exam.: Pune: Khandala, *Sedgwick* 2584, July, 1917; Pune, *Razi* 5358, 23.7.1951. Satara: Mahabaleshwar, *Kapadia* 614 & 622; 7.9.1954; *Bole* 1707, 2.8.1958 and 2158-9, 14.7.1959 (All in BLAT).

Status: Endangered (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Extent of occurrence estimated to be *ca* 3,000 sq km: found only at 4 locations.

Notes: So far this variety has been reported only from two districts viz. Pune and Satara of Maharashtra. Its distribution is recorded as rare in both these districts. Opening up of forest areas due to deforestation is the principal cause of its present status.

It can be distinguished by its upwards leafy stem, subequal segments of petals and spur distinctly clavate at apex.

Habenaria multicaudata Sedgew. in Rec. Bot. Surv. India 6(8): 352. 1919; Blatt. & McC. in J. Bombay nat. Hist. Soc. 36: 16. 1932; Sant. & Kap., Orch. Bombay 14, t. 2, f. 6. 1966; Nayar & Kochhar in J. Econ. Tax. Bot. 5: 920. 1984; Raghavan & Singh in *ibid.* 5(1): 162. 1984; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 249. 1987; Kamble & Pradhan, Fl. Akola 216. 1988; Deshpande, *et al.*, Fl. Mahabaleshwar 2: 575. 1995; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 41. 1996; Yadav in Pokie *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 45. 1997.

Type: India, Karnataka, N. Kanara, Guddehalli, *T.R. Bell* 3045, September, 1917 (BLAT!).

Herbs, 30-65 cm high, erect, slender; stems with appressed sheaths in lower part. Leaves 4-15 x 1.5-4 cm, elliptic-oblong, acute or subacuminate at apex, many-nerved. Racemes 10-15 cm long, lax, many-flowered, shortly pedunculate; pedicels 1.7-2 cm long; bracts 15-17 x 3-5 mm, lanceolate, acute. Flowers brownish-green; spur *ca* 1 cm long. Sepals unequal, subacute, 3-nerved; dorsal sepal *ca* 6 x 3 mm, ovate or ovate-oblong, erect; lateral sepals *ca* 8 x 5 mm, ovate-oblong. Lateral petals bipartite; upper segments 5-6 mm long, narrowly linear; lower segments 14-17 mm long, filiform. Lip 3-partite; mid-lobe *ca* 10 x 1 mm, filiform; lateral lobe up to 25 mm long. Spur 10-12 mm long, curved, slender, slightly clavate at tip.

Fls.: August-September.

Illus.: Sant. & Kap., *op. cit.*

Habitat: Undergrowth in dense forests.

Distrib.: Endemic to Goa, Karnataka, Tamil Nadu, MAHARASHTRA: Akola (Narnala fort), Satara (Mahabaleshwar, Shirsingi).

Spec. exam.: Akola: Narnala fort, *Kamble* 150473 A, without date. Satara: Koyna, Shirshingi, *Kochhar* 154102, 7.9.1978; Mahabaleshwar, *T.S. Nayar* 154890, 12.9.1979 (All in BSI).

Status: Endangered (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Area of occupancy up to 300 sq km: found only at 3 locations.

Notes: Earlier this species was reported from Goa, Karnataka and Tamil Nadu States. From Maharashtra it was first reported by Nayar & Kochhar (*op.cit.*). They collected it from two localities of Satara district, where its distribution was reported as rare. Later Kamble also collected it from Akola district. Here also its distribution is sporadic.

The species can be distinguished by its fantastic filiform appendages and enormous anther cells, projecting beyond the flower.

Habenaria panchganlensis Sant. & Kap. in J. Bombay nat. Hist. Soc. 54: 478. 1957 et Orch. Bombay 27, t. 6, f. 24. 1966; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 11. 1983 et in J. Econ. Tax. Bot. 5 (1): 163. 1984; Singh & Raghavan in *ibid.* 8 (1): 34. 1986; Mistry, Fl. Ratnagiri 2: 657. 1986 (Ph.D. Thesis, *ined.*); Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 249. 1987; Kulkarni, Fl. Sindhurg 434. 1988; Singh & Kulkarni in Nayar & Sastry (eds.), Red Data Book Indian Pl. 3: 198. 1990; Deshpande *et al.*, Fl. Mahabaleshwar 2: 576. 1995; Anon., India Glob. Threat. Taxa 30.1996; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 42. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 45. 1997. *H. variabilis* Blatt. & McC. in J. Bombay nat. Hist. Soc. 36(1): 19, tt. 4 & 5. 1932 non Ridl. 1886.

Types: Paratypes: India, Maharashtra, Satara, Panchgani, *Blatter* 201, 204-6, July, 1925; *Blatter & Isaacs* 26494, July, 1925; *Sedgwick* 7908, August 1921 (All at BLAT! as *H. variabilis*).

Herbs, 10-22 cm high; tubers 1-2, 1-2.5 x 0.8-1.5 cm, oblong or ellipsoid. Leaves 3-5, 2-8 x 0.8-2.5 cm, oblong, oblong-lanceolate or elliptic, acute, entire, minutely papillate. Inflorescence 4-15 cm long, 2 to several flowered,

secund or subsecund in dense or lax racemes. Flowers white, pedicellate, bracteate; bracts 1-2, rarely several, *ca* 3 x 0.3 - 1 cm, amplexicaul, oblong, elliptic or oblong-lanceolate, acute. Capsules *ca* 2.5 x 0.5-0.7 cm, spindle shaped, beak 3-5 mm long, ribs 6, strong.

Fls. & Frts. : July - September.

Illus.: Blatt. & McC., *op. cit.* (*H. vaiabilis*); Sant. & Kap., *op. cit.* 1966.

Habitat: In open plateau at high altitudes.

Distrib.: Endemic to MAHARASHTRA: Ratnagiri (Gothane plateau), Satara (Kas Mahabaleshwar, Panchgani), Sindhudurg (Amboli ghat).

Spec. exam.: Satara: Mahabaleshwar, *Santapani* 22739, 14.9.1958 & 22774, 15.9.1958; *Bole* 2208-9, 15.7.1959; 1698, 1.8.1958 & 2000, 17.7.1959 (All in BLAT); Kas Plateau, *Mishra* 176843, 22.8.1997. Sindhudurg: Amboli ghat, *Kulkarni* 106301, 25.8.1965; *R.S. Rao* 131562, 8.8.1971; *Mishra* 176897, 3.9.1997 (All in BSI).

Status: Endangered.

Criteria: Extent of occurrence estimated up to 1,000 sq km: found only at 5 locations.

Notes: Though this species is quite common at Kas, Mahabaleshwar and Panchgani, it has been put into Endangered category because of its restricted distribution.

It can be differentiated by its lip much longer than lateral sepals, broadly ovate or ovate-oblong petals and spur shorter than or equalling ovary.

Habenaria suaveolens Dalz. in Hook. J. Bot. & Kew Gard. Misc. 2: 263. 1850; Hook. f. Fl. Brit. India 6: 140. 1890; Cooke, Fl. Pres. Bombay 3: 222. 1958 (Repr.ed.); Sant. & Kap. Orch. Bombay 27.1966; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 249. 1987; Kulkarni, Fl. Sindhudurg 435. 1988; Almeida in J. Econ. Tax. Bot. Addl. Ser. 8 (2), Fl. Savantwadi 2:15.1990; Lakshminarasimhan in Sharma *et al.* (eds.), Fl.

Maharashtra, Monocot. 44. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt.1: 45. 1997.

Herbs, 15-25 cm high; tubers 2, 1.5 – 2 x ca 1 cm, ovoid or oblong-ovoid. Leaves 5, clustered at base, 1.5 – 7 x 1-3.5 cm, oblong or elliptic, acute at apex. Scapes ca 25 cm long, erect. Spikes ca 2 cm long, fairly dense; bracts 6-8 mm long, lanceolate. Flowers small, white, jasmine-scented. Sepals unequal, white, acute; lateral sepals obliquely ovate; dorsal sepal ovate. Petals oblique, ovate-acute. Lip white, 3-lobed; lateral lobes broader, slightly shorter than the linear mid lobe. Spur pendulous, filiform, equalling or slightly shorter than the ovary.

Fls. : August-September.

Habitat: Along the margins of forests, under shades of trees.

Distrib.: Endemic to Karnataka, MAHARASHTRA: Sindhudurg (Charatha, Majgaon, Vengurla).

Status: Critically Endangered (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Area of occupancy up to 10 sq km: found only at a single location.

Notes: This species was first reported from Maharashtra by Cooke based on Dalzell's collection from 'between Vengurla and Malwan' But later it could not be recollected from this locality. Hence, this locality is not considered here. However, later Almeida reported it from Charatha and Majgaon (SMA 3829), the two nearby places (which can be considered as a single locality). Here its distribution was reported to be rare.

This species can be distinguished by its entire petals having broad sidelobes and lip not or hardly longer than lateral sepals.

Peristylus richardianus Wight, Ic. t. 1697. 1851; Almeida in J. Econ. Tax. Bot. Addl. Ser. 8(2), Fl. Savantwadi 2: 20. 1990; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 57. 1996. *Habenaria bicornuta* Hook. f. Fl. Brit. India 6: 156. 1890.

Herbs, 19-34 cm high. Leaves alternate, linear-lanceolate or ovate-lanceolate, sheathing at base, acuminate at apex. Inflorescence of terminal, long spikes. Flowers greenish-yellow, bracteate; bracts varying in size, foliaceous. Dorsal sepal oblong, 3-nerved, obtuse; lateral sepals linear-lanceolate, 1-nerved, obtuse. Lateral petals ovate-elliptic, 2-3-nerved, obtuse. Lip 3-lobed with a concave claw; mid-lobe short, triangular, deflexed; side lobes filiform, incurved like horns. Spur clavate with short tip, longer than sepals.

Fls. & Frts. : September-October.

Illus.: Wight, *op. cit.*

Habitat: On laterite flats on hill tops.

Distrib.: Endemic to Tamil Nadu, MAHARASHTRA: Sindhudurg (Amboli).

Status: Critically Endangered (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Area of occupancy less than 10 sq km: found only at a single location.

Notes: Earlier this species was known only from Tamil Nadu. From Maharashtra it has been reported only from Amboli (Almeida, *op.cit.*) based on M.R. Almeida's collection (MRA-334). Here its distribution is also very much sporadic.

This species can be distinguished by its leaves scattered along the stem, triangular and deflexed mid-lobe of lip and spur longer than sepals.

ZINGIBERACEAE

	<u>Genera</u>	<u>Species + Intraspecific taxa</u>
World	48	900
India	22	190
Maharashtra	11	28
Endemic to Maharashtra - 3 species		

Curcuma inodora Blatt. in J. Proc. Asiat. Soc. Bengal (n.s.) 26: 357. 1930. Sant. in J. Bombay nat. Hist. Soc. 51: 135, f.1. 1952; Mistry, Fl. Ratnagiri 2: 664. 1986 (Ph.D. Thesis, *ined.*); Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1:236.1987; Lakshminarasimhan & Sharma, Fl. Nasik 457. 1991; Kothari & Moorthy, Fl. Raigad 397. 1993; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 75. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 45. 1997.

Type: Holotype: India, Maharashtra, Bombay, Moolgaon, Salsette, Hallberg 12724, June, 1917 (BLAT!).

Herbs, erect; rhizomes with many tuberiferous fibrous roots; tubers ovoid, white inside. Leaves radical, appearing with the flowers, 16-31 x 7-14 cm, broadly elliptic-lanceolate, acuminate at tip, plicate, hairy along the nerves; petioles *ca* 16 cm long, deeply concave, winged. Inflorescence lateral, showy; peduncle *ca* 10 cm long. Spikes 10-20 cm long; bracts rounded and purplish at apex. Flowers 2.0-2.5 x 1.2-1.8 cm; corolla purplish with a yellow streak on the lip. Capsules 3-valved. Seeds arillate.

Fls. & Frts. : June-November.

Illus.: Sant., *op. cit.*

Habitat: In shady areas in hilly forests.

Distrib.: Endemic to MAHARASHTRA: Bombay (Andheri, Borivli, Salsette), Bhandara (Hazra falls), Buldhana (Hajam nala Ambabarwa forest), Kolhapur (Radhanagari), Nasik (Bahre, Surgana-Waghani Road), Raigad (Matheran), Ratnagiri, Thane (Bhiwandi, Jawar, Kundkhend, Tokavada, Vihigaon, Washala).

Spec. exam.: Bhandara: Hazra falls, nursery side, Malhotra 144980, 1.10.1976. Nasik: Surgana-Waghani Road, Cherian 109386, 21.7.1966; Bahre, Cherian 109332, 18.9.1966. Thane: Vihigaon range, Vada-Suryamal Road, Billore 110591, 29.8.1967; Jawar range, Denga-chi-Met R.F., Billore 111734, 3.9.1967; Washala range, Ajoba Parvat foot hill, Billore 111926, 16.10.1967; Vihigaon range, Utwada hill, Billore 112979, 20.10.1967; Bhiwandi range, Mohill R.F., Billore 116258, 20.7.1968; Dighashi R.F., Billore 116274, 21.7.1968; Tokavada range, Harishchandragarh foot hill, Billore 115806. 20.11.1968 (All in BSI).

Status: Low Risk.

Notes: Though this species is endemic to Maharashtra State, it is common throughout. In Bombay, Nasik and Thane districts it is one of the most common forest undergrowths. Hence, immediate conservation measures are not needed for this species.

It can be distinguished by its vernal or aestival flowering spike appearing before the leaves and obovate lip of flowers.

Curcuma purpurea Blatt. in J. Proc. Asiat. Soc. Bengal (n.s.) 26: 358. 1930; Sant. in Rec. Bot. Surv. India 16 (1), Fl. Khandala 274. 1967 (3rd Rev. ed.); Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 76. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 46. 1997.

Type: Holotype: India, Maharashtra, Pune, Khandala, Hallberg 14566, 1917.

Herbs, root fibres thick; sessile tubers *ca* 4 x 1 cm, faintly aromatic. Leaves *ca* 20 x 8 cm, acuminate, plaited; petioles *ca* 15 cm long, deeply furrowed, winged. Lower bracts shorter and broader than upper. Calyx *ca* 1 cm long, tubular, shortly and irregularly 3-lobed at apex. Corolla *ca* 4.3 cm long, tube *ca* 3 cm long, white; lobes. Ovate to ovate-lanceolate, purplish, subsaccate at tip, dorsal lobe long mucronate, side lobes rounded at apex. Staminodes and lip almost of equal length. Ovary densely soft-bristly upwards.

Fls. & Frts. : June-July

Habitat: On the ghats.

Distrib.: Endemic to MAHARASHTRA: Pune (Khandala).

Status: Data Deficient.

Notes: After description of this species, there is no further information regarding its distribution pattern. Hence, before categorising, it should be searched thoroughly through extensive explorations at its type locality and adjacent places. In 1996, efforts were made to collect it but in vain.

Herbarium specimen of this species also could not be located in Indian herbaria.

This species can be distinguished by the presence of its sessile tubers and ovate-lanceolate corolla lobes with subsaccate tip.

Hitchenia caulina (Grah.) Baker in Hook. f. Fl. Brit. India 6: 224. 1890; Cooke, Fl. Pres. Bombay 3: 233. 1958 (Repr.ed.); Sant. in Rec. Bot. Surv. India 16(1), Fl. Khandala 273. 1967 (3rd Rev. ed.); Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 11. 1983 et in J. Econ. Tax. Bot. 5(1): 163. 1984; Singh & Raghavan in *ibid.* 8(1): 34. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 236. 1987; Deshpande *et al.*, Fl. Mahabaleshwar 2: 585. 1995; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 79. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 46. 1997. *Curcuma caulina* Grah. Cat. Pl. Bombay 210. 1939. 'Chavar' 'Chawar'

Herbs, annual, rhizomes with many, ellipsoid, hanging tubers; tubers white inside; stems leafy, 90-150 cm high. Leaves 30-50 x 7.5-15 cm, oblong-lanceolate, acuminate, narrowed at base; petioles sheathing. Flowers yellow or white, in 10-15 cm long spikes; bracts *ca* 3 cm long, obovate, pinkish. Calyx tubular, membranous. Capsules oblong, coriaceous. Seeds ovoid with a lacerate aril.

Fls. & Frts. : July - October.

Habitat: In moist shady places at high altitudes.

Distrib.: Endemic to MAHARASHTRA: Pune (Khandala, Purandhar), Satara (Koyna, Mahabaleshwar, Pandavgad, Yaveteshwar).

Spec. exam.: Pune: Purandhar, on way to Vazirgad near N.C.C. Camp, R.S.Rao 88632, 19.7.1963. Satara: Mahabaleshwar, Machutar forest on Satara road, Ansari 67530, 10.10.1960; Mahabaleshwar, lake side, Ansari 67681, 12.10.1960; Koyna, Jadholi, Kochhar 153621, 4.9.1978; Mahabaleshwar, Kates point, Mishra 17518, 14.7.1996 (All in BSI).

Status: Vulnerable.

Criteria: Extent of occurrence estimated to be *ca* 3,500 sq km: found only at 6 locations.

Notes: The species qualified for Endangered category for its extent of occurrence (less than 5,000 sq km). But it has been put into Vulnerable category due to its occurrence at more than 5 localities. It is one of the most common species occurring in Mahabaleshwar and Panchgani area. From other localities its distribution is reported as infrequent. Rhizomes of this plant yields arrowroot of commerce and hence it is widely cultivated in some places of Goa, Diu, Daman, Dadra and Nagar Haveli (Rao, 1980).

It can be distinguished by its complicate filaments, broad connective and turbinate stigma.

AMARYLLIDACEAE

	<u>Genera</u>	<u>Species + Infraspecific taxa</u>
World	85	1,100
India	5	27
Maharashtra	2	17
Endemic to Maharashtra	3 species & 1 forma.	

Crinum brachynema Herb. in Bot. Reg. Misc. 36. 1842; Hook.f. Fl. Brit. India 6: 284. 1892; Cooke, Fl. Pres. Bombay 3: 258. 1958 (Repr.ed.); Inamdar in Bull. Bot. Surv. India 10: 131.1968; Shah, Fl. Gujarat 2: 668. 1978. Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 10. 1983 et in J. Econ. Tax. Bot. 5 (1): 163. 1984; Singh & Raghavan in *ibid.* 8(1): 35. 1986; Bachulkar in Rayat Resarch J. 1 (2): 114. 1993; Deshpande *et al.*, Fl. Mahabaleshwar 2: 589. 1995; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 94. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pat. 1: 46. 1997.

Herbs, bulbous, scapigerous; bulbs 6.2-7.5 cm in diameter, ovoid, without a distinct neck. Leaves 45-60 x 7.5-10 cm, lorate, bright green, moderately firm, margin entire. Scapes *ca* 30 cm long, subterete. Flowers pedicellate, 15-20 in an umbel, fragrant; bracts 3.8 - 5 cm long, lanceolate, greenish. Perianth tube 3.8-5 cm long, greenish; lobes 6, *ca* 5 x 1.9 cm, oblanceolate, obtuse, cuspidate, white. Capsules subglobose.

Fls. & Frts.: May.

Habitat: Along hills in open situations.

Distrib.: Endemic to Gujarat, MAHARASHTRA: Satara (Kas, Mahabaleshwar).

Status: Critically Endangered(Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Area of occupancy less than 10 sq km: severely fragmented populations.

Notes: According to Cooke this species was common along hill slopes at Mahabaleshwar. But, surprisingly it could not be recollected from this locality since then. In 1968 Inamdar reported it from Gujarat State. Recently in 1999 it was collected from Kate's point of Mahabaleshwar where only single individual was noticed. It has been planted in the experimental garden of Botanical Survey of India, Pune. However, Bachulkar (1993) reported its extended distribution up to Kas of the same district. Exploitation of its bulbs by the local people is the major threat of this species which should be controlled immediately for its conservation.

This species can be distinguished by its strap-shaped leaves, indistinct neck of bulb and funnel-shaped as well as nodding perianth.

Crinum eleonora Blatt. & McC. in J. Bombay nat. Hist. Soc. 32 (4): 733. 1928; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 10. 1983 et in J. Econ. Tax. Bot. 5 (1): 163. 1984; Singh and Raghavan in *ibid.* 8(1): 35. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 241. 1987; Sharma & Kulkarni in Nayar & Sastry (eds.), Red Data Book Indian Pl. 1: 22, f. 1987; Deshpande *et al.*, Fl. Mahabaleshwar 2: 590. 1995; Anon., India Glob. Threat. Taxa 19. 1996; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 94. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 46. 1997; Yadav, S.S. *et al.* in Geobios new Rep. 16: 8. 1997.

f. *eleonora*.

Types: India, Maharashtra, Satara, Mahabaleshwar, *McCann* 7-10, June, 1927 (BLAT!).

Herbs, bulbous, scapigerous; bulbs *ca* 20 x 13 cm, ovoid-spherical, narrowed into a stout neck about 8 cm long. Leaves *ca* 60 x 5 cm, ensiform, apex obtuse, glabrous. Scapes *ca* 50 x 2.5 cm, lateral, cylindrical, slightly compressed, green with a purple tinge. Flowers up to 20 in an umbel, nodding, white, fragrant; bracts 2, *ca* 9 x 3.3 cm, broadly lanceolate, obtuse or acute, inflexed, green; bracteoles up to 9 cm long, linear, green, tinged with purple. Perianth funnel shaped; tube *ca* 6.5 cm long, 4-angled; lobes *ca* 7.5 x 2.2 cm, lanceolate.

Fls. : April-May.

Illus.: Sharma & Kukarni, *op. cit.*

Habitat: Open hill slopes and along banks of river.

Distrib.: Endemic to MAHARASHTRA: Satara (Mahabaleshwar).

Spec. exam.: Type, as above.

Status: Possibly Extinct.

Notes: This plant is known only by its type collection. Recently, during 1996-1999 it was searched extensively at its type locality but yielded nothing. Exploitation of its bulbs for gardening purpose may be responsible for its present status. It might be surviving in private gardens but has to be confirmed.

It can be distinguished by its ensiform leaves, distinct neck of bulb, funnel-shaped and nodding perianth, broadly lanceolate as well as white perianth segments and green with a purple tinge bracts.

Crinum eleonora Blatt. & McC. f. **purpurea** Blatt. & McC. in J. Bombay nat. Hist. Soc. 32 (4): 734. 1928; Deshpande *et al.*, Fl. Mahabaleshwar 2: 590. 1995; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 95. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 46. 1997.

Type: India, Maharashtra, Satara, Mahabaleshwar, *McCann* 11, June, 1927 (BLAT!).

Very similar to f. *eleonora* but can easily be distinguished by its oblanceolate perianth segments which are deep purple on dorsal side and brownish-purple tinged bracts.

Fls. : April-May.

Habitat: Open hill slopes and along banks of river.

Distrib.: Endemic to MAHARASHTRA: Satara (Mahabaleshwar).

Spec. exam.: Type, as above.

Status: Possibly Extinct.

Notes: This forma was also collected by McCann from the same locality and in the same season as that of typical forma. It was also searched extensively during 1996-1999 without success. Like f. *eleonora*, over exploitation of its bulbs is the main cause for its present status and it might be surviving in private gardens which should essentially be confirmed for its conservation.

Crinum woodrowii Baker in Bot. Mag. t. 7597. 1898; Cooke, Fl. Pres. Bombay 3: 257. 1958 (Repr.ed.); Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 10. 1983 et in J. Econ. Tax. Bot. 5 (1): 163. 1984; Singh & Raghavan in *ibid.* 8(1): 35. 1986; Deshpande *et al.* Fl. Mahabaleshwar 2: 591. 1995; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 97. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 46. 1997.

Type: Bot. Mag. t. 7597.

Herbs, bulbous, scapigerous; bulbs *ca* 10 cm in diameter, without any produced neck. Leaves *ca* 30 x 7.5-10 cm, few, contemporary with the flowers, linear, obtuse, glabrous, bright green. Scapes arising from the bulb outside the tuft of leaves, *ca* 30 cm long, stout, compressed. Umbels 6-7-flowered; pedicels *ca* 2.5 cm long; bracts 3.8-4.4 cm long, ovate, acute. Perianth tube 7.6-8.9 cm long, cylindric, greenish; lobes as long as the tube, lanceolate, white.

Fls. : May - June.

Illus.: Baker, *op. cit.*

Spec. exam.: Bombay, *M. Woodrow s.n.*, May, 1899 (CAL).

Distrib.: Endemic to MAHARASHTRA: Satara (Mahabaleshwar).

Status: Possibly Extinct.

Notes: This species also could not be recollected after its type collection. During 1996-1999, efforts were made to locate it but in vain. More explorations are needed to trace it if it is surviving either in its natural habitat or in any private garden.

It can be differentiated by its pedicelled flowers, salver-shaped perianth and lanceolate perianth-lobes.

Pancretium sanctae-mariae Blatt. & Hallb. in J. Indian Bot. Soc. 2: 52, f. 5. 1921; Sant. in Rec. Bot. Surv. India 16(1), Fl. Khandala 279. 1967 (3rd Rev. ed.); Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 12. 1983 et in J. Econ. Tax. Bot. 5 (1): 163. 1984; Singh & Raghavan in *ibid.* 8(1): 35. 1986; Lakshminarasimhan & Sharma, Fl. Nasik 460. 1991; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 99. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 46. 1997. '*Pachankanda*'

Type: India, Maharashtra, Pune, Khandala, St. Mary's Villa, *McCann* 19854 (BLAT!).

Herbs, perennial; bulbs 3.5-6 cm in diameter, tunicated. Leaves 15-20 x 1-2 cm, lanceolate. Scapes 10-15 cm long. Umbels simple, terminal. Flowers white; perianth lobes 2.0 - 2.5 x 0.2-0.3 cm, lanceolate. Capsules ca 1 cm long, obovoid, 3-angled, loculicidally 3-valved. Seeds many, black.

Fls. & Frts.: May-June.

Illus.: Blatt & Hallb., *op. cit.*

Habitar: On hill tops in open places or under the shade of trees.

Distrib.: Endemic to MAHARASHTRA: Nasik (Anjaneri), Pune (Junnar, Khandala).

Spec. exam.: Nasik: Anjaneri hill top, *Lakshminarasimhan* 167694, 15.5.1985 (BSI). Pune: Khandala, *Santapau* 516, 15.6.1942; Khandala, foot of Monkey hill, *Santapau* 526, 17.6.1942; Khandala, *Y.A. Merchant* 1104 & 1107, 6.6.1959 (All in BLAT); Durga khilla plateau, 19 miles west of Junnar, *Hemadri* 89954, 15.5.1964 (BSI).

Status: Endangered.

Criteria: Area of occupancy less than 500 sq km: found only at 3 locations.

Notes: This species was described by Blatter & Hallberg based on *McCann s.n.* (19854, BLAT) collected from St. Mary's Villa, Khandala. However, this type specimen is missing from BLAT and according to Santapau (1967), it might have been perished. Later, Santapau collected similar plants from the type locality but could not identify due to absence of type. In 1964 and 1985 it has also been collected from Junnar of Pune district and Anjaneri hill of Nasik district where its distribution is reported as rare.

It can be distinguished by the presence of neck in the bulb and short (2-2.5 cm) perianth tube.

LILIACEAE

	<u>Genera</u>	<u>Species + Infraspecific taxa</u>
World	250	3,700
India	48	228
Maharashtra	12	39
Endemic to Maharashtra	11 species	
(including Trilliaceae).		

Camptorrhiza indica Yadav, Singh & Mathew in Kew Bull. 48: 735, f.1. 1993; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 121. 1996; Yadav in Pokle *et al.* (eds.), Flow Pl. Syst. Diver. pt. 1: 46. 1997.

Types: Holotype: India, Maharashtra, Ratnagiri, Dharmashala, ca 3 km from Ratnagiri, on way to Pavas, Yadav 1867, 20.6.1990 (CAL!). Isotype (BSI!, K).

Herbs, 15-25 cm high, erect, perennial, glabrous. Corms 1-1.5 x 0.9-1.3 cm, ovate to subglobose, narrowed at the apex, dark brown. Stems solitary, slender, rigid. Leaves 3-5, cauline, alternate, 5-15 x 0.3-0.7 cm, linear-lanceolate. Inflorescence a corymbose raceme, 3-6-flowered. Flowers bright pink to pinkish-mauve, white in bud stage, pedicellate. Capsules 6-10 x 5-7 mm, obovoid, 3 locular, with 7-15 seeds. Seeds 2.5 x 2.5-3 mm, subglobose or ovoid, brown.

Fls. & Frts. : June-July.

Illus.: Yadav, Singh & Mathew, *op. cit.*

Habitat: Ditches in open grasslands on laterite substrate.

Distrib.: Endemic to MAHARASHTRA: Ratnagiri.

Spec.exam.: Types, as above.

Status: Critically Endangered.

Criteria: Area of occupancy ca 1 sq km: found only at a single location.

Notes: This species is newly described by Yadav *et al.* in 1993. According to them it is restricted to a small area and for this reason it was not discovered earlier. Hence, until its further report from other localities its habitat should be conserved immediately.

Before the discovery of this species, the genus *Camptorrhiza* was thought to be monotypic and confined to Southern Africa in the form of *C. strumosa* (Baker) Obermeyer (Yadav *et al.* 1993).

This genus differs from its closely related genus *Iphigenia* in its latrorse anthers and single filiform style with an apical punctiform stigma. *C. indica* Yadav *et al.* can be differentiated from *C. strumosa* (Baker) Obermeyer by its larger perianth segments (1-1.5 cm long) and throughout

slender filaments without any median swelling, which is found in the latter one.

Chlorophytum bharuchae Ansari, Raghavan & Hemadri in Indian For. 96: 304, f. 1-10. 1970; Raghavan & Singh in J. Econ. Tax. Bot. 5(1): 163. 1984; Singh & Raghavan in *ibid*, 8(1): 35. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 239. 1987; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 125. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. syst. Diver. pt. 1: 46. 1997; Naik, Fl. Marathwada 2: 860. 1998.

Types: Holotype: India, Maharashtra, Pune, Junnar, Shivneri hill, Ansari 88712A, 25.7.1963 (CAL!). Isotypes: 88712 B-F (BSI!), G(MH), H(K), I(L), J(MO), K(BLAT!). Paratypes: Maharashtra: Pune: Ranga hill, near Pune city, Subramanian 64992, 24.7.1961; Shivneri hill, near Junnar, Hemadri 94310, 24.6.1964 & 107097, 25.6.1965. Mysore (Karnataka): Shimoga: Tirthahalli, Sundararaghavan 81068, 27.5.1962; Agumbe, Sundararaghavan 90419, 3.9.1963 (All in BSI!).

Herbs, perennial; roots numerous, fleshy, evenly thickened, cylindrical. Leaves radical, 15-55 x 1.5-3 cm, linear-lanceolate, lorate or ensiform, slightly narrowed at base, acute to acuminate at apex, margins wavy, hyaline, veins 15-20. Scapes usually solitary, rarely 2, terminal, 40-90 cm long with 2-5 branches; floral bracts 5-30 x 2-7 mm, ovate-lanceolate, persistent; pedicels 5-10 mm long in flowers and *ca* 18 mm long in fruits, terete, jointed at apex, greenish-brown. Perianth lobes 11-13 x 2-3 mm, oblong-lanceolate, divergent, white, with prominent greenish-brown spot. Capsules 7-9 mm long, obcordate, deeply 3-lobbed, green. Seeds 2-4 mm across, suborbicular, discoid, black.

Fls. & Frts. : May-August.

Illus.: Ansari, *et al.*, *op. cit.*

Habitat: Along hill slopes among grasses.

Distrib.: Endemic to Karnataka, MAHARASHTRA: Aurangabad (Mhaismal), Pune (Junnar, Range hills).

Spec. exam.: Types as above.

Status: Endangered (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Extent of occurrence estimated to be *ca* 5,000 sq km; found only at 3 locations.

Notes: Authors of this species mentioned its wide range of distribution all along the Western Ghats from Pune to Shimoga district of Karnataka. But from Western Ghats of Maharashtra it is reported only from two places of Pune district so far. However, it has been reported from Aurangabad of Marathwada region also. Everywhere its distribution is very much sporadic.

This species can be distinguished by its evenly thickened roots, pedicels joined at apex, flowers in fascicles of 4-8, oblong-lanceolate, perianth with distinct greenish-brown spots at the apices, glabrous filaments and 3-5 seeds in each locule of the capsules.

Chlorophytum borivilianum Sant. & Fernand. in J. Bombay nat. Hist. Soc. 52: 898. 1955; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 10. 1983 et in J. Econ. Tax. Bot. 5(1): 163. 1984; Singh & Raghavan in *ibid.* 8(1): 35. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 239. 1987; Kamble & Pradhan, Fl. Akola 224. 1988; Kothari in Nayar & Sastry (eds.), Red Data Book Indian Pl. 2: 142. 1988; Kothari & Moorthy, Fl. Raigad 404. 1993; Anon., India Glob. Threat. Taxa 16. 1996; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 125. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 46. 1997.

Types: Holotype: India, Maharashtra, Bombay, Borivli, in the Island of Salsette, *Fernandes* 1810, 14.6.1954 (BLAT!). Paratypes: Borivli, *Fernandes* 1804, 1807 & 1822 (BLAT), 1796 & 1824 (K).

Herbs, with root tubers; tubers 1-9 up to 50 x 8 mm, fascicled, reddish-brown outside, white inside. Leaves radical, up to 8, 12-18 x *ca* 1.5 cm, linear-lorate or ensiform, acute at apex, margins hyaline and wavy. Scapes usually solitary, rarely double, 16-30 cm long, bearing flowers in the upper third or half of their length; pedicels 6-10 mm long, jointed, whitish; bracts up to 2 cm long, linear, persistent. Perianth white, with two heteromorphous series; outer segments 1.5-1.8 x *ca* 0.3 cm, linear to linear-elliptic, sepaloid;

inner segments 1.7-2 x ca 0.4 cm, oblanceolate to narrowly obovate, petaloid. Capsules 5-6 x ca 6.8 mm, obcordate, green to yellow. Seeds up to 3 mm in diameter, black.

Fls. & Frts. : June-September.

Habitat: In moist places along plains and lower hill slopes.

Distrib.: Endemic to Rajasthan, MAHARASHTRA: Akola, Amaravati, Bombay, Kolhapur, Pune, Raigad, Satara.

Spec.exam.: Akola: Wanoja, Kamble 150358, 1.9.1977; Narnala fort, Kamble 153785, 24.6.1978. Satara: 5-6 km before Panchgani from Pune, Rao 105072, 20.6.1968 (All in BSI).

Status: Low Risk.

Notes: This species is distributed in the vast range of Maharashtra, mainly in the Konkan, Deccan and Vidarbha regions. Hence it has been excluded from threatened category as mentioned in the Red Data Book (*op.cit.*).

It can be distinguished by its linear or ensiform leaves, usually unbranched scapes, flowers in alternate and 3-flowered clusters, linear floral bracts and glabrous filaments.

Chlorophytum glaucoides Blatt. in J. Asiat. Soc. Bengal (n.s.) 26: 361. 1930; Singh & Raghavan in J. Econ. Tax. Bot. 8(1): 35. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 239. 1987; Kamble & Pradhan, Fl. Akola 224.1988. Lakshminarasimhan & Sharma, Fl. Nasik 473. 1991; Deshpande *et al.*, Fl. Mahabaleshwar 597. 1995; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 127. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 46. 1997; Pradhan & Singh, Fl. Ahmednagar 522. 1999.

Types: Lectotype: India, Maharashtra, Satara, Panchgani, Blatter P-73, August, 1925 (BLAT!). Syntypes: Panchgani, Blatter P-73 A-E. August, 1925 (BLAT!).

Herbs, ca 80 cm high. Leaves 4-6, 22-33 x 2-4 cm, elliptic-lanceolate acuminate, membranous-leathery, glabrous, attenuated to a short petiole. Scapes simple, up to 50 cm long, clothed with sheathing scales. Inflorescence of dense racemes, up to 30 cm long. Flowers white; bracts persistent, lanceolate, acuminate. Capsules ca 8 mm long, globose, emarginate, triquetrous, black. Seeds 2, orbicular.

Fls. & Frts. : August-October.

Habitat: On hill slopes.

Distrib.: Endemic to MAHARASHTRA: Ahmednagar (Ghatghar, Kalsubai), Akola (Narnala fort), Chandrapur, Nasik (Barshingi, Saptashringi, Trimbak), Pune, Satara (Jadholi, Mahabaleshwar, Pandavgad, Yaveteshwar), Thane.

Spec. exam.: Ahmednagar: Kalsubai, *Mishra* 176998, 9.9.1998. Akola: Narnala fort, *Kamble* 153856A, 25.6.1978. Nasik: Brahmagiri top (Trimbak), *Lakshminarasimhan* 165947, 4.10.1983; Saptashringi hill (Kalwan), *Lakshminarasimhan* 165260, 15.8.1983. Satara: Yaveteshwar ghat, *Mishra* 175461, 24.8.1996 (All in BSI).

Status: Low Risk.

Notes: Though this species is endemic to Maharashtra, it is quite common in areas at high altitudes and is not qualifying any criteria of threatened categories.

It can be distinguished by its elliptic-lanceolate leaves and scapes clothed with scaly bracts never forming a cone before flowering.

Dipcadi concanense (Dalz.) Baker in J. Linn. Soc. Bot. 11: 399. 1871; Hook.f. Fl. Brit. India 6: 34.1892; Cooke, Fl. Pres. Bombay 3: 277. 1958 (Repr.ed.); Deb & Dasgupta in J. Bombay nat. Hist. Soc. 75: 69, f. 10.1978 et in Fasc. Fl. India 7: 3, f. 1-2. 1981; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 5. 1983 et in J. Econ. Tax. Bot. 5(1): 163. 1984; Mistry, Fl. Ratnagiri 2: 681. 1986 (Ph.D. Thesis *ined.*); Singh & Raghavan in J. Econ. Tax. Bot. 8 (1): 35. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 240. 1987; Dasgupta & Deb in Nayar & Sastry (eds.), Red Data Book Indian Pl. 1: 175, f. 1987; Kulkarni, Fl. Sindhudurg 452. 1988; Mistry & Almeida in J. Bombay nat. Hist. Soc. 86 (3): 478.

1989; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 130. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 46. 1997. *Uropetalum concanense* Dalz. in Hook. Kew J. Bot. 2: 143. 1850.

Types: India, Bombay, Malwan, Dalzell *s.n.* (K).

Herbs, 18-28 cm high, bulbous, scapigerous. Bulbs 1.2–1.8 cm in diameter, globose, tunicated. Leaves 3-4, 5-22 x *ca* 0.2 cm, linear, acute at apex, broad at base. Scapes 15-28 cm long, slender, terete, glabrous, naked, bearing terminal racemes of 2-6 flowers. Flowers 2.5-3.6 cm long, salver shaped, shining white; pedicels 5-10 mm long, filiform; bracts 3-5 mm long, deltoid, scarious, acuminate. Perianth *ca* 1.5 cm long, stipitate, segments 6, in two whorls. Capsules deeply 3-lobed. Seeds 6 in each locule, *ca* 8 mm across, compressed, rotund, shining black.

Fls. & Frts.: August-September.

Illus.: Deb & Dasgupta, *op. cit.*, 1978 & 1981.

Habitat: Sandy sea costs.

Distrib.: Endemic to MAHARASHTRA: Ratnagiri, Sindhudurg (Malwan).

Spec. exam.: Malabar-Konkan, Stocks & Law *s.n.* (CAL).

Status: Critically Endangered.

Criteria: Area of occupancy less than 10 sq km: a) found only at a single location, b) declension in the number of subpopulations.

Notes: Dasgupta & Deb (1987) categorised this species as Possibly Extinct in the wild, because after 1861 it could not be recollected from its type locality, though the region had been repeatedly explored. However, after 123 years in 1985, Mistry once collected this plant near Shivaji Nagar in Ratnagiri city where several members were growing in a fenced, fallow plot of rocky land. For this reason the status of this plant has been changed. Urbanization activities at its habitat might be the major threat of this species.

It can easily be differentiated by its larger flowers and styles (2-2.5 cm long).

Dipcadi maharashtrensis Deb & Dasgupta in J. Bombay nat. Hist. Soc. 72: 822, t. 1. 1975 et in *ibid.* 75: 62. 1978 et in Fasc. Fl. India 7: 4, f. 3-4. 1981; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 10. 1983 et in J. Econ. Tax. Bot. 5(1): 163. 1984; Singh & Raghavan, in *ibid.*, 8(1): 35. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 240. 1987; Dasgupta & Deb in Nayar & Sastry (eds.), Red Data Book Indian Pl. 1: 17, f. 1987; Anon., Indian Glob. Threat. Taxa 24. 1995; Deshpande *et al.*, Fl. Mahabaleshwar 2: 598. 1995; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 130. 1996; Samaddar & Roy, Addl. Ele. Indian Fl. 1: 124. 1997; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 46. 1997; Yadav, S.S. *et al.* in Geobios new Rep. 16(1): 8. 1997.

Types: India, Maharashtra, Satara, Panchgani, *Rukmini Bai*, 433, 5.9. 1955 (BLAT!).

Herbs, ca 36 cm high, bulbous, scapigerous. Bulbs ca 2.5 x 2.5 cm, globose, tunicated, profusely rooting. Leaves few, 25-30 x 0.5-0.7 cm, linear, plicate, acute at apex. Scapes ca 36 cm long, slender, erect, terete, glabrous, naked, bearing terminal racemes of about 12 flowers. Flowers 1.1 -1.3 cm long, pedicellate; pedicels 2-3 mm long; bracts 10-20 x 3-3.5 mm, subulate, coriaceous, persistent. Perianth segments 6, united in two whorls; outer lobes lanceolate, linear or deltoid-lanceolate. Capsules subglobose or obovate. Seeds orbicular, compressed, obscurely winged, brownish black.

Fls. & Frts. : August - September.

Illus.: Deb & Dasgupta, *op. cit.* 1981; Dasgupta & Deb, *op. cit.*

Habitat: In sandy gravel on the plateau.

Distrib.: Endemic to MAHARASHTRA: Satara (Panchgani).

Spec. exam.: Type, as above.

Status: Critically Endangered.

Criteria: Area of occupancy up to 4 sq km: found only at a single location.

Notes: This species could not be recollected after its type collection, though the area has been thoroughly explored. Recently during 1996 to 1998 also this place has been botanised without success. However, more efforts have to be made.

It can be distinguished by its stout pedicels, acute and coriaceous bracts which are much longer than pedicels, smaller flowers and unequal perianth segments.

Dipcadi minor Hook.f. Fl. Brit. India 6: 346. 1892; Cooke, Fl. Pres. Bombay 3: 278. 1958 (Repr.ed.); Deb & Dasgupta in J. Bombay nat. Hist. Soc. 75: 66. 1978 et in Fasc. Fl. India 7: 4. 1981; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 7. 1983 et in J. Econ. Tax. Bot. 5(1): 163. 1984; Singh & Raghavan in *ibid.* 8(1): 35. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 240. 1987; Dasgupta & Deb in Nayar & Sastry (eds.), Red Data Book Indian Pl. 1: 177. 1987; Anon., India Glob. Threat. Taxa 24. 1995; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 131. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 46. 1997.

Type: India, Maharashtra, Konkan, Hewra Plain, August. 1859, *Dalzell s.n.*(K).

Herbs, 12-15 cm high, bulbous, scapigerous. Bulbs 1.8-2 x 1.5-2 cm, ovoid, tunicated, with fibrous roots. Leaves 12-15 x 0.2-0.3 cm, linear, plicate. Scapes terete, long glabrous, naked, with loose terminal racemes of 6-12 flowers. Pedicels 3-5 mm, filiform; bracts 4-5 x 3-4 mm, acuminate, deltoid, scarious. Flowers 8-9 mm long, bracteate, pedicellate. Perianth 7.5-12 mm long, segments 6, in 2 whorls. Capsules unknown.

Habitat: On sandy plateau.

Distrib.: Endemic to MAHARASHTRA: Pune (Hewra).

Status: Critically Endangered.

Criteria: Area of occupancy less than 10 sq km: found only at a single location.

Notes: This species could not be recollected after its type collection, though the region has been explored repeatedly. However, it needs more explorations.

It can be distinguished by its smaller flowers and equal perianth segments.

Dipcadi saxorum Blatt. in J. Bombay nat. Hist. Soc. 32: 736. 1928; Deb & Dasgupta in *ibid.* 75: 62, f. 5. 1978 et in Fasc. Fl. India 7: 9. 1981; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 10. 1983 et in J. Econ. Tax. Bot. 5 (1): 163. 1984; Singh & Raghavan in *ibid.* 8(1): 35. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 240. 1987; Dasgupta & Deb in Nayar & Sastry (eds.), Red Data Book Indian Pl. 1: 180, f. 1987; Anon. India Glob. Threat. Taxa 24. 1995; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 131. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 46. 1997; Yadav, S.S. *et al.* in Geobios new Rep. 16(1): 8. 1997.

Type: India, Maharashtra, Bombay, Salsette, Blatter & Hallberg 1. August, 1917 (BLAT!).

Herbs, 20-40 cm long, bulbous, scapigerous. Bulbs 1.5-2 x 1.5-2 cm, globose, tunicated. Leaves 16-25 x 0.5-0.7 cm, linear. Scapes 20-40 cm long, terete, glabrous, naked, with a terminal raceme of 15-20 flowers. Flowers *ca* 1 cm long, white; pedicels 6-10 mm long; bracts 5-7 x *ca* 3 mm, ovate, acuminate, scarious. Perianth segments 6, in two whorls. Capsules 0.8-1 x 1-1.3 cm, obovoid-oblong, trilobed, locucidally dehiscent. Seeds 4-9 per locule, 4-5 x *ca* 3 mm, compressed, orbicular, elliptic or quadrangular.

Fls. & Frts.: June-November.

Illus.: Deb & Dasgupta, *op. cit.* 1978; Dasgupta & Deb *op. cit.*

Habitat: On rocky hills.

Distrib.: Endemic to MAHARASHTRA: Bombay (Borivli).

Spec.exam.: Bombay, Borivli, Salsette, Blatter 2353-61, 8.8.1943; Fernandez R. 87, 11.8.1952; 1351, 25.7.1953 & 1398, 9.8.1953; Santapau

15714 A-D, 25.7.1953; *Rukmini Bai* 106, 10.8.1954; 303, 27.6.195 & 479, 25.10.1956; *Merchant* 173, 24.8.1957 & 1194, 26.7.1959; *Santapau* 23159, 26.7.1959 (All in BLAT).

Status: Critically Endangered.

Criteria: Extent of occurrence estimated to be *ca* 100 sq km: found only at a single location.

Notes: This species was reported as common at Borivli (Blatter 1928), but from other parts of the state it has not been collected so far in spite of intensive searching. Presently its habitat has come under National Park, but specific care should be taken for the conservation of this plant.

It can be distinguished by its stout pedicels as long as bracts, smaller flowers and unequal perianth segments.

Dipcadi ursulae Blatt. in *J. Bombay nat. Hist. Soc.* 32: 735. 1928; Deb & Dasgupta in *ibid.* 75: 63, f. 7. 1978 et in *Fasc. Fl. India* 7: 10. 1981; Raghavan & Singh in Jain & Sastry (eds.), *Pl. Cons. Bull.* 3: 10. 1983 et in *J. Econ. Tax Bot.* 5(1): 163. 1984; Singh & Raghavan in *ibid.* 8(1): 35. 1986; Ahmedullah & Nayar, *Endemic Pl. Indian Reg.* 1: 240. 1987; Dasgupta & Deb in Nayar & Sastry (eds.), *Red Data Book Indian Pl.* 2: 143. 1988; Kamble & Pradhan, *Fl. Akola* 225. 1988, Bachulkar in *Rayat Research J.* 1(2): 114. 1993; Deshpande *et al.*, *Fl. Mahabaleshwar* 2: 599. 1995; Lakshminarasimhan in Sharma *et al.* (eds.), *Fl. Maharashtra, Monocot.* 133. 1996, Yadav in Pokle *et al.* (eds.), *Flow. Pl. Syst. Diver.* pt. 1: 46. 1997.

var. ***ursulae***.

Types: Holotype: India, Maharashtra, Satara, Panchgani table land, *Blatter* P-74, August, 1925 (BLAT!).

Herbs, 15-30 cm high, bulbous, scapigerous. Bulbs *ca* 1 x 2 cm, globose or ovoid, tunicated. Leaves 1-6, 15-30 x 0.4-0.7 cm, linear, plicate. Scapes 1-2 per bulb, 15-30 cm long, with 6-14-flowered terminal racemes. Flowers white, cream or orange, often greenish outside; pedicels 5-7 mm long, bracts 1-2.5 cm long ovate, plicate. Perianth segments 6, in two whorls: outer lobes plicate, recurved at middle; inner lobes shorter, recurved

at tip. Capsules obovoid-oblong, 3-lobed, straw coloured. Seeds *ca* 6 x 5 mm, semiorbicular, compressed, glossy, black.

Fls. & Frts.: June-August.

Illus.: Deb. & Dasgupta, *op. cit.* 1978.

Habitat: On gravelly, grassy hill tops.

Distrib.: Endemic to MAHARASHTRA: Akola (Khaperdari), Bombay (Trombay), Pune (Junnar), Satara (Panchgani).

Spec. exam.: Akola: Khaperdari, Kamble 153959, 29.6.1978 (BSI). Bombay: Trombay hills, Balamani B. 88, 10.7.1958; Merchant 606, 26.7.1958; Shah 9894, 26.7.1958; Merchant 1197-8, 1.8.1959 (All in BLAT). Pune: Junnar, without Coll. name & No., 6.7.1894; Shivneri hills, Ansari 88729, 25.7.1963; Mangni hill, near Junnar, Hemadri 99527, 29.6.1964; Shivneri hills, Hemadri 10709, 25.6.1965 (All in BSI). Satara: Panchgani table land, Chennaveeraiah 15756, 1.8.1953 (BLAT).

Status: Endangered.

Criteria: Area of occupancy less than 500 sq. km: found only at four locations.

Notes: Earlier this species was reported only from three localities of Western Ghats, where its distribution was recorded as common. Later in 1978 it was also collected from Akola district, where it is quite infrequent and rare. Grazing and encroachment of its natural habitats should be controlled for its conservation.

It can be distinguished by its shorter scapes (up to 30 cm long) bearing 6-14 flowered racemes, stout pedicels, long acuminate and scarious bracts much longer than pedicels, unequal perianth segments and smaller flowers with stipitate ovary.

Drimia polyphylla (Hook.f.) Ansari & Raghavan in J. Bombay nat. Hist. Soc. 77: 174. 1980; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 135. 1996; *Urginea polyphylla* Hook.f. Fl. Brit. India 6: 348. 1892; Deb & Dasgupta in Bull. Bot. Surv. India 16: 123.

(1974) 1977 et in Fasc. Fl. India 7: 20. 1981; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 241. 1987; Anon., India Glob. Threat. Taxa 59. 1995; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 46. 1997.

Type: India, Deccan Peninsula, Akya, Heyne in Wall. Num. List No. 5062 F (CAL! & K).

Bulbs 2-4.5 x 2-4 cm, ovoid. Leaves 20-25 x *ca* 2.5 cm, filiform, involute at margins. Scapes longer than leaves, very slender. Racemes terminal, 6-flowered. Flowers suberect; pedicels short; bracts *ca* 4 mm long, longer than pedicels, subulate with broad membranous auricles; perianth 8 mm long, oblong-lanceolate, obtuse, 5-nerved in the middle.

Distrib.: Endemic to Deccan Peninsula.

Spec. exam.: Type, as above.

Status: Possibly Extinct.

Notes: This species could not be recollected after its discovery made over 100 years ago, though the region has been thoroughly explored during last few years.

It can be identified by its pedicels shorter than bracts.

Drimia razii Ansari in J. Bombay nat. Hist. Soc. 78(3): 572, f. 1-8. 1981; Singh & Raghavan in J. Econ. Tax. Bot. 8(1): 35. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 240. 1987; Sharma & Kulkarni in Nayar & Sastry (eds.), Red Data Book Indian Pl. 2: 144. 1988; Anon., India Glob. Threat. Taxa 25. 1995; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 137. 1996.

Types: Holotype: India, Maharashtra, Pune, Dive ghat, *Ansari* 104878 A, 15.3.1970 (CAL!). Isotypes: 104878 B-C (BSI!), D(CAL!), E(K), F(BLAT!).

Herbs, scapigerous, bulbous. Bulbs 5-7 x 3-4 cm, ovate or subglobose. Leaves (after flowering) 20-25 x 0.2-0.3 cm, narrowly linear, erect or ascending, fleshy, grooved above. Scapes up to 15 cm long, slender. Inflorescence 10-15 cm long, dense raceme, 10-25-flowered. Flowers

ascending, dull brownish; bracts *ca* 1.5 x 1 mm, spurred; perianth lobes 6 in 2 whorls, elliptic-oblong or oblong, reflexed. Capsules 8-10 x 5-6 mm, ovate or elliptic-ovate, trilocular. Seeds 5-6, *ca* 7 x 4 mm, broadly ovate or subglobose, winged, black.

Fls. & Frts. : March-April.

Illus.: Ansari, *op. cit.*

Habitat: On exposed rocky areas and gravelly slopes on top of the ghat.

Distrib.: Endemic to MAHARASHTRA: Pune (Dive ghat).

Status: Critically Endangered.

Criteria: Area of occupancy less than 10 sq km: found only at a single location.

Notes: This species is located only at the top of the Dive ghat where it is reported as rare. Later it has been searched at other places having same altitude and more or less similar ecological conditions but yielded nothing. Hence, until new localities of this species would be found out, this habitat should be protected for its conservation.

It can be distinguished by its dense racemes, pedicels up to 0.8 cm long and longer than bracts, evanescent bracts, longer perianth lobes (0.8-0.9 cm long) and filaments longer than anthers.

Iphigenia magnifica Ansari & Rolla Rao in Bull.Bot. Surv. India 20: 162, t. 1. (1978) 1979; Mistry, Fl. Ratnagiri 2: 683. 1986; Singh & Raghavan in J. Econ. Tax. Bot. 8(1): 35. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 240. 1987; Ansari in Nayar & Sastry (eds.), Red Data Book Indian Pl. 1: 183. 1987; Kamble & Pradhan, Fl. Akola 226. 1988; Mistry & Almeida in J. Bombay nat. Hist. Soc. 86(3): 478. 1989; Lakshminarasimhan & Sharma, Fl. Nasik 476. 1991; Bachulkar in Rayat Research J. 1 (2): 114. 1993; Kothari & Moorthy, Fl. Raigad 405. 1993; Anon., India Glob. Threat. Taxa 36. 1996; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 139. 1996; Samaddar & Roy, Add. Ele. Indian Fl. 1: 219. 1997; Yadav, S.S. *et al.* in Geobios new Rep. 16(1): 8. 1997.

Types: Holotype: India, Maharashtra, Dhule, *Pataskar* 118218 A, 5.10.1969 (CAL!). Isotypes: 118218 B-C (BSI!), D(CAL!), E(K). Paratypes: Dhule, *Ansari* 104945, 8.9.1970 (BSI!); Raigad, Matheran, *Ansari* 104948, 30.7.1973 (BSI!).

Herbs, up to 60 cm high, erect. Corms *ca* 2.5 x 2 cm, subglobose, tunicated. Leaves many, 14-25 x 0.2-1.2 cm, linear-lanceolate, acute at apex, grass like. Inflorescence a simple, 4-many-flowered raceme. Flowers dark brownish-purple, pedicellate; perianth lobes 6, 1-2 x *ca* 0.2 cm, linear-subulate or elliptically linear, 1-3-nerved. Capsules 0.8 - 1.75 x 0.5-1 cm, subglobose or elliptically oblong, triocular, 3-valved. Seeds many, *ca* 3 x 2.5 mm, subglobose, brown, with white or pale brown conspicuous band of raphe.

Fls. & Frts. : September-December.

Illus.: Ansari & Rolla Rao, *op. cit.*

Habitat: On exposed grassy slopes of the hills in gravelly soils with *ca* 150 cm annual rainfall.

Distrib.: Endemic to Karnataka, MAHARASHTRA: Akola (Chikhalwal, Manora, Wanoja), Dhule, Kolhapur (Dajipur), Nasik (Sindewadikuran), Raigad (Matheran), Ratnagiri (Phurus, Mirya). Satara (Kartikswami, Panchgani, Yaveteshwar).

Spec.exam.: Akola: Manora, *Kamble* 153916, 27.6.1978; Wanoja, *Kamble* 153931, 28.6.1978; Chikhalwal, *Kamble* 154031, 2.7.1978. Kolhapur: On way from Dajipur to Radhanagari, *Mishra* 176890, 30.8.1997. Nasik: Sindewadikuran area near Malegaon, Lakshranarasimhan 166228, 6.12.1983.

Status: Vulnerable (Regionally in Maharashtra). Not Evaluated (In India).

Criterion: A severe decline of at least 50% is suspected to be likely to occur in the near future (within 20 years), based on potential levels of exploitation.

Notes: This plant is sporadically but widely distributed and its extent of occurrence in Maharashtra is *ca* 1 lakh sq km. Like *I. stellata*, the seeds and bulbs of this species also are a potential source of commercially important colchicine, causing its exploitation and depletion of population. Hence, it should be conserved by prohibiting its collection for commercial purpose from its natural habitat by creating and implementing laws.

It can be distinguished by its branched stems, purple perianth with linear-subulate or elliptic-linear segments and glabrous filaments.

Iphigenia stellata Blatt. in J. Bombay nat. Hist. Soc. 32: 734. 1928 *emend* Ansari & Rolla Rao in Bull. Bot. Surv. India 15: 120, f. 1-7b. 1972; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 11. 1983 et in J. Econ. Tax. Bot. 5(1): 163. 1984; Singh & Raghavan, in *ibid* 8(1): 35. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 240. 1987; Ansari in Nayar & Sastry (eds.), Red. Data Book Indian Pl. 1: 185. 1987; Anon., India Glob. Threat. Taxa 36. 1985. Almeida in J. Econ. Tax. Bot. Addl. Ser. 8(1), Fl. Savantwadi 2: 38. 1990; Bachulkar in Rayat Research J. 1(2): 115. 1993; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 140. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 46. 1997; Yadav, S.S. *et al.* in Geobios new Rep. 16(1): 8. 1997.

Types: Lectotype: India, Maharashtra, Satara, Panchgani table land, Blatter P-1, June, 1927 (BLAT!). Syntypes: Panchgani, Blatter P-1 A-C, June, 1927 (BLAT!).

Herbs, *ca* 15 cm high, perennial. Corms ovate-subglobose. Leaves 4-6, 8-14 x 0.9-1 cm, linear to linear-lanceolate, apex acute or mucronate, narrowed at base. Flowers 2-6 in a short terminal raceme, bright pink to pinkish-mauve, creamy-white in bud, pedicellate; perianth segments 6, 6-10 x 3-4 mm, broadly elliptic or elliptic-ovate, acute or acuminate at apex, 7-9-nerved. Capsules 0.8-1.2 cm long, subglobose or obovoid, loculicidal, deeply grooved. Seeds 20-30, *ca* 2 x 1.5 mm, subglobose-ovoid, brownish black.

Fls. & Frts. : June-September.

Illus.: Ansari & Rolla Rao, *op. cit.*

Habitat: On open plateaus and on gentle well drained gravelly soils in slopy areas.

Distrib.: Endemic to MAHARASHTRA: Kolhapur (Panhalā, Radhanagari), Satara (Kas, Mahabaleshwar, Panchgani), Sindhudurg (Amboli).

Spec. exam.: Satara: Panchgani plateau, near St. Joseph's School, R.S. Rao 77906, 6.8.1962; Koyna, in nursery, Kochhar 158615, 28.7.1979; Mahabaleshwar, near Kates point, Mishra 175416, 14.7.1996 (All in BSI).

Status: Vulnerable.

Criteria: A severe decline of at least 50% is suspected to be likely to occur in the near future (within 20 years), based on potential level of its exploitation.

Notes: Though this species is locally common but restricted to a very few places. The seeds and bulbs of this species contain the highest quantity of colchicine and hence its large scale commercial exploitation is causing depletion of populations. Hence for its conservation, collection of this plant from its natural habitat for commercial purpose should be banned with immediate effect. It can be used commercially only through production by cultivation.

This species can easily be distinguished by its bright pink flowers and broadly elliptic or elliptic-ovate perianth segments.

Protasparagus karthikeyanii Kamble in J. Econ. Tax. Bot. 19: 735, f. 1. (1995) 1996; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 749. 1996.

Type: Holotype: India, Maharashtra, Pune, Junnar, J.A. Vasavada 17349, June, 1956 (BSI).

Stems terete, glabrous, yellowish-brown; spines straight, pungent, very stiff, up to 1 cm long; small branches generally 3-5 nate, up to 20 cm long, angular with ridges; branchlets also 3-5 nate, up to 4 cm long; cladodes 3-6 nate, up to 2.5 cm long, linear, slender, triquetrous. Flowers few, laxly arranged on branches having 1-3 cladodes along with flowers; bracts up

to 0.9 mm long, papery; pedicels articulated, just near base of flowers; perianth segments 6, up to 3.2 x 1.1 mm, elliptic, obovate, acute at apex.

Fls. & Frts.: May-August.

Illus.: Kamble, *op. cit.*

Distrib.: Endemic to MAHARASHTRA: Pune (Junnar).

Status: Data Deficient.

Notes: This is a newly described species based on herbarium specimen, deposited at BSI. Sufficient information regarding its distribution pattern is lacking for its categorisation. Hence, further explorations are needed at its type locality and adjoining places.

It can be distinguished from its closely allied species [*P. racemosus* (Willd.) Oberm.] by its 3-5 nate branches and branchlets, ensiform and ascending cladodes, few and laxly arranged flowers on branches having 1-3 cladodes and slender as well as triquetrous pedicels having spines only at the base.

Scilla viridis Blatt. & Hallb. in J. Indian Bot. Soc. 2:52. 1921; Deb & Dasgupta in Bull. Bot. Surv. India 17: 45. (1975) 1978 et in Fasc. Fl. India 7: 15. 1981; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 12. 1983 et in J. Econ. Tax. Bot. 5(1): 163. 1984; Singh & Raghavan in *ibid.* 8(1): 35. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 240. 1987; Dasgupta & Deb in Nayar & Sastry (eds.), Red Data Book Indian Pl. 1: 188. 1987; Anon., India Glob. Threat. Taxa 55. 1996; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 141. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diverr. pt. 1: 46. 1997; Yadav, S.S. *et al.* in Geobios new Rep. 16 (1): 8. 1997.

Type: Holotype: India, Maharashtra, Pune, Khandala, *McCann* 14500, September, 1918 (BLAT!).

Herbs, *ca* 50 cm high, bulbous, Scapigerous. Bulbs *ca* 5 x 4 cm, ovoid or globose, tunicated, pale green. Leaves hysteranthous. Scapes *ca* 50 cm long, slender, terete, glabrous, naked, yellowish-purple, shining, bearing

terminal racemes of about 40 flowers. Flowers *ca* 1.5 cm in diameter; stellate, pinkish, pedicellate; perianth segments 6, free, oblong.

Fls. & Frts. : September-March.

Habitat: On small sandy, hilly areas.

Distrib.: Endemic to MAHARASHTRA: Pune (Khandala).

Status: Possibly Extinct.

Notes: This species could not be recollected after its type collection even after extensive explorations. Recently during 1996-1998 also efforts were made to collect it but in vain.

It can be identified by its tunicated bulbs, less than 40 flowered racemes, over 1 cm long pedicels and 3-6 ovules per locule.

COMMELINACEAE

	<u>Genera</u>	<u>Species + Intraspecific taxa</u>
World	38	500
India	14	92
Maharashtra	7	46

Belosynapsis vivipara (Dalz.) Sprague ex C.E.C. Fischer in Kew Bull. 1928: 254. 1928 et. in Gamble, Fl. Pres. Madras 3: 1082. 1957 (Repr.ed.); Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 208. 1987; Kammathy in Nayar & Sastry (eds.), Red Data Book Indian Pl. 1: 124, f. 1987; Anon., India Glob. Threat. Taxa 10. 1996; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 147. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 47. 1997; Yadav, S.S. *et al.* in Geobios new Rep. 16 (1): 1997. *Cyanotis vivipara* Dalz. in Kew J. Bot. 3: 226. 1851; Hook. f. Fl. Brit. India 6: 388. 1892; Cooke, Fl. Pres. Bombay 3: 305. 1958 (Repr.ed.).

Herbs, epiphytic, subscapigerous, 5-20 cm long, clothed with scattered rufous spreading hairs; rootstocks small, with tufts of leaves. Leaves

radical, 5-12.5 x 0.6-1 cm, sessile, linear, acute, clothed with rufous hairs. Scapes many from the root, rooting below, viviparous at apex, with several small oblong-lanceolate, acute leaves, 0.6-1.2 cm long. Flowers white. Capsules ca 3.3 x 1.3 mm, oblong, obtuse, rufous hairy, valves much recurved after dehiscence. Seeds cylindrical, smooth.

Fls. & Frts. : August-October.

Illus.: Kammathy *op.cit.*

Habitat: On densely moss covered tree trunks and branches in cool, shady evergreen forests.

Distrib.: Endemic to Karnataka, Tamil Nadu, MAHARASHTRA: Parva ghat.

Spec. exam.: Karnataka State: Katlekan, on way to Gerosoppa from Jog, Ansari & Kammathy 78707, 30.11.1961; Yedur, Shimoga district, Raghavan 82972, 4.10.1962; Hulical, Shimoga district, Raghavan 83069, 8.10.1962 and 83088 A, 9.10.1962; Agumbe, Shimoga district, Raghavan 83267, 16.10.1962; Hulical-Hosgadda area, Shimoga district, Raghavan 9196, 24.8.1963; Shirur ghat, Shimoga district, Raghavan 90372 A, 1.9.1963; Bhimanagundi, Coorg district, A.S. Rao 95014, 23.10.1963; Talacauvery, Coorg district, A.S. Rao 95144, 26.10.1963 (All in BSI).

Status: Data Deficient.

Notes: Since Dalzell's report from Maharashtra, this species could not be collected from any part of the state so far. It appears, the species might have been vanished from this state. Of course more explorations have to be made to confirm it. However, the species has been collected several times from the evergreen forests of Karnataka and Tamil Nadu.

It can be distinguished by its terminal flowers in few-flowered cynules.

Cyanotis papilionacea (L.) R. & S. var. *vaginata* (Wight) C.E.C. Fischer in Gamble, Fl. Pres. Madras 1549. 1931 [3: 1081. 1957 (Repr. ed.)]; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 166. 1996. *C. vaginata* Wight, Ic. t. 2088. 1853; Hook. f. Fl.

Brit. India 6: 385. 1892; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 209. 1987; Almeida in J. Econ. Tax. Bot. Addl. Ser. 8(2), Fl. Savantwadi 2: 44. 1990; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 47. 1997.

Herbs, erect or ascending, softly hairy. Leaves oblong-lanceolate, sessile, acute or obtuse at apex, villous on both surfaces; sheaths ca 1 cm long. Inflorescence axillary with 1-2 cymes; peduncles 1-3 cm long, slender. Spathe as long as inflorescence. Capsules oblong. Seeds cup shaped, brown, rugose.

Fls. & Frts. : August-October.

Illus.: Wight, *op. cit.*

Habitat: In wet places, near watercourse.

Distrib.: Endemic to Karnataka, Kerala, Tamil Nadu, MAHARASHTRA: Sindhudurg (Amboli).

Status: Critically Endangered (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Area of occupancy less than 10 sq km: found only at a single location.

Notes: This variety was earlier reported from Karnataka, Kerala and Tamil Nadu state. However, from Maharashtra it was once collected (SMA-531) from Sindhudurg district (Almeida, *op.cit.*). Here its distribution was reported as rare. It might have been newly introduced from the neighbouring Karnataka state.

This variety differs from the typical one in its softly hairy nature, ovate-falcate bracteoles and rugose seeds.

Murdannia lanuginosa (Wall. ex C.B. Cl.) Brueck. in Engl. & Prantl, Pflanzenfam. ed. 2, 15 a: 173. 1930; Gandhi in Sald. & Nicols. Fl. Hassan 648. 1976; Kammathy in Jain & Rao (eds.), Ass. Threat. Pl. India 215. 1983; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 209. 1987; Kammathy in Nayar & Sastry (eds.), Red Data Book Indian Pl. 2: 99.

1988; Almeida in Rec. Bot. Surv. India, Addl. Ser. 8(2), Fl. Savantwadi 46. 1990; Deshpande *et al.*, Fl. Mahabaleshwar 2: 610. 1995; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 173. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 47. 1997. *Aneilema lanuginosum* Wall. ex C.B.Cl. in DC. Monogr. Phan. 3: 214. 1881; Hook. f. Fl. Brit. India 6: 380. 1892; Cooke, Fl. Pres. Bombay 3: 300. 1958 (Repr.ed.). *A. siennea* Blatt. in J. Bombay nat. Hist. Soc. 33: 75. 1929. *Murdannia siennea* (Blatt.) Raiz. in Indian For. 84: 499. 1958.

Type: India, Karnataka, Bababudan hills, Heyne, September, 1816.

Herbs, erect to decumbent, 10-40 cm long, rootstock with 3-10 tubers of 3-6 cm long. Leaves 2.5-6.2 x 0.4-1 cm, sessile, linear to linear-lanceolate, finely acuminate, pubescent on both sides, margins undulate. Flowers from upper leaf sheaths, 1-5 from each sheath, orange-yellow, fading blue. Capsules 5-8 mm long, oblong, trigonous, violet, shiny, 3-celled, long cuspidate with style. Seeds 4-6 in each cell, angular, smooth or obscurely pitted.

Fls. & Frts. : May-October.

Habitat: In moist shady plateau.

Distrib.: Endemic to Karnataka, Tamil Nadu, MAHARASHTRA: Kolhapur (Asundoli village), Satara (Koyna, Mahabaleshwar, Panchgani), Sindhudurg (Amboli).

Spec. exam.: Kolhapur, near Asundoli village, *Moorthy* 155567, 11.9.1978. Satara: Mahabaleshwar, Lingmala, *Puri* 25648, 6.10.1957; Panchgani table land, *Kammathy* 32804, 14.10.1961, 78309, 16.10.1962 & 82669, July, 1962 (All in BSI).

Status: Endangered (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Extent of occurrence estimated to be ca 4,000 sq km: found only at 5 locations.

Notes: This species was described from Karnataka state, but later it was reported from Kolhapur, Satara and Sindhudurg districts of

Maharashtra state also. Here its distribution was recorded as infrequent. Overgrazing in the open plateau is the main reason of its rarity.

It can be differentiated by its longer stems, larger leaves; axillary and solitary or clustered flowers, bearded filaments and 2-seriate seeds in each cell.

ARACEAE

	<u>Genera</u>	<u>Species + Infraspecific taxa</u>
World	115	2,000
India	29	162
Maharashtra	12	27
Endemic to Maharashtra - 3 species		

Amorphophalus konkanensis Hett., Yadav & Patil in *Blumea* 39: 289, f. 1. 1994; Lakshminarasimhan in Sharma *et al.* (eds.), *Fl. Maharashtra, Monocot.* 749 1996; Yadav in Pokle *et al.* (eds.), *Flow. Pl. Syst. Diver.* pt. 1: 47. 1997.

Types: Holotype: India, Maharashtra, Sindhudurg, Maneri, *Patil* 4687 A, 15.5.1992 (CAL!). Paratypes*: Maneri, *Patil* 4687 B (BLAT!), 4687 C (L).

Herbs, tuberous; tubers globose or depressed-globose, producing rhizomatous offsets. Leaf solitary; petiole 29-88 cm long; lamina 40-96 cm in diameter, leaflets 4-19 x 1-4 cm, lanceolate, acuminate at apex. Inflorescence long peduncled, spathes 3.3-8.5 x 2.3-7 cm, erect, outside dirty pinkish with brownish hue and faint brownish spots, veins dark purplish-brown, inside maroon, base within dark maroon; spadix stipitate, 9.5-16 cm long. Female flowers congested; male flowers slightly distant. Berries ripen pinkish, 2-4-seeded. Seeds subglobose, 3-5 mm long, 2-3.5 cm in diameter.

* In the protologue of this species, specimens *Patil* 4687B and 4687C are designated as 'paratypes'. These cannot be 'paratypes' because these are the replicates of holotype (*Patil* 4687A). Hence, these are isotypes only.

Fls. & Frts. : April-June.

Illus.: Hett. *et al.*, *op. cit.*

Habitat: On laterite soils near bushes.

Distrib.: Endemic to Goa, MAHARASHTRA: Sindhudurg (Maneri).

Spec. exam.: Types, as above.

Status: Vulnerable (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Extent of occurrence less than 20,000 sq km: severely fragmented populations.

Notes: This newly described species occurs throughout Konkan region of Maharashtra and Goa. According to Yadav (by personal communication) this species is sparsely distributed in this area (25-50 individuals per sq km).

It can be differentiated from its allied species by its flattened staminodes and basal placentation.

Arisaema caudatum Engl. in DC. Monogr. Phan. 2: 559. 1879; Hook. f. Fl. Brit. India 6: 508. 1893; Cooke, Fl. Pres. Bombay 3: 333. 1958 (Repr.ed.); Blatt. in J. Bombay nat. Hist. Soc. 35: 19. 1931, *emend.* Rolla Rao & Ahuja in Bull. Bot. Surv. India 11: 450, f. 1-5. (1969) 1972; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 5. 1983 et in J. Econ. Tax. Bot. 5(1): 163. 1984; Singh & Raghavan in *ibid.* 8(1): 35. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 207. 1987; Deshpande *et al.* Fl. Mahabaleshwar 2: 615. 1995; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 211. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. syst. Diver. pt. 1: 47. 1997. *A. longicaudatum* Blatt. in J. Proc. Asiat. Soc. Bengal 26: 365. 1921 et in J. Bombay nat. Hist. Soc. 35: 20, t.3 (2). 1931; Mistry, Fl. Ratnagiri 2: 702. 1986 (Ph.D. Thesis, *ined.*).

Types: Neotype: India, Maharashtra, Satara, Panchgani, *Ansari* 105095 A, 23.7.1968 (CAL!). Isoneotype: 105095 B (BSI!), C (K), D(L), E(B).

Herbs, annual, erect, up to 100 cm high; tubers *ca* 2 cm in diameter, depressed-globose; root-fibres numerous, from the upper side of the tuber. Leaf solitary, sometimes two; petiole stout; leaflets 5-8, 12.5-22 x 5-9 cm, oblong-elliptic, obovate-cuneate, broadly lanceolate or oblong-lanceolate, caudate-acuminate. Peduncles up to 40 cm long. Male spathes up to 30 cm long, grass-green throughout, striped externally with white, tube 7-10 x 4 cm; male spadix up to 9 cm long. Female spathes up to 45 cm long; female spadix *ca* 7 cm long, flower bearing part *ca* 3.5 cm long, above female flower, appendix 4 cm long like male.

Fls. & Frts. : June-September.

Illus.: Blatt. *op. cit.* 1931 (*A. longicaudatum*); Rolla Rao & Ahuja, *op. cit.*

Habitat: In the shady places at high altitudes.

Distrib.: Endemic to MAHARASHTRA: Kolhapur (Dajipur), Pune (Bhimashankar), Ratnagiri, (Gothane), Satara (Kas plateau, Koyna, Mahabaleshwar, Panchgani).

Spec. exam.: Pune: Bhimashankar, *Venavada* 2312, 15.6.1956. Satara: Mahabaleshwar, Bhikauli forest, *Rolla* 62344, 3.6.1960; Koyna, Tapola, *Kochhar* 158482, 24.7.1979; Mahabaleshwar, Kates point, *Mishra* 175417, 14.7.1996 (All in BSI).

Status: Endangered.

Criteria: Extent of occurrence estimated to be *ca* 5,000 sq km: severely fragmented populations.

Notes: As the holotype of this species deposited at Kew by Stocks is missing, Ansari has designated its neotype from Mahabaleshwar on 1968 and deposited at CAL. Thereafter, this plant has been reported from different parts of Kolhapur, Pune, Ratnagiri and Satara districts. However, Rolla Roa & Ahuja (1972) guessed its possible distribution to be from the Igatpuri ranges to as far as Coorg or even Kerala ghats. But, still it has not been confirmed. Hence, till date this plant is considered as endemic to Maharashtra state only. At Mahabaleshwar and Panchgani it is found somewhat common in the shady areas.

This species can easily be distinguished by its petiolate leaflets with long caudate-acuminate apex.

Arisaema sahyadricum Yadav, Patil & Bachulkar in *Willdenowia* 23: 177, f. 1. 1993; Lakshminarasimhan in Sharma *et al.* (eds.), *Fl. Maharashtra, Monocot.* 750. 1996; Yadav in Pokle *et al.* (eds.), *Flow. Pl. Syst. Diver.* pt. 1: 47. 1997.

Types: Holotype: India, Maharashtra, Sindhudurg, Ramghat, *Yadav* 3986, 4.6.1991 (CAL!). Isotypes (K, SUK!). Paratypes: Sindhudurg, Choukul, *Patil* B-341 & P-342 (SUK!).

Herbs; corms 0.8-2.5 x 1.3-3 cm, globose, with fibrous roots arising from upper side. Leaf solitary; petiole 14-35 cm long, sheathing base 3-4 cm long; leaflets 3-8, subpedate, 8-21 x 3-10 cm, obovate to oblong, acuminate at apex. Spathe 7-13 cm long, reddish purple with vertical white striations; spadix sessile, 4.5-7.5 cm long, usually bisexual, sometimes unisexual and then usually staminate. Pistillate flowers many, compactly arranged; staminate flowers many, shortly stalked. Berries *ca* 6 x 7 mm, 4-5-seeded, ripen red.

Fls. & Frts. : May-July

Illus.: Yadav *et al.*, *op.cit.*

Habitat: Around small bushes at an altitude between 800-1200 m.

Distrib.: Endemic to MAHARASHTRA: Sindhudurg (Choukul, Ramghat).

Spec. exam.: Types, as above.

Status: Endangered.

Criteria: Area of occupancy *ca* 40 sq km: severally fragmented populations.

Notes: This species occurs along the main ranges of Sahyadris in south-western Maharashtra. According to Yadav (by personal

communication) it is distributed sporadically in this region (30-50 individuals per sq km).

This species can be differentiated from its closely allied species [*A. murrayi* (Grah.) Hook.] by its uniformly reddish-purple spathe and the short, thick, blunt appendix included in the spathe.

Arisaema sivadasanii Yadav, Patil & Janarthanam in *Aroideana* 20: 53, f. 1-4. 1997.

Types: Holotype: India, Maharashtra, Kolhapur, Amboli, *Yadav* 4688, 10.9.1995 (CAL!). *Isotypes*: *Yadav* 4695 A* (BLAT!), 4695 B* (BSI!), *Yadav* 4688 C, 4688 D (SUK!).

Herbs; corms globose, globose-depressed; roots fibrous, arising from the top of the corm. Leaf usually solitary; petiole *ca* 150 cm long, 3.5 cm diameter; leaflets 7-9, *ca* 30 x 11 cm, sessile or subsessile, acuminate, margins crisped, bright green above, glaucous below. Spathe up to 17 cm long, tube up to 7 x 2.5 cm, limb up to 11 x 6.5 cm; spadix bisexual or unisexual and then male; bisexual spadix up to 20 cm long, differentiated into basal pistillate portion *ca* 2 cm in length, staminate portion *ca* 3 cm in length and an appendage usually *ca* 10 cm long. Pistillate flowers many, compactly arranged; staminate flowers stalked. Berries *ca* 6 mm in diameter, 6-10-seeded, ripen red.

Fls. & Frts. : August-November.

Illus.: *Yadav et al., op. cit.*

Habitat: Along road sides and forest borders at higher altitudes (500-600 m) in Western Ghats.

Distrib.: Endemic to Karnataka, MAHARASHTRA: Kolhapur (Amboli).

Spec. exam.: Types, as above.

* In the protologue of this species, specimens *Yadav* 4695A and 4695B are designated as 'isotypes'. These cannot be 'isotypes' as the collections are different from that of the holotype (*Yadav* 4688). Hence, these are paratypes only.

Status: Critically Endangered (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Area of occupancy less than 10 sq km: found only at a single location.

Notes: This species is newly described and according Yadav (by personal communication) it may be of recent origin. Hence, there is a possibility of gradual increase of its locality.

It can be distinguished from its allied species by its short, thick appendage which projects slightly out of the spathe limb and by its late as well as prolonged flowering from August to October.

Cryptocoryne cognata Schott in *Bonplandia* 5: 222. 1857; Hook. f. *Fl. Brit. India* 6: 494. 1893; Woodrow in *J. Bombay nat. Hist. Soc.* 13: 427. 1901; Cooke, *Fl. Pres. Bombay* 3: 329. 1958 (Repr.ed.); Raghavan & Singh in Jain & Sastry (eds.), *Pl. Cons. Bull.* 3:4. 1983; Sivadasan in Jain & Rao (eds.), *Ass. Threat. Pl. India* 253. 1983; Raghavan & Singh in *J. Econ. Tax. Bot.* 5(1): 163. 1984; Singh & Raghavan in *ibid.* 8(1): 35. 1986; Ahmedullah & Nayar, *Endemic Pl. Indian Reg.* 1: 207. 1987; Almeida in *J. Econ. Tax. Bot. Addl. Ser.* 8(2), *Fl. Savantwadi* 2: 54. 1990; Singh & Kulkarni in Nayar & Sastry (eds.), *Red Data Book Indian Pl.* 3: 27. 1990; Anon., *India Glob. Threat. Taxa* 20. 1996; Lakshminarasimhan in Sharma *et al.* (eds.), *Fl. Maharashtra, Monocot.* 215. 1996; Yadav in Pokle *et al.* (eds.), *Flow Pl. Syst. Diver.* pt. 1: 47. 1997.

Types: Konkan (K).

Herbs, roots bulbous with vermiform fibres. Leaves 15-25 x 2.3-3.7 cm, oblong-lanceolate to linear-oblong, acute at both ends, margins undulate, midrib very broad, petioles stout, shorter than or equalling the blade. Spathe reaching *ca* 17.5 cm long, shortly pedunculate; tube of spathe reaching *ca* 5 cm long. Male inflorescence separated from the female by an interspace of *ca* 3 cm.

Fls. & Frts. : August-October.

Habitat: Sides of lake and also in running water.

Distrib.: Endemic to MAHARASHTRA: Sindhudurg (Achirne, Ajgaon).

Spec. exam.: Sindhudurg, Achirne, near Vaibhawadi, *Mishra* 176827, 20.8.1997 (BSI).

Status: Critically Endangered.

Criteria: Area of occupancy less than 10 sq km.: severely fragmented populations.

Notes: After its description based on 2 specimens deposited at Kew from Konkan region of Maharashtra, Almeida first recollected it from Ajgaon near Savantwadi of Sindhudurg district. Here its distribution was reported as rare. Recently in 1997 once again this species was noticed and collected from Achirne of the same district, where a very few number of mature individuals were growing in running water. There is a possibility of getting this plant from other places also, but until it is not possible some necessary steps should be taken to conserve it in these two places.

It can be distinguished by its oblong-lanceolate to linear-oblong leaves, ovate-lanceolate blade of spathe which is constricted into a long subulate tail and tube of spathe shorter than long caudate lamina.

Cryptocoryne cognatoides Blatt. & McC. in *J. Bombay nat. Hist. Soc.* 35: 17, t. 2. 1931; Sharma & Kulkarni in Nayar & Sastry (eds.), *Red Data Book. Indian Pl.* 1: 43. 1987; Kulkarni, *Fl. Sindhudurg* 468. 1988; Mistry & Almeida in *J. Bombay nat. Hist. Soc.* 86 (3): 478. 1989; Anon., *India Glob. Threat. Taxa* 20. 1996; Lakshminarasimhan in Sharma *et al.* (eds.), *Fl. Maharashtra, Monocot.* 215. 1996; Yadav, S.S. *et al.* in *Geobios new Rep.* 16 (1): 9. 1997. *C. spiralis* var. *cognatoides* (Blatt. & McC.) Yadav, Patil & Bogner in *Aqua-Planta* 2: 65. 1993; Yadav in Pokle *et al.* (eds.), *Flow. Pl. Syst. Diver.* pt. 1: 47. 1997.

Types: Holotype: India, Karnataka, N. Kanara, *T.R.D. Bell* 3091, October, 1971 (BLAT!). Isotypes: 3091 a-b (BLAT!).

Herbs, rhizomatous, roots thick, cylindrical. Leaves 8-18 x 2.5 - 4.5 cm, oblong-lanceolate, glabrous, margins undulate, apex acute to acuminate, midrib of 3 prominent nerves from base to apex, 6-8 lateral nerves ending

towards upper margin, petioles 9-15 cm long. Spathes 10-14 cm long, linear-lanceolate; spadix *ca* 4.2 cm long. Male flowers in cone like clump at the top; female flowers grouped at base, separated by *ca* 2.5 cm, long interspace.

Fls. : August-October.

Illus.: Blatt. & McC., *op. cit.*

Habitat: Amidst rocks in flowing streams as well as in marshy soils on edges of ponds.

Distrib.: Endemic to Karnataka & MAHARASHTRA: Kolhapur (Gaganhawda, Koyananagar, Tilari ghat), Ratnagiri (Gothani), Sindhudurg (Amboli ghat, Kankavli).

Spec. exam.: Sindhudurg. Kankavli-Osargaon, Kulkarni 131739, 18.8.1971 (BSI).

Status: Critically Endangered (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Area of occupancy less than 10 sq km: severely fragmented populations.

Notes: Type specimens of this species was collected from Karnataka state. In Maharashtra it was first reported by Kulkarni (1971) from Sindhudurg district. Here its distribution was reported as rare. Later in 1989, Mistry found its extended distribution up to Gothani village of Sangameshwar taluka in Ratnagiri district. Here, this plant was noticed only once on the crest of the ghats. In the recent years Yadav located it from several places of Kolhapur district where *ca* 2000 individuals were noticed(*ined.*). From Sindhudurg district also it has been collected from a new locality, Amboli ghat, where *ca* 50 individuals were distributed in about 100 sq m area (*Diwakar, Prasanna & Moorthy, 182309, ined., BSI*). Habitat modifications, grazing and trampling are the major possible threats of this species.

It can be differentiated from its allied species by its broadly oblong-lanceolate, acuminate leaves and slightly wider lower tube of spathe which is more or less constricted below the upper tube.

ALISMATACEAE

	<u>Genera</u>	<u>Species + Infraspecific taxa</u>
World	13	90
India	6	14
Maharashtra	4	5

Wiesneria triandra (Dalz.) Mich. in DC. Monogr. Phan. 3: 82--1881; Hook.f. Fl. Brit. India 6: 562. 1893; Cooke, Fl. Pres. Bombay 3: 346. 1958 (Repr.ed.); Joseph & Chandr. in J. Bombay nat. Hist. Soc. 77: 169, f. 1-11. 1980; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 13. 1983 et in J. Econ. Tax. Bot. 5(1): 163. 1984; Singh & Raghavan in *ibid.* 8(1): 36.1986; Mistry, Fl. Ratnagiri 2: 708. 1986 (Ph.D. Thesis, *ined.*); Kulkarni, Fl. Sindhudurg 471. 1988; Singh & Kulkarni in Nayar & Sastry (eds.), Red Data Book Indian Pl. 3: 7.1990; Anon., India Glob. Threat. Taxa 61. 1996; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 235. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 47. 1997. *Sagittaria triandra* Dalz. in Hook. J. Bot. 2: 144. 1850; Dalz. & Gibs. Bombay Fl. 249. 1861.

Herbs, scapigerous, *ca* 30 cm high; roots fibrous. Leaves radical, numerous, 5-12 x 0.4-0.9 cm, linear-lanceolate, obtusely keeled on the back, apex acute; petioles 6-16 cm long, sheathing at base. Scapes 12.5-15 cm long, floriferous at the apex. Whorls of flowers 6-8, of which the lower 1-2 consist of females and the upper of males. Flowers white, usually 3 in a whorl. Achenes 3-5 mm long, ovoid, apiculate, 1-seeded.

Fls. & Frts. : August- September.

Illus.: Joseph & Chandr., *op. cit.*

Habitat: In marshes on barren laterite flats.

Distrib.: Endemic to Goa, Karnataka, MAHARASHTRA: Ratnagiri (Mandavkarwadi, Dingni), Sindhudurg (Devgad, Malwan Vaibhavwadi).

Spec.exam.: Sindhudurg: Malwan, Nandurk, *Kulkarni* 121300, 29.9.1970; Deogad, Naringra, *Kulkarni* 131823, 21.8.1971; Achirne, *ca* 8 km from Vaibhavwadi, *Mishra* 176826, 20.8.1997.

Status: Endangered (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Extent of occurrence estimated to be ca 500 sq km: found only at five locations.

Notes: This species is endemic to India and is distributed along the coastal region from Maharashtra to Goa and Karnataka. In Maharashtra it is reported only from five localities so far. At Vaibhavwadi it is quite common but in other places it is reported to be infrequent. Clearing of open marshy lands for cultivation is one of the major reasons of its rarity.

It is the only representative member under the genus *Wiesneria* in India and can be differentiated from the other genera of Alismataceae by its number of stamens (3).

APONOGETONACEAE

	<u>Genera</u>	<u>Species + Infraspecific taxa</u>
World	1	30
India	1	8
Maharashtra	1	5
Endemic to Maharashtra - 2 species.		

Aponogeton bruggenii Yadav & Govekar in *Rheedea* 4(1): 34, f. 1-4. 1994; Lakshminarasimhan in Sharma *et al.* (eds.), *Fl. Maharashtra, Monocot.* 237. 1996; Yadav in Pokle *et al.* (eds.), *Flow. Pl. Syst. Diver.* pt. 1: 47. 1997.

Types: Holotype: India, Maharashtra, sindhudurg, Nerurpar, ca 9 km west to Kudal, *Yadav* 1, 10.9.1992 (CAL!). Isotype (BSI!).

Herbs, perennial, tuberiferous, 10-30 cm high. Tubers 0.6-3 x 1-2 cm, globose to elongate, crowned with fibrous roots. Leaves all emerging, semierect; petioles 5-25 cm long, stout; lamina 2-7.5 x 1.8-3.3 cm, oblong-ovate, cordate, truncate or rounded at base, entire, acute or rounded at apex, 7-9-nerved, amphistomatic, dark green. Inflorescence 1-spiked;

peduncles 20-30 cm long, slender; spathe *ca* 1.5 x 0.6 cm, caducous; spike 6-7 cm long, densely flowered. Flowers pink, all around the axis. Fruits 5-7 x 2-3 mm, beaked, smooth. Seeds with simple testa.

Fls. & Frts. : August - September.

Illus.: Yadav & Govekar, *op. cit.*

Habitat: In paddy fields, along the banks of Tarkarli river.

Distrib.: Endemic to MAHARASHTRA: Sindhudurg (Nerurpar).

Spec.exam.: Sindhudurg: Nerurpar, *ca* 9 km west to Kudal, Mishra 176824, 20.8.1997 (BSI).

Status: Critically Endangered.

Criteria: Area of occupancy up to 2 sq km: found only at a single location.

Notes: This species is a weed in paddy fields and quite abundant (5-60 mature individuals per sq m) in this area. Still it has been put into Critically Endangered category due to its localised distribution. Weeding operations in paddy fields is the major threat of this species. Hence, this habitat should be conserved until new locality is discovered.

It can be distinguished by its all emerging leaves, 1-spiked inflorescence, flowers all around axis, tepals up to 3 mm long and single testa.

Aponogeton satarensis Sundararaghavan, Kulkarni & Yadav in *Kew Bull.* 36 (4): 687, f. 1. 1982; Singh & Raghavan in *J. Econ. Tax. Bot.* 8(1): 35. 1986; Mistry & Almeida in *J. Bombay nat. Hist. Soc.* 86(3): 478. 1989; Bachulkar in *Rayat Research J.* 1(2): 113. 1993; Lakshminarasimhan in Sharma *et al.* (eds.), *Fl. Maharashtra, Monocot.* 239. 1996; Yadav in Pokle *et al.* (eds.), *Flow. Pl. Syst. Diver.* pt. 1: 47. 1997; Yadav, S.S. *et al.* in *Geobios new Rep.* 16: 9. 1997.

Types: Holotype: India, Maharashtra, Satara, Mavashi plateau, *Yadav* Y-15 (CAL). Isotypes: Y-15 B-C (K), D-F (Ram Narain Ruia College, Bombay), G (BSI!).

Herbs, scapigerous, partly submerged, annual, 16-25 cm high. Tubers 1.4-1.6 cm across, globose. Leaves all emarginate; petioles 4-12 cm long; lamina 3.5-8.2 x 0.5-1.4 cm, lanceolate, base cuneate to rounded, apex tapering, acute. Spathes 0.8-1.2 x 0.25-0.3 cm, wide conical. Spikes dioecious, once forked, purple. Male inflorescence 5-7 cm long; tepals purple, turning rose to pale white. Female inflorescence 2.5-3.5 cm long. Follicles 6-7 x ca 4 mm. Seeds 1-2.

Fls. & Frts.: May September.

Illus.: Sundararaghavan *et al.*, *op. cit.*

Habitat: In temporary, shallow, stagnant pools on open plateau.

Distrib.: Endemic to MAHARASHTRA: Ratnagiri (Gothane plateau), Satara (Kas plateau, Mavashi plateau, Patan plateau).

Spec. exam.: Satara: Mavashi plateau, near Karad, *Raghavan* 161738, 24.9.1983; Kas plateau, *Mishra* 175407, 1.7.1996 (Both in BSI).

Status: Endangered.

Criteria: Area of occupancy up to 3 sq km: found at only four locations.

Notes: Though the total approximate area of its occupancy qualified itself for Critically Endangered category, it occurs at four isolated locations and is quite ample (10-50 mature individuals per sqm) in these places. There are possibilities of getting this species from some other plateaus also. However, at Panchgani plateau it could not be traced even after intensive searching. The species can be conserved only by protecting its habitat because its cultivation is difficult. It has been reported that the immediate danger to the species at Gothani plateau may be due to a proposed dam which may inundate the sites (*Mistry & Almeida*, 1989).

This species can easily be identified by its forked and 2-spiked inflorescences.

ERIOCAULACEAE

	<u>Genera</u>	<u>Species + Infraspecific taxa</u>
World	13	1,150
India	1	70
Maharashtra	1	36
Endemic to Maharashtra - 6 species		

Eriocaulon bolel Bole & Almeida in J. Bombay nat. Hist. Soc. 83: 600. 1987; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 247, 1996.

Type: Holotype: India, Maharashtra, Satara, Mahabaleshwar, Lingmala, P.V. Bole 2230, 6.11.1955 (BLAT!).

Herbs, 10-20 cm high. Leaves small, lanceolate. Heads *ca* 1 cm across, white. Bracts covering the floral parts completely. Male flowers 1-3 in a single bract; sepals 2, lanceolate or spatulate; petals united into a tube; stamens 4-6, anthers black, basifixed. Female flowers 1-2 in each bract; sepals 2, boat-shaped, hairy on the back; petals linear, with faint black spots, with long white hairs. Nuts brownish-red.

Fls. & Frts. : November.

Habitat: In running waters.

Distrib.: Endemic to MAHARASHTRA: Satara (Mahabaleshwar).

Spec. exam.: Type, as above.

Status: Critically Endangered.

Criteria: Area of occupancy less than 10 sq km: found only at a single location.

Notes: Though, this species was collected in 1955, it has been described in 1987 only. Hence, there is a possibility of its further report in the adjacent places having similar climatic conditions. But until it has

been done it should be kept under Critically Endangered category and must be conserved.

It can be distinguished by its glabrous nature, larger heads (0.7-1 cm across), longer scapes (10-15 cm long), black floral bracts with white hairs on the back, 2 female sepals, hairy (upper part) female petals and brown to black anthers.

Eriocaulon ratnagiricus Yadav, Gaikwad & Sardesai in *Rheedea* 8(2): 145, f. 1. 1998.

Types: Holotype: India, Maharashtra, Ratnagiri, Dharmashala, about 3 km from Ratnagiri on the way to Pavas, *Gaikwad* 1A, 1.10.1996 (CAL).
Isotypes: 1B (BSI!), 1C (K), 1D (BL), 1E (SUK).

Herbs, erect, acaulescent, tufted, up to 2.5 cm high. Leaves 0.5 - 1 x 0.1-0.2 cm, rosulate, linear, acuminate, glabrous. Peduncles few, 2-2.2 cm long, ribbed, glabrous. Heads *ca* 1.5 cm in diameter, obovoid, pale yellow. Involucral bracts *ca* 1.25 x 1 mm erect or spreading, oblong-obovate, obtuse or acute, chartaceous, glabrous, hyaline. Floral bracts *ca* 1 x 0.5 cm, oblong-oblongeolate, acute, sparsely hairy towards apex, hyaline. Flowers minutely pedicellate. Seeds *ca* 1 x 0.6 mm, oblong-ellipsoid, brown, dark brown at acute end.

Fls. & Frts. : September-October.

Illus.: Yadav *et al.*, *op.cit.*

Habitat: On lateritic plateaux along temporary pond margins and in wet grounds.

Distrib.: Endemic to MAHARASHTRA: Ratnagiri.

Spec. exam.: Type, as above.

Status: Critically Endangered.

Criteria: Area of occupancy *ca* 1 sq km: found only at a single location.

Notes: This species has been described recently and according to authors (Yadav *et al.*) it is restricted to a small area with *ca* 150 individuals in about 5 subpopulations. According to Gaikwad (*ined.*) the habitat of the species has been decreased @ 20-50% in the last 3 years. Hence, until its further report from any other place, this locality must be protected for its conservation.

It can be differentiated from its closely allied species (*E. trilobum* Koern.) by its linear-lanceolate sepals of female flowers, white anthers and seeds without appendages.

Eriocaulon rouxianum Steud. Syn. Pl. Glum. 2: 270. 1855; Cooke, Fl. Pres. Bombay 3: 363. 1958 (Repr.ed.); Fyson in J. Indian Bot. 3: 18. 1922; Lakshminarasimhan & Sharma, Fl. Nasik 494.1991; Ansari & Balakr., Fam. Eriocaul. India 188. 1994; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 269. 1996.

Type: Holotype: India, Maharashtra, Bombay, *P. roux s.n.*, 1832.

Herbs, acaulescent. Leaves 2.5-3.7 cm long, lanceolate from a broad base. Heads *ca* 0.43 cm in diameter; involucre bracts herbaceous, erect, linear-oblong, obtuse, $\frac{1}{4}$ th longer than the white villous head; floral bracts obovate, obtuse, ciliate. Sepals lanceolate, ciliate at apex.

Fls. & Frts. : October.

Habitat: In marshy places.

Distrib.: Endemic to MAHARASHTRA: Bombay, Nasik (Igatpuri).

Spec. exam.: Nasik: Igatpuri, *D.K. Patel s.n.* 20.10.1982 (BLAT).

Status: Critically Endangered.

Criteria: Area of occupancy less than 10 sq km: a) found only at a single location, b) declension in the number of subpopulations.

Notes: According to Ansari & Balakr. (1994), this is probably an extinct species, because it has not been recollected from its type locality after 1832. They have also mentioned that no specimen of this species is

available in Indian herbaria. But surprisingly they did not comment anything about the specimen from Nasik district, deposited in BLAT. It seems that they might have overlooked this specimen and hence, its status has been changed.

Eriocaulon santapauli Moldenke in *Phytologia* 3: 163. 1949; Sant. in *Rec. Bot. Surv. India* 16(1), Fl. Khandala 296. 1967 (3rd Rev. ed.); Raghavan & Singh in Jain & Sastry (eds.), *Pl. Cons. Bull.* 3: 10. 1983 et in *J. Econ. Tax. Bot.* 5(1): 163. 1984; Singh & Raghavan in *ibid.* 8(1): 36. 1986; Ansari & Balakr., *Fam. Eriocaul. India* 56, f. 17. 1994; Lakshminarasimhan in Sharma *et al.* (eds.), *Fl. Maharashtra, Monocot.* 263. 1996; Yadav in Pokle *et al.* (eds.), *Flow. Pl. Syst. Diver.* pt. 1: 48. 1997.

Types: Holotype: India, Maharashtra, Pune, Khandala, near Kune Mission, *Santapau & McCann* 1290, 7.11.1942 (NY). Isotype (BLAT!).

Herbs, acaulescent. Leaves rosulate, up to 4 x 0.3 cm, linear-lanceolate, acute or obtuse, glabrous. Sheaths up to 3 cm long, glabrous; limb lanceolate, obtuse or subacute. Peduncles many, up to 20 cm long, virgate, glabrous. Heads *ca* 3 mm across, ovoid or obovoid, grey; involucre bracts *ca* 2 x 1 mm, erect or spreading, oblong-lanceolate, obtuse, chartaceous, straw coloured; Floral bracts *ca* 1.5 x 0.5 mm, oblanceolate-cuneate, obtuse or subacute, chartaceous, black. Seeds *ca* 0.45 x 0.35 mm, ovoid-globose, obtuse, pale purple.

Fls. & Frts.: September-November.

Illus.: Ansari & Balakr., *op. cit.*

Habitat: In streams at high altitude.

Distrib.: Endemic to MAHARASHTRA: Pune (Khandala).

Spec. exam.: Type, as above.

Status: Critically Endangered.

Criteria: Area of occupancy less than 10 sq km: found only at a single location.

Notes: This species is known only by its type collection in 1942 from Khandala. Recently during 1996-1998 efforts were made to collect it but in vain.

Eriocaulon sharmae Ansari & Balakr. Fam. Eriocaul. India 36, f. 9. 1994; Lashminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 754. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 48. 1997.

Types: Holotype: India, Maharashtra, Ratnagiri, Amboli plateau (presently in Sindhudurg district), *Kulkarni* 106366, 7.11.1965 (BSI!).

Herbs, acaulescent. Leaves rosulate, up to 25 x 2 cm, oblong, obtuse or subacute, glabrous. Sheaths up to 12 cm long, glabrous; limb lanceolate, acuminate, entire. Peduncles many, up to 36 cm long, rigid, glabrous. Heads *ca* 1 cm across, globose, white; involucre bracts *ca* 3 x 2 mm, obovate, acute or subacuminate, reflexed; chartaceous, dorsally sparsely pilose, straw coloured; floral bracts *ca* 3.8 x 1 mm, oblanceolate, acuminate, chartaceous, black. Seeds *ca* 0.7 x 0.6 mm, oblong-ellipsoid or globose, obtuse, dark purple.

Fls. & Frts. : November onwards.

Illus.: Ansari & Balakr., *op.cit.*

Habitat: In open places at high altitude.

Distrib.: Endemic to MAHARASHTRA. sindhudurg (Amboli).

Spec. exam.: Type, as above.

Status: Data Deficient.

Notes: This is a newly described species based on an earlier collection made from Amboli and deposited at BSI. After its description the type locality was explored only once in 1997, but the species could not be traced. It is probably due to the time of exploration which was somewhat earlier in the season. Hence, before categorising it, the type locality and the adjacent places have to be explored again.

It can be differentiated from its closely allied species (*E. robusto-brownianum* Ruhl.) by the number and structure of seed coat appendages, pilose involucre bracts and lanceolate sepals in female flowers.

Eriocaulon tuberiferum A.R. Kulkarni & Desai in J. Bombay nat. Hist. Soc. 71: 81, t. 1974; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 10. 1983 et in J. Econ. Tax. Bot. 5 (1): 163. 1984; Singh & Raghavan in *ibid.* 8 (1): 36. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 211. 1987; Ansari & Balakr. Fam. Eriocaul. India 151, f. 53. 1994; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 267. 1996; Yadav in Pokle *et al.* (eds.), Flow Pl. Syst. Diver. pt. 1: 48. 1997.

Types: Holotype: India, Maharashtra, Kolhapur, Panhala, A.R. Kulkarni & Desai 537, 28.7.1968 (CAL!). Isotypes: 538-540 (SUK!).

Herbs, acaulescent, tuberiferous; root tubers 2-15, *ca* 4 x 2.5 mm, oval or bilobed, covered with unicellular hairs. Leaves rosulate, up to 5 x 0.5 cm, linear-lanceolate, acuminate, rigid, glabrous, 5-7-nerved. Sheaths up to 6 cm long, glabrous, closely appressed to the peduncles, obliquely split at apex; limb ovate, acuminate. Peduncles 1-3, 11-18 cm long. Heads *ca* 9 mm across, spherical or hemispherical, black or grey; involucre bracts many, *ca* 2 x 1 mm, reflexed, oblong, acute or obtuse, chartaceous, glabrous, black; floral bracts *ca* 2.5 x 1 mm, oblanceolate, acute or acuminate, chartaceous, black. Male flowers numerous, both towards periphery and centre of the head; female flowers few, restricted to the periphery of the head. Seeds *ca* 0.5 x 0.4 mm, ovoid-globose, obtuse or apiculate, purple.

Fls. & Frts. : July-September.

Illus.: Kulkarni & Desai, *op.cit.*: Ansari & Balakr., *op. cit.*

Habitat: Along the margins of puddles.

Distrib.: Endemic to MAHARASHTRA: Kolhapur (Panhala, Radhanagari), Satara (Kas).

Spec. exam.: Kolhapur: Panhala, Mishra 176833, 21.8.1997. Satara: Kas plateau, Mishra 176838, 22.8.1997 (Both in BSI).

Status: Endangered.

Criteria: Area of occupancy up to 20 sq km: found only at three locations.

Notes: So far this species is reported only from Kolhapur and Satara districts. It is somewhat common at Kas and Panhala, but is very much localised. Gradual encroachment of its natural habitat as well as increasing pressure from the tourists are the major threats of this species. Hence, before qualifying Critically Endangered category it should be conserved by protecting its habitat.

It can be distinguished by its tuberous nature, distinctly anisopetalous male flowers and yellowish or white anthers in young stage.

HYDATELLACEAE

	<u>Genera</u>	<u>Species + Infraspecific taxa</u>
World	2	7
India	1	1
Maharashtra	1	1

Trithuria konkanensis Yadav & M.K. Janarthanam in *Rheedea* 4: 18, f. 1-6. 1994; Lakshminarasimhan in Sharma *et al.* (eds.), *Fl. Maharashtra*, Monocot 269. 1996; Bhat in *Indian J. For.* 20: 104. 1997; Yadav in Pokle *et al.* (eds.), *Flow. Pl. Syst. Diver.* pt.1: 47. 1997.

Types: Holotype: India, Maharashtra, Sindhudurg, Achirane, in between Phonda & Vaibhavadi, *Yadav & Janarthanam* 1001, 20.9.1993 (CAL!). Isotype (BSI!).

Herbs, annual, up to 1.3 cm high, green to red; roots fibrous; stems reduced. Leaves tufted, numerous, up to 1.2 x 0.08 cm, linear, flattened, acute at apex, entire, 1-nerved, green to red. Capitula numerous, scapose, crowded among leaves; bracts 2, up to 5 x 0.6 mm, linear, 1-nerved, leaf like. Flowers unisexual, naked; male flowers solitary with red stamens, 1 per capitulum, at the centre, surrounded by female flowers; female flowers 15-20 per capitulum, each represented by a solitary pistil. Fruits up to 0.3

mm long, ovoid with three longitudinal ribs, stigmatic hairs persistent. Seeds translucent with dark tip.

Fls. & Frts. : September-October.

Illus.: Yadav & M.K. Janarthanam, *op. cit.*

Habitat: In temporarily inundated, sandy-gravelley areas.

Distrib.: Endemic to Karnataka, MAHARASHTRA: Sindhudurg (Achirane).

Spec. exam.: Types, as above.

Status: Low Risk.

Notes: Earlier this species was considered to be endemic to Maharashtra State only. However, in 1997 Bhat (*op.cit.*) reported it from Karnataka also. According to Yadav (by personal communication), it is common throughout coastal plains right from Ratnagiri to Mangalore of Karnataka state. Hence, it is not included into threatened category.

It is worth mentioning that this species is the single member of the family Hydatellaceae reported from India. Earlier this family was thought restricted to Australia, New Zealand and Tasmania (Yadav & M.K.Janarthanam, *op.cit.*).

CYPERACEAE

	<u>Genera</u>	<u>Species + Intraspecific taxa</u>
World	90	4,000
India	39	580
Maharashtra	22	174
Endemic to Maharashtra - 12 species & 1 subspecies.		

Cyperus decumbens Govind. in J. Indian Bot. Soc. 52: 72, f. 1. 1973; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 213. 1987; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra Monocot.

281. 1996. *Pycneus decumbens* (Govind.) P. & V. Singh in J. Econ. Tax. Bot. 5: 467. 1984.

Type: Holotype: India, Maharashtra, Satara, Mahabaleshwar, *Sedgwick* 4792 (PCM). Isotype: 4792A (CAL!).

Herbs, annual; culms caespitose, trigonous, erect or decumbent at base. Leaves shorter than or as long as culms, narrow, flat, glabrous. Inflorescence simple, capitate or subspiciform, consisting of 3-5 spikelets; bracts 2, 1.5-3 cm long, unequal. Spikelets 5-12 x ca 2 mm, linear-lanceolate or narrowly ovate, 16-26-flowered; glumes distichous, castaneous, margins hyaline, ca 1.6 x 1.5 mm, broadly deltoid ovate, keeled. Nuts 7.5-8.5 mm long, suborbicular or subelliptical, turgid, biconvex, shining, castaneous, black, shortly stipitate.

Illus.: Govind. *op. cit.*

Distrib.: Endemic to MAHARASHTRA: Satara (Mahabaleshwar).

Spec. exam.: Type, as above.

Status: Data deficient.

Notes: This species was described in 1973 based on earlier collections made during the second decade of this century. Thereafter no information is available regarding its distribution pattern and frequency. Efforts were made to collect it during 1996-1998, but could not get success. This area needs to be explored again thoroughly before determining the status of this species.

It can be distinguished by its annual nature, gracile culms which are curved at base and non spicate spikelets.

Cyperus pentabracteatus Govind. & Hemadri in Proc. Indian Acad. Sci. 82 B: 207, f. 2. 1975; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 213. 1987; Lakshminarasimhan in Sharma *et al.*(eds.) Fl. Maharashtra, Monocot. 291. 1996.

Types: Holotype: India, Maharashtra, Pune, Durga khilla Malvanddara, 17-18 miles west of Junnar, *Hemadri* 107562 A, 1.10.1965 (CAL!). Isotype: 107562 B (BSI!).

Herbs, perennial; rhizomes distinct, long, woody; culms 70-80 cm high, triquetrous. Leaves 1-5 per culm, 4-6 mm broad, 3/4th or nearly as long as the culms, flat, acuminate, asperous in upper half of abaxial surface, scabrid at margins and abaxial surface. Inflorescence simple, 1-1.5 x 1.5-2 cm, contracted, capitate, obtuse, broadly ovate or subglobose, consisting of numerous spikelets. Spikelets 5-6 x 0.8-1 mm, ovate-lanceolate or subulate, 1-flowered. Nuts 2.8-2.9 x 0.8-1 mm, broadly ellipsoid, narrowing at both ends, yellowish-brown.

Fls. & Frts. : September-October.

Illus.: Govind. & Hemadri, *op. cit.*

Distrib.: Endemic to MAHARASHTRA: Pune (Junnar).

Spec.exam.: Types, as above.

Status: Critically Eendangered.

Criteria: Area of occupancy less than 10 sq km: found only at a single location.

Notes: This species is known only by its type collections. Efforts were made to collect it during 1995-1996 at Junnar and surroundings without success.

It can be distinguished by its perennial nature with woody rhizome and spicate spikelets with single flower.

Eleocharis lankana Koyama in Bull. Natl. Sci. Mus. 17: 67, f. 1. 1974. subsp. ***mohamadif*** Wadood Khan in J. Econ. Tax. Bot. 22 (3): 560, t.3. 1998.

Types: Holotype: India, Maharashtra, Kolhapur, Kagal Lake, near Kolhapur city, *Wadood Khan* 4254 a (CAL). Isotypes: 4254 b-d (BSI).

Herbs, perennial, leafless, densely tufted, 10-30 cm high; rhizomes stoutish; stolons 10-30 cm long, slender, bright golden brown; culms terete, distinctly septate, strongly ribbed, greenish to pale yellowish. Inflorescence a single terminal spikelet. Spikelets 2.5 - 4 x 0.3-0.45 cm, cylindrically

elongated, angular, stramineous to pale-yellowish; glumes 5.5 - 6 x 2.5 - 3 mm, ovate to elliptic-oblong, striated. Nuts *ca* 2 x 1.5 mm, obovate oblong, subturgid, finely striated, stramineous to pale brown.

Fls. & Frts.: October - December.

Illus.: Wadood Khan, *op.cit.*

Habitat: In perennial lakes and ponds, often in stagnant waters.

Distrib : Endemic to MAHARASHTRA: Kolhapur.

Status: Critically Endangered.

Criteria: Area of occupancy up to 500 sqm: found only at a single location.

Notes: This taxon has been described very recently and it should be considered as endemic to its type locality until its further report from any other place. Though, here it is quite common (15-20 mature individuals per sqm), it has been categorised as Critically Endangered because it is restricted to a small area. It may face danger of extinction in immediate future. Hence, further explorations are essential to locate it in the adjacent places and if not available, steps have to be taken to conserve it at its type locality only. Clearing of lakes and ponds may be the main cause of its rarity.

This subspecies differs from the typical one (*E. lankana* Koyama subsp. *lankana*) by its golden-brown stolons which are 10-30 x 0.3-0.5 cm, emitting from the thick rhizomes and by angular spikelets. *E. lankana* Koyama subsp. *lankana* is endemic to Srilanka.

Fimbristylis ambavanensis V.P. Prasad & N.P. Singh in J. Bombay nat. Hist. Soc. 96 (3): 454, f. 1. (A-F) 1999.

Types: Holotype: India, Maharashtra, Pune, Mulshi, Ambavane, B. Venkatta Reddi 99049, 6-9. 1964 (CAL!). Isotypes: 99049 A & B (BSI!).

Herbs, annual, glabrous, with fibrous roots; culms *ca* 25 cm high, tufted, slender, compressed, more or less flat below the inflorescence,

striate. Leaves 6-18 x ca 0.1 cm, shorter than or as long as stems, flat, linear, abruptly acuminate at apex, margins infolded and thickened on upper surface; sheaths up to 6 cm long, chartaceous, striate; ligule a fringe of short hairs. Inflorescence 0.8-1.5 cm long, with 3-12 spikelets, lax, simple or compound; involucre bracts 2-3, lowest overtopping the inflorescence. Spikelets solitary, rarely paired, 3-4 x 1.5-2 mm, ovoid to oblong-lanceolate, few-flowered, brown; glumes ca 2 x 1.5 mm, spiral, ovate, mucronulate, keeled, membranous. Nuts ca 1 x 0.6 mm, trigonous, obovoid, umbonulate, shortly stipitate, smooth, creamish white.

Fls. & Frts.: September.

Illus.: V.P. Prasad & N.P. Singh, *op.cit.*

Habitat: Top of the fort.

Distrib.: Endemic to MAHARASHTRA: Pune (Ambavane).

Spec. exam.: Types as above.

Status: Data Deficient.

Notes: This species is described very recently, based on herbarium specimens deposited at BSI. During the collection of type specimens it was reported to be common at type locality. But, before putting it into proper category, its present distribution pattern has to be observed at its type locality and adjoining areas.

It can be differentiated from its closely allied species (*F. capilliculmis* Ohwi) by its wider leaves, single stamen, smaller style (ca 1 mm long) and longer nuts.

Fimbristylis nagpurensis V.P. Prasad & N.P. Singh in J. Econ. Tax.Bot. 21 (3): 671, f. 1 (A-E). 1997.

Types: Holotype: India, Maharashtra, Nagpur, College of Science premises, V.P. Donde D 10, August, 1961 (CAL!). Isotypes (BSI!).

Herbs, annual, with fibrous roots; culms ca 30 cm high, tufted, slender. Leaves 0.7-1 mm broad, shorter than stems, upper leaves highly reduced;

sheaths up to 3 cm long, papery. Inflorescence 1.5 - 2 x 1-1.5 cm, with 3-8 spikelets, simple or subcompound. Spikelets *ca* 3 x 1.2 mm, ovoid, acute, yellowish-brown, few-flowered; glumes *ca* 1.5 x 1 mm, spiral, broadly ovate, acute-mucronate, keeled, membranous. Nuts *ca* 0.7 x 0.5 mm, trigonous, broadly obovoid, minutely apiculate, whitish, verruculose.

Fls. & Frts.: August.

Illus.: Prasad & N.P. Singh, *op. cit.*

Distrib.: Endemic to MAHARASHTRA: Nagpur.

Spec. exam.: Types, as above.

Status: Data Deficient.

Notes: This is a newly described species, based on earlier collected herbarium specimens deposited at BSI. As information regarding its distribution pattern is lacking, explorations are needed at its type locality and adjoining areas before putting it into proper category.

It can be differentiated from its closely allied species (*F. dauciformis* Govind. and *F. tenera* R. & S.) by its narrower leaves, shorter inflorescence with less number of spikelets, inconspicuous involucre bracts, shorter spikelets, single stamen and obtuse nuts which are minutely apiculate at apex.

Fimbristylis ratnagirica V.P. Prasad & N.P. Singh in J. Econ. Tax. Bot. 21 (3): 673, f.2 (A-G). 1997.

Types: Holotype: India. Maharashtra, Ratnagiri, Kasal, Osargaon plateau (presently in Sindhudurg district), *Kulkarni* 131758, 18.8.1971 (CAL!). Isotype: 131758 A (BSI!).

Herbs, annual, glabrous; culms 6-10 cm high, tufted, slender, compressed, trigonous. Leaves 1.5-5 x 0.03-0.08 cm, up to half the length of the stem, linear, flat, abruptly acuminate at apex; sheaths 4-12 mm long, chartaceous, striate. Inflorescence usually reduced to a single spikelet, at times with an additional peduncled spikelet; involucre bract 1, very small; glumes *ca* 1.8 x 1 mm, spiral, broadly ovate, acute and mucronate

at apex, membranous, keeled. Nuts *ca* 0.8 x 0.5 mm, trigonous, obovoid, umbonulate, minutely stipitate, sparsely verruculose, creamish white.

Fls. & Frts. : August.

Illus.: V.P. Prasad & N.P. Singh, *op. cit.*

Habitat: On rocks in plateau.

Distrib.: Endemic to MAHARASHTRA: Sindhudurg (Kasal).

Spec. exam.: Types, as above.

Status: Data Deficient.

Notes: It is also a newly described species, based on earlier collected herbarium specimens, deposited at BSI. So, before placing it into proper category, detailed information regarding its distribution pattern have to be collected through extensive field exploration at its type locality and adjoining places.

This species can be differentiated from its closely allied species (*F. woodrowii* Cl.) by its shorter stems which are much slender and inflorescence usually of a single spikelet.

Flmbristylis unispicularis Govind. & Hemadri in Proc. Indian Acad. Sci. 82 B: 205, f. 1. 1975; Raghavan & Singh in J. Econ. Tax. Bot 5(1): 164. 1984; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 215. 1987; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 321. 1996. Yadav in Pokle *et al.* (eds.), Flow.Pl. Syst. Diver. pt. 1: 48. 1997.

Types: Holotype: India, Maharashtra, Pune, Durga Khilla, about 30 km west of Junnar, Hemadri 107528 A, 1.10.1965 (CAL!). Isotypes: 107528 B-D (BSI!), E(CAL!), F(K), G(L), H(MO), I(LE), J(MH), K(BLAT!).

Herbs, annual; culms 2.5–5 cm high, fasciculate, erect. Leaves 3-5 x *ca* 0.05 cm, distichous, acute or subacute, ligulate, nearly as long as the culms; sheaths glabrous or sparsely ciliate, ferruginous, purple-dotted.

Bract solitary, 2-3 mm long, erect, glabrous. Spikelet solitary at the end of culms, *ca* 3 x 2.5 mm, ovate, few-flowered, castaneous brown; glumes 1.5 - 2 x *ca* 1 mm, ovate, acute, keeled. Nuts up to 1 x 0.75 mm, obovate, biconvex, shortly stipitate, umbonulate, white or stramineous.

Fls. & Frts. : September - October.

Illus.: Govind. & Hemadri, *op. cit.*

Habitat: In open, grassy plateau at an altitude of *ca* 1,100 m.

Distrib.: Endemic to MAHARASHTRA: Pune (Junnar).

Spec. exam.: Types, as above.

Status: Critically Endangered.

Criteria: Area of occupancy less than 10 sq km: found only at a single location.

Notes: This species is represented only by its type collections. During 1995-1996 efforts were made to recollect it at Junnar and surroundings but in vain. However, it needs more efforts and if available to be protected immediately. Grazing is the major threat of this sedge.

It can be distinguished by its solitary spikelet with 2 stamens and 2-fid style.

Mariscus blatteri McC. in J. Bombay nat. Hist. Soc. 37: 532. 1934; Deshpande *et al.*, Fl. Mahabaleshwar 642. 1995; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 333. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 48. 1997.

Types: Holotype: India, Maharashtra, Satara, Mahabaleshwar, Nana 7627, October 1920 (BLAT!). Isotype: 7627A (BLAT!). Paratype: Mahabaleshwar, Nana 7646, October, 1920 (BLAT!).

Herbs, *ca* 70 cm high, tufted. Leaves up to 88 x 0.6 cm, equalling or longer than stems, linear, acuminate, scabrous on upper surface, margins minutely serrulate. Inflorescence *ca* 2.4 x 1.9 cm, consisting of numerous

spikelets, reddish; bracts up to 9, leafy, *ca* 34.5 x 0.6 cm. Spikelets *ca* 8 x 1.7 mm, angular, rachilla winged; glumes 2-3 mm long, ovate-lanceolate, 7-9-nerved, margins incurved. Nuts *ca* 3.5 x 1.3 mm, oblong, trigonous, puncticulate.

Fls. & Frts.: October.

Distrib.: Endemic to MAHARASHTRA: Satara (Mahabaleshwar).

Spec. exam.: Types, as above.

Status: Critically Endangered.

Notes: This species is known only by the type collection during first half of this century. Thereafter, it could not be relocated even after intensive searching. However, more explorations are needed to trace it and whenever it will be possible to be conserved immediately.

It can be distinguished by the absence of stolons and oblong base of stems which is thickened by the turgid, membranous, coloured sheaths.

Marisens konkanensis (T. Cooke) Sedgw. in J. Bombay nat. Hist. Soc. 25: 698. 1918; Blatt. & McC. in *ibid.* 37: 534. 1934; Mistry, Fl. Ratnagiri 2: 756. 1986 (Ph.D. Thesis *ined.*); Deshpande *et al.*, Fl. Mahabaleshwar 2: 643. 1995; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 339, f. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1. 48. 1997. *Cyperus konkanensis* T. Cooke, Fl. Pres. Bombay 3: 387. 1958 (Repr.ed.).

Herbs, perennial, tufted; culm solitary, up to 75 cm high, robust, erect, triquetrous. Leaves *ca* 60 cm long, rigid, folded, transverse septae nodulose. Inflorescence of compound umbel, up to 22 cm long; bracts 4-5, up to 60 cm long; primary rays 5-7, up to 12 cm long, bearing 3-6 spikes. Spikes digitate, up to 4.5 cm long; knobs prominent. Spikelets distant, up to 7 mm long, spreading at right angles, green, turning straw-coloured. Nuts *ca* 3 mm long, oblong, triquetrous, pale brown.

Fls. & Frts. : July-November.

Illus.: Lakshminarasimhan, *op. cit.*

Illus.: Lakshminarasimhan, *op. cit.*

Habitat: On rocky soils in the crest of ghats.

Distrib.: Endemic to MAHARASHTRA: Dhule, Nagpur, Pune (Khandala, Purandhar), Ratnagiri, Satara (Fitzgerald ghat, Mahabaleshwar), Thane.

Spec. exam.: Pune: Khandala, *Bhide* 15417, without date; Purandhar fort, *Blatter & McCann*. 5572, without date. Satara: Mahabaleshwar, *Sedgwick* 4617, without date; Fitzgerald ghat *McCann* 2974-8 & 3410, without date (All in BLAT).

Status: Low Risk.

Notes: Earlier this species was known confined to only Konkan region of Maharashtra. Later its extended distribution was discovered up to Dhule and Nagpur district. Hence, now it can be considered as a widely distributed species in Maharashtra.

It can be distinguished by its large and stout stems which are thickened by much dilated leaf-sheaths, erect and distantly arranged spikelets along the rachis and smooth nuts.

Pycreus boleii S. M. Almeida in *J. Bombay nat. History Soc.* 83: 180, t. 1, f. 1. 1986 et in *J. Econ. Tax. Bot. Addl. Ser.* 8(2), Fl. Savantwadi 2: 91. 1990; Lakshminarasimhan in *Sharma et al.* (eds.), *Fl. Maharashtra, Monocot.* 344. 1996; Samaddar & Roy, *Add. Ele. Indian Fl.* 1: 354. 1997.

Type: Holotype: India, Maharashtra, Sindhudurg, Savantwadi, Satara, *S.M. Almeida* SMA-3438, 22.10.1980 (BLAT!).

Herbs, ca 30 cm high, tufted; culms striate. Leaves 27-30 cm long, flat, linear, narrowing to apex, glabrous. Inflorescence of compact, sessile, stellate, linear spikes; bracts 4-5, 15-20 x 0.2-0.3 cm, leaf-like, glabrous. Spikes 0.7-1.3 x 0.02-0.03 cm, linear, sessile, straw coloured with 25-40 spikelets; glumes 0.5- 1 x 0.5 - 0.7 mm, ovate, aristate, keeled. Nuts oblanceolate, compressed, shortly apiculate, marked with longitudinal rows of tubercles on the surface.

Fls. & Frts. : October-November.

Illus.: S.M. Almeida, *op. cit.*

Habitat: In open paddy fields near river banks.

Distrib.: Endemic to MAHARASHTRA: Sindhudurg (Satarda).

Spec. exam.: Type, as above.

Status: Critically Endangered.

Criteria: Area of occupancy less than 10 sq km: found only at a single location.

Notes: So far this species is reported only from its type locality, where its distribution was recorded as rare. In 1997 efforts were made to locate it in the adjoining areas without success. Weeding operations in the paddy fields might be the major cause of its rarity.

It can be distinguished by its cylindrical rachis, conspicuous glumes with hyaline margins and 2 short stamens with slender filaments.

Pycreus lanceoloti S.M. Almeida in J. Bombay nat. Hist. Soc. 83: 182, t. 1, f. 2. 1986 et in J. Econ. Tax. Bot. Addl. Ser. 8(2), Fl. Savantwadi 2: 92. 1990; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 347. 1996; Samaddar & Roy, Add. Ele. Indian Fl. 1: 354. 1997; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 48. 1997.

Types: Holotype: India, Maharashtra, Sindhudurg, Savantwadi, Charatha, S.M. Almeida SMA - 162, 25.5.1977 (BLAT!).

Herbs, annual, 5-8 cm high, tufted, with number of slender, fibrous roots. Leaves 8-10 x 0.15-0.2 cm radical, linear, flat, glabrous, tapering to apex. Scapes 5-7 cm long, dull grey, glabrous. Inflorescence of compact spikes forming heads; bracts 3-4, 6-8 x 0.1-0.2 cm, leaf-like. Spikes radiating, dull grey, distichous. Spikelets oblong, compactly arranged on rachilla, boat-shaped, acute, glabrous, keeled. Nuts oblanceolate, shortly beaked, with compactly arranged tubercles on the surface.

Fls. & Frts. : May.

Illus.: S.M. Almeida, *op. cit.*

Habitat: In wet rice fields, near river banks.

Distrib.: Endemic to MAHARASHTRA: Sindhudurg (Charatha).

Spec.exam.: Type, as above.

Status: Critically Endangered.

Criteria: Area of occupancy less than 10 sq km: found only at a single location.

Notes: After the type collection in 1977, this species could not be recollected. In 1997 efforts were made to collect it but yielded nothing. Weeding operations in the paddy fields may be one of the main causes of its rarity.

This species can be distinguished by its compact spikes forming heads, conspicuous glumes with hyaline margins; stamens 2, long with flattened filaments and oblanceolate nuts.

Scirpus naikianus Wadood Khan in *Rheedea* 8(1): 71, f. 1. 1998.

Types: Holotype: India, Maharashtra, Nanded, Bhokar, Amdari, Wadood Khan 2158a, 4.1.1998 (MUA!). Isotypes: 2158 b, c & d (MUA!).

Herbs, annual, 10-30 cm high, densely tufted. Leaf-sheaths herbaceous, glabrous; blades of the first sterile leaves 4-5 mm broad, thin, flat, ultimately deciduous. Inflorescence pseudolateral, sessile, capitate with clusters of 2-10 spikelets near the base of stems. Spikelets 8-10 x 2.5-3 mm, ellipsoid, angular; glumes 1.8-2 x 1.5-1.7 mm, ovate, boat-shaped, keeled. Nuts 1-1.3 mm across, biconvex, broadly obovoid or almost suborbicular, smooth, yellowish to chestnut-brown, shining, apiculate.

Fls. & Frts. : December-January.

Illus.: Wadood Khan, *op. cit.*

Habitat: Marshes along the margins of tank.

Distrib.: Endemic to MAHARASHTRA: Nanded (Amdari).

Spec. exam.: Types, as above.

Status: Critically Endangered.

Criteria: Area of occupancy up to 500 sq m: found only at a single location.

Notes: This species is newly described and quite common at its type locality (30-40 mature individuals per sq m). It has been put into Critically Endangered category because of its very much localised distribution. Clearing of lakes and ponds and their margins may be one of the causes of its rarity. Hence, to prevent its extinction it should be conserved at its type locality until its further report from any other area.

It can be differentiated from its closely allied species (*S. wallichii* Nees & *S. lateriflorus* Gmel.) by its inflorescence always near the base of the stems, smaller boat shaped glumes, papillose anther tips and the smooth nuts without hypogynous bristles.

Scleria poklii Wadood Khan in J. Econ. Tax. Bot. 22 (3): 559, f. 2. 1998.

Types: Holotype: India, Maharashtra, Gadchiroli, Laheri Road, *Wadood Khan* 4703 a (CAL!). *Isotypes:* 4703 b-d (BSI).

Herbs, annual; culms erect, much branched. Inflorescence of axillary clusters, 3-4 mm long and broad with peduncles often cellularly spongy papillose, white. Spikelets unisexual; male ones few, oblong, sessile, 1-2-flowered; female ones several, 0.8-1 x 0.5-0.8 mm, turbinate or ovoid; glumes 2, 0.8-1 mm long, equal, ovate, boat-shaped, 7-nerved, membranous, hyaline. Nuts 0.7-1 mm long and broad, obtusely trigonous, subglobose, greyish.

Fls. & Frts.: October-November.

Illus.: Wadood Khan, *op. cit.*

Habitat: In wet, open grasslands, paddy fields and forest clearings on hill slopes.

Distrib.: Endemic to MAHARASHTRA: Gadchiroli (Laheri Road).

Status: Critically Endangered.

Criteria: Area of occupancy up to 1,000 sq m: found only at a single location.

Notes: This newly described species is quite abundant (200-400 mature individuals per sq m.) at its type locality, but still has been placed under Critically Endangered category due to its localised distribution. Weeding operations in the paddy fields and grazing may be the main causes of its rarity and these should be controlled for its conservation.

This species can be distinguished from its closely allied species [*S. reticulata* (Holt.) Kern & *S. caricina* (R. Br.) Benth.] by its turbinate or ovoid female spikelets having smaller, 3-lobed and distinctly several-nerved glumes and by larger, etuberculate-reticulate nuts with sparsely hispidulous apex.

POACEAE

	<u>Genera</u>	<u>Species + Infraspecific taxa</u>
World	620	10,000
India	243	1,208
Maharashtra	110	383

Endemic to Maharashtra - 22 species & 2 varieties.

Arthraxon hispidus (Thunb.) Makino var. *junnarensis* (Jain & Hemadri) Welzen in *Blumea* 27 (1): 277, f. 5. 1981; Raghavan & Singh in Jain & Sastry (eds.), *Pl. Cons. Bull.* 3: 9. 1984 et in *J. Econ. Tax. Bot.* 5(1): 164. 1984; Deshpande & Singh, *Grass. Maharashtra* 23. 1986; Singh & Raghavan in *J. Econ. Tax. Bot.* 8(1): 36. 1986; Lakshminarasimhan in Sharma *et al.* (eds.), *Fl. Maharashtra, Monocot.* 399. 1996; Yadav in Pokle *et al.* (eds.), *Flow. Pl. Syst. Diver.* pt. 1: 49. 1997. *A. junnarensis* Jain & Hemadri in *J. Bombay nat. Hist. Soc.* 68: 300. 1971; Jain in *J. Indian Bot. Soc.* 51: 175, f. 16. 1972; Hemadri, *Grass. Junnar* 28. 1980; Karthikeyan in Jain & Rao (eds.), *Ass. Threat. Pl. India* 243. 1983. *A. pusillus* Bor in *J. Indian Bot. Soc.* 50 a: 92. 1971.

Types: Holotype: India, Maharashtra, Pune, Warsubai plateau, 16 km west of Junnar, *Hemadri* 106849 A/I, 6.10.1965 (CAL!). Isotypes: 106849 A/II, A/III (CAL!), B-C (BSI!), D(K), E(L), F(MO) & G(LE). Paratypes: Satara, Mahabaleshwar, Wilson point road, *Mahajan* 27170 A-B, 12.10.1957 (BSI!).

Herbs, annual, up to 20 cm long; culms capillary, rooting at lower nodes. Leaves 1-2.5 x 0.5- 0.75 cm, ovate or ovate-lanceolate, with tubercle based hairs. Inflorescence a short panicle on long, glabrous peduncle; spikes 5-12, 1-1.75 cm long. Spikelets 1.5-2 x ca 1.5 mm, solitary, hermaphrodite; lower glume 1.2-1.8 mm long, ovate-lanceolate, acute, 5-nerved; upper glume boat shaped, minutely apiculate at apex; lower lemma minute, hyaline or absent; upper lemma ca 1 mm long, hyaline; awn 4-5 mm long, geniculate. Grains ca 1 mm long, linear or cylindrical.

Fls. & Frts.: September - October.

Illus.: Jain & Hemadri, *op.cit.*

Habitat: On the undulating open plateau in the shade of *Euphorbia neriifolia* L.

Distrib.: Arabia: Muscat & Oman (Dhufar); India: MAHARASHTRA: Pune (Junnar), Satara (Mahabaleshwar).

Spec. exam.: Types, as above.

Status: Endangered (Regionally in Maharashtra). Not Evaluated (Globally).

Criteria: Area of occupancy less than 500 sq km: found only at two locations.

Notes: Though this variety was considered to be endemic to Maharashtra state only, Hemadri (1980) speculated its possible distribution along the entire ghat belt extending from Maharashtra to Karnataka. In 1981, Welzen merged with this *A. pusillus* Bor and reported its extended distribution up to Muscat & Oman (Dhufar) in Arabia. However, he also mentioned that the Indian plants of this variety differ in many aspects from the Arabian species. So, further critical taxonomic study needs to be done.

This variety can be distinguished by its weak, capillary culms not exceeding 25 cm in length; 1.5-2 mm long spikelets and lower lemma minute or absent.

Arthraxon hispidus (Thunb.) Makino var **santapaul** (Bor) Welzen in *Blumea* 27: 280, f. 6. 1981; Raghavan & Singh in *J. Econ. Tax. Bot.* 5(1): 164. 1984; Deshpande & Singh, *Grass. Maharashtra* 23. 1986; Singh & Raghavan in *J. Econ. Tax. Bot.* 8(1): 36. 1986; Lakshminarasimhan in Sharma *et al.* (eds.), *Fl. Maharashtra, Monocot.* 399. 1996; Yadav in Pokle *et al.* (eds.), *Flow. Pl. Syst. Diver.* pt. 1: 49. 1997; Pradhan & Singh, *Fl. Ahmednagar* 575. 1999. *A. santapauli* Bor in *Kew Bull.* 1951: 446. 1952 et *Grass. Burm. Ceyl. Ind. & Pak.* 102. 1960; Jain in *Indian Bot. Soc.* 51: 181. 1972; Karthikeyan in Jain & Rao (eds.), *Ass. Threat. Pl. India* 243. 1983; Raghavan & Singh in Jain & Sastry (eds.), *Pl. Cons. Bull.* 3: 9. 1983.

Type: India, Maharashtra, Pune, Purandhar fort, *Santapau* 11450 A, 10.10.1950 (K).

Herbs, annual, culms up to 15 cm high. Leaves 1.7-5.3 x 0.4-1.5 cm, margins with bulbous based hairs in the lower half. Peduncles *ca* 0.3 mm long. Spikes 2-4 x 0.4-1.8 cm. Sessile spikelets 5.4-8.4 x 1-1.1 mm, linear-lanceolate; lower glume dorsally, usually densely spiculate all over. Pedicelled spikelet absent.

Fls. & Frts.: September-October.

Illus.: Welzen, *op. cit.*

Habitat: In monsoon forests at an altitude between 1000-1500 m. Sometimes also at lower altitudes.

Distrib.: Arabia: Muscat & Oman (Dhufar); India: Himachal Pradesh, MAHARASHTRA: Ahmednagar (Panchnai), Pune (Purandhar).

Spec. exam.: Ahmednagar: Panchnai, *Wadhwa* 127528, 24.9.1970. Pune: Purandhar, *Kammathy* 82686, 6.10.1963 (Both in BSI).

Status: Endangered (Regionally in Maharashtra). Not Evaluated (Globally).

Criteria: Area of occupancy up to 100 sq km: found only at two locations.

Notes: This plant was considered as endemic to India till 1980. Welzen (1981) changed the taxonomic status of this taxon from species to variety and reported its extended distribution up to Muscat & Oman in Arabia. It was last collected by Wadhwa in 1970 from Maharashtra.

This variety can be distinguished by its long, exerted, pilose, curved peduncles and large spikelets.

Arthraxon jubatus Hack. in DC. Monogr. Phan. 6: 358. 1889; Hook.f. Fl. Brit. India 7: 147. 1896; Cooke, Fl. Pres. Bombay 3: 489. 1958 (Repr.ed.); Blatt. & McC. in J. Bombay nat. Hist. Soc. 32: 419. 1928 et Bombay Grass. 79. 1935; Bor, Grass. Burm. Ceyl. Ind. & Pak. 100. 1960; Jain in J. Indian Bot. Soc. 51: 174, f.9. 1972; Hemadri, Grass. Junnar 28. 1980; Welzen in Blumea 27: 280. 1981; Karthikeyan in Jain & Rao (eds.), Ass. Threat. Pl. India 243. 1983; Deshpande & Singh, Grass. Maharashtra 23. 1986; Mistry, Fl. Ratnagiri 2: 780. 1986 (Ph.D. Thesis, *ined.*); Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 217. 1987; Kulkarni, Fl. Sindhudurg 504. 1988; Almeida in J. Econ. Tax. Bot. Addl. Ser. 8(2), Fl. Savantwadi 2: 109. 1990; Kothari & Moorthy, Fl. Raigad 466. 1993; Deshpande *et al.*, Fl. Mahabaleshwar 2: 659. 1995; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 399. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 49. 1997.

Type: India, Maharashtra, Bombay Herb. *Stocks s.n.* (K).

Herbs, annual, slender; culms 10-30 cm long, decumbent, leafy, terete, glabrous; nodes pubescent. Leaves 2.25-4.5 x 0.43 x 0.75 cm, lanceolate, acute, flat, thinly membranous, pubescent on both surfaces. Racemes enclosed in upper most sheaths. Sessile spikelets *ca* 8 mm long; lower glume linear, 2-nerved; upper glume shorter than lower, linear-lanceolate, mucronate, 1-nerved; lower floral glume narrow, linear, subacute, hyaline, nerveless, glabrous; upper floral glume lanceolate, acute, glabrous; palea 0. Pedicelled spikelets *ca* 5 mm long, not awned.

Fls. & Frts.: October - February.

Illus.: Blatt. & McC., *op. cit.*, t.50; Jain, *op. cit.*

Habitat: On over-hanging rocks which are constantly moistened by water.

Distrib.: Endemic to Kerala, MAHARASHTRA: Bombay, Kolhapur (Gagangad), Pune (Junnar, Lonavala), Raigad (Raigad fort), Ratnagiri (Ambaghat), Satara (Mahabaleshwar, Mahad ghat, Pratapgad), Sindhudurg (Ambolighat).

Spec. exam.: Pune: Dhak khilla, near Junnar, *Hemadri* 107489, 22.9.1965 & 117979, 22.9.1968 (BSI, CAL). Raigad: On way from Pachhad to Raigad fort, *Mishra* 176960, 8.10.1997. Satara: Mahad ghat, *Ansari* 68673, 12.10.1960; Pratapgad, *Rolla* 71712, 9.5.1961; *Mishra* 177637, 5.10.1998 (All in BSI).

Status: Vulnerable (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Extent of occurrence estimated to be *ca* 17,900 sq km: severely fragmented populations.

Notes: This species is reported from several localities of seven districts in Maharashtra and everywhere its distribution is very much localised. At Raigad fort hill it was found growing only on two overhanging rocks near waterfalls. In Pratapgarh also it was noticed on the steep slopes at the foot of the fort. Land slides may be the one of the major reasons of its rarity. Hence, it should be controlled artificially at the habitat of this species.

This species can be identified easily by its spikelets having long awn (15-25 cm long).

Arundinella spicata Dalz. in Dalz. & Gibs. Bombay Fl. 293. 1861; Hook. f. Fl. Brit. India 7: 77.1896; Cooke, Fl. Pres. Bombay 3: 525. 1958 (Repr.ed.); Blatt. & McC. Bombay Grass. 197. 1935; Bor, Grass. Burm. Ceyl. Ind. & Pak. 425. 1960; Hemadri, Fl. Junnar 35. 1980; Karthiyan in Jain & Rao (eds.), Ass. Threat. Pl. India 243, 1983; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 9. 1983; Deshpande & Singh, Grass. Maharashtra 28. 1986; Singh & Raghavan in J. Econ. Tax. Bot. 8(1): 36. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 218. 1987; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot.

409. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 49.
1997. 'Benel' 'Kotir'

Herbs, annual; culms 5-30 cm high, erect. Leaves 2.5-3.7 x *ca* 0.6 cm, linear-lanceolate, acute, densely hairy. Spikes 0.8-3 cm long, cylindrical. Spikelets 5-7 mm long; lower involucral glume lanceolate, acuminate, 3-nerved, with bulbous based hairs; upper involucral glume narrowly lanceolate, acuminate, 3-nerved; lower floral glume lanceolate, acute, glabrous, empty or male; upper floral glume oblong, obtuse, female or bisexual; awn *ca* 4 mm long, geniculate. Grains *ca* 1.3 mm long.

Fls. & Frts.: September-November.

Illus.: Blatt. & McC., *op. cit.*, t. 129.

Habitat: On open, grassy plateau.

Distrib.: Endemic to Daman, Diu, Goa, Karnataka, Nagar-Haveli, MAHARASHTRA: Ahmednagar (Kalshubai, Panshet forest), Pune (Junnar), Satara (Machutar forest, Mahabaleshwar, Panchgani), Thane (Vada).

Spec. exam.: Ahmednagar: Panshet forest, *Wadhwa* 128306, 9.10.1970; Kalsubai, *Mishra* 176993, 9.9.1998. Pune: Warsubai plateau, near Junnar, *Hemadri* 106848, 6.10.1965; Between Jhavli Chiwadi & Warsubai temple, 16 km south-west of Junnar, *Hemadri* 117860, 19.9.1968. Satara: Mahabaleshwar, *Bhide* 1159, 20.11.1902; *Mahajan* 13042, 5.1.1957 & 27175, 12.10.1957; Machutar forest, *Ansari* 67540, 10.10.1960; Panchgani plateau, *A.S. Rao* 77973, 28.11.1962; *Mishra* 175630, 1.10.1996; Mahabaleshwar, Talbot 4538, without date. Thane: Vada, Forest Research station, *Billore* 115952, 13.9.1968 (All in BSI).

Status: Vulnerable (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Extent of occurrence estimated to be *ca* 9,000 sq km: severely fragmented populations.

Notes: Earlier workers *viz.*, Sedgwick & Bell, Dalzell & Gibson, Woodrow, Cooke and Blatter & McCann reported this species as very

common in Mahabaleshwar and Panchgani plateau. However, in 1996 it was found that its occurrence in this area has remarkably deteriorated and is now distributed very much sporadically. It is very much infrequent, in its other localities also. Disturbance of its natural habitats by tourists, particularly at Panchgani plateau and Mahabaleshwar is the major threat of this species which should be controlled immediately.

This species can easily be differentiated by its cylindrical and densely spicate inflorescence.

Bhidea burnsiiana Bor in Kew Bull. 1948: 445, f. 1949 et Grass. Burm. Ceyl. Ind. & Pak. 103, f. 2. 1960; Sant. in Rec. Bot. Surv. India 16(1), Fl. Khandala 305. 1953; Nayar in Bull. Bot. Surv. India 22(1-4): 18. 1980; Karthikeyan in Jain & Rao (eds.), Ass. Threat. Pl. India 243. 1983; Deshpande & Singh, Grass. Maharashtra 30, t. 4. 1986; Mistry, Fl. Ratnagiri 2: 787. 1986 (Ph.D. Thesis, *ined.*); Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 218. 1987; Deshpande in Nayar & Sastry (eds.), Red Data Book Indian Pl. 1: 290. 1987; Kulkarni, Fl. Sindhudurg 509. 1988; Mistry & Almeida in J. Bombay nat. Hist. Soc. 86 (3): 479. 1989; Anon., India Glob. Threat. Taxa 110. 1996; Lakshminarasimhan in Sharma, *et al.* (eds.), Fl. Maharashtra, Monocot. 413. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Diver. pt. 1: 49. 1997; Yadav, S.S. *et al.* in Geobios new Rep. 16 (1): 9. 1997.

Types: Holotype: India, Maharashtra, Pune, Lonavla, *Bhide s.n.*, 1919 (K). Isotypes *s.n.* (BSI!).

Herbs, annual, tufted; culms 8-15 cm high, slender, nodes hairy. Leaves 3-6 cm long, narrowly linear-lanceolate, margins bulbous based hairy. Racemes 1-3, 2-3 cm long. Sessile spikelets 5-8 mm long (excluding awn) with geniculate awns; lower glume 5-7 mm long, oblong-lanceolate, flat or depressed, winged in upper half, wing obliquely ovate; upper glume 4-6 mm long, rounded, tip forked, with two long projections. Pedicelled spikelets ovate-lanceolate; lower glume 5-6 mm long, obliquely winged; upper glume linear, longer than lower one.

Fls. & Frts.: September-October.

Illus.: Bor, *op. cit.* 1949 et 1960; Deshpande & Singh, *op. cit.*

Habitat: On bare, lateritic flats.

Distrib.: Endemic to Karnataka, MAHARASHTRA: Bombay (Borivli), Pune (Khandala, Lonavla), Ratnagiri (Ganapatipule, Purngad, Ratnagiri city surroundings), Sindhudurg (Amboli, Devgad, Malwan).

Spec. exam.: Bombay: Borivli, *Fernandez* 1914, 11.9.1954 & 1922-5, 9.11.1954. Pune: Khandala, without coll. name, 9918, September, 1919 (All in BLAT). Ratnagiri: Mirjole, *Mishra* 176983, 3.10.1997. Sindhudurg: Malwan, Adari-Nandruk, *Kulkarni* 121296, 27.9.1970; Malwan, Dhamapur, *Kulkarni* 121328, 30.9.1970 (All in BSI).

Status: Endangered (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Extent of occurrence estimated to be *ca* 3,000 sq km: a) severely fragmented populations, b) declension in the number of subpopulations.

Notes: This species might have been vanished from its two old localities in Bombay and Pune because it could not be recollected from these two places even after intensive searching after 1954 and 1919 respectively. At its new localities in Ratnagiri and Sindhudurg districts also it is very much infrequent and distributed sporadically.

This species can be identified by its two lobes and awned upper glume of the fertile spikelet.

***Chrysopogon castaneus* Veldkamp & Salunke in Rheedea 10 (1): 59-61, f.1.2000.**

Types: Holotype: India, Maharashtra, Sindhudurg, Amboli-Choukul, 725 m, *S.R.Yadav* 8678, 18.9.1993 (L). Isotypes (SUK). Paratypes: Kas plateau, 1310 m, *Salunke* 8586-7, 9.10. 1994 (SUK).

Perennials, culms 40-100 cm high. Leaf blades 8-25 x 0.3-0.8 cm, flat, obtuse, margins pectinate with bulbous-based hairs, otherwise glabrous. Panicles 8-20 x *ca* 2.5 cm, castaneous, with few spikelets. Sessile spikelets *ca* 10 mm long (including callus); callus *ca* 2 mm long, oblique, pungent; lower glumes smooth, distally minutely tuberculate, apex notched; upper

glumes distally minutely tuberculate, without a dorsal fringe of hairs, apex mucronate, awns straight or geniculate, 60-70 mm long column contorted, puberulous. Pedicelled spikelets 10.5-12 mm long, with one male floret. Glumes green, smooth, glabrous, mucicous.

Fls. & Frts.: September - October.

Illus.: Veldkamp & Salunkhe, *op.cit.*

Habitat: In open grasslands at an altitudinal range between 725-1310 m.

Distrib.: Endemic to MAHARASHTRA: Satara (Kas plateau), Sindhudurg (Amboli-Choukul).

Status: Endangered.

Criteria: Area of occupancy less than 500 sq km: found only at two locations.

Notes: This species has been described very recently based on specimens collected by S.R.Yadav and C.B.Salunkhe. In the protologue its distribution is reported as rare in association with species of *Dimeria*, *Glyphochloa* and *Ischaemum*.

This species can be distinguished by its lax panicle, the glabrous pedicels of the pedicelled spikelets more than half as long as the sessile spikelet, and in the very long awns. The glumes of the sessile spikelet are deeply castaneous, glossy and distally minutely tuberculate.

Coelachne minuta Bor in *J. Bombay nat. Hist. Soc.* 58: 317. 1961; Karthikeyan in Jain & Rao (eds.), *Ass. Threat. Pl. India* 243. 1983; Ved Prakash & Jain in Jain & Rao (eds.), *Ass. Threat. Pl. India* 262. 1983 et in *Fasc. Fl. India* 14: 5, f. 1-13. 1984; Deshpande & Singh, *Grass. Maharashtra* 37. 1986; Ahmedullah & Nayar, *Endemic Pl. Indian reg.* 1: 219. 1987; Deshpande in Nayar & Sastry (eds.), *Red Data Book Indian Pl.* 1: 291. 1987; Kulkarni, *Fl. Sindhudurg* 514. 1988; Almeida in *J. Econ. Tax. Bot. Addl. Ser.* 8(2), *Fl. Savantwadi* 2: 17. 1990; Deshpande *et al.*, *Fl. Mahabaleshwar* 2: 667. 1995; Anon., *India Glob. Threat. Taxa* 17. 1996; Lakshminarasimhan in Sharma *et al.* (eds.), *Fl. Maharashtra, Monocot.*

435. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 49. 1997; Yadav, S.S. *et al.* in Geobios new Rep. 16 (1): 9. 1997. *C. ghatica* Naik in Reinwardtia 9: 393, f. 1. 1980 et in Indian For. 106: 732, f. 9. 1980 (*nom. sup.*).

Types: India, Maharashtra, Satara, Mahabaleshwar, *Santapau* 22731, 14.9.1958 (K, BLAT!)

Herbs, annual, tufted, culms 5-15 cm high, slender, nodes hairy. Leaves 0.5-3 x 0.1-0.4 cm, lanceolate, hirsute on nerves above, glabrous beneath, apex acute. Panicles 2-8 cm long, effuse, branches up to 1.5 cm long. Spikelets 1-1.3 cm long, globose; lower glume broadly ovate, nerveless or 1-3-nerved; upper glume ovate-oblong, 3-5-nerved; lower lemma folded, nerveless or obscurely 5-nerved, palea elliptic, grooved, nerveless, glabrous; upper lemma and palea lanceolate, 2-keeled, hairy along keels on dorsal surface.

Fls. & Frts.: August - September.

Illus.: Naik, *op. cit.*; Ved Prakash & Jain, *op. cit.* 1984.

Habitat: On open, rocky, moist grasslands.

Distrib.: Endemic to MAHARASHTRA: Aurangabad (Aurangabad plateau), Satara (Kas plateau, Mahabaleshwar), Sindhudurg (Amboli ghat).

Spec. exam.: Satara: Kas plateau, *Mishra* 176840, 22.8.1997 (BSI). Sindhudurg: Amboli, *Kulkarni* 131615, 12.8.1971 (BSI, CAL); Amboli hill station, *Naik* 1300, 13.9.1971 (Type of *C. ghatica*, BSI).

Status: Endangered.

Criteria: Extent of occurrence estimated to be ca 3,300 sq km: found only at four locations.

Notes: Once this species was reported from Aurangabad plateau (Deshpande & Singh, 1986) but there is no further information from this district. Even Naik has not included it in his recently published Fl. Marathwada (1998). At Mahabaleshwar it could not be located during

1996-1998 but at Kas plateau it is quite common. Excessive grazing in the open plateau is the major reason of its rarity.

This species can be distinguished by its smaller spikelets and number of stamens (2).

Dichanthium armatum (Hook.f.) Blatt. & McC. in J. Bombay nat. Hist. Soc. 32: 425. 1928 et Bombay Grass. 91. 1935; Bor. Grass. Burm. Ceyl. Ind. & Pak. 134. 1960; Karthikeyan in Jain & Rao (eds.), Ass. Threat. Pl. India 243. 1983; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 10. 1983 et in J. Econ. Tax Bot. 5(1): 164. 1984; Deshpande in Fasc. Fl. India 15: 6, f. 3-4. 1984; Deshpande & Singh, Grass. Maharashtra 45. 1986; Singh & Raghavan in J. Econ. Tax. Bot. 8(1): 36. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 220. 1987; Deshpande in Nayar & Sastry (eds.), Red Data Book Indian Pl. 1. 294. 1987; Deshpande *et al.*, Fl. Mahabaleshwar 2: 672. 1995; Anon., India Glob. Threat. Taxa 23. 1996; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 452. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 49. 1997; Yadav, S.S. *et al.* in Geobios new Rep. 16 (1): 9. 1997; Pradhan & Singh, Fl. Ahmednagar 589. 1999. *Andropogon armatus* Hook.f. Fl. Brit. India 7: 197. 1886; Cooke, Fl. Pres. Bombay 3: 50. 1958 (Repr.ed.).

Type: India, Concan (Konkan), *Stocks s.n.* (K).

Herbs, annual, tufted; culms 15-45 cm high, erect, nodes bearded. Leaves 10-15 cm long, linear, bulbous hairy on both surfaces. Inflorescence subdigitate, racemes 2-5, simple; peduncles capillary with a whorl of long hairs in the axils. Sessile spikelets ca 0.3 cm long; callus bearded; lower glume elliptic, pitted. Pedicelled spikelets slightly longer than the sessile spikelets; lower glume armed with marginal, bulbous based bristles.

Fls. & Frts. : September - October.

Illus.: Deshpande, *op.cit.* 1984.

Habitat: On exposed hill tops, among other grasses.

Distrib.: Endemic to MAHARASHTRA: Ahmednagar (Kedarnath hill a Harishchandragarh), Nasik (Kalsubai hill, Khandgerm), Pune

(Bhimashankar, Junnar, Khandala, Lohagad), Satara (Panchgani, Pasarni ghat), Thane (Harishchandragarh).

Spec. exam.: Nasik: Khandgerm, *Shinde* 627, May, 1986. Pune: Khandala, without coll. name, 9430-1, October, 1918; Pune, *McCann s.n.*, October, 1918 (All in BLAT); Junnar, Dhak Khillia, *Hemadri* 107490, 29.9.1965; Junnar, Pimparwadi, *Hemadri* 106834, 5.10.1965 (Both in BSI). Satara: Panchgani, *M.R. Almeida* 2319, 30.9.1973 (BLAT).

Status: Vulnerable.

Criteria: Extent of occurrence estimated to be ca 5,500 sq km: found only at eight locations.

Notes: Though this grass has been recorded from eight localities of five districts, its distribution is reported as rare and infrequent everywhere. Grazing and collection of fodder grasses from the open hill tops by the local people are the main reasons for its vulnerability.

This species differs from others in its pitted lower glume of only sessile spikelets.

Dichanthium compressum (Hook.f.) Jain & Deshpande in Bull. Bot. Surv. India 20: 133. (1978) 1979; Karthikeyan in Jain & Rao (eds.), Ass. Threat. Pl. India 243. 1983; Deshpande in Fasc. Fl. India 15: 10, f. 20-21. 1984; Deshpande & Singh, Grass. Maharashtra 46: 1986; Singh & Raghavan in J. Econ. Tax. Bot. 8(1): 36. 1986; Ahmedullah & Nayar Endemic Pl. Indian Reg. 1. 220. 1987; Deshpande in Nayar & Sastry (eds.), Red Data Book Indian Pl. 1: 295. 1987; Anon., India Glob. Threat. Taxa 23. 1996; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 453. 1996; Yadav in Pogle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 41. 1997; Yadav, S.S. *et al.* in Geobios new Rep. 16(1): 9. 1997. *Andropogon compressus* Hook.f. Fl. Brit. India 7: 172. 1896; Cooke, Fl. Pres. Bombay 3: 496. 1958 (Repr.ed.). *Amphilophis compressa* (Hook.f.) Blatt. & McC., Bombay Grass. 83. 1935. *Bothriochloa compressa* (Hook.f.) Henr. in Blumea 3: 456. 1940; Bor, Grass. Burm. Ceyl. Ind. & Pak. 106. 1960. *B. ensiformis* (Hook.f.) Henr., *op. cit.* 457; Bor, *op. cit.* 107; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 4. 1983.

Herbs, perennial, stout; culms 90-120 cm high, erect, sparingly branched, nodes glabrous. Leaves 20-40 x 0.6-1 cm, linear, finely acuminate, flat, scaberulous on margins and on surfaces. Inflorescence up to 7.5 cm long. Sessile spikelets 4-5 mm long, ovate-lanceolate; lower glume ovate-lanceolate, villous on the back below middle, 5-7-nerved; upper glume ovate, acute, as long as the lower. Pedicelled spikelets as long as the sessile, linear-oblong; lower glume 9-11-nerved; upper glume 3-nerved. Caryopsis oblong.

Fls. & Frts.: October-November.

Illus.: Blatt. & McC., *op. cit.*, t. 53 (*Amphilophis compressa*); Deshpande, *op.cit.* 1984.

Habitat: On gravelly soils.

Distrib.: Endemic to MAHARASHTRA: Pune (Ambavane, Bhimashankar, Khandala-Lonavla).

Spec. exam.: Pune: Lonavla, Gammie *s.n.*, 9.11.1907; Bhide *s.n.* 14.10.1909; Bhimashankar, Kalaimal, Janardhanan 81850, 10.10.1962; Mulshi, Ambavane, near Tiskari vill., Reddi 99425, 24.10.1964 (All in BSI).

Status: Endangered.

Criteria: Extent of occurrence estimated to be ca 700 sq km: found only at three locations.

Notes: After Reddi's collection from Ambavane in 1964, this species could not be recollected even after intensive searching. However, more efforts have to be made.

This species can be differentiated from others by its distichous leaves and joints as well pedicels with a translucent groove.

Dichanthlum jainli (Deshpande & Hemadri) Deshpande in Bull. Bot. Surv. India 21: 198 (1979) 1981 et in Fasc. Fl. India 15: 17, f. 25-26. 1984; Karthikeyan in Jain & Rao (eds.), Ass. Threat. Pl. India 243. 1983; Deshpande & Singh, Grass. Maharashtra 48, t. 6. 1986; Singh & Raghavan

in *J. Econ. Tax. Bot.* 8(1): 36. 1986; Ahmedullah & Nayar, *Endemic Pl. Indian Reg.* 1: 220. 1987; Deshpande *et al.*, *Fl. Mahabaleshwar* 2: 675. 1995; Lakshminarasimhan in Sharma *et al.* (eds.), *Fl. Maharashtra, Monocot.* 456. 1996; Yadav in Pokle *et al.* (eds.), *Flow. Pl. Syst. Diver.* pt. 1: 49. 1997. Pradhan & Singh, *Fl. Ahmednagar* 591. 1999. *Bothriochloa jainii* Deshpande & Hemadri in *Indian For.* 97: 593, f. 1-19. 1971; Hemadri, *Grass. Junnar* 36. 1980.

Types: Holotype: India, Maharashtra, Pune, Durga Khilla, about 30 km west of Junnar, *Hemadri* 104241, 29.10.1964 (CAL!). Isotypes: 104241 B-C (BSI!), D(K), E (L), F (US), G(LE), H (MO), I(BLAT!). Paratypes: Pune, Raireshwar, *Vartak* 11944, 14.12.1957; Ambavane, Tishari forest, *Reddi* 95800, 30.1.1964; Ambavane, Pandongar, *Reddi* 99471, 25.10.1964; Junnar, Durga Khilla, *Hemadri* 104401, 12.1.1965; Junnar, Dhak Khilla, *Hemadri* 108222, 21.1.1966; Ghatghar, *Hemadri* 120572, 5.12.1969; Satara, Mahabaleshwar, Lingmala falls, *Mahajan* 13075, 5.1.1957; Thane: Harishchandragarh, Taramati hill, *Billore* 115689, 19.11.1968 (All in BSI!).

Herbs, perennial, tufted; culms up to 2 m high, nodes 5-8, bearded. Leaves 30-65 x 0.8-1.5 cm, acuminate, margins spinulose, bulbous based hairy on both surfaces. Racemes 3-15, 5-10 cm long, greenish or purple. Spikelets in pairs, dissimilar. Sessile spikelets 5.2-6.2 mm long, lanceolate, bisexual. Pedicelled spikelets 6.5-9 x 1.5-2 mm oblong, staminate. Grains ellipsoid, reddish-brown.

Fls. & Frts.: October-January.

Illus.: Deshpande & Hemadri, *op.cit.*; Deshpande & Singh, *op.cit.*

Habitat: On the open hill tops and slopes at an altitude above 1000 m.

Distrib.: Endemic to MAHARASHTRA: Ahmednagar (Kalsubai hill), Pune (Ambavane, Junnar, Raireshwar), Satara (Mahabaleshwar), Thane (Harishchandragarh).

Spec. exam.: Ahmednagar: Kalsubai hill, *Patwardhan* 1114, 13.10.1907 (BSI).

Status: Endangered.

Criteria: Extent of occurrence estimated to be *ca* 3,800 sq km; severely fragmented populations.

Notes: This species has been reported only from six localities of four districts, last of which was from Junnar in 1969 by Hemadri. Everywhere its distribution is reported as rare and occurs sporadically. Grazing, collection of immature grasses for green fodder and mature grasses for dry fodder and fuel from the open hill tops and slopes by the local people are the major threats to this species which should be checked for its conservation.

This species differs from others in its robust nature of all parts including stems, leaves, spikelets and stamens and having 15-20-nerved lower glume of pedicelled spikelets.

Dichanthium maccannii Blatt. in J. Bombay nat. Hist. Soc. 32: 357, t. 2. 1927; Blatt. & McC. Bombay Grass. 92, t. 60. 1935; Bor, Grass. Burm. Ceyl. Ind. & Pak. 135. 1960; Karthikeyan in Jain & Rao (eds.), Ass. Threat. Pl. India 248. 1983; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 6. 1983. et in J. Econ. Tax. Bot. 5 (1): 164. 1984; Deshpande in Fasc. Fl. India 15: 19, f. 31-32. 1984; Deshpande & Singh, Grass. Maharashtra 48. 1986; Singh & Raghavan in J. Econ. Tax. Bot. 8(1): 36. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 220. 1987; Deshpande in Nayar & Sastry (eds.), Red Data Book Indian Pl. 1: 296. 1987; Goel in J. Econ. Tax. Bot. 9(1): 75. 1987; Deshpande *et al.*, Fl. Mahabaleshwar 2: 675. 1995; Anon., India Glob. Threat. Taxa 23. 1996; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 457. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 49. 1997; Yadav, S.S. *et al.* in Geobios new Rep. 16 (1): 10. 1997; Naik, Fl. Marathwada 2: 1018. 1998.

Type: India, Maharashtra, Satara, Panchgani, east of the third table land, *McCann s.n.*, October, 1925 (BLAT!).

Herbs, annual, tufted; culms *ca* 45 cm high, densely bearded at nodes. Leaves *ca* 10 cm long, linear-lanceolate, base amplexicaul, bulbous based hairy all over. Racemes solitary or two, *ca* 3.5 cm long; lowest 3-4 pairs of spikelets glabrous, upper with a line of ciliate hairs. Sessile spikelets

ca 4 mm long; lower glume 7-nerved; upper glume broadly lanceolate; lower lemma narrowly oblong, obtuse. Pedicelled spikelets up to 5 mm long; glumes 10-nerved, with spinous stiff hairs on margins and at apex.

Fls. & Frts. : October - April.

Illus.: Blatt. & McC., *op. cit.*; Deshpande, *op. cit.* 1984.

Distrib.: Endemic to MAHARASHTRA: Aurangabad (Daulatabad), Beed, Nagpur, Nanded (Mahur), Parbhani, Satara (Panchgani).

Spec. exam.: Aurangabad: Daulatabad, *Naik* 179, 1968 (MUA). Nanded: Mahur, *Zate* 1426 (CAL). Satara: Panchgani, *Prof. De Wet* A,B, 1962 (BLAT).

Status: Data Deficient.

Notes: Deshpande (1987, *op.cit.*) categorised this species into Vulnerable category based on its distributional records from Satara and Aurangabad districts. Later it has been reported from Beed, Nagpur, Nanded and Parbhani districts also. Therefore, the recent status of this species should be reconsidered after getting sufficient distributional data from all of its localities.

This species can be distinguished by its pedicelled spikelets having lower glume armed with bulbous based bristles on margins and by non pitted lower glume of both sessile and pedicelled spikelets.

Dichanthium panchganiensis Blatt. & McC. in *J. Bombay nat. Hist. Soc.* 32. 357, t. 1. 1927 et *Bombay Grass.* 90, t. 58. 1935; *Bor. Grass. Burm. Ceyl. Ind. & Pak.* 135. 1960; Karthikeyan in Jain & Rao (eds.), *Ass. Threat. Pl. India* 243. 1983; Raghavan & Singh in Jain & Sastry (eds.), *Pl. Cons. Bull.* 3: 10. 1983 et in *J. Econ. Tax. Bot.* 5(1): 164. 1984; Deshpande in *Fasc. Fl. India* 15: 21, f. 33-34. 1984; Deshpande & Singh, *Grass. Maharashtra* 48, f. 6-7, t. 5. 1986, Singh & Raghavan in *J. Econ. Tax. Bot.* 8(1): 36. 1986; Ahmedullah & Nayar, *Endemic Pl. Indian Reg.* 1: 220. 1987; Deshpande in Nayar & Sastry (eds.), *Red Data Book Indian Pl.* 2: 183. 1988; Deshpande *et al.*, *Fl. Mahabaleshwar* 2: 676. 1995; Anon., *India Glob. Threat. Taxa* 23. 1996; Lakshminarasimhan in Sharma

et al. (eds.), Fl. Maharashtra, Monocot. 458. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 49. 1997.

Types: Holotype: India, Maharashtra, Satara, Panchgani, *McCann s.n.*, November, 1925 (BLAT!, K).

Herbs, annual; culms 5-35 cm high, bearded at nodes. Leaves 1-5 x ca 0.3 cm, linear, acuminate, bulbous based hairy. Racemes 1-3, up to 3 cm long; peduncles capillary. Sessile spikelets ca 3 mm long; lower glume broadly oblong, pitted, 5-7-nerved, hairy except near the pit; lower lemma oblong, ciliolate on margins; upper glume oblong-lanceolate. Pedicelled spikelets 3-4 mm long; lower glume pitted, armed with spreading marginal, bulbous based bristles.

Fls. & Frts.: October - November.

Illus.: Blatt. & McC., *op. cit.*, Deshpande, *op. cit.*

Habitat: Open, rocky and gravelly plateau.

Distrib.: Endemic to MAHARASHTRA: Pune (Sinhagadh), Satara (Panchgani).

Spec.exam.: Pune: Sinhadh hill, *Ansari* 101699, 21.10.1964 (BSI). Satara: Panchgani, *Sedgwick* 4735, November, 1918; *Blatter & Hall s.n.*, October, 1920 (All in BLAT); *Deshpande* 104601 A, 8.11.1964 (BSI).

Status: Endangered.

Criteria: Area of occupancy ca 20 sq km: found only at two locations.

Notes: Earlier this species was collected only from Panchgani plateau in Satara district. Later it was also reported from Sinhadh hill of Pune district. During 1996-1997 efforts were made to recollect this grass from this two localities but in vain. Disturbance of its natural habitats by tourists, particularly at Panchgani plateau is the principal reason for which it is becoming rare. Hence some steps should be taken immediately to conserve it.

This species can easily be differentiated from others by its pitted lower glume of sessile as well as pedicelled spikelets.

Dichanthium woodrowii (Hook.f.) Jain & Deshpande in Bull. Bot. Surv. India 20: 134. (1978) 1979; Mehrotra in *ibid.* 21 (1-4): 237. 1979; Karthikeyan in Jain & Rao (eds.), Ass. Threat. Pl. India 243. 1983; Deshpande in Fasc. Fl. India 15: 26. 1984; Deshpande & Singh, Grass. Maharashtra 49. 1986; Singh & Raghavan in J. Econ. Tax. Bot. 8(1): 36. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 20. 1987; Deshpande in Nayar & Sastry (eds.), Red Data Book Indian Pl. 1: 297. 1987; Anon., India Glob. Threat. Taxa 23. 1996; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 460. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 49. 1997; Yadav, S.S. *et al.* in Geobios new Rep. 16(1): 10. 1997. *Andropogon woodrowii* Hook.f. Fl. Brit. India 7: 173. 1896; Cooke, Fl. Pres. Bombay 3: 497. 1958 (Repr.ed.). *Amphilophis woodrowii* (Hook.f.) A. Camus in Rev. Bot. Appl. 305. 1921; Blatt. & McC., Bombay Grass. 84. 1935. *Bothriochloa woodrowii* (Hook.f.) A. Camus in Ann. Soc. Linn. Lyon, 1930 (n.s.) 76: 165; Bor. Grass. Burm. Ceyl. Ind. & Pak. 110. 1960; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 4. 1983 et in J. Econ. Tax. Bot. 5 (1): 164. 1984.

Types: Isotype: India, Maharashtra, Mawal, *Woodrow* 27, December, 1894 (BLAT!, K).

Herbs, tufted, with woody root-stock; culms *ca* 1.5 m high, nodes glabrous. Leaves 30-60 x 0.3-0.4 cm, rigid, scaberulous on both surfaces and margins; sheaths loose, keeled; ligule membranous, truncate, ciliate. Racemes 3-5, 1.2-2.5 cm long; peduncles 0.3-1.2 cm long, slender, silky. Sessile spikelets *ca* 5 mm long; lower glume coriaceous, ovate-oblong, many-nerved, margins incurved, keels ciliolate; upper glume chartaceous, oblong, 3-nerved, as long as the lower. Pedicelled spikelets as long as the sessile but narrower; lower glume glabrous on the back; upper glume narrow, linear, acute.

Fls. & Frts. : December-January.

Habitat: In the plains of low rainfall area.

Distrib.: Endemic to MAHARASHTRA: Pune (Mawal).

Spec. exam.: Type, as above.

Status: Endangered.

Criteria: Area of occupancy less than 500 sq km: found only at a single location.

Notes: After the type collection, the species has been recollected only once by Harlan in 1960 and that too again from the type locality. Recently, during 1996-1998 the species was searched in this region but yielded nothing.

This species can be distinguished by its sessile spikelets with lower glume hairy below middle and pedicelled spikelets with non pitted lower glume.

Dimeria blatteri Bor in Kew Bull. 1949: 70. 1949 et Grass. Burm. Ceyl. Ind. & Pak. 140, f. 4(18). 1960; Karthikeyan in Jain & Rao (eds.), Ass. Threat. Pl. India 243. 1983; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 10. 1983 et in J. Econ. Tax. Bot. 5 (1): 164. 1984; Deshpande & Singh, Grass. Maharashtra 52. 1986; Mistry, Fl. Ratnagiri 2: 804. 1986 (Ph.D. Thesis, *ined.*); Singh & Raghavan in J. Econ. Tax. Bot. 8 (1): 36. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 221. 1987; Deshpande in Nayar & Sastry (eds.), Red Data Book Indian Pl. 2: 184. 1988; Kulkarni, Fl. Sindhudurg 520. 1988; Almeida in J. Econ. Tax. Bot. Addl. Ser. 8(2), Fl. Savantwadi 2: 124. 1990; Anon., India Glob. Threat. Taxa 24. 1996; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 467. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 49. 1997.

Types: Holotype: India, Maharashtra, Pune, Khandala, Echo point, Blatter & McCann. 9918, October, 1918 (BLAT!).

Herbs, annual, tufted, culms 35-90 cm high, slender, nodes bearded. Leaves 3-5 x 0.15-0.25 cm, linear or linear-lanceolate, hairy on both sides, finely acute at apex, margins bulbous based hairy. Racemes 2-4, 4-6 cm long. Spikelets pedicelled, laterally compressed, 0.7-1.2 cm long; lower glume elliptic-oblong, hairy all along keel, long hairs at tip, margins hyaline; upper glume 6-9 mm long, linear-oblong, hairy along keel. '*Karad*'

Fls. & Frts.: October-November.

Illus.: Bor, *op. cit.* 1960.

Habitat: Open areas on the plateau and along higher slopes of the ghats.

Distrib.: Endemic to MAHARASHTRA: Pune (Khandala, Lonavla); Ratnagiri ((Kond Ozare), Sindhudurg (Savantwadi, Ramghat).

Spec. exam.: Pune: Lonavla, Sakarpathar plateau, Reddi 98770, 27.9.1964; Lonavla, Ravine above Bhushi lake, Reddi 98791, 28.9.1964 (Both in BSI); Khandala, hill top adjoining Tata's Power station, Hemadri 85167, 3.10.1969 (CAL). Sindhudurg: Ramghat, Kulkarni 119152, 28.10.1969 (BSI); Savantwadi, M.R. Almeida 1720, 20. 11.1971 (BLAT).

Status: Vulnerable.

Criteria: Extent of occurrence estimated to be ca 11,900 sq km: severely fragmented populations.

Notes: Earlier this species was reported only from Pune and Sindhudurg districts. Mistry (1986) located it from Ratnagiri district also, where it is distributed in the coast and mid belt region. At Kond Ozare of the same district it is reported somewhat common.

This species can easily be differentiated from others by its larger spikelets.

Dimeria woodrowii Stapf in Hook. Ic. Pl. t. 2321. 1894; Hook.f. Fl. Brit. India 7: 104. 1896; Cooke, Fl. Pres. Bombay 3: 462. 1958 (Repr.ed.); Blatt. & McC. Bombay Grass. 8, t. 5. 1935; Bor. Grass. Burm. Ceyl. Ind. & Pak. 144, f. 4 (22). 1960; Karthikeyan in Jain & Rao (eds.), Ass. Threat. Pl. India 243. 1983; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 6. 1983 et in J. Econ. Tax. Bot. 5(1): 164. 1984; Deshpande & Singh, Grass. Maharashtra 52. 1986; Mistry, Fl. Ratnagiri 2: 806.1986 (Ph.D. Thesis, *ined.*); Singh & Raghavan in J. Econ. Tax. Bot. 8 (1): 36. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 221.1987; Deshpande in Nayar & Sastry (eds.), Red Data Book Indian Pl. 1: 298. 1987; Kulkarni, Fl. Sindhudurg 523, f. 1-8. 1988; Mistry & Almeida in J. Bombay nat. Hist. Soc. 86 (3): 479. 1989; Almeida in J. Econ. Tax. Bot. Addl. Ser. 8(2), Fl. Savantwadi 2: 125. 1990; Anon., Ind. Glob. Threat. Taxa 24. 1996; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 470. 1996; Yadav in Pogle *et al.* (eds.), Flow Pl. Syst. Diver. pt. 1: 50. 1997; Yadav, S.S. *et al.* in Geobios new Rep. 16(1): 10. 1997.

Type: India, Maharashtra, Ratnagiri, Karanje, *Woodrow s.n.*, without date.

Herbs, annual, tufted; culms 7.5-15 cm high, slender, nodes hairy. Leaves 3.5-7.5 x 0.1-0.5 cm, linear, finely acuminate, glabrous, margins bulbous based hairy. Racemes 2, 2-2.5 cm long, at first erect and then circinate incurved. Spikelets 3-4 mm long, distant, pedicellate, laterally compressed, imperfectly awned; lower glume *ca* 3 mm long, linear, acute, folded, glabrous or sparsely hairy; upper glume equal or slightly shorter than the lower one, narrow, acute, keeled and thickened at the back, margins hyaline; lower lemma narrowly linear, hyaline; upper lemma bifid, awned in the sinus, hyaline.

Fls. & Frts.: September-February.

Illus.: Blatt. & McC., *op. cit.*; Bor, *op. cit.*; Kulkarni, *op. cit.*

Habitat: On bare, laterite flats, especially near the sea.

Distrib.: Endemic to Daman, Diu, Goa, Kanataka, MAHARASHTRA: Ratnagiri (Karanjee, Mirjole, Mirya, Pawas). Sindhudurg (Achra, Devgad, Malwan, Shirgaon).

Spec. exam.: Ratnagiri: *Saldanha* C.S.7132a, 15.9.1961 (CAL); Pawas, *Mishra* 176984, 3.10.1997 (BSI). Sindhudurg: Shirgaon, *Rawjee s.n.*, October, 1893 (BLAT); Near Devgad rest house, *Kulkarni* 120364, 28.2.1970; Malwan, Adari, *Kulkarni* 121287, 29.9.1970; Achra, Kaziwada Sada, *Kulkarni* 120259, 23.12.1970 (All in BSI).

Status: Endangered (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Extent of occurrence estimated to be *ca* 1,000 sq km: severely fragmented populations.

Notes: The type locality of this species is Karanje in Ratnagiri district. Bhide and Talbot reported it from Marmagoa. Bell, Hallberg, McCann and Sedgwick collected it from Karnataka state also. After a long gap of 79 years this grass was collected from Sindhudurg district of Maharashtra, where it was found to be very rare. Recently in 1997 it has been recollected from Pawas of Ratnagiri district. Here also its distribution is

very much sporadic. Encroachment of its natural habitats due to urbanization may be the major reason of its rarity.

This species can be distinguished by its circinate involute rachis forming a hook after drying.

Glyphochloa mysorensis (Jain & Hemadri) W.D. Clayton in Kew Bull. 35: 815. 1981; Raghavan & Singh in J. Econ. Tax. Bot. 5(1): 164. 1984; Deshpande & Singh, Grass. Maharashtra 66. 1986; Singh & Raghavan in J. Econ. Tax. Bot. 8(1): 37. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 222. 1987; Kulkarni, Fl. Sindhudurg 534. 1988; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 501. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 50. 1997. *Manisuris mysorensis* Jain & Hemadri in Bull. Bot. Surv. India 10: 280, f. a-c. (1968) 1969; Jain in *ibid.* 12: 15. (1970) 1972; Karthikeyan in Jain & Rao (eds.), Ass. Threat. Pl. India 243. 1983; Almeida in J. Econ. Tax. Bot. Addl. Ser. 8(2), Fl. Savantwadi 2: 149. 1990.

Types: Holotype: India, Karnataka, N. Kanara, Castle Rock, *Gammie* 15643 A, 25.10.1902 (CAL!). Isotypes: 1543 B-C (CAL!), D (BSI), E (BLAT!). Paratype: Ratnagiri, Ambolighat (Presently in Sindhudurg district), *Talbot* 4305, 6.10.1900 (BSI!).

Herbs, annual, tufted; culms 8-20 cm high, erect or slightly ascending, softly or densely villous, nodes hairy. Leaves 3-10 x 0.2-0.3 cm, linear, acute, flat, sparsely hairy on both sides, faintly 5-nerved. Racemes solitary, 1-3.5 x *ca* 4.5 cm, erect, compressed. Sessile spikelets 3.5-5 mm long; lower glume ovate to orbicular, hooked along margins, ribbed or hooked on dorsal surface, winged at tip, with 2 awns. Pedicelled spikelets 3.5-4 mm long; lower glume winged on one side, awned; upper glume boat shaped. Grains *ca* 1.5 mm long, elliptic-oblong, compressed.

Fls. & Frts.: September-October.

Illus.: Jain & Hemadri, *op. cit.* (*Manisuris mysorensis*)

Habitat: In Open, moist situations on rocky plains along the ghats.

Distrib.: Endemic to Karnataka, MAHARASHTRA: Kolhapur (Dajipur), Sindhudurg (Amboli ghat).

Spec. exam.: Kolhapur, Ijiwadi Sada, near Dajipur, *Mishra* 176884, 30.8.1997 (BSI).

Status: Endangered (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Area of occupancy up to 150 sq km: found only at two locations.

Notes: Though the holotype of this species was collected from Karnataka state, its paratype was from Ambolighat of Sindhudurg district in Maharashtra. Here its distribution was recorded as occasional. Recently, in 1997 it has been collected for the first time from Kolhapur district also. Here its population is severely fragmented. Frequent grazing by Bison at Dajipur is the main cause of its rarity in this area.

It can be distinguished from its allied species by its glabrous and unequal joints and pedicels.

Glyphochloa ratnagirica (Kulkarni & Hemadri) W.D. Clayton in *Kew Bull.* 35: 815. 1981; Deshpande & Singh, *Grass. Maharashtra* 66. 1986; Kulkarni, *Fl. Sindhudurg* 534, f. 1-6. 1988; Lakshminarasimhan in Sharma *et al.* (eds.), *Fl. Maharashtra, Monocot.* 501. 1996; Yadav in Pokle *et al.* (eds.), *Flow. Pl. Syst. Diver.* pt. 1: 50. 1997. *Manisuris ratnagirica* Kulkarni & Hemadri in *Indian For.* 100: 250, f. 1974; Nayar in *Bull. Bot. Surv. India* 22 (1-4): 20. 1980; Karthikeyan in Jain & Rao (eds.), *Ass. Threat. Pl. India* 243. 1983; Raghavan & Singh in Jain & Sastry (eds.), *Pl. Cons. Bull.* 3: 12. 1983; Almeida in *J. Econ. Tax. Bot. Addl. Ser.* 8(2), *Fl. Savantwadi* 2: 149. 1990.

Types: Holotype: India, Maharashtra, Ratnagiri, Amboli (presently in Sindhudurg district), *Kulkarni* 121638 A, 12.10.1970 (CAL!). Isotypes: 121638 B-D & M-O (BSI!), E(K), F(L), G(GH), H(US), I(MO), J(LE), K(MH), L(BLAT!). Paratypes: Sindhudurg, Amboli, Soliya jungle plateau, near Chaukul, *Kulkarni* 119190, 29.10.1970, A-D & I-K (BSI!), E-F (CAL!), G(K), H(L).

Herbs, annual, tufted; culms 15-35 cm high, erect, branched, nodes bearded. Leaves 3-10 x 0.2-0.5 cm, linear, sparsely clothed with bulbous based hairs. Raceme, solitary, 3-6 cm long. Sessile spikelets 5-6 mm long, dorsally compressed; lower glume oblong, winged along the margins, with

3-8 tubercles, upper half smooth, lower half 5-6-ribbed, 2-awned; upper glume ovate-lanceolate or oblong-lanceolate, boat shaped, 3-nerved, margins inflexed. Pedicelled spikelets 0.9-1.3 cm long; lower glume oblong-lanceolate, 3-5-nerved, 1-awned; upper glume boat shaped, keel winged.

Fls. & Frts. : September-October.

Illus.: Kulkarni & Hemadri, *op. cit.* (*Manisuris ratnagirica*); Kulkarni, *op. cit.*

Habitat: On the plateau in open situations at an altitude of ca 650 m.

Distrib.: Endemic to MAHARASHTRA: Sindhudurg (Amboli ghat).

Spec. exam.: Types, as above.

Status: Endangered.

Criteria: Area of occupancy up to 200 sq km: found only at a single location.

Notes: So far this species is known only by its type collection from Sindhudurg district where its distribution was reported as infrequent. Recently in 1997 efforts were made to collect to collect it but in vain.

This species can be differentiated by its larger anthers (ca 2 mm long), both pedicel and rachis joint with tuft of hairs at the apex and characteristically winged but awnless upper glume of pedicelled spikelets.

Glyphochloa santapau (Jain & Deshpande) W.D. Clayton in Kew Bull. 35: 815. 1981; Deshpande and Singh, Grass, Maharashtra 66. 1986; Mistry, Fl. Ratnagiri 2: 835: 1986 (Ph.D. Thesis *ined.*); Singh & Raghavan in J. Econ. Tax. Bot. 8(1): 37. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 222.1987; Deshpande in Nayar & Sastry (eds.), Red Data Book Indian Pl. 2: 185. 1988; Kulkarni, Fl. Sindhudurg 536.1988; Anon., India Glob. Threat. Taxa 30. 1996; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 501. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 50. 1997. *Manisuris santapau* Jain & Deshpande in Bull. Bot. Surv. India 10: 277, f. (1968) 1969; Jain in *ibid.* 12: 15, f.11. (1970) 1972; Nayar in *ibid.* 22 (1-4): 20. 1980; Karthikeyan in Jain & Rao (eds.), Ass. Threat. Pl. India 243. 1983; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 5. 1983.

Types: Holotype: India, Maharashtra, Ratnagiri, *Saldanha* C.S.7130A, 15.9.1961 (CAL!). Isotypes: C.S.7130B (BSI!), C-D (CAL!). Paratypes: Ratnagiri, *Saldanha* 7132, 15.9.1961 (BLAT!, CAL!).

Herbs, annual, tufted; culms 10-25 cm high, nodes glabrous. Leaves 3-5 x 0.15-0.2 cm, linear, acute, glabrous, or sparsely villous. Raceme solitary, 2-6 cm long, erect, peduncles glabrous. Sessile spikelets 3.5-4 mm long (excluding awn); lower glume 2.5-4 mm long, oblong-ovate, densely ciliate on the margins and at back below, unequally winged on both keels up to the base, wings hyaline and finely purple veined, awns 4-4.5 mm long; pedicelled spikelets *ca* 5 mm long (including awns), oblong-ovate; lower glume oblong-elliptic, 5-nerved, obliquely winged; upper glume ovate-lanceolate, boat shaped, 2-3-nerved, strongly keeled, margins unequal, keel broadly winged, purple veined, broad above, gradually narrowing down to the base.

Fls. & Frts.: August February.

Illus.: Jain & Deshpande, *op. cit.*; Jain, *op. cit.* (*Manisuris santapaui*).

Habitat: Open situations along coastal areas.

Distrib.: Endemic to MAHARASHTRA: Ratnagiri (Mirjole, Pawas), Sindhudurg (Devgad-Naringre, Malwan-Adari).

Spec. exam.: Ratnagiri: Mirjole, *Mishra* 176938, 3.10.1997 (BSI).

Status: Endangered.

Criteria: Extent of occurrence estimated to be *ca* 500 sq km: found only at four locations.

Notes: In the abovesaid two districts, the species is found to occur only in the coastal regions where its distribution is infrequent and very much sporadic. Urbanisation activities at its natural habitat may be responsible for its present status.

This species can easily be identified by its joints and pedicels forming a long high-heeled boot-like structure.

Hubbardia haptaneuron Bor in Kew Bull. 1950: 385, t.4.1951 et Grass. Burm. Ceyl. Ind. & Pak. 572. 1960; Karthikeyan in Jain & Rao (eds.), Ass. Threat. Pl. India 243.1983; Raghavan & Singh in J. Econ. Tax. Bot. 5(1): 164. 1984; Singh & Raghavan in *ibid.* 8(1): 37. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 227. 1987; Nayar & Sastry in Nayar & Sastry (eds.), Red Data Book of Indian Pl.1: 303. 1987.

Types: Holotype: India, Karnataka, Jog, Gersoppa falls, *Sedgwick* 7089, October, 1919 (K). Isotype: 7089 (BLAT!).

Annuals, trailing or pendulous; culms slender, rooting at nodes. Leaves 2-3 cm long, elliptic to oblong-elliptic, rough on the margins, with short sheathing base without ligule, translucent, pale green. Panicles slender, numerous from nodes; spikelets 2-3 mm long, with 2 glumes, ellipsoid, oblong-acute and marked with 5-7 conspicuous longitudinal veins. Grains *ca* 1.25 mm long, spindle-shaped.

Fls. & Frts.: September - March.

Illus.: Bor, *op.cit.*

Habitat: On moist rocks in shady places at an altitude ranging between 400 - 500 m.

Distrib.: Endemic to Karnataka, MAHARASHTRA: Kolhapur (Tilari ghat).

Spec. Exam.: Type as above.

Status: Critically Endangered (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Area of occupancy up to 3 sq km: found only at a single location.

Notes: Earlier this grass was considered to be endemic to Karnataka state only. It was first collected by Sedgewick from Gersoppa falls (Jog) in 1919 but was described in 1950 by Bor. Two further gatherings of the same species are known which were collected by Hallberg & McCann, also in the year 1919 from the same locality. However, recently Yadav

and Salunkhe (*Yadav* 8966-7, 10.9.2000, *ined* and *Salunkhe* 8998, 17.9.2000, & 8999, 18.9.2000, *ined*. SUK) collected it for the first time from Tilari ghat of Kolhapur district in Maharashtra state. In the next year the grass was again collected from the same locality (*Divakar, Prassana & Moorthy* 182304, 12.3.2001, BSI). The species is presumed extinct from its type locality because it could not be recollected from this place over 8 decades even after intensive searching. In Maharashtra the species was searched other places like Amboli, Phonda and Karul ghat but in vein. Forest fires, land slides, dam construction and road broadening are the major threats of this species.

Isachne bicolor Naik & Patunkar in Bull. Bot. Surv. India 15: 157, f. 1-7. (1973) 1976; Patunkar, Grass. Maathwada 262. 1980; Karthikeyan in Jain & Rao (eds.), Ass. Threat. Pl. India 243. 1983; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 11. 1983; Ved Prakash & Jain in Jain & Rao (eds.), Ass. Threat. Pl. India 257. 1983 et in Fasc. Fl. India 14: 14. 1984; Raghavan & Singh in J. Econ. Tax. Bot. 5 (1): 164. 1984; Deshpande & Singh, Grass. Maharashtra 70. 1986; Singh & Raghavan in J. Econ. Tax. Bot. 8(1): 37. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 227. 1987; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 507. 1996; Samaddar & Roy, Addl. Ele. Indian Fl. 1: 222. 1997; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 50. 1997; Naik, Fl. Marathwada 2: 1049. 1998; Pradhan & Singh, Fl. Ahmednagar 607. 1999.

Types: Holotype: India, Maharashtra, Aurangabad, Mhaismal, *Patunkar* 1849A, 8.10.1973 (CAL!). *Isotypes:* 1849 B-E (MUA!).

Herbs, annual; culms 30-45 cm long, decumbent, nodes glabrous or pilose. Leaves 3.5-4.5 x 0.3-0.7 cm, narrowly ovate-lanceolate, bulbous based hairs on both sides, acute at apex, margins entire or serrulate, cartilaginous. Panicles narrowly effuse, 2-5 cm long. Spikelets 2.8-3 mm long, broadly ovate; glumes 2.5-3 mm in diameter, nearly orbicular, apiculate or not, glabrous or with bulbous based hairs, 5-9-nerved.

Fls. & Frts.: September-November.

Illus.: Naik & Patunkar, *op. cit.*

Habitat: Open plateau, in wet situations.

Distrib.: Endemic to MAHARASHTRA: Ahmednagar, Aurangabad (Mhaismal), Kolhapur (Dajipur), Satara, (Panchgani).

Spec. exam.: Kolhapur: Holicha Sada, near Dajipur Bison Sanctuary, Mishra 176876, 29.8.1997; Ijiwadi Sada, near Dajipur, Mishra 176885, 30.8.1997. Satara: Panchgani 1st table land, Ved Prakash 346B, 10.10.1979 (All in BSI).

Status: Endangered.

Criteria: Area of occupancy up to 200 sq km: found only at three locations.

Notes: Though this species has also been reported from Ahmednagar district (Raghavan & Singh, 1983) the specific locality is not mentioned. Recently in 1998 efforts were made to locate it in this district but were unsuccessful. Hence, this district is not considered as its locality during categorisation. In other localities this grass is very much infrequent and distributed sporadically. At Dajipur the major threat to this species may be the frequent grazing by Bison and some domestic animals in the open plateau.

This species can be differentiated by its bulbous-based hairy leaves with rather conspicuous nerves and spikelets with hairy glumes and lemmas.

Isachne borii Hemadri in Indian For. 97: 223, f. 1-8. 1971; Karthikeyan in Jain & Rao (eds.), Ass. Threat. Pl. India 243. 1983; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 11. 1983 et in J. Econ. Tax Bot. 5(1): 164. 1984; Ved Prakash & Jain in Jain & Rao (eds.), Ass. Threat. Pl. India 257. 1983 et in Fasc. Fl. India 14: 14. 1984; Deshpande & Singh, Grass. Maharashtra 70. 1986; Singh & Raghavan in J. Econ. Tax. Bot. 8(1): 37. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 227. 1987; Deshpande in Nayar & Sastry (eds.), Red Data Book Indian Pl.:186.1988; Lakshminara-simhan in Sharma *et al.* (eds.), Fl. Maharashtra. Monocot. 509. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 50. 1997.

Types: Holotype: India, Maharashtra, Pune, Dhak Khilla, ca 27 km west of Junnar, Hemadri 117968 A, 22.9.1968 (CAL!). Isotypes: 117968

B-D (BSI!), E(CAL!), F(K), G(L), H(MO), I(LE). Paratypes: Pune, Bushi lake, near Lonavla, *Reddi* 98672 A-E, 20.8.1964 (BSI); Sholapur, Jeur, *Woodrow s.n.* December, 1897 (BLAT!).

Annuals; culms 15-75 cm high, erect, slender. Leaves 6-15 x 0.25-0.6 cm, linear-oblong, flat with tubercle based hairs, margins cartilaginous, thickened. Inflorescence a lax panicle, 5-20 x 2-10 cm, with capillary branches up to 5 cm long; pedicels with one to several glandular bands. Spikelets 2.5-3 x 2.2-2.75 mm, subglobose-ellipsoid; glumes equal to or slightly shorter than the spikelet, setosely hirsute on dorsal side. Grains ca 1.8 x 1.3 mm, ellipsoid, plano-convex, with 3 ribs on the flat face, yellowish-brown.

Fls. & Frts.: August-December.

Illus.: Hemadri, *op. cit.*

Habitat: On the plateau, in moist places.

Distrib.: Endemic to MAHARASHTRA: Pune (Junnar, Lonavala). Sholapur (Jeur).

Spec. exam.: Types, as above.

Status: Endangered.

Criteria: Area of occupancy less than 500 sq km: found only at three locations.

Notes: After the type collection, this species could not be recollected from any of its locality. In 1997 efforts were made to collect it from Junnar and Lonavla but were not fruitful.

This species can easily be distinguished by the presence of very characteristic, long, copious wooly tuft of hairs on the callus of both lower and upper florets.

Isachne lisboae Hook.f. Fl. Brit. India 7: 22. 1896; Cooke, Fl. Pres. Bombay 3: 438. 1958 (Repr.ed.); Blatt. & McC., Bombay Grass. 187, t.120. 1935; Bor, Grass. Burm. Cey. Ind. & Pak. 581. 1960; Karthikeyan in Jain

& Rao (eds.), Ass. Threat. Pl. India 246. 1983; Ved Prakash & Jain in Jain & Rao (eds.), Ass. Threat. Pl. India 260. 1983 et in Fasc. Fl. India 14: 30.1984; Deshpande & Singh, Grass. Maharashtra 70.1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg.1: 227. 1987; Deshpande in Nayar & Sastry (eds.), Red Data Book Indian Pl. 1: 306. 1987; Kothari & Moorthy, Fl. Raigad 504. 1993; Deahpande *et al.*, Fl. Mahabaleshwar 2: 692. 1995; Anon., India Glob. Threat. Taxa 36. 1996; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 511. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 50. 1997; Yadav, S.S. *et al.* in Geobios new Rep. 16 (1): 10. 1997.

Types: India, Maharashtra, Satara, Mahabaleshwar, *Lisboa s.n.* (K).

Herbs, annual; culms 6-23 cm long, prostrate or ascending, with creeping base and long, wiry roots. Leaves 1-3.5 x 0.25-1.3 cm, lanceolate, amplexicaule, thin, soft, hirsute above, margins pectinately ciliate with long tubercle based hairs. Panicles 1.5-6 cm long, lax, few-flowered. Spikelets globose; glumes 2-3 mm long, longer than the florets, obtusely cuspidate, densely setose on back; lemmas orbicular. Grains planoconvex.

Fls. & Frts. : September-October.

Illus.: Blatt. & McC., *op. cit.*

Habitat: Along marshy places.

Distrib.: Endemic to Karnataka, MAHARASHTRA: Ahmednagar (Kalsubai), Kolhapur (Dajipur), Satara (Fitzerald ghat, Kas, Koyna, Mahabaleshwar, Panchgani).

Spec. exam.: Ahmednagar: Kalsubai hill, *Mishra* 176997, 9.9.1998. Kolhapur: Ijiwadi Sada, near Dajipur, *Mishra* 176886, 30.8.1997 (Both in BSI). Satara: Mahabaleshwar, *Sedgwick* 4581, November, 1918; *McCann* 434-9, October, 1923; *Bole* 393, 21.10.1951 & 1141, 5.9.1954; *Santapau* 13171, 18.8.1951 & 22794, 15.9.1958 (All in BLAT); Old Mahabaleshwar Road, *Ansari* 67584, 11.10.1960; Along Mahad Road ghat, *Ansari* 67679, 12.10.1960 (Both in BSI); Panchgani, *M.R. Almeida* 2329, 30.9.1972 (BLAT); Kas plateau, *Mishra* 176841, 22.8.1997 (BSI); Fitzerald ghat, without coll. name, *s.n.*, without date (Acc. No. 3850, BSI).

Status: Endangered (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Extent of occurrence estimated to be *ca* 2,700 sq km: severely fragmented populations.

Notes: During recent explorations for the study this species has been reported for the first time from Ahmednagar district. Here it was found growing gregariously at a single spot around the middle of the way from foot hills to Kalsubai temple. At Kas plateau and Ijiwadi Sada it is distributed sporadically. At Panchgani it could not be traced during 1996-1998.

This species differs from others in its lanceolate or ovate to ovate-lanceolate leaf blades, glumes conspicuously longer than spikelet and lower florets almost similar in shape, size and texture with that of upper ones.

Isachne meeboldii Fischer in Kew Bull. 1932: 323. 1932 et in Fl. Pres. Madras 3: 1244. 1957 (Repr.ed.); Bor, Grass. Burm. Ceyl. Ind. & Pak. 581.1960; Patunkar, Grass. Marathwada 263, f. 80. 1980; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 13. 1983 et in J. Econ. Tax Bot. 5(1): 164. 1984; Ved Prakash & Jain in Fasc. Fl. India 14: 31. 1984; Deshpande & Singh, Grass. Maharashtra 70. 1986; Singh & Raghavan in J. Econ. Tax. Bot. 8(1): 37. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 227. 1987; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 511. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 50. 1997; Naik, Fl. Marathwada 2: 1049. 1998.

Types: Holotype: India, Karnataka, Shimoga, *Meebold* 1047 (K). Isotype (CAL!). Paratypes: Shimoga, *Meebold* 1046 (CAL! K); Kumshi, *Meebold* 10745 (CAL! K).

Herbs, perennial, tufted; culms 30-45 cm high, erect, nodes glabrous. Leaves 7-21 x 0.6 - 1.2 cm, elliptic-lanceolate, glabrous or hispid, mid nerve impressed below, acute at apex, margins cartilaginous. Panicles 7-13 cm long, ovate-oblong or subpyramidal, lax; branches 3-8 cm long, glabrous; pedicels geminate, unequal in length; spikelets 2-3 mm long, globose or obovate; glumes 2-2.2 mm long, equal or subequal, ovate, 7-9-nerved, hispid, apex orbicular; lemmas 1.7-2 mm long, orbicular, crustaceous, puberulous. Grains 1.5 cm long, elliptic, dorsally compressed.

Fls. & Frts. : August-December.

Illus.: Patunkar, *op. cit.*

Habitat: Pastures of open grasslands, near water storage.

Distrib.: Endemic to Karnataka, MAHARASHTRA: Aurangabad (Mhaismal).

Spec. exam.: Aurangabad: Mhaismal, Naik 886, (MUA); Mishra 177650, 28.10.1998 (BSI).

Status: Endangered (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Area of occupancy estimated to be *ca* 200 sq km: Severely fragmented populations.

Notes: Before collection from Maharashtra this species was considered to be endemic to Karnataka state only. It may be newly introduced to Maharashtra state and is localised only in Aurangabad district. Here its distribution is also very much sporadic (1-2 mature individuals per sq km). In Karnataka it is a weed in paddy fields (Ved Prakash & Jain, 1984).

This species can be distinguished by its larger and linear leaf blades and wider culms (*ca* 5 mm wide).

Isachne swaminathanii Ved Prakash & Jain in Proc. Indian Acad. Sci (Pl. Sci.) 92: 19, f. 10.1983 et in Jain & Rao (eds.), Ass. Threat. Pl. India 262. 1983 et in Fasc. Fl. India 14: 36. 1984; Deshpande & Singh, Grass. Maharashtra 71. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 227. 1987; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 512. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 41. 1997.

Types: Holotype: India, Maharashtra, Satara, Mahabaleshwar, Ved Prakash 337A, 9.10.1979 (CAL!). Isotypes: 337B-E (CAL!). Paratypes: Bombay, Trombay, Meebold 9118, September, 1907 (CAL!); Pune, Lonavla, near Valwan dam, Reddi 98729, September, 1964 (BSI!); Satara,

Mahabaleshwar, *Talbot* 4545, October, 1918 (BLAT!); *Puri* 25641 & 25642 A-B, 5.10.1957 (BSI!); *Mehrotra s.n.*, 10.10.1979 (CAL!); Thane, Harishchandragarh, *Wadhwa* 127804, September, 1970 (BSI!).

Herbs, perennial; culms 30-95 cm high, erect or decumbent at base. Leaves 5-16 x 0.5-1.7 cm, linear-lanceolate to broadly lanceolate, acute-acuminate, hirsute with tubercle based hairs, margins cartilaginous. Panicles 8-18 cm long, pyramidal, effuse; branches up to 6 cm long, subcapillary, flexuous, glabrous. Spikelets 2.2-2.7 cm long, globose; glumes broadly elliptic, obtuse, subequal, glabrous or sparsely setose; lemmas globose; glumes broadly elliptic, obtuse, subequal, glabrous or sparsely setose; lemmas similar to glumes.

Fls. & Frts. : September-October.

Illus.: Ved Prakash & Jain, *op. cit.*

Habitat: Damp and shady places in shandy-rocky soils at an altitude above 600 m.

Distrib.: Endemic to MAHARASHTRA: Bombay (Trombay), Pune (Lonavla), Ratnagiri (Kumbharli ghat), Satara (Mahabaleshwar), Thane (Harishchandragarh).

Spec. exam.: Ratnagiri: Kumbharli ghat, *Mishra* 176914, 30.9.1997 (BSI).

Status: Vulnerable.

Criteria: Extent of occurrence estimated to be ca 9,400 sq km: found only at five locations.

Notes: So far this species has been reported from five districts of Maharashtra and everywhere its distribution is recorded as occasional and sporadic.

This species differs from others in its larger size, robust nature, narrowly to broadly lanceolate leaf-blades, larger and globose spikelets and broadly ellipsoid to hemispherical florets.

Ischaemum boleii Almeida in Indian For.98: 236, f. 1-11. 1972; Kathikeyan in Jain & Rao (eds.), Ass. Threat. Pl. India 243. 1983; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3:11 1983 et in J. Econ. Tax. Bot. 5(1): 164.1984; Deshpande & Singh, Grass. Maharashtra, 73. 1986; Singh & Raghavan in J. Econ. Tax. Bot. 8(1): 37.1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 228. 1987; Kulkarni, Fl. Sindhudurg 539. 1988; Almeida in J. Econ. Tax. Bot. Addl. Ser. 8(2), Fl. Savantwadi 2: 136. 1990; Lakshminarasimhan in Sharma *et al.*(eds.), Fl. Maharashtra, Monocot. 515. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 41. 1997. '*Karpil*'

Type: Holotype: India, Maharashtra, Sindhudurg, Savantwadi, *M.R. Almeida* 1535, 18.11.1970 (BLAT!).

Herbs, annual; culms up to 75 cm high, erect or decumbent, branched from base. Leaves 3.5-10 x *ca* 1 cm, linear-lanceolate; lower leaves sagittate or deeply cordate, petiolate; upper sessile, hairy on both sides; sheaths prominent, covering half of the internodes; ligule elongated, with tubercle based hairs. Racemes 2, terminal, *ca* 4 cm long. Sessile spikelets 3.5-4 mm long; lower glume narrowly and evenly intumed, with 2-4 nodules on margins; upper glume boat shaped, 1-nerved. Pedicelled spikelets almost same as sessile spikelets.

Fls. & Frts. : October-November.

Illus.: Almeida, *op. cit.*

Habitat: Grass lands in partially shady places.

Distrib.: Endemic to MAHARASHTRA: Sindhudurg (Savantwadi).

Spec. exam.: Sindhudurg: Savantwadi, Charatha, *S.M. Almeida* 913, 11.11.1977 & 2150, 24.10.1978 (BLAT).

Status: Endangered.

Criteria: Area of occupancy up to 12 sq km: found only at a single location.

Notes: So far, this species is known only from Savantwadi of Sindhudurg district, where its distribution was recorded as occasional (Almeida, 1972). During present study efforts were made to collect it without success. However, the area to be explored again.

This species differs from its allied species in having awnless spikelets.

Ischaemum bombalense Bor in J. Bombay nat. Hist. Soc. 49: 165. 1950 et Grass. Burm. Ceyl. Ind. & Pak. 178. 1960; Karthikeyan in Jain & Rao (eds.), Ass. Threat. Pl. India 243. 1983; Deshpande & Singh, Grass. Maharashtra 73.1986; Mistry, Fl. Ratnagiri 2: 824. 1986 (Ph.D. Thesis, *ined.*); Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 515. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 41. 1997.

Types: India, Maharashtra, Khandala, Tata's Lake, *Blatter* 9904, October, 1919 (K, BLAT).

Herbs, annual; culms up to 30 cm high, slender, branched at nodes. Leaves *ca* 12 x 0.7 cm, linear, narrowed at base, bulbous hairy; sheaths loose, smooth, striate; ligules scarious. Racemes in pairs, seated at tip of a stout peduncle. Sessile spikelets: lower glume *ca* 8 x 3-35 mm, oblong-acute, crustaceous-coriaceous in the lower half, herbaceous above; upper glumes *ca* 8 x 5 mm, boat shaped, rounded on the back below, strongly keeled above, 3-nerved. Pedicelled spikelets: lower glume *ca* 7.5 x 3 mm, with a broad wing on one margin; upper glume *ca* 7 mm long, boat shaped, with 2-3 nodules on the dorsal surface at the base.

Fls. & Frts. : October.

Distrib.: Endemic to MAHARASHTRA: Bombay (Mira Road), Pune (Khandala), Ratnagiri (Marakwadi near Pachvali).

Spec. exam.: Bombay: Mira Road, *McCann* 6173, 24.8.1945. Pune Khandala, *Santapau* 10473 & 10475, 28.10.1949 (All in BLAT).

Status: Critically Endangered.

Criteria: Area of ocupancy less than 10 sq km: a) found only at a single location, b) declension in the number of subpopulations.

Notes: This species could not be recollected from its earlier two localities in Bombay and Pune over fifty years even after intensive searching. Recently, it was collected only once from a streambank in Ratnagiri district (Mistry, 1986).

The unique feature of this species by which it can easily be distinguished is the presence of nodules on the upper glume of both sessile and pedicelled spikelets.

Ischaemum huegelii Hack. in DC. Monogr. Phan. 6: 252. 1889; Hook.f. Fl. Brit. India 7: 139. 1896; Bor Grass. Burm. Ceyl. Ind. & Pak. 179. 1960; Karthikeyan in Jain & Rao (eds.), Ass. Threat. Pl. India 243. 1983; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 11. 1983 et in J. Econ. Tax. Bot 5(1): 164. 1984; Deshpande & Singh, Grass. Maharashtra 74. 1986; Mistry, Fl. Ratnagiri 2: 825. 1986 (Ph.D. Thesis *ined.*); Singh & Raghavan in J. Econ. Tax. Bot. 8(1): 37. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 228. 1987; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 517. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 41. 1997. *I. inerme* Stapf ex Bor in Kew Bull. 1951: 448. 1952.

Type: India, Maharashtra, Bombay, Bandra, R.C. Wroughton s.n., October, 1896 (K).

Herbs, annual; culms slender, decumbent below, rooting at lower nodes, purple. Leaves up to 15 x 2 cm; upper sessile, cordate-lanceolate; lower shortly petioled. Racemes mostly unbranched. Sessile spikelets 6.5-7.5 mm long; lower glume oblong, obtuse, coriaceous, with 3-4 nodules on margins, connected by bar relief and ridges; upper glume ovate, deeply keeled. Pedicelled spikelets similar to sessile spikelets.

Fls. & Frts. : October.

Illus.: Mistry, *op. cit.*, plate x.

Distrib.: Endemic to MAHARASHTRA: Bombay (Bandra), Ratnagiri (Chinchvali).

Status: Critically Endangered.

Criteria: Area of occupancy less than 10 sq km: a) found only at a single location, b) declension in the number of subpopulation.

Notes: This species might have been vanished from its type locality because it could not be recollected after 1896 from this place even after intensive searching. However, more efforts to be made in this direction. Mistry (1986) reported this grass from Ratnagiri district where it was collected only once from abandoned fields in secondary forests. Here its distribution was reported as rare.

This species can be differentiated from its allied ones by its unawned and large, sessile spikelets and pedicels of pedicelled spikelets more than one-third the length of sessile spikelets.

Ischaemum ralzadae Hemadri & Billore in Indian For. 96: 318, f. 1-13. 1970; Bor in *ibid.* 96: 318. 1970; Karthikeyan in Jain & Rao (eds.), Ass. Threat. Pl. India 246. 1983; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 11. 1983 et in J. Econ. Tax. Bot. 5(1): 164. 1984; Deshpande & Singh, Grass. Maharashtra. 75. 1986; Mistry, Fl. Ratnagiri 2: 828.1986 (Ph.D. Thesis, *ined.*); Singh & Raghavan in J. Econ. Tax. Bot. 8(1): 37. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 228.1987; Deshpande in Nayar & Sastry (eds.), Red Data Book Indian Pl. 2: 189.1988; Kulkarni, Fl. Sindhudurg 542. 1988; Almeida in J. Econ. Tax. Bot. Addl. Ser. 8 (2), Fl. Savantwadi 2: 138, f. A-H. 1990; Lakshminarasimhan & Sharma, Fl. Nasik 568. 1991; Anon., India Glob. Threat. Taxa 37. 1995; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 523. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 50. 1997. *I. borii* Almeida in J. Bombay nat. Hist. Soc. 66: 513. (1969) 1970 (*nom. sup.*).

Types: Holotype: India, Maharashtra, Thane, Sadrya ghat, near Harishchandragarh, *Billore* 115450 A, 16.11.1968 (CAL!). Isotypes: 115450 B-F & I-O (BSI!), G (K), H(L). Paratypes: BSI Experimental Garden, *Billore* 115984 A-Z, 10.10.1969; A-Q (BSI!), R-S (CAL!), T(K), U(L), V(GH), W(US), X(MO), Y(LE), Z(BLAT!); Nasik, Ambewadi in Igatpuri range, *Patwardhan* 1115, 12.10.1907; Ratnagiri, Amba, *Bhide* 15 A-B, 10.5.1904; Sindhudurg, Ambolighat, *Kulkarni* 119225 A-F, 31.10.1969 (All in BSI!).

Herbs, annual, tufted; culms *ca* 15 cm high, erect or suberect. Leaves 5-8 x 0.5-1 cm, linear-lanceolate, acute to acuminate at apex, rounded

at base. Racemes 2, 2-4 cm long (excluding awn). Sessile spikelets 4-5 mm long, lanceolate; lower glume 4-5 mm long, small hump in lower half, margins narrowly incurved with a tuft of hairs on either side about the middle; upper glume 4-5 mm long, boat shaped, with a hump and tuft of hairs in the centre. Pedicelled spikelets 4-5 mm long; lower glume 4-5 mm, long, margins keeled in the upper half, apex bifid; upper glume 3.5-4 mm long, oblong-lanceolate, 3-nerved, boat shaped.

Fls. & Frts. : September - November.

Illus.: Hemadri & Billore, *op. cit.*; Almeida, *op. cit.*

Habitat: On rocks and in rocky crevices, near water falls.

Distrib.: Endemic to Karnataka, MAHARASHTRA: Kolhapur (Ganganbavda), Nasik (Ambewadi), Pune (Junnar), Ratnagiri (Amba, Kumbharli ghat), Sindhudurg (Amboli ghat), Thane (Sadrya ghat).

Spec. exam.: Pune: Durga khilla, near Junnar, *Mishra* 176813, 21.11.1996. Ratnagiri: Kumbharli ghat, *Mishra* 176921, 30.9.1997 (Both in BSI). Sindhudurg: Amboli, *M.R. Almeida* MRA 895, 24.12.1968 (Holotype of *I. borii*, BLAT) & MRA 895 A (Isotype of the same, BLAT).

Status: Vulnerable (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Extent of occurrence estimated to be ca 8000 sq km: severely fragmented populations and found only at seven locations.

Notes: This species was described in 1970 by Hemadri based on very old collection made by G.B. Patwardhan in 1907 from Ambewadi of Nasik district. Later it was reported from Kolhapur, Ratnagiri, Sindhudurg and Thane districts of Maharashtra and from Karnataka also. Recently, in 1996 it has been collected for the first time from Pune district. Here, it is confined at a single spot near Durga khilla by the side of the water falls. Land slides and soil erosion may be the major reasons of its rarity.

This species can be distinguished by its awned sessile spikelets having lower glume without any tuft of hairs but a bulge in lower third with margins

narrowly and evenly inturred from base to apex and pedicelled spikelets having pedicels more than one-third the length of sessile spikelets.

Ischaemum santapaul Bor in J. Bombay nat. Hist. Soc. 49: 167. 1950 et Grass. Burm. Ceyl. Ind. & Pak. 185.1960; Billore, Fl. Thane 2: 1085.1972 (Ph.D. Thesis, *ined.*); Karthikeyan in Jain & Rao (eds.), Ass. Threat. Pl. India 248: 1993; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 11. 1983 et in J. Econ. Tax Bot. 5(1): 164. 1984; Deshpande & Singh, Grass. Maharashtra 75. 1986; Singh & Raghavan in J. Econ. Tax. Bot. 8(1): 37. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 228. 1987; Kulkarni, Fl. Sindhudurg 542. 1988; Almeida in J. Econ. Tax. Bot. Addl. Ser. 8(2), Fl. Savantwadi 2: 139. 1990; Lakshminarasimhan & Sharma, Fl. Nasik 570, f. 51. 1991; Kothari & Moorthy, Fl. Raigad 461. 1993; Anon., India Glob. Threat. Taxa 37. 1996; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 524. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 49. 1907. 'Tol'

Types: Holotype: India, Maharashtra, Karjat, G.I.P. Rly. Riversides, *Santapau* 9665, 11.2.1948 (BLAT!). Paratypes: Karjat, *Santapau* 10535-7, 10539-42, 10544-5 & 10547, 10.12.1949 (All in BLAT!).

Herbs, tufted; culms 30-45 cm high, stout, supported by stilt roots. Leaves 11-25 x 0.5 - 0.8 cm, linear-lanceolate, bulbous based hairy on both sides. Racemes 4-10 cm long, binate, divergent. Sessile spikelets *ca* 5 mm long; lower glumes oblong-ovate, 10-11-nerved, 2-keeled above, awn 1.5 cm long; upper glume *ca* 5 mm long, boat shaped, keeled on upper half. Pedicelled spikelets 5 mm long, awned; glumes, rudimentary.

Fls. & Frts. : September-November.

Illus.: Lakshminarasimhan & Sharma, *op. cit.*

Habitat: In open situations on rocky slopes along streams and in cultivated fields.

Distrib.: Endemic to Gujarat, Nagar-Haveli, MAHARASHTRA: Bombay (Borivli, Kandivli, Malad), Nasik (Karanjul), Pune (Khandala), Raigad (Karjat), Ratnagiri (Harnai), Sindhudurg (Kankavli, Koloshi, Kudal), Thane (Kelvadi, Khutal).

Spec. exam.: Bombay: Borivli, *Fernandez* 962, 28.10.1952 & 1125, 6.12.1952; Kandivli, *Fernandez* 2120, 15.10.1955; Malad, *G.L. Shah* 6190, 20.10.1955 (All in BLAT). Nasik: Karanjul in Umbarthan range, *Lakshminarasimhan* 167612, 24.9.1984 (BSI). Raigad: Karjat, *Santapau* 9665, 11.12.1948, 10535-48, 10.12.1949 & 17470-1, 20.11.1953 (All in BLAT). Ratnagiri: Harnai near Dapoli, *Mishra* 176952, 6.10.1997. Sindhudurg: Vard, 15 km from Kudal, *Kulkarni* 107642, 19.11.1965; Koloshi, on Devgad Road, *Kulkarni* 121504, 6.10.1970; Kankavli-Phonda road, *Kulkarni* 121799, 12.10.1970; Kankavli, Digwal, *Kulkarni* 121734, 18.10.1970 (All in BSI). Thane: Mumbra, *Shenoy* 4458, 23.9.1954 (BLAT); Kelvadi, foot hill of Sadrya ghat, *Billore* 115423, 14.11.1968; Khutal, *Billore* 115424, 14.11.1968 (All in BSI).

Status: Low Risk.

Notes: Though this species has been reported as rare by several workers, in Maharashtra it is quite common and its extent of occurrence estimated to be ca 26,000 sq km. Hence it has been put under Low Risk.

This species can be differentiated from others by its stilt-rooted culms, lower leaves tapering to base, lower glumes of sessile spikelet with nodules on rounded keels and lower glumes of pedicelled spikelets not winged.

Panicum deccanense Naik & Patunkar in *Reinwardtia* 9: 405, f. 2. 1980; Patunkar, *Grass. Marathwada* 154, f. 46. 1980; Karthikeyan in Jain & Rao (eds.), *Ass. Threat. Pl. India* 243. 1983; Deshpande & Singh, *Grass. Maharashtra* 84. 1986; Singh & Raghavan in *J. Econ. Tax. Bot.* 8(1): 37. 1986; Ahmedullah & Nayar, *Endemic Pl. Indian Reg.* 1: 230. 1987; Lakshminarasimhan in Sharma *et al.* (eds.), *Fl. Maharashtra, Monocot.* 548. 1996; Yadav in Pokle *et al.* (eds.), *Flow. Pl. Syst. Diver.* pt. 1: 51. 1997; Naik, *Fl. Marathwada* 2: 1066. 1998.

Types: Holotype: India, Maharashtra, Nanded, Degloor, *Patunkar* 2350 a, 24.9.1974 (MUA!). Isotype (K).

Herbs, perennial; culms 2-30 cm high, erect or decumbent, glabrous. Leaves 3-15 x 0.6-0.8 cm, flat, acute or acuminate, glabrous or hairy. Panicles 7-25 cm long, effuse. Spikelets 2.5-3 mm long, ovate, acuminate, green or purplish, glabrous; lower glume ovate, acute, hyaline, 1-nerved;

upper glume *ca* 2.5 cm long, ovate-lanceolate, acuminate, 9-13-or more-nerved; lower lemma 5-7-nerved; pale hyaline; upper lemma elliptic, acute, hyaline.

Fls. & Frts. : September - October.

Illus.: Naik & Patunkar, *op. cit.*; Patunkar, *op. cit.*.

Habitat: In open grasslands.

Distrib.: Endemic to MAHARASHTRA: Throughout Marathwada.

Status: Vulnerable.

Criteria: Extent of occurrence estimated to be *ca* 10,000 sq km: severely fragmented populations.

Notes: According to Naik (by personal communication), this species is distributed very much sporadically (*ca* 12 mature individuals per sq km) throughout the Marathwada region. Grazing in the open grasslands may be the principal cause of its rarity.

It can be distinguished by its shorter spikelets, acute lower glume and 9-13-or more nerved upper glume.

Panicum johnii S.M. Almeida in J. Bombay nat. Hist. Soc. 83(1): 184, t.2, f.3. 1986 et in J. Econ. Tax. Bot. Addl. Ser. 8(2), Fl. Savantwadi 2: 143. 1990; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 548. 1996.

Type: Holotype: India, Maharashtra, Sindhudurg, Savantwadi, Sateli, S.M. Almeida SMA-2597, 5.9.1980 (BLAT!).

Herbs, annual, tufted; culms *ca* 90 cm high, stout, erect, striate with prominent nodes and internodes. Leaves *ca* 30 cm long, linear, with prominent mid-vein, narrowing to apex, ligule hairy. Inflorescence of terminal, slender, racemose spikes. Spikelets 2-3 x 0.7-1 mm, acute at apex, solitary, articulate, falling entirely at maturity; outer glume boat-shaped, 5-nerved; inner glume lanceolate, transparent, 4-nerved. Caryopsis oblong, compressed with persistent style bases.

Fls. & Frts. : September-October.

Illus.: S.M. Almeida, *op. cit.* 1986.

Habitat: In paddy fields.

Distrib.: Endemic to MAHARASHTRA: Sindhudurg (Sateli).

Spec. exam.: Type, as above.

Status: Endangered.

Criteria: Area of occupancy up to 12 sq km: found only at a single location.

Notes: Hitherto this species is reported only from Sateli, its type locality. In 1997 efforts were made to collect it from this place, but were unsuccessful. However, it needs more explorations. Clearing of paddy fields may be one of the major threats of this species. It should be conserved at its type locality immediately after its rediscovery.

This species can be distinguished from its allied ones by its slender, racemose spike, narrowly lanceolate to lanceolate-oblong spikelets and lower glume one quarter to half the length of spikelet.

Panicum paianum Naik & Patunkar in Reinwardtia 9(4): 407, f. 3. 1980; Patunkar, Grass. Marathwada 157, f. 47. 1980; Karthikeyan in Jain & Rao (eds.), Ass. Threat. Pl. India 243. 1983; Deshpande & Singh, Grass. Maharashtra 84. 1986; Singh & Raghavan in J. Econ. Tax. Bot. 8(1): 37. 1986; Ahmedullah & Nair, Endemic Pl. Indian Reg. 1: 230. 1987; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 550. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 41. 1997; Naik, Fl. Marathwada 2: 1068. 1998.

var. ***paianum***

Types: Holotype: India, Maharashtra, Nanded, Rajgarh, Patunkar 2430 a, 26.10.1974 (MUA!). Isotype (K).

Herbs, annual; Culms 15-50 cm high, erect or procumbent, rooting at lower nodes, pubescent with bulbous based hairs. Leaves 3-10 x 0.5-0.9 cm, linear-lanceolate, acute, glabrous or pubescent. Panicles 6-15 x 6-10 cm, effuse. Spikelets 2.7-3 x 1-1.2 mm, lanceolate, acute; lower glume *ca* 1 cm long, acute, 5-nerved. upper glume 2.5-3 mm long, ovate-lanceolate, acute, 9-11-nerved; lower lemma similar to glume, 7-nerved; palea lanceolate, 2-nerved; upper lemma 1.8-2 mm long, obtuse, 3-5-nerved; palea similar.

Fls. & Frts. : September-October.

Illus.: Naik & Patunkar, *op. cit.*; Patunkar, *op. cit.*

Habitat: Gullies in open grasslands.

Distrib.: Endemic to MAHARASHTRA: Nanded (Rajgarh).

Spec. exam.: Type, as above.

Status: Vulnerable.

Criteria: Area of occupancy up to 2,000 sq km; found at a single location.

Notes: This variety is reported only from its type locality so far and according to Naik (by personal communication) its distribution is very much sporadic (2-3 mature individuals per sq km). In 1998 efforts were made to recollect it without success. Hence, further explorations are essential to locate it and immediately after its rediscovery some conservation measures must have to be taken.

This variety is very distinct because of the bulbous-based hairs covering the vegetative parts and desiduous spikelets.

***Panicum patanum* Naik & Patunkar var. *minor* Naik & Patunkar** in Reinwardtia 9(4): 409. 1980; Patunkar, Grass. Marathwada 158, f. 48. 1980; Karthikeyan in Jain & Rao (eds.), Ass. Threat. Pl. India 243. 1983; Deshpande & Singh, Grass. Maharashtra 85. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 230. 1987; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 550. 1996; Yadav in Pokle

et al. (eds.), Fl. Pl. Syst. Diver. pt. 1. 51. 1997; Naik, Fl. Marathwada 1068. 1998.

Types: Holotype: India, Maharashtra, Nanded, Rajgarh, *Patunkar* 2439 a, 26.10.1974 (MUA!). Isotype (K).

Very similar to var. **palanum** but can easily be distinguished by its low stature, smaller spikelets and absence of hairs.

Fls. & Frts. : September - October.

Illus.: *Patunkar, op. cit.*

Habitat: Along gullies in open grasslands.

Distrib.: Endemic to MAHARASHTRA: Nanded (Rajgarh).

Spec. exam.: Type, as above.

Status: Vulnerable.

Criteria: Area of occupancy up to 2,000 sq km: found only at a single location.

Notes: This variety is also restricted to the open grasslands at Rajgarh along with var. **palanum**, but according to Naik (by personal communication) its distribution is more sporadic (1-2 mature individuals per sq km). Hence, steps also have to be taken for its conservation.

Panicum phoinicladus Naik & Patunkar in *Reinwardtia* 9(4): 403, f. 1.1980; Patunkar, *Grass. Marathwada* 159, f. 49. 1980; Karthikeyan in Jain & Rao (eds.), *Ass. Threat. Pl. India* 243. 1983; Deshpande & Singh, *Grass. Maharashtra* 85.1986; Singh & Raghavan in *J. Econ. Tax. Bot.* 8(1): 37.1986; Ahmedullah & Nayar, *Endemic Pl. Indian Reg.* 1: 230.1987; Lakshminarasimhan in Sharma *et al.* (eds.), *Fl. Maharashtra, Monocot.* 551. 1996; Yadav in Pokle *et al.* (eds.), *Flow. Pl. Syst. Diver. pt. 1:* 51. 1997; Naik, *Fl. Marathwada* 2: 1069.1998.

Types: Holotype: India, Maharashtra, Nanded, Ganjgaon, *Patunkar* 2468a, 17.11.1974 (MUA!). Isotype (K).

Herbs, perennial, tufted grass, with short, creeping rhizomes; culms 9-120 cm high, erect, rooting at lower nodes. Leaves 10-25 x 0.3-0.5 cm, linear-lanceolate, rigid; glabrous, tapering to a fine point. Panicles 8-15 cm long, pyramidal, sparingly branched. Spikelets 2.5-3 mm long, ovate, lanceolate; 1-nerved; upper glume *ca* 2.5 mm long, linear-lanceolate, acute, 7-9-nerved; lower lemma similar, slightly broader; palea hyaline, closely 2-nerved; upper lemma *ca* 2 mm long, 7-nerved.

Fls. & Frts. : October-December.

Illus.: Naik & patunkar, *op. cit.*

Habitat: In stagnant water pools.

Distrib.: Endemic to MAHARASHTRA: Amravati, Nanded (Ganjaon).

Spec. exam.: Type, as above.

Status: Critially Endangered.

Criteria: Area of occupancy *ca* 10 sq km: severely fragmented populations.

Notes: This species is reported only from two localities so far. According to Naik (by personal communication) distribution of this species is also very much sporadic (2-3 mature individuals per sq km). Filling up of wet lands as well as clearing of water bodies may be the major reasons of its rarity. It is possible to overcome these threats by implementing the concerned existing laws.

It is very distinct species with purplish culms and sheaths and very short rhizome. It can be distinguished by its fibrous basal sheaths, ovate-acuminat lower glume which is 1-nerved and sterile lower lemma.

Pogonachne racemosa Bor in Kew Bull. 1949: 176, f. 1-11. 1944 et Grass. Burm. Ceyl. Ind. & Pak. 200. 1960; Billore, Fl. Thane 2: 1098. 1972 (Ph.D. Thesis *ined.*); Nayar in Bull. Bot. Surv. India 22 (1-4): 22. 1980; Karthikeyan in Jain & Rao (eds.), Ass. Threat. Pl. India 243. 1983; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 12. 1983 et

in J. Econ. Tax. Bot. 5(1): 164. 1984; Deshpande & Singh, Grass. Maharashtra 90. 1986; Mistry, Fl. Ratnagiri 2: 844. 1986 (Ph.D. Thesis, *ined.*); Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 230. 1987; Kulkarni, Fl. Sindhudurg 552. 1988; Kothari & Moorthy, Fl. Raigad 455. 1993; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 571. 1996; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 51. 1997; Pradhan & Singh, Fl. Ahmednagar 624. 1999.

Types: India, Maharashtra, Colaba (presently Raigad district), Matheran, *Woodrow s.n.*, 25.10.1896 (K), Isotype (BSI!).

Herbs, annual or perennial, tufted; culms 60-100 cm high. Leaves 10-20 x 0.7-1.4 cm, linear-lanceolate, tubercle based hairy on both sides, margins scaberulous. Racemes 4-6 cm long in spathes. Spikelets 6-9 mm long (excluding awn), awns *ca* 2.4 cm long; lower glumes *ca* 8 mm long, elliptic-ovate, coriaceous, glabrous on back, tip 1/3rd portion 2 keeled, flat, scabrid; upper glumes *ca* 9 mm long, coriaceous, scabrid along sides and tip.

Fls. & Frts. : October-November.

Illus.: Bor, *op. cit.* 1949.

Habitat: Along slopes of the ghats on gravel.

Distrib.: Endemic to MAHARASHTRA: Ahmednagar (Harishchandragarh), Kolhapur (Gaganbavda), Pune (Khandala), Raigad (Matheran, Raigad fort hill), Ratnagiri, Satara (Mahabaleshwar, Pasarni ghat), Sindhudurg (Amboli ghat, Phonda ghat), Thane (Harishchandragerh, Talegaon).

Spec. exam.: Pune: Khandala, *McCann* 9924-6, October, 1918; *Santapau* 13806 & 13798, 4.11.1951 (All in BLAT); Khandala, Bhoma hill of Tata's power station, *Hemadri* 85173, 3.10.1969 (CAL). Raigad: On way from Pachhad to Raigad fort, *Mishra* 176957, 8.10.1997. Sindhudurg: Phonda ghat top, *Kulkarni* 118956, 24.10.1969. Thane: Tokavada range, Harishchandragarh hill, *Billore* 115548 & 115579, 17.11.1968; Talegaon hill near Igatpuri, *Mishra* 177615; 16.9.1998 (All in BSI).

Status: Vulnerable.

Criteria: Extent of occurrence estimated to be ca 12,800 sq km: found only at ten locations.

Notes: This species is not much infrequent in its localities. At Raigad fort hill and Talegaon hill it is somewhat common along the slopes. Still it has been kept under threatened category because of its localisation in restricted places at higher altitude.

This species can be distinguished by its jointed and fragile rachis of the racemes, solitary and pedicelled spikelets, and glumes rounded on the back with a thick tuft of hairs from the middle of the upper glume.

Pseudodichanthium serrafalcoides (T. Cooke & Stapf) Bor in Indian For. 66: 272. 1940 et in Grass. Burm. Ceyl. Ind. & Pak. 204. 1960; Billore, Fl. Thane 2: 1100. 1972 (Ph.D. Thesis, *ined.*); Nayar in Bull. Bot. Surv. India 22 (1-4): 22. 1980; Karthikeyan in Jain & Rao (eds.), Ass. Threat. Pl. India 243. 1983; Deshpande & Singh, Grass. Maharashtra 92. 1986; Mistry, Fl. Ratnagiri 2: 846. 1986 (Ph.D. Thesis, *ined.*); Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 230. 1987; Kulkarni, Fl. Sindhudurg 552. 1988; Almeida in J. Econ. Tax. Bot. Addl. Ser. 8(2), Fl. Savantwadi 2: 151. 1990; Kothari & Moorthy, Fl. Raigad 474. 1993; Deshpande *et al.*, Fl. Mahabaleshwar 2: 708. 1995; Lakshminarasimhan in Sharma *et al.* (eds.); Fl. Maharashtra, Monocot. 577. 1996; Yadav in Pokle *et al.* (eds.), Flow Pl. Syst. Diver. pt. 1: 51. 1997. *Andropogon serrafalcoides* T. Cooke & Stapf in Kew Bull. 1908: 459. 1908. *A. cookei* Stapf ex Woodr. in J. Bombay nat. Hist. Soc. 13: 438. 1901, *nom. tantum*; Cooke, Fl. Pres. Bombay 3: 506. 1958 (Repr.ed.). *Dichanthium serrafalcoides* (T. Cooke & Stapf) Blatt. & McC. in J. Bombay nat. Hist. Soc. 32: 426, t. 63. 1928 et Bombay Grass. 95. 1935.

Herbs, annual; culms 20-30 cm high, slender, decumbent-ascending, glabrous. Leaves 4-9 x 0.3-0.4 cm, linear, acuminate, sparsely bulbous based hairy on both sides, margins scaberulous. Racemes 2-3 cm long (excluding awns), solitary. Sessile spikelets ca 6 mm long, ovoid-ellipsoid, awns ca 2.4 cm long; lower glumes ca 6 mm long, ovate, 7-9-nerved, winged along margins, tips forked; upper glumes ca 5.5 mm long, elliptic, hyaline, 3-nerved, apex acute. Pedicelled spikelets ca 8 mm long, ellipsoid.

Fls. & Frts.: September-November.

Illus.: Blatt. & McC. *op. cit.* (*Dichanthium serrafalcoides*).

Habitat: Along higher slopes of the ghats in open places.

Distrib.: Endemic to Rajasthan, MAHARASHTRA: Ahmednagar (Harishchandragarh), Kolhapur (Gaganbavda), Pune (Junnar, Khandala, Lonavla, Sinhagadh), Raigad (Matheran, Raigad fort hill), Ratnagiri (Amba ghat), Satara (Mahabaleshwar, Panchgani), Sindhudurg (Amboli ghat), Thane (Harishchandragarh).

Spec. exam.: Pune, Lonavla, *Bhide* 9676, October 1919; Purandhar, *Santapau* 11360, 8.10.1950 (Both in BLAT); Sinhagadh hill, *Ansari* 101696, 21.10.1964; Junnar, *Hemadri* 107475, 29.9.1965. Raigad: Matheran, Danger path, *Mishra* 175694, 14.10.1996; On way from Pachhad to Raigad fort, *Mishra* 176959, 8.10.1997. Satara: Mahabaleshwar, Lingmala, *Puri* 25649, 8.10.1957. Sindhudurg: Amboli ghat, *Kulkarni* 121612, 11. 8. 1971. Thane: Tokavada range, Harishchandragarh, Kedarnath hill slope, *Billore* 115506, 17.11.1968 (All in BSI).

Status: Vulnerable (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Extent of occurrence estimated to be *ca* 11,300 sq km: severely fragmented populations.

Notes: Though this species has been reported from eight districts of Maharashtra, everywhere it is very much infrequent and distributed sporadically. Grazing as well as land slides and soil erosion are the major threats of this species.

This species can be differentiated by its curved racemes without an involucre, and lower glume of sessile spikelets keeled and broadly winged.

***Sacciolepis indica* (L.) A. Chase var. *intermedia* S.M. Almeida** in *J. Bombay nat. Hist. Soc.* 83: 184, t. 2, f. 4. 1986 et in *J. Econ. Tax. Bot. Addl. Ser.* 8(2), Fl. Savantwadi 2: 154. 1990; Lakshminarasimhan in *Sharma et al. (eds.), Fl. Maharashtra, Monocot.* 586. 1996.

Type: Holotype: India, Maharashtra, Sindhudurg, Savantwadi, Charatha, S.M. Almeida SMA-1393, 31.12.1997 (BLAT!).

Herbs, annual, with 4-5 branches from base having number of fibrous roots; culms 45-60 cm high, slender with 3-4 internodes, nodes brown, hairy. Leaves linear with sheathing leaf base, lamina 12-15 cm long, acicular. Inflorescence of terminal, unbranched, solitary, compressed, paniculate spikes. Spikelets lanceolate, bracteate. Flowers unisexual.

Fls. & Frts. : December-January.

Illus.: Almeida, *op. cit.*

Habitat: In moist places.

Distrib.: Endemic to MAHARASHTRA: Sindhudurg (Charatha).

Spec. exam.: Type, as above.

Status: Endangered.

Criteria: Area of occupancy ca 12 sq km: found only at a single location.

Notes: So far this variety is known only from its type locality (Charatha), where its distribution was recorded as rare. In 1997 efforts were made to collect it but yielded nothing. Hence, further explorations should be going on to locate it and immediately after rediscovery it should be conserved without delay.

This variety differs from the typical variety in the presence of longer pedicels, acute spikelets and in the absence of scales.

Schizachyrium paranjpyeanum (Bhide) Raizada & Jain in Proc. Ind. Sci. Congr. Abstracts 3: 130. 1953; Bor, Grass. Burm. Ceyl. Ind. & Pak. 216. 1960; Kulkarni & Wadhwa in J. Bombay nat. Hist. Soc. 70: 238, t. 4. 1973; Raghavan & Singh in Jain & Sastry (eds.), Pl. Cons. Bull. 3: 8. 1983 et in J. Econ. Tax. Bot. 5(1): 164. 1984; Deshpande & Singh, Grass. Maharashtra 95. 1986; Singh & Raghavan in J. Econ. Tax. Bot. 8(1): 37. 1986; Goel in *ibid.* 9(1): 83. 1987; Deahpande in Nayar & Sastry (eds.),

Red Data Book Indian Pl. 2: 192. 1988; Kulkarni, Fl. Sindhudurg 556, f. 1-8. 1988; Almeida in J. Econ. Tax. Bot. Addl. Ser. 8(2), Fl. Savantwadi 2: 155. 1990; Annon., India Glob. Threat. Taxa 55. 1996; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 588. 1996. *Andropogon paranjpyeanus* Bhide in J. Proc. Asiat. Soc. Bengal (n.s.) 7: 514. 1911. *Eremopogon paranjpyeanus* (Bhide) Blatt. & McC. in J. Bombay nat. Hist. Soc. 32: 427. 1927 et Bombay grass. 97. 1935.

Types: Syntype: India, Karnataka, North Karnara, Castle rock, *Bhide s.n.* 1909 (BSI!).

Herbs, annual, tufted, delicate grass; culms 20-30 cm high, nodes bearded. Leaves 4-8 x 0.2-0.3 cm, linear, hairy on both sides, subcordate at base, margins thickened. Raceme solitary, 2-3 cm long, on a very slender peduncle. Sessile spikelets *ca* 3.5 cm long, awns *ca* 2.6 cm long; lower glume oblong-elliptic, faintly 5-7-nerved, rounded on back; upper glume *ca* 4 mm long, elliptic, glabrous, 3-nerved, apex acute; lower lemma hyaline; upper lemma bilobed, awned in the sinus. Pedicelled spikelets *ca* 5 mm long, flat.

Fls. & Frts. : September-November.

Illus.: Kulkarni & Wadhwa, *op. cit.* ; Kulkarni *op. cit.*

Habitat: On open laterite flats, along ghats.

Distrib.: Endemic to Karnataka, MAHARASHTRA: Kolhapur (Dajipur, Radhanagari), Sindhudurg (Amboli ghat).

Spec. exam: Kolhapur: Ijiwadi Sada, near Dajipur, *Mishra* 176883, 30.8.1997. Sindhudurg: Amboli reserve forest, *Kulkarni* 106365, 7.11.1965. Hiranyakeshi, near Amboli ghat, *Kulkarni* 118094, 22. 10.1969. (All in BSI).

Status: Endangered (Regionally in Maharashtra). Not Evaluated (In India).

Criteria: Area of occupancy up to 75 sq km: found only at three locations.

Notes: Earlier this species was considered as endemic to Karnataka state only. Kulkarni (1965) collected it from Amboli, which was the first report from Maharashtra. Later it was reported from Radhanagari of Kolhapur district (Nayar *et al. ined.*). Recently in 1997 it has been collected from an open plateau near Dajipur of the same district. Everywhere its distribution is sporadic and infrequent.

This species can be differentiated from others by its long awns, plants remain green at maturity and long exerted racemes from sub-tending sheaths.

Tripogon polyanthus Naik & Patunkar in Bull. Bot. Surv. India 15: 158, f. 1-6. (1973) 1976; Patunkar, Grass. Marathwada 261. 1980; Karthikeyan in Jain & Rao (eds.), Ass. Threat. Pl. India 243. 1983; Deshpande & Singh, Grass. Maharashtra 112. 1986; Singh & Raghavan in J. Econ. Tax. Bot. 8 (1): 37. 1986; Ahmedullah & Nayar, Endemic Pl. Indian Reg. 1: 234. 1987; Lakshminarasimhan in Sharma *et al.* (eds.), Fl. Maharashtra, Monocot. 629. 1996; Samaddar & Roy, Addl. Ele. Indian Fl. 1: 454. 1997; Yadav in Pokle *et al.* (eds.), Flow. Pl. Syst. Diver. pt. 1: 51. 1997; Naik, Fl. Marathwada 2: 1113. 1998.

Types: Holotype: India, Maharashtra, Aurangabad, Daulatabad, Patunkar 1859 A, 18.10.1973 (MUA!). Isotypes: 1859 B-E (MUA!).

Herbs, perennial; stolons short, stout, with long fibrous roots; culms 30-80 cm high, erect, nodes glabrous. Leaves 3-7.5 x 0.2-0.3 cm, convolute, glabrous. Racemes 15-18 cm long, spiciform. Spikelets 2 - 6.5 cm long, sessile, linear, 40-50 or more flowered, dense, erect or ascending; lower glume 3-3.2 mm long, narrowly lanceolate, caudate-acuminate, 1-nerved; upper glume 4-4.5 mm long, linear-lanceolate, 1-nerved; lemma 5-5.2 x ca 2.2 mm, ovate-lanceolate; palea 4-4.2 x 1-2.5 mm, obovate-lanceolate, 2-keeled.

Fls. & Frts. : August-December.

Illus.: Naik & Patunkar, *op. cit.*

Habitat: Along stream banks and wet margins of tanks.

Distrib.: Endemic to MAHARASHTRA: Aurangabad (Daulatabad).

Spec. exam.: Types, as above.

Status: Endangered.

Criteria: Area of occupancy up to 50 sq km: found only at a single location.

Notes: This species is known only from its type locality so far, where it was recorded as rare. In 1998 efforts were made to recollect it but in vain. Hence, further explorations have to be done and if it will be rediscovered should be conserveed without delay.

This species can be differentiated by its smaller leaves, smaller lower glume with caudate-acuminate apex and the lemmas 2-fid at apex.

CHAPTER - VI

INFORMATION REGARDING INTERNATIONAL TRADE PRACTICES OF SOME PLANTS

In the course of present study data regarding international trade of 475 plant taxa occurring in Maharashtra state have been collected from Wildlife Regional Office, Mumbai during 1995-'97. Out of these, 92 plant taxa had been exported in bulk amounts to various countries for commercial purposes. These plants are listed in the Table 5 below along with the plant parts exported, value and name of the places where these had been exported. In this list plant names are given as recorded in the Wildlife Regional Office but if there is a change in the name as per the botanical nomenclature, the correct name is given and the name recorded in the above office is written within parentheses.

The remaining 383 plant taxa had been exported in meagre amounts (100 to 500 gms) to France, Japan and USA by a single private agency viz. Bhojibal C. Shah & Co., Indore for research and analysis purpose only (Table 6). These plants have been listed in the table as recorded in the above office. From this list it is found that several plant species are being exported, sometimes the same species under different names. So, the actual identity of some of these species is doubtful. It is worth mentioning that these plants are being exported in powder form and hence, the Wildlife Regional Office has no provision to identify the concerned species. Therefore, it is very important that whatever plant species are exported in whichever form should be identified correctly by some experts in this field, so that any breach in the law on international trade of threatened flora can be checked.

Table 5: List of the plant taxa occurring in Maharashtra State having international trade for commercial purpose.

Sl. No.	Name of the plant taxa	Plant parts exported	Value (Rs./Kg.)	Places to where the plant parts are exported
1.	<i>Abrus precatorius</i> L.	Sds.	28.00	Egypt
2.	<i>Acacia rugata</i> (Lam.) Voigt. (<i>A. concinna</i> (Willd.) DC.)	Pds.	—	U.S.A.
3.	<i>A. sinuata</i> (Lour.) Merr.	Pds.	—	Malaysia
4.	<i>Alpinia galanga</i> (L.) Willd.	Rts.	10.00	Karachi, Qatar
5.	<i>Alstonia scholaris</i> (L.) R. Br.	Stb.	24.50	U.S.A.
6.	<i>Anamirta cocculus</i> Wt. & Arn.	Frts.	7.50	Karachi
7.	<i>Andrographis paniculata</i> (Burm.f.) Wall. ex Nees	W.P.	9.20	Karachi
8.	<i>Anogeissus latifolia</i> (Roxb. ex DC.) Wall. ex Guillem. & Perr.	Gm.	58.70	Norway
9.	<i>Asparagus racemosus</i> Willd.	Rts.	16.10	Oman
10.	<i>Bacopa monnieri</i> (L.) Pennell	Frts. ex W.P.	2583.25	U.S.A., Germany
11.	<i>Bauhinia malabarica</i> Roxb.	Sd. ex.	875.00	Sweden
12.	<i>B. tomentosa</i> L.	Rt. ex.	700.00	U.S.A.
13.	<i>Boerhavia diffusa</i> L.	Pl. ex	857.50	U.S.A.
14.	<i>Boswellia serrata</i> Roxb. ex Coleb.	Frts., Rsn.	112.85 1204.25- 1522.40	West Indies U.S.A.
15.	<i>Caesalpinia bonduc</i> (L.) Lamk.	Frts.	42.00	Malaysia
16.	<i>Calotropis gigantea</i> (L.) R. Br.	Rts.	—	U.S.A.
17.	<i>Cassia absus</i> L.	Lvs.	—	Colombo
18.	<i>C. angustifolia</i> Vahl	Lvs.	—	Kuwait
19.	<i>C. fistula</i> L.	Frts.	26.00- 35.00	Spain, Colombo
20.	<i>C. occidentalis</i> L.	Sds.	—	Sweden
21.	<i>C. tora</i> L.	Sds.	9.00- 11.00	Japan, Taiwan
22.	<i>Catunaregam spinosa</i> (Thunb.) Tirven. (<i>Randia dumetorum</i> (Retz.) Poir.)	Rts.	—	Sweden

Sl. No.	Name of the plant taxa	Plant parts exported	Value (Rs./Kg.)	Places to where the plant parts are exported
23.	<i>Centella asiatica</i> (L.) Urb.	W.P.	30.45	France
24.	<i>Clerodendrum viscosum</i> Vent.	Rts.	857.18	U.S.A.
25.	<i>Crateva magna</i> (Lour.) DC. (<i>C. nurvala</i> Buch.-Ham.)	Rts.	840.00	Sweden
26.	<i>Curculigo orchioides</i> Gaertn.	Rhz.	4.60	Karachi
27.	<i>Curcuma aromatica</i> Salisb.	Tbs.	12.46	Italy
28.	<i>Cyperus rotundus</i> L.	Tbs.	840.00	Sweden
29.	<i>Desmostachya bipinnata</i> (L.) Stapf (<i>Eragrostis cynosuroides</i> Beauv.)	W.P.	—	Colombo
30.	<i>Dodonaea viscosa</i> Jacq.	Fls.	—	Germany
31.	<i>Eclipta alba</i> (L.) Hassk.	W.P.	35.00	Srilanka
32.	<i>E. prostrata</i> (L.) L.	Pl. ex.	945.00	Sweden
33.	<i>Embelia ribes</i> Burm.f.	Fr. ex.	875.00	Sweden
34.	<i>Enicostema hyssopifolium</i> (Willd.) Verdoorn (<i>E. littorale</i> Bl.)	Pl. ex.	945.00	U.S.A.
35.	<i>Entada rheedei</i> Spreng. (<i>E. scandens</i> Benth.)	Sds.	—	Germany
36.	<i>Eranthemum roseum</i> (Vahl) R. Br. (<i>Daedalacanthus roseus</i> Anders.)	Rts.	32.00	London
37.	<i>Evolvulus alsinoides</i> (L.) L.	W.P.	15.26	U.S.A.
38.	<i>Ficus racemosa</i> L.	Rt.ex.	840.00	Sweden
39.	<i>Fumaria parviflora</i> Lam.	Pl. ex.	857.50	U.S.A.
40.	<i>Garcinia cambogia</i> Desr.	Fr. ex.	1384.80	Japan
41.	<i>Gymnema sylvestre</i> (Retz.) R. Br. ex Schult.	W.P.	31.20	Italy
42.	<i>Hedyotis corymbosa</i> (L.) Lam. (<i>Oldenlandia corymbosa</i> L.)	W.P.	—	Norway
43.	<i>Helicteres isora</i> L.	Frts.	—	Malaysia
44.	<i>Hemidesmus indicus</i> (L.) R. Br.	Rts.	35.00	Colombo
45.	<i>Holarhena pubescens</i> (Buch.-Ham.) Wall ex G. Don. (<i>H. antidysenterica</i> (Roxb.) DC.)	Stb. ex.	857.50	U.S.A.
46.	<i>Hygrophila auriculata</i> (K. Schum.) Heine	W.P.		Sweden

Sl. No.	Name of the plant taxa	Plant parts exported	Value (Rs./Kg.)	Places to where the plant parts are exported
47.	<i>Hyptis suaveolens</i> (L.) Poit.	W.P.	—	Srilanka
48.	<i>Ipomoea mauritiana</i> Jacq. (<i>I. digitata</i> Cl.)	Rt. ex.	534.10	U.S.A.
49.	<i>Juncellus pygmaeus</i> (Rottb.) Cl. (<i>Cyperus pygmaeus</i> Rottb.)	Tbs.	23.56	Malaysia
50.	<i>Kaempferia galanga</i> L.	Tb.ex.	138.75	Srilanka
51.	<i>Lagerstroemia parviflora</i> Roxb.	Stb.	80.00	Germany
52.	<i>L. speciosa</i> (L.) Pers.	Sds.	80.00	Germany
53.	<i>Litsea glutinosa</i> (Lour.) Robinson (<i>L. chinensis</i> Lam.)	Sds.	—	Malaysia
54.	<i>Ludwigia octovalvis</i> (Jacq.) Raven (<i>Jussiaea suffruticosa</i> L.)	W.P.	—	Karachi
55.	<i>Mallotus philippensis</i> (Lamk.) Muell., Arg.	Sds.	—	Taiwan
56.	<i>Mammea suriga</i> (Buch.-Ham. ex Roxb.) Kosterm. (<i>Ochrocarpus longifolius</i> Bth. ex Anders.)	Flb.	—	U.S.A.
57.	<i>Mesua ferrea</i> L.	Fr. ex.	980.00	Sweden
58.	<i>Mimosa pudica</i> L.	W.P.	—	Colombo
59.	<i>Mucuna pruriens</i> (L.) DC.	Sds.	—	London
60.	<i>Myristica malabarica</i> Lam.	Mce	128.00	Saudi Arabia
61.	<i>Nothapodytes nimmoniana</i> (G. Grah.) Mabberley (<i>Mappia foetida</i> (Wight) Mast.)	Chips	42.56	Japan
62.	<i>Nyctanthes arbor-tristis</i> L.	Sds.	80.00	Germany
63.	<i>Ocimum gratissimum</i> L.	W.P.	—	Oman
64.	<i>Oroxylum indicum</i> Vent.	Rts.	—	Srilanka
65.	<i>Peganum harmala</i> L.	Lvs.	—	Japan
66.	<i>Phyllanthus asperulatus</i> Hutch. (<i>P. niruri</i> L.)	Pl. ex.	910.00	Sweden
67.	<i>Piper longum</i> L.	Frts.	770.00	Sweden
68.	<i>Plumbago zeylanica</i> L.	W.P.	—	Germany
69.	<i>Cullen corylifolia</i> (L.) Medik. (<i>Psoralea corylifolia</i> L.)	Sds.	23.00	London, Malaysia

Sl. No.	Name of the plant taxa	Plant parts exported	Value (Rs./Kg.)	Places to where the plant parts are exported
70.	<i>Ricinus communis</i> L.	Sds.	32.00	Germany, London
71.	<i>Rubia cordifolia</i> L.	Pl. ex.	857.00-875.00	London, Sweden U.S.A.
72.	<i>Salvia plebeia</i> R. Br.	W.P.	—	Karachi
73.	<i>Sapindus laurifolia</i> Vahl. (<i>S. trifoliata</i> L.)	Rts.	35.00	Srilanka
74.	<i>Semecarpus anacardium</i> L. f.	Frts.	7.86	Karachi
75.	<i>Sesbania bispinosa</i> (Jacq.) Wight (<i>S. aculeata</i> (Willd.) Poir.)	Sds.	7.52	Taiwan
76.	<i>Sida cordifolia</i> L.	W.P.	—	Malaysia
77.	<i>S. rhombifolia</i> L.	Pl. ex.	857.50	U.S.A
78.	<i>Solanum nigrum</i> L.	Rts.	—	Sweden
79.	<i>S. virginianum</i> L. (<i>S. xanthocarpum</i> Schd. & Wendl.)	W.P.	—	London
80.	<i>Sphaeranthus indicus</i> L.	W.P.	—	Lahore
81.	<i>Symplocos beddomei</i> Cl.	Fls.	—	Colombo
82.	<i>S. racemosa</i> Roxb.	Stb.	8.75	Malaysia
83.	<i>Terminalia arjuna</i> (Roxb.) Wt. & Arn.	Stb.	152.60 - 230.82	Malaysia, Saudi Arabia, U.S.A.
84.	<i>T. chebula</i> Retz.	Frts.	8.75	Hong Kong
85.	<i>Tinospora cordifolia</i> (Willd.) Miers ex Hook.	Pl. ex.	700.00 - 805.00	U.S.A.
86.	<i>Tribulus terrestris</i> L.	Pl. ex.	589.40 - 700.00	U.S.A.
87.	<i>Tylophora indica</i> (Burm.f.) Merr. (<i>T. asthamatica</i> (L.f.) Wt. & Arn.)	Rt. ex.	857.50	U.S.A.
88.	<i>Urena lobata</i> L.	Sds.	—	London
89.	<i>Vitex negundo</i> L.	Rt. ex.	857.50	U.S.A.
90.	<i>Withania somnifera</i> (L.) Dun.	Sds.	48.80 - 122.50	Australia, Oman, Srilanka, U.S.A.
91.	<i>Woodfordia fruticosa</i> Salisb.	Fls.	25.20	Malaysia
92.	<i>Wrightia tinctoria</i> R. Br.	Lvs.	—	Sweden

Table-6: List of the plant taxa occurring in Maharashtra state having international trade for research and analysis purpose.

Sl. No.	Name of plant taxa	Plants parts exported
1.	<i>Abutilon muticum</i> Sweet	Fls., Tws.
2.	<i>A. polyandrum</i> Wt. & Arn.	W.P.
3.	<i>Acacia caesia</i> Wt. & Arn.	Fls., Tws.
4.	<i>A. catechu</i> Willd.	W.P.
5.	<i>A. concinna</i> DC.	Frts.
6.	<i>A. farnesiana</i> Willd.	W.P.
7.	<i>A. ferruginea</i> DC.	Fls., Tws.
8.	<i>Acalypha indica</i> L.	W.P.
9.	<i>Acronychia laurifolia</i> Bl.	Tws.
10.	<i>Aerva javanica</i> Juss.	W.P.
11.	<i>Aganosma cymosa</i> Don.	Tws.
12.	<i>Agave sisalana</i> Perrine ex Engelmann	Lvs.
13.	<i>Ailanthus excelsa</i> Roxb.	W.P.
14.	<i>Alangium lamarckii</i> Thw.	Fls., Frts., Tws.
15.	<i>Albizzia amara</i> Boiv.	W.P.
16.	<i>A. lebbek</i> Benth.	Frts.
17.	<i>Allophylus cobbe</i> Bl.	Lvs., Tws.
18.	<i>Alpinia nutans</i> Rosc.	W.P.
19.	<i>Alstonia scholaris</i> Br.	W.P., Tws.
20.	<i>Alysicarpus longifolius</i> Wt. & Wm.	W.P.
21.	<i>Amaranthus blitum</i> L.	W.P.
22.	<i>A. polygamus</i> L.	W.P.
23.	<i>A. viridis</i> L.	W.P.
24.	<i>Ammannia pentandra</i> Roxb.	W.P.
25.	<i>A. tenuis</i> Cl.	W.P.
26.	<i>Anagallis arvensis</i> L.	W.P.
27.	<i>Ancistrocladus heyneanus</i> Wall.	Lvs. Tws.
28.	<i>Anisomeles malabarica</i> Br.	W.P.
29.	<i>Anogeissus serisea</i> Brand.	W.P.
30.	<i>Anthocephalus cadamba</i> Miq.	Frts.

Sl. No.	Name of plant taxa	Plants parts exported
31.	<i>Antigonon leptopus</i> Hook. & Arn.	W.P.
32.	<i>Ardisia solanacea</i> Roxb.	W.P.
33.	<i>Argyreia cuneata</i> Ker.	W.P.
34.	<i>A. involucrata</i> Cl.	Tws.
35.	<i>A. speciosa</i> Sweet.	Tws.
36.	<i>Arisaema leschenaultii</i> Bl.	W.P.
37.	<i>Aristida setacea</i> Retz.	W.P.
38.	<i>Asclepias curasavica</i> L.	W.P.
39.	<i>Asparagus racemosus</i> Willd.	Rts.
40.	<i>Asphodelus tenuifolius</i> Cav.	W.P.
41.	<i>Atalantia ceylanica</i> Oliv.	W.P.
42.	<i>A. monophylla</i> DC.	W.P.
43.	<i>A. racemosa</i> Wt. & Arn.	W.P.
44.	<i>Atylosia sericea</i> Benth.	W.P.
45.	<i>Barleria cuspidata</i> Heyne	W.P.
46.	<i>B. lawii</i> Anders.	W.P.
47.	<i>B. sepalosa</i> Cl.	W.P.
48.	<i>B. strigosa</i> var. <i>terminalis</i> Nees	W.P.
49.	<i>Bauhinia racemosa</i> Lam.	Lvs., Fls.
50.	<i>Bergia ammannioides</i> Roxb.	W.P.
51.	<i>Bixa orellana</i> L.	W.P.
52.	<i>Blainvillea latifolia</i> DC.	W.P.
53.	<i>Blumea amplexens</i> DC.	W.P.
54.	<i>B. glomerata</i> DC.	W.P.
55.	<i>B. malabarica</i> Hook.f.	W.P.
56.	<i>B. membranacea</i> DC.	W.P.
57.	<i>Boehmeria malabarica</i> Wedd.	W.P.
58.	<i>Boerhavia diffusa</i> L.	W.P.
59.	<i>B. repens</i> L.	W.P.
60.	<i>Boswellia serrata</i> Roxb.	Tws.
61.	<i>Bridelia hamiltoniana</i> Wall.	W.P.
62.	<i>B. retusa</i> Spr.	Tws.

Sl. No.	Name of plant taxa	Plants parts exported
63.	<i>B. stipularis</i> Bl.	W.P.
64.	<i>Brunfelsia americana</i> L.	W.P.
65.	<i>Buddleia asiatica</i> Lour.	W.P.
66.	<i>Butea gibsonii</i> Grah.	Fls.
67.	<i>B. monosperma</i> (Lam.) Taub.	W.P.
68.	<i>Cadaba indica</i> Lam.	W.P.
69.	<i>Caesalpinia sepiaria</i> Roxb.	Frts.
70.	<i>Calamus pseudotenuis</i> Becc.	Tws.
71.	<i>C. thwaitesii</i> Becc.	Tws.
72.	<i>Callicarpa lanata</i> L.	W.P.
73.	<i>Calotropis gigantea</i> R. Br.	W.P.
74.	<i>C. procera</i> R. Br.	W.P.
75.	<i>Calycopteris floribunda</i> Lam.	W.P.
76.	<i>Canavalia ensiformis</i> DC.	Frts.
77.	<i>Canscora decussata</i> (Vahl) R. Br.	W.P.
78.	<i>Capparis brevispina</i> DC.	W.P.
79.	<i>C. divaricata</i> Lam.	W.P.
80.	<i>C. horrida</i> L.f.	W.P.
81.	<i>C. moonii</i> Wt.	W.P.
82.	<i>C. pedunculosa</i> Wall.	W.P.
83.	<i>C. sepiaria</i> L.	Tws.
84.	<i>C. spinosa</i> L.	W.P.
85.	<i>Carex condensata</i> Nees	W.P.
86.	<i>Caryota urens</i> L.	Lvs.
87.	<i>Cassia alata</i> L.	Pds., W.P.
88.	<i>C. angustifolia</i> Vahl.	W.P.
89.	<i>Cedrela toona</i> Roxb.	W.P.
90.	<i>Celastrus paniculata</i> Willd.	Fls., Lvs.
91.	<i>Celsia coromandeliana</i> Vahl	W.P.
92.	<i>Cephalandra indica</i> Naud.	W.P.
93.	<i>Chasalia curviflora</i> Thw.	W.P.
94.	<i>Chenopodium murale</i> L.	W.P.

Sl. No.	Name of plant taxa	Plants parts exported
95.	<i>Chloroxylon swietenia</i> DC.	Lvs.
96.	<i>Chrozophora prostrata</i> Dalz.	W.P.
97.	<i>Cinchorium intybus</i> L.	W.P.
98.	<i>Cipadessa fruticosa</i> Bl.	W.P.
99.	<i>Clausena wildenowii</i> Wt. & Arn.	W.P.
100.	<i>Clematis wightiana</i> Wall.	W.P.
101.	<i>Clerodendrum fragrans</i> Br.	W.P.
102.	<i>C. infortunatum</i> L.	W.P.
103.	<i>Clitoria biflora</i> Dalz.	W.P.
104.	<i>Cocculus loeba</i> DC.	W.P.
105.	<i>C. macrocarpus</i> Wt. & Arn.	W.P.
106.	<i>Coldenia procumbens</i> L.	W.P.
107.	<i>Colebrookea oppositifolia</i> Sm.	W.P.
108.	<i>Combretum extensum</i> Roxb.	W.P.
109.	<i>Conyza stricta</i> Willd.	W.P.
110.	<i>Corchorus tridens</i> L.	W.P.
111.	<i>Cordia macleodii</i> Hook.f.	W.P.
112.	<i>Crataeva religiosa</i> Forst.	Fls., Tw., W.P.
113.	<i>Crimum asiaticum</i> L.	W.P.
114.	<i>C. defixum</i> Ker.	W.P.
115.	<i>Crotalaria leschenaultii</i> Grah.	W.P.
116.	<i>C. lutescens</i> Dalz.	W.P.
117.	<i>C. nana</i> Burm.	W.P.
118.	<i>C. retusa</i> L.	W.P.
119.	<i>C. striata</i> DC.	W.P.
120.	<i>Cryptostegia grandiflora</i> Br.	Tw.
121.	<i>Cuscuta hyalina</i> Roth	W.P.
122.	<i>Cylista scariosa</i> Roxb.	W.P.
123.	<i>Cyperus hyalinus</i> Vahl	W.P.
124.	<i>Daedalacanthus nervosus</i> Anders.	W.P.
125.	<i>Daemia extensa</i> R. Br.	W.P.
126.	<i>Dalbargia melanoxyton</i> Guill. & Perr.	W.P.

Sl. No.	Name of plant taxa	Plants parts exported
127.	<i>D. paniculata</i> Roxb.	Fls., Tws.
128.	<i>D. rubiginosa</i> Roxb.	W.P.
129.	<i>D. torta</i> Grah.	Lvs., Tws.
130.	<i>D. volubilis</i> Roxb.	W.P.
131.	<i>Debregeasia velutina</i> Gaud.	Tws.
132.	<i>Delonix regia</i> (Boger) Rafin	Lvs, Frts.
133.	<i>Dendrobium barbatulum</i> Lindl.	W.P.
134.	<i>D. crepidatum</i> Lindl.	W.P.
135.	<i>D. macrostachyum</i> Lindl.	W.P.
136.	<i>Desmodium pulchellum</i> Benth.	W.P.
137.	<i>D. triquetrum</i> DC.	W.P.
138.	<i>Dichanthium annulatum</i> (Forssk.) Stapf	W.P.
139.	<i>Dicliptera zeylanica</i> Nees	W.P.
140.	<i>Dillenia indica</i> L.	Tws.
141.	<i>Dioscorea alata</i> Grah.	W.P.
142.	<i>Diospyros melanoxylon</i> Roxb.	Lvs., Tws.
143.	<i>D. sylvatica</i> Roxb.	W.P.
144.	<i>Diplospora apiocarpa</i> Hook.	W.P.
145.	<i>Dolichandrone falcata</i> Seem.	Frts.
146.	<i>Dysophylla stellata</i> Bth.	W.P.
147.	<i>Elaeagnus latifolia</i> L.	W.P.
148.	<i>Eleocharis atropurpurea</i> Kunth	W.P.
149.	<i>Elephantopus scaber</i> L.	W.P.
150.	<i>Embelia robusta</i> Roxb.	W.P.
151.	<i>Emilia sanchifolia</i> DC.	W.P.
152.	<i>Erinocarpus nimmonii</i> Grah.	W.P.
153.	<i>Eriocaulon stellatum</i> Koern.	W.P.
154.	<i>Ervatamia heyneana</i> Cooke	W.P.
155.	<i>Erythrina indica</i> Lam.	Fls., Tws.
156.	<i>Eugenia codyensis</i> Munro	W.P.
157.	<i>E. corymbosa</i> Lam.	W.P.
158.	<i>E. jambolana</i> Lam.	Lvs., Fls.

Sl. No.	Name of plant taxa	Plants parts exported
159.	<i>E. rubicunda</i> Wt.	W.P.
160.	<i>E. spicata</i> Lam.	Lvs., Tws
161.	<i>E. stocksii</i> Duth.	W.P.
162.	<i>E. utilis</i> Talb.	W.P.
163.	<i>Fagonia cretica</i> L.	W.P.
164.	<i>Ficus arnottiana</i> Miq.	Lvs.
165.	<i>F. asperrima</i> Roxb.	W.P.
166.	<i>F. carica</i> L.	W.P.
167.	<i>F. heterophylla</i> L.	Tws.
168.	<i>F. hispida</i> L.	Lvs., Frts.
169.	<i>F. retusa</i> L.	W.P.
170.	<i>F. talboti</i> G. King	Fls., Tws
171.	<i>F. tsjakela</i> Burm.	W.P.
172.	<i>Flacourtia ramontchi</i> L.' Herit	Frts., Tws
173.	<i>F. sepiaria</i> Roxb.	Lvs., Tws
174.	<i>Flemingia bracteata</i> Wt.	Lvs., Tws
175.	<i>F. lineata</i> Roxb.	W.P.
176.	<i>F. strobilifera</i> Br.	W.P.
177.	<i>Fluggea leucopyrus</i> Dalz.	Lvs., Tws
178.	<i>Gardenia lucida</i> Roxb.	W.P.
179.	<i>Garuga pinnata</i> Roxb.	Frts., Tws
180.	<i>Glinus lotoides</i> Loefl.	W.P.
181.	<i>Glochidion hohenackeri</i> Bedd.	W.P.
182.	<i>G. zeylanicum</i> var. <i>nitidum</i> Dalz.	W.P.
183.	<i>Gmelina arborea</i> Roxb.	Frts., Sds.
184.	<i>Gomphandra axillaris</i> Wall.	W.P.
185.	<i>Grangia madaraspatana</i> Poir.	W.P.
186.	<i>Grewia heterotricha</i> Mast.	W.P.
187.	<i>G. hirsuta</i> Vahl	W.P.
188.	<i>Gymnema sylvestre</i> R. Br.	W.P.
189.	<i>Gymnosporia rothiana</i> Laws.	W.P.
190.	<i>Haplanthus tentaculatus</i> Nees	W.P.

Sl. No.	Name of plant taxa	Plants parts exported
191.	<i>H. verticillaris</i> Nees	W.P.
192.	<i>Hedychium coronarium</i> Koen.	W.P.
193.	<i>Heliotropium supinum</i> L.	W.P.
194.	<i>Heptapleurum venulosum</i> Seem.	Tws.
195.	<i>Heterophragma roxburghii</i> A. DC.	W.P.
196.	<i>Heynea trijuga</i> Roxb.	W.P.
197.	<i>Hibiscus cannabinus</i> L.	W.P.
198.	<i>H. furcatus</i> Willd.	W.P.
199.	<i>H. intermedius</i> Rich.	W.P.
200.	<i>Hiptage madablota</i> Gaert.	W.P.
201.	<i>Holarrhena antidysenterica</i> Wall.	Fls., Frts
202.	<i>Holigarna arnottiana</i> Hook.f.	Fls., Tws
203.	<i>Holoptelea integrifolia</i> Planch.	Frts.
204.	<i>Holostemma rheedianum</i> Spr.	W.P.
205.	<i>Homonoia riparia</i> Muell.	W.P.
206.	<i>Hoya wightii</i> Hook.f.	Lvs., Tws.
207.	<i>Hygrophila polysperma</i> Anders.	W.P.
208.	<i>Ilex malabarica</i> Bedd.	W.P.
209.	<i>Indigofera glandulosa</i> Willd.	W.P.
210.	<i>I. pulchella</i> Roxb.	W.P.
211.	<i>Ipomoea biloba</i> Forsk.	W.P.
212.	<i>I. indica</i> Stapf	W.P.
213.	<i>Isachne australis</i> R. Br.	W.P.
214.	<i>Ischaemum diplopogon</i> Hook.f.	W.P.
215.	<i>Ixora coccinea</i> L.	W.P.
216.	<i>I. elongata</i> Heyne	W.P.
217.	<i>I. parviflora</i> Vahl	W.P.
218.	<i>Jasminum auriculatum</i> Vahl	Tws.
219.	<i>J. malabaricum</i> Wt.	W.P.
220.	<i>J. officinale</i> L.	Tws.
221.	<i>Kigelia pinnata</i> DC.	Tws.
222.	<i>Lagerstroemia lanceolata</i> Wall.	W.P.

Sl. No.	Name of plant taxa	Plants parts exported
223.	<i>Laggera aurita</i> Schult	W.P.
224.	<i>Lasiosiphon eriocephalus</i> Dcne.	W.P.
225.	<i>Lavandula gibsoni</i> Grah.	W.P.
226.	<i>Leea sambucina</i> Willd.	Lvs., Fls., W.P.
227.	<i>Leonotis nepetifolia</i> R.Br.	W.P.
228.	<i>Lepidagathis cuspidata</i> Nees	W.P.
229.	<i>L. rigida</i> Dalz.	W.P.
230.	<i>Leucas biflora</i> R. Br.	W.P.
231.	<i>L. cephalotes</i> Spr.	W.P.
232.	<i>L. longifolia</i> Bth.	W.P.
233.	<i>L. stelligera</i> Wall.	W.P.
234.	<i>Ligustrum neilgherrense</i> var. <i>obovata</i> Cl.	W.P.
235.	<i>Limnanthemum cristatum</i> Griesb.	W.P.
236.	<i>Linaria ramosissima</i> Wall.	W.P.
237.	<i>Linociera malabarica</i> Wall.	W.P.
238.	<i>Liparis nervosa</i> Lindl.	W.P.
239.	<i>Litsea zeylanica</i> Nees	W.P.
240.	<i>Lobelia nicotianaefolia</i> Heyne	W.P.
241.	<i>Loranthus capitellatus</i> Wt. & Arn.	W.P.
242.	<i>L. cuneatus</i> Heyne	W.P.
243.	<i>L. elasticus</i> Desr.	W.P.
244.	<i>L. stocksii</i> Hook.f.	W.P.
245.	<i>Luvunga eleutherandra</i> Dalz.	W.P.
246.	<i>Maba nigrescens</i> Dalz.	W.P.
247.	<i>Macaranga tomentosa</i> Wt.	W.P.
248.	<i>Madhuca latifolia</i> (Roxb.) McBride	Fls., Frts.
249.	<i>M. longifolia</i> (Koen.) McBride	Lvs., Twigs.
250.	<i>Maesa indica</i> Wall.	W.P.
251.	<i>Marsdenia tenacissima</i> Wt. & Arn.	W.P.
252.	<i>M. volubilis</i> Cooke	Twigs
253.	<i>Melilotus indica</i> All.	W.P.
254.	<i>Memecylon edule</i> Roxb.	W.P.

Sl. No.	Name of plant taxa	Plants parts exported
255.	<i>M. umbellatum</i> Burm.	W.P.
256.	<i>Mentha viridis</i> L.	Tws.
257.	<i>Merremia pentaphylla</i> Hall.	W.P.
258.	<i>M. vitifolia</i> Hall.	W.P.
259.	<i>Millettia racemosa</i> Benth.	Lvs., Pots., W.P.
260.	<i>Mimosa pudica</i> L.	W.P.
261.	<i>Morinda tomentosa</i> Heyne	Tws.
262.	<i>Moringa concanensis</i> Nimmo	Fls., Sds.
263.	<i>Myristica malabarica</i> Lam.	W.P.
264.	<i>Nanothamnus sericeus</i> Thoms.	W.P.
265.	<i>Nephelium longana</i> Camb.	Lvs., Fls.
266.	<i>Nyctanthes arbor-tristis</i> L.	W.P.
267.	<i>Ocimum basilicum</i> L.	W.P.
268.	<i>O. gratissimum</i> L.	W.P.
269.	<i>O. sanctum</i> L.	W.P.
270.	<i>Olea dioica</i> Roxb.	W.P.
271.	<i>Osyris arborea</i> Wall.	W.P.
272.	<i>Oxystelma esculentum</i> R. Br.	Tws.
273.	<i>Palaquium ellipticum</i> Engl.	W.P.
274.	<i>Pandanus furcatus</i> Roxb.	Frts.
275.	<i>Panicum trypheron</i> Schult.	W.P.
276.	<i>Paracaryum lambertianum</i> Cl.	W.P.
277.	<i>Paramignya monophylla</i> Wt.	W.P.
278.	<i>Parkia biglandulosa</i> Wt. & Arn.	W.P.
279.	<i>Pavetta indica</i> L.	W.P.
280.	<i>Pavonia zeylanica</i> Cav.	W.P.
281.	<i>Pentatropis cynanchoides</i> R. Br.	W.P.
282.	<i>Petalidium barlerioides</i> Nees	W.P.
283.	<i>Phaseolus trilobus</i> Ait.	W.P.
284.	<i>Phyllanthus lawii</i> Grah.	W.P.
285.	<i>Physalis minima</i> L.	W.P.
286.	<i>Pimpinella adscendens</i> Dalz.	W.P.
287.	<i>Piper nigrum</i> L.	W.P.

Sl. No.	Name of plant taxa	Plants parts exported
288.	<i>P. trichostachyon</i> Cass.	W.P.
289.	<i>Plantago ovata</i> Forsk.	W.P.
290.	<i>Plectranthus coetsa</i> Buch.-Ham.	W.P.
291.	<i>Plectronia wightii</i> Cooke	W.P.
292.	<i>Pogostemon parviflorus</i> Bth.	W.P.
293.	<i>P. plectranthoides</i> Desf.	W.P.
294.	<i>Polygnum barbatum</i> Woodr.	W.P.
295.	<i>P. glabrum</i> Willd.	W.P.
296.	<i>P. plebejum</i> R. Br.	W.P.
297.	<i>P. serrulatum</i> Lag.	W.P.
298.	<i>Prosopis specigera</i> L.	Fls, Tws
299.	<i>Psychotria dalzellii</i> Hook.f.	W.P.
300.	<i>P. truncata</i> Wall.	W.P.
301.	<i>Pupalia lappacea</i> Moq.	W.P.
302.	<i>Pygeum gardneri</i> Hook.f.	W.P.
303.	<i>Radermachera xylocarpa</i> Schum.	Frts.
304.	<i>Randia dumetorum</i> Lam.	W.P.
305.	<i>Ranunculus scleratus</i> L.	W.P.
306.	<i>Rhinacanthus communis</i> Nees.	W.P.
307.	<i>Rhizophora mucronata</i> Lam.	TwS.
308.	<i>Rubia cordifolia</i> L.	W.P.
309.	<i>Rubus moluccanus</i> L.	W.P.
310.	<i>Rumex dentatus</i> L.	W.P.
311.	<i>Saccopetalum tomentosum</i> Hook.f. & Thoms.	Lvs.
312.	<i>Salmalia malabarica</i> Sch. & Endl.	W.P.
313.	<i>Salvadora persica</i> L.	W.P.
314.	<i>Salvia plebeta</i> R. Br.	W.P.
315.	<i>Sapindus emarginatus</i> Vahl.	W.P.
316.	<i>S. laurifolius</i> Vahl.	W.P.
317.	<i>Sapium insigne</i> Trim.	Lvs., TwS.
318.	<i>Schleichera oleosa</i> (Lour.) Oken	Lvs., TwS.
319.	<i>Scutia indica</i> Brongn.	W.P.
320.	<i>Sebastiania chamaelea</i> Muell.	W.P.

Sl. No.	Name of plant taxa	Plants parts exported
321.	<i>Senebiera pinnatifida</i> DC.	W.P.
322.	<i>Senecio gibsoni</i> Hook.	W.P.
323.	<i>Sesbania grandiflora</i> Pers.	W.P.
324.	<i>Sida cordifolia</i> L.	W.P.
325.	<i>Sideroxylon tomentosum</i> Roxb.	W.P.
326.	<i>Smilax macrophylla</i> Roxb.	W.P.
327.	<i>Smithia bigemina</i> Dalz.	W.P.
328.	<i>Solanum denticulatum</i> Bl.	W.P.
329.	<i>S. giganteum</i> Jacq.	W.P.
330.	<i>S. trilobatum</i> L.	W.P.
331.	<i>Sphaeranthus indicus</i> L.	W.P.
332.	<i>Spilanthes acmella</i> Murr.	W.P.
333.	<i>S. calva</i> DC.	W.P.
334.	<i>Spinifex squarrosus</i> L.	Tws.
335.	<i>Spodiopogon rhizophorus</i> (Steud.) Pilger	W.P.
336.	<i>Stellaria media</i> Cyr.	W.P.
337.	<i>Stemodia viscosa</i> Roxb.	W.P.
338.	<i>Sterculia colorata</i> Roxb.	Fls., Tws.
339.	<i>S. foetida</i> L.	Frts., Sds.
340.	<i>S. guttata</i> Roxb.	Frts., W.P.
341.	<i>S. urens</i> Roxb.	Fls., Frts.
342.	<i>S. villosa</i> Roxb.	Frts.
343.	<i>Stereospermum suaveolens</i> DC.	Fls.
344.	<i>Strobilanthus barbatus</i> Nees	Tws.
345.	<i>S. lupulinus</i> Nees	W.P.
346.	<i>Syzygium heyneanum</i> Wall.	Tws.
347.	<i>Tamarix dioica</i> Roxb.	Lvs., Tws.
348.	<i>T. ericoides</i> Rottl.	W.P.
349.	<i>Tarenna zeylanica</i> Gaertn.	W.P.
350.	<i>Tecomella undulata</i> Seem.	W.P.
351.	<i>Tephrosia tinctoria</i> Pers.	W.P.
352.	<i>Terminalia bellerica</i> Roxb.	Frts.

Sl. No.	Name of plant taxa	Plants parts exported
353.	<i>T. paniclata</i> Roth	W.P.
354.	<i>Toona ciliata</i> Roem.	Lvs., Fls.
355.	<i>Tridax procumbens</i> L.	W.P.
356.	<i>Triphasia aurantiola</i> Lour.	Frts.
357.	<i>Tylophora dalzellii</i> Hook. f.	Lvs., Tw.,
358.	<i>T. fasciculata</i> Ham.	W.P.
359.	<i>T. rotundifolia</i> Ham.	Tw.
360.	<i>Urena lobata</i> L.	Tw.
361.	<i>Vanda parviflora</i> Lindl.	W.P.
362.	<i>Vangueria spinosa</i> Roxb.	W.P.
363.	<i>Ventilago bombaiensis</i> Dalz.	W.P.
364.	<i>V. calyculata</i> Tul.	W.P.
365.	<i>Veronica anagalis</i> L.	W.P.
366.	<i>Vernonia indica</i> Cl.	W.P.
367.	<i>Vicoa indica</i> DC.	W.P.
368.	<i>Vigna vexillata</i> Rich.	W.P.
369.	<i>Viscum angulatum</i> Heyne	W.P.
370.	<i>V. articulatum</i> Burm.	W.P.
371.	<i>Vitis adnata</i> , Wall.	W.P.
372.	<i>V. elongata</i> Wall.	W.P.
373.	<i>V. pallida</i> Wt. & Arn.	W.P.
374.	<i>V. woodrowii</i> Stapf	W.P.
375.	<i>Vogelia indica</i> Gibs.	W.P.
376.	<i>Wagatea spicata</i> Dalz.	W.P.
377.	<i>Wendlandia exserta</i> DC.	W.P.
378.	<i>W. notoniana</i> Wall.	Lvs., Fls.
379.	<i>Wrightea tinctoria</i> R. Br.	W.P.
380.	<i>W. tomentosa</i> R. & S.	Fls., Sds.
381.	<i>Zehneria umbellata</i> Thw.	W.P.
382.	<i>Zingiber nimmonii</i> Dalz.	W.P.
383.	<i>Zizyphus rugosa</i> Lam.	W.P.

CHAPTER - VII

DISCUSSION

The present study on Endemic and Threatened Flowering plants of Maharashtra includes a total of 215 taxa. Of these 105 species and 12 infraspecific taxa are dicotyledon belonging to 65 genera of 25 families; and 92 species and 6 infraspecific taxa are monocotyledon belonging to 45 genera of 11 families. Of these 215 taxa enumerated in the present work 130 species and 12 infraspecific taxa are strictly endemic to Maharashtra State (Table 7). These endemic taxa are further categorised (Table 7, Diagram 1) under Possibly Extinct (PE, 8 taxa, Map 5), Critically Endangered (CR, 53 taxa, Map 6), Endangered (EN, 41 taxa, Map 7), Vulnerable (VU, 20 taxa), Low Risk (LR, 6 taxa) and Data Deficient (DD, 14 taxa). This categorisation, although arrived at the studies on the taxa of Maharashtra State, is well applicable on global basis also, since these taxa are endemic to the area of study. Of the remaining 73 taxa represented in Maharashtra and treated in the present work 71 are endemic to India, particularly Peninsular India. Out of these, 61 taxa have been categorised regionally (in Maharashtra State) into CR (15 taxa), EN (29 taxa), VU (16 taxa) and DD (1 taxa) (table 8). Remaining 10 taxa have been grouped into LR (table 13), though these were earlier considered as threatened. This regional status may not be truly applicable at National or Global level.

Table-7: Revised IUCN Categories for taxa endemic to Maharashtra State only.

Sl. No.	Name of Taxa with family	IUCN Category
DICOTYLEDONS		
Acanthaceae		
1.	<i>Barleria gibsonioides</i> Blatt.	CR
*2.	<i>Dicliptera ghatika</i> Sant.	CR
3.	<i>D. nasikensis</i> Lakshminarasimhan & Sharma	CR
4.	<i>Hypoestis lanata</i> Dalz	PE
5.	<i>Lepidagathis bandraensis</i> Blatt.	CR
6.	<i>Nilgirianthus reticulatus</i> (Stapf) Bremek	LR
7.	<i>Synnema anomalum</i> (Blatt.) Sant.	PE

Sl. No.	Name of Taxa with family	IUCN Category
Amaranthaceae		
8.	<i>Achyranthus coynei</i> Sant.	EN
9.	<i>Amaranthus caturus</i> Heyne ex Hook. f.	EN
Apiaceae		
*10.	<i>Heracleum dalgadianum</i> Almeida	CR
11.	<i>Pimpinella rollae</i> Billore & Hemadri	CR
*12.	<i>P. tomentosa</i> (Dalz. & Gibs.) C.B. Cl.	LR
*13.	<i>Pinda concanensis</i> (Dalz.) P.K. Mukherjee	LR
Asclepiadaceae		
*14.	<i>Bidaria khandalense</i> (Sant.) Jagtap & Singh	CR
*15.	<i>Brachystelma malwanense</i> Yadav & Singh	CR
*16.	<i>B. naorojii</i> E. Tetali, D.K. Kulk., S. Tetali & Kumbh.	CR
17.	<i>Ceropegia evansii</i> McC.	CR
18.	<i>C. huberi</i> Ansari	EN
19.	<i>C. jainii</i> Ansari & Kulkarni	CR
20.	<i>C. lawii</i> Hook. f.	EN
21.	<i>C. maccannii</i> Ansari	EN
22.	<i>C. mahabalei</i> Hemadri & Ansari	CR
23.	<i>C. media</i> (Huber) Ansari	VU
24.	<i>C. noorjahaniae</i> Ansari	EN
25.	<i>C. panchganiensis</i> Blatt. & McC.	CR
26.	<i>C. rollae</i> Hemadri	CR
27.	<i>C. sahyadrica</i> Ansari & Kulkarni	VU
28.	<i>C. santapauli</i> Wadhwa & Ansari	EN
29.	<i>C. vincaefolia</i> Hook.	EN
30.	<i>Frerea indica</i> Dalz.	CR
Asteraceae		
31.	<i>Blumea venkataramanii</i> Rolla Rao & Hemadri	EN
*32.	<i>Cyathocline purpurea</i> (Buch.-Ham. ex D. Don) O. Ktze. var. <i>alba</i> Sant.	VU
*33.	<i>C. purpurea</i> (Buch.-Ham. ex D. Don) O. Ktze. var. <i>bicolor</i> Sant.	CR
*34.	<i>Phyllocephalum hookeri</i> (C.B. Cl.) Uniyal	DD

Sl. No.	Name of Taxa with family	IUCN Category
Begoniaceae		
*35.	<i>Begonia phrixophylla</i> Blatt. & McC.	CR
Caesalpiniaceae		
36.	<i>Cassia kolabensis</i> Kothari, Moorthy & Nayar	EN
Celastraceae		
*37.	<i>Salacia brunoniana</i> Wight & Arn.	CR
Convolvulaceae		
38.	<i>Argyreia boseana</i> Sant. & Patel	EN
*39.	<i>Ipomoea clarkei</i> C.B. Cl.	EN
40.	<i>I. salsettensis</i> Sant. & Patel	EN
41.	<i>Operculina tansaensis</i> Sant. & Patel	CR
Euphorbiaceae		
*42.	<i>Euphorbia concanensis</i> Janarthanam & Yadav	CR
*43.	<i>E. katrajensis</i> Gage	VU
*44.	<i>E. khandalensis</i> Blatt. & Hallb.	EN
*45.	<i>E. panchganiensis</i> Blatt. & McC.	EN
*46.	<i>Jatropha nana</i> Dalz.	EN
Fabaceae		
*47.	<i>Alysicarpus luteo-vexillatus</i> Naik & Pokle	VU
*48.	<i>A. narimanii</i> S.M. Almeida & M.R. Almeida	DD
*49.	<i>A. salim-alii</i> S.M. Almeida & M.R. Almeida	DD
*50.	<i>A. tetragonolobus</i> Edgew. var. <i>pashanensis</i> S.M. Almeida & M.R. Almeida	DD
51.	<i>Crotalaria decasperma</i> Naik	VU
52.	<i>Flemingia rollae</i> (Billore & Hemadri) A. Kumar	EN
*53.	<i>Galactia tenuiflora</i> Wight & Arn. var. <i>minor</i> Baker	DD
54.	<i>Indigofera deccanensis</i> Sanjappa	VU
55.	<i>I. santapauli</i> Sanjappa	CR
*56.	<i>I. trita</i> L. var. <i>purandharensis</i> Sanjappa	CR
57.	<i>Smithia agharkarii</i> Hemadri	VU
*58.	<i>S. oligantha</i> Blatt.	CR

Sl. No.	Name of Taxa with family	IUCN Category
*59.	<i>Sphenostylis bracteata</i> (Baker) Gillett	VU
	Getianaceae	
*60.	<i>Canscora diffusa</i> (Vahl) R.Br. ex Roem & Schult. var. <i>tetraptera</i> Naik & Pokle	EN
*61.	<i>C. khandalensis</i> Sant.	VU
	Lamiaceae	
*62.	<i>Leucas deodikarii</i> Billore	EN
	Loranthaceae	
*63.	<i>Scurrula stocksii</i> (Hook.f.) Hans.	CR
	Lythraceae	
*64.	<i>Rotala floribunda</i> (Wight) Koehne	EN
	Malvaceae	
65.	<i>Abutilon ranadei</i> Woodr. & Stapf	CR
	Ranunculaceae	
*66.	<i>Delphinium malabaricum</i> (Huth) Munz var. <i>malabaricum</i>	VU
67.	<i>D. malabaricum</i> (Huth) Munz var. <i>ghaticum</i> Billore	CR
*68.	<i>Thalictrum obovatum</i> Blatt.	CR
	Rhamnaceae	
*69.	<i>Ventilago madaraspata</i> Gaertn. var. <i>fructifida</i> Sant.	CR
*70.	<i>Ziziphus rugosa</i> Lam. var. <i>glabra</i> Bhandari & Bhansali	DD
	Rubiaceae	
71.	<i>Neanotis sahyadrica</i> Billore & Mudaliar	CR
	Scrophulariaceae	
*72.	<i>Bonnayodes limnophiloides</i> Blatt. & Hallb.	CR
*73.	<i>Lindernia quinqueloba</i> (Blatt. & Hallb.) Mukh.	CR

Sl. No.	Name of Taxa with family	IUCN Category
MONOCOTYLEDONS		
Amaryllidaceae		
1	<i>Crinum eleonora</i> Blatt. & McC. f. <i>eleonora</i>	PE
*2	<i>C. eleonora</i> Blatt. & McC. f. <i>purpurea</i> Blatt. & McC.	PE
3	<i>C. woodrowii</i> Baker	PE
4	<i>Pancratium sanctae-mariae</i> Blatt. & Hallb.	EN
Aponogetonaceae		
*5	<i>Aponogeton bruggenii</i> Yadav & Govekar	CR
6	<i>A. satarensis</i> Sundararaghavan, Yadav & Kulkarni	EN
Araceae		
7	<i>Arisaema caudatum</i> Engl.	EN
*8	<i>A. sahyadricum</i> Yadav, Patil & Bachulkar	EN
9	<i>Cryptocoryne cognata</i> Schott	CR
Cyperaceae		
10	<i>Cyperus decumbens</i> Govind.	DD
11	<i>C. pentabracteatus</i> Govind. & Hemadri	CR
*12	<i>Eleocharis lankana</i> Koyama subsp. <i>Mohamadii</i> Wadood Khan	CR
*13	<i>Fimbristylis ambavanensis</i> V.P.Prasad & N.P.Singh	DD
*14	<i>Fimbristylis nagpurensis</i> V.P.Prasad & N.P. Singh	DD
*15	<i>F. ratnagirica</i> V.P.Prasad & N.P. Singh	DD
16	<i>F. unispicularis</i> Govind & Hemadri	CR
*17	<i>Mariscus blatteri</i> McC.	CR
*18	<i>M. konkanensis</i> (T. Cooke) Sedgw.	LR
*19	<i>Pycneus bolei</i> S.M. Almeida	CR
*20	<i>P. lanceolotii</i> S.M. Almeida	CR
*21	<i>Scirpus naikanus</i> Wadood Khan	CR
*22	<i>Scleria poklii</i> Wadood Khan	CR
Eriocaulaceae		
*23	<i>Eriocaulon bolei</i> Bole & Almeida	CR

Sl. No.	Name of Taxa with family	IUCN Category
*24	<i>Eriocaulon ratnagiricus</i> Yadav, Gaikwad & Sardesai	CR
25	<i>E. rouxianum</i> Steud.	CR
*26	<i>E. santapau</i> Moldenke	CR
*27	<i>E. sharmae</i> Ansari & Balakr.	DD
28.	<i>E. tuberiferum</i> A.R. Kulkarni & Desai	EN
Liliaceae		
*29	<i>Camptorrhiza indica</i> Yadav, Singh & Mathew	CR
30	<i>Chlorophytum glaucoides</i> Blatt.	LR
31	<i>Dipcadi concanense</i> (Dalz.) Baker	CR
32	<i>D. maharashtrensis</i> Deb & Dasgupta	CR
33	<i>D. minor</i> Hook.f.	CR
34	<i>D. saxorum</i> Blatt.	CR
35	<i>D. ursulae</i> Blatt. var. <i>ursulae</i>	EN
36	<i>Drimia polyphylla</i> (Hook.f.) Ansari & Raghavan	PE
37	<i>D. razii</i> Ansari	CR
38	<i>Iphigenia stellata</i> Blatt.	VU
*39	<i>Protasparagus karthikeyanii</i> Kamble	DD
40	<i>Scilla viridis</i> Blatt. & Hallb.	PE
Orchidaceae		
41	<i>Habenaria caranjensis</i> Dalz.	PE
42	<i>H. panchganiensis</i> Sant. & Kap.	EN
Poaceae		
*43	<i>Chrysopogon castaneus</i> Veldkamp & Salunkhe	EN
44	<i>Coelachne minuta</i> Bor	EN
45	<i>Dichanthium armatum</i> (Hook.f.) Blatt. & McC.	VU
46	<i>D. compressum</i> (Hook.f.) Jain & Deashpande	EN
47	<i>D. jainii</i> (Deshpande & Hemadri) Deshpande	EN
48	<i>D. maccanii</i> Blatt.	DD
49	<i>D. panchganiensis</i> Blatt. & McC.	EN
50	<i>D. woodrowii</i> (Hook.f.) Jain & Deshpande	EN
51	<i>Dimeria blatteri</i> Bor	VU
52	<i>Glyphochloa ratnagirica</i> (Kulkarni & Hemadri) W.D. Clayton	EN

Sl. No.	Name of Taxa with family	IUCN Category
53	<i>Glyphochloa santapau</i> (Jain & Deahpande) W.D. Clayton	EN
54	<i>Isachne bicolor</i> Naik & Patunkar	EN
55	<i>I. borii</i> Hemadri	EN
56	<i>I. swaminathanii</i> Ved Prakash & Jain	VU
57	<i>Ischaemum bolei</i> Almeida	EN
58	<i>I. bombaiense</i> Bor	CR
59	<i>I. huegelii</i> Hack.	CR
60	<i>Panicum deccanense</i> Naik & Patunkar	VU
*61	<i>P. johnii</i> S.M. Almeida	EN
62	<i>P. paianum</i> Naik & Patunkar var. <i>paianum</i>	VU
63	<i>P. paianum</i> Naik & Patunkar var. <i>minor</i> Naik & Patunkar	VU
64	<i>P. phoinicladus</i> Naik & Patunkar	CR
65	<i>Pogonachne racemosa</i> Bor	VU
66	<i>Sacciolepis indica</i> (L.) A. chase var. <i>intermedia</i> S.M. Almeida	EN
67	<i>Tripogon polyanthus</i> Naik & Patunkar	EN
Zingiberaceae		
68	<i>Curcuma inodora</i> Blatt.	LR
69	<i>C. purpurea</i> Blatt.	DD
70	<i>Hitchenia caulina</i> (Grah.) Baker	VU

*Taxa added to endemic list of the state after Ahmedullah & Nayar (1987)

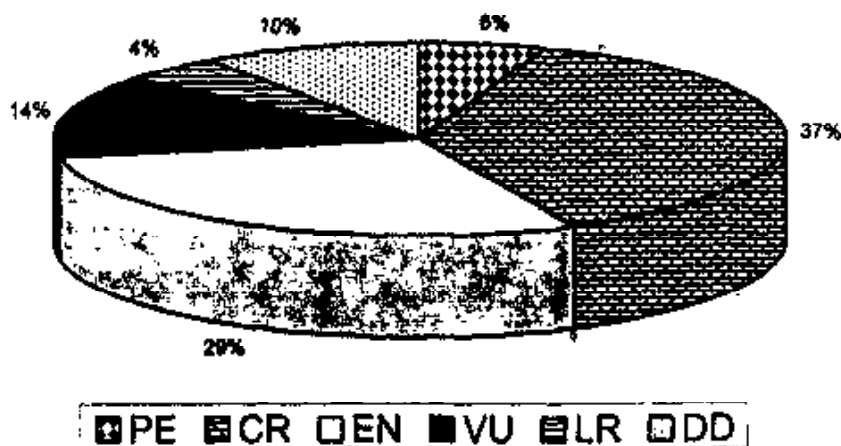


Diagram-1: Different IUCN Categories for Taxa Endemic to Maharashtra State



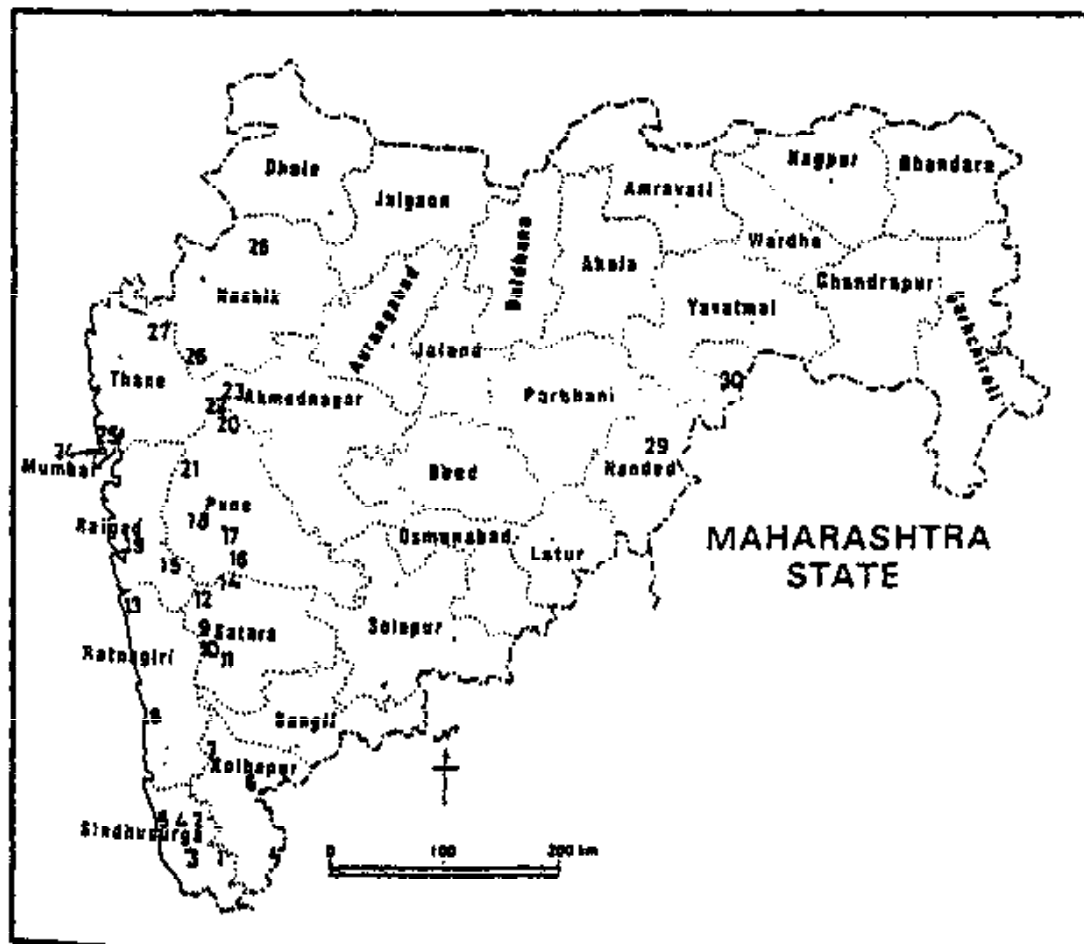
Map 5: Reported Localities of Possibly Extinct Taxa

Explanation of Map-5 showing the reported localities of Possibly Extinct taxa.

Plant Taxon	Distribution*
<i>Crinum eleonora</i> Blatt. & McC. f. <i>eleonora</i>	2
<i>C. eleonora</i> Blatt. & McC. f. <i>purpurea</i> Blatt. & McC.	2
<i>C. woodrowii</i> Baker	2
<i>Habenaria caranjensis</i> Dalz.	5
<i>Hypoestis lanata</i> Dalz.	1, 3
<i>Scilla viridis</i> Blatt. & Hallb.	4
<i>Synnema anomalum</i> (Blatt.) Sant.	4, 6

* Numbers in the above map and table depict the following places viz.,

Number	Place
1.	Roha
2.	Dapoli
3.	Mahabaleshwar
4.	Khandala
5.	Bombay
6.	Salsette



Map 6: Distribution of Critically Endangered Plants, Endemic to Maharashtra State

Explanation of Map-6 showing the distribution of Critically Endangered plants endemic to Maharashtra State only.

Plant Taxon	Distribution*
DICOTYLEDONS	
Acanthaceae	
<i>Barleria gibsonioides</i> Blatt.	12
<i>Dicliptera ghatica</i> Sant.	21
<i>D. nasikensis</i> Lakshminarasimhan & Sharma	28
<i>Lepidagathis bandraensis</i> Blatt.	24, 30
Aplaceae	
<i>Heracleum dalgadianum</i> Almeida	1
<i>Pimpinella rollae</i> Billore & Hemadri	22
Asclepiadaceae	
<i>Bidaria khandalense</i> (Sant.) Jagtap & Singh	19, 21
<i>Brachystelma malwanense</i> Yadav & Singh	5
<i>B. naorajii</i> P. Tetali, D.K. Kulk., S. Tetali & Kumbh.	14
<i>Ceropegia evansii</i> McC.	7, 21
<i>C. jainii</i> Ansari & Kulkarni	1, 9
<i>C. mahabalei</i> Hemadri & Ansari	20
<i>C. panchganiensis</i> Blatt. & McC.	12
<i>C. rollae</i> Hemadri	20, 22
<i>Frerea indica</i> Dalz.	11, 12, 15, 16, 20, 23
Begoniaceae	
<i>Begonia phrixophylla</i> Blatt. & McC.	12
Celastraceae	
<i>Salacia brunoniana</i> Wight & Arn.	1
Convolvulaceae	
<i>Operculina tansaensis</i> Sant. & Patel	24
Euphorbiaceae	
<i>Euphorbia concanensis</i> Janarthanam & Yadav	2
Fabaceae	
<i>Indigofera santapau</i> Sanjappa	16

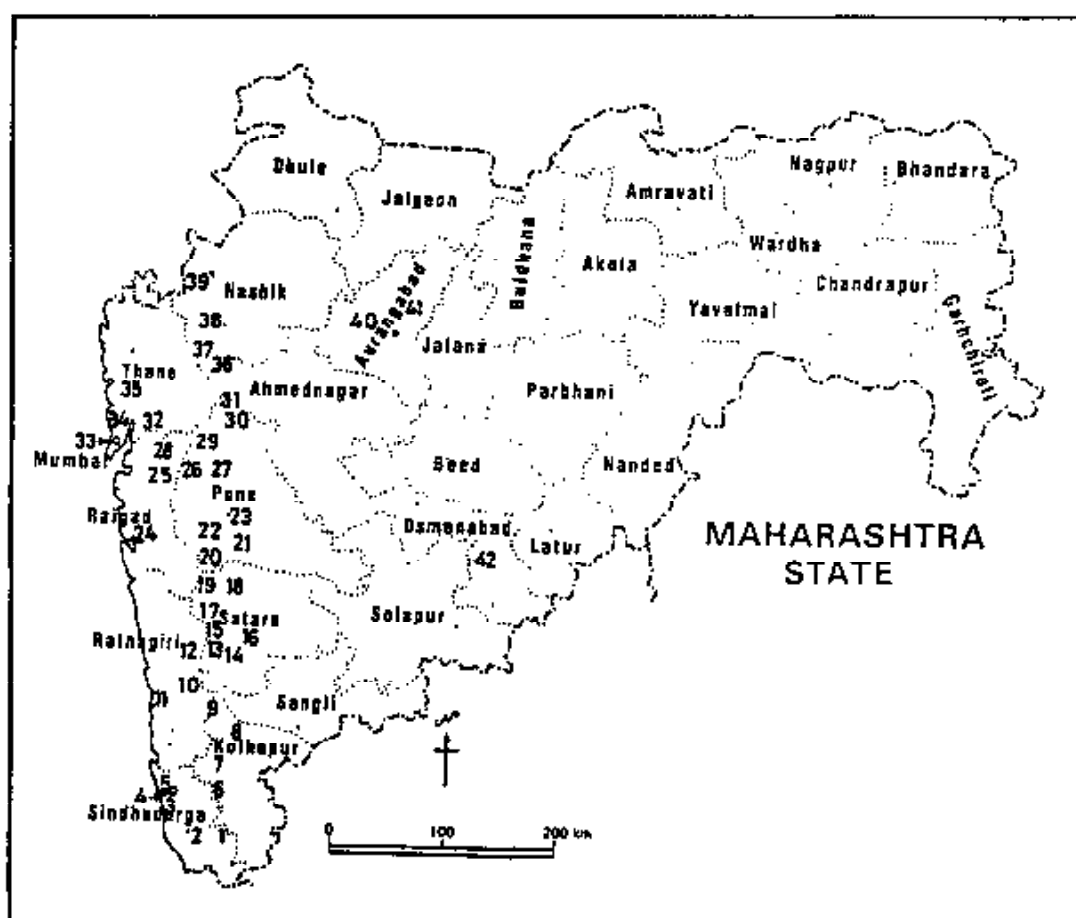
Plant Taxon	Distribution*
<i>Indigofera trita</i> L. var. <i>purandharensis</i> Sanjappa	16
<i>Smithia oligantha</i> Blatt.	24
Loranthaceae	
<i>Scurrula stocksii</i> (Hook. f.) Dans.	3,13
Malvaceae	
<i>Abutilon ranadei</i> Woodr. & Stapf.	1, 7, 10
Ranunculaceae	
<i>Delphinium malabaricum</i> var. <i>ghaticum</i> Billore	18,27
<i>Thalictrum obovatum</i> Blatt.	12
Rhamnaceae	
<i>Ventilago madaraspatana</i> var. <i>fructifida</i> Sant.	21
Rubiaceae	
<i>Neanotis sahyadrica</i> Billore & Mudaliar	22
Scrophulariaceae	
<i>Bonnayodes limnophiloides</i> Blatt. & Hallb.	21
<i>Lindernia quinqueloba</i> (Blatt. & Hallb.) Mukh.	24
MONOCOTYLEDONS	
Aponogetonaceae	
<i>Aponogeton bruggenii</i> Yadav & Govekar	4
Araceae	
<i>Cryptocoryne cognata</i> Schott	2,3
Cyperaceae	
<i>Cyperus pentabracteatus</i> Govind. & Hemadri	20
<i>Eleocharis lankana</i> subsp. <i>mohamadii</i> Wadood Khan	6
<i>Fimbristylis unispicularis</i> Govind. & Hemadri	20
<i>Mariscus blatteri</i> McC.	12
<i>Pycneus bolei</i> S.M. Almeida	3
<i>P. lanceolotii</i> S.M. Almeida	3
<i>Scirpus naikanus</i> Wadood Khan	29

Plant Taxon	Distribution*
Eriocaulaceae	
<i>Eriocaulon bolei</i> Bole & Almeida	12
<i>E. ratnagiricus</i> Yadav et al.	8
<i>E. rouxianum</i> Steud.	26
<i>E. santapau</i> Moldenke	21
Liliaceae	
<i>Camptorrhiza indica</i> Yadav et al.	8
<i>Dipcadi concanense</i> (Dalz.) Baker	5, 8
<i>D. maharashtrensis</i> Deb & Dasgupta	12
<i>D. minor</i> Hook.f.	20
<i>D. saxorum</i> Blatt.	25
<i>Drimia razii</i> Ansari	17
Poaceae	
<i>Chrysopogon castaneus</i> Veldkamp & Salunkhe	1, 9
<i>Ischaemum bombaiense</i> Bor	21, 24
<i>I. huegelii</i> Hack.	24
<i>Panicum phoinicladus</i> Naik & Patunkar	30

* Numbers in the above map and table depict the following places viz.,

Number	Place
1.	Ambolighat-Chaukul - Ramghat region
2.	Achirne
3.	Savantwadi and surroundings
4.	Kudal
5.	Malwan
6.	Kolhapur
7.	Amba ghat
8.	Ratnagiri
9.	Kas

Number	Place
10.	Vasota
11.	Sajjangad
12.	Mahabaleshwar-Panchgani region
13.	Kelshi
14.	Shindewadi
15.	Shivthalgadh
16.	Purandhar
17.	Dive ghat
18.	Khadkalla
19.	Roha
20.	Junnar
21.	Khandala-Lonavla region
22.	Harishchandragadh
23.	Randha falls
24.	Bombay and surroundings
25.	Borivli
26.	Igatpuri
27.	Mokhada
28.	Satana
29.	Bhokar
30.	Kinwat



Map 7: Distribution of Endangered Plants,
Endemic to Maharashtra State

Explanation of Map-7 showing the distribution of Endangered plants, endemic to Maharashtra State only.

Plant Taxon	Distribution*
DICOTYLEDONS	
Amaranthaceae	
<i>Achyranthus coynei</i> Sant.	1,26, 28, 35
<i>Amaranthus caturus</i> Heyne ex Hook.f.	42
Asclepiadaceae	
<i>Ceropegia huberi</i> Ansari	7, 9, 15
<i>C. lawii</i> Hook.f.	7, 20, 21, 22, 31,
<i>C. maccannii</i> Ansari	21, 22, 31

Plant Taxon	Distribution*
<i>Ceropegia noorjahaniae</i> Ansari	16, 18
<i>C. santapau</i> Wadhwa & Ansari	10, 12, 19
<i>C. vincaefolia</i> Hook.	15, 17, 19, 22, 32, 35
Asteraceae	
<i>Blumea venkataramanii</i> Rolla Rao & Hemadri	27, 30
Caesalpiaceae	
<i>Cassia kolabensis</i> Kothari <i>et al.</i>	24, 25, 28
Convolvulaceae	
<i>Argyreia boseana</i> Sant. & Patel	1, 13, 17, 19
<i>Ipomoea clarkei</i> C.B. Cl	30, 33, 35, 37, 39.
<i>I. salsettensis</i> Sant. & Patel.	34
Euphorbiaceae	
<i>Euphorbia khandalensis</i> Blatt. & Hallb.	26, 28
<i>E. panchganiensis</i> Blatt. & McC.	4, 19, 21
<i>Jatropha nana</i> Dalz.	23
Fabaceae	
<i>Flemingia rollae</i> (Billore & Hemadri) A. Kumar	31,36
Gentianaceae	
<i>Canseora diffusa</i> var. <i>tetraptera</i> Naik & Pokle	
Lamiaceae	
<i>Leucas deodikarii</i> Billore	31, 36, 37
Lythraceae	
<i>Rotala floribunda</i> (Wight) Koehne	10, 19
MONOCOTYLEDONS	
Amaryllidaceae	
<i>Pancratium sanctae-mariae</i> Blatt. & Hallb.	26, 30, 38

Plant Taxon	Distribution*
Aponogetonaceae	
<i>Aponogeton satarensis</i> Sundararaghavan et al.	10, 14, 17
Araceae	
<i>Arisaema caudatum</i> Engl.	6, 13, 10, 17, 19, 29
<i>A. sahyadricum</i> Yadav et al.	1
Eriocaulaceae	
<i>Eriocaulon tuberiferum</i> A.R. Kulkarni & Desai	6, 8, 17
Liliaceae	
<i>Dipcadi ursulae</i> Blatt.	19, 30, 33
Orchidaceae	
<i>Habenaria panchganiensis</i> Sant. & Kap.	1, 10, 17, 19
Poaceae	
<i>Coelachne minuta</i> Bor	1, 17, 19
<i>Dichanthium compressum</i> (Hook.f.) Jain & Deshpande	26, 29
<i>D. jainii</i> (Deshpande & Hemadri) Deshpande	19, 20, 26, 30, 31
<i>D. panchganiensis</i> Blatt. & McC.	19, 22
<i>D. woodrowii</i> (Hook.f.) Jain & Deshpande	26
<i>Glyphochloa ratnagirica</i> (Kulkarni & Hemadri) W.D. Clayton	1
<i>G. santapauli</i> (Jain & Deshpande) W.D. Clayton	3, 5, 11
<i>Isachne bicolor</i> Naik & Patunkar	6, 19, 41
<i>I. borii</i> Hemadri	26, 30
<i>Ischaemum bolei</i> Almeida	2
<i>Panicum johnii</i> S.M. Almeida	2
<i>Sacciolepis indica</i> var. <i>intermedia</i> S.M. Almeida	2
<i>Tripogon polyanthus</i> Naik & Patunkar	40

* Numbers in the above map and table depict the following places viz.,

Number	Place
1.	Amboli ghat
2.	Savantwadi and surroundings
3.	Malwan
4.	Achra
5.	Devgarh
6.	Dajipur-Radhanagari area
7.	Gaganbawda
8.	Panhala
9.	Amba ghat
10.	Devrukh-Gothane area
11.	Ratnagiri and surroundings
12.	Kumbharli ghat
13.	Koyna and surroundings
14.	Mavasi-Patan area
15.	Vasota
16.	Jarandeshwar-Kartikswamy area
17.	Kas
18.	Wai-Panchgani ghat
19.	Mahabaleshwar-Panchgani region
20.	Rareshwar
21.	Purandhar
22.	Sinhagadh
23.	Pune and surroundings
24.	Roha
25.	Pen-Khopoli area
26.	Khandala-Lonavla region

Number	Place
27.	Vadgaon
28.	Matheran
29.	Bhimashankar
30.	Junnar and surroundings
31.	Harishchandragarh
32.	Mumbra
33.	Bombay and surroundings
34.	Borivli
35.	Bhitola-Dahisar-Tungar region
36.	Kalsubai
37.	Igatpuri-Kasara area
38.	Anjaneri
39.	Zari
40.	Daulatabad
41.	Mhaismal
42.	Osmanabad surroundings

Table-8: Revised IUCN Categories for taxa endemic to India, particularly Pninsular India and threatened in Maharashtra State.

Sl. No.	Name of Taxa with family	IUCN Category
DICOTYLEDONS		
Acanthaceae		
1	<i>Barleria grandiflora</i> Dalz.	CR
2	<i>Nilgirianthus ciliatus</i> (Nees.) Bremek.	EN
3	<i>N. membranaceus</i> (Talb.) Bremek.	VU
4	<i>N. warrensis</i> (Dalz.) Bremek.	EN
5	<i>Rungia linifolia</i> Nees	CR

Sl. No.	Name of Taxa with family	IUCN Category
Apiaceae		
6	<i>Polyzygous tuberosus</i> Dalz.	VU
Apocynaceae		
7	<i>Beaumontia jerdoniana</i> Wight	CR
Asclepiadaceae		
8	<i>Ceropegia attenuata</i> Hook.	VU
9	<i>C. odorata</i> Nimmo ex Hook.f.	CR
10	<i>Heterostemma deccanense</i> (Talb.) Swarupanandan & Mangaly	VU
11	<i>H. urceolatum</i> Dalz.	EN
12	<i>Seshagiria sahyadrica</i> Ansari & Hemadri	VU
Asteraceae		
13	<i>Cyathocline lutea</i> Law ex Wight	EN
14	<i>Nanothamnus sericeus</i> Thoms.	EN
Begoniaceae		
15	<i>Begonia concanensis</i> A. DC.	VU
16	<i>B. trichocarpa</i> Dalz.	EN
Boraginaceae		
17	<i>Heliotropium cornutum</i> Johnst.	EN
Celastraceae		
18	<i>Maytenus puberula</i> (Laws.) Loes	EN
Convolvulaceae		
19	<i>Merremia rhyncorhiza</i> (Dalz.) Hall.	EN
Euphorbiaceae		
20	<i>Epiprinus mallotiformis</i> (Muell.-Arg.) Crozzatin	CR

Sl. No.	Name of Taxa with family	IUCN Category
Fabaceae		
21	<i>Crotalaria naikiana</i> Zate	VU
22	<i>Flemingia gracilis</i> (Mukherjee) Ali	EN
23	<i>F. nilgheriensis</i> (Baker) Wight ex Cooke	EN
24	<i>Nogra dalzellii</i> (Baker) Merr.	EN
25	<i>Vigna khandalensis</i> (Sant.) Raghavan & Wadhwa	VU
Gentianaceae		
26	<i>Canscora concanensis</i> C.B.Cl.	VU
Lamiaceae		
27	<i>Pogostemon salicifolius</i> (Dalz. ex Hook. f.) El Gazzar & L. Watson	EN
Lauraceae		
28	<i>Litsea wightiana</i> (Nees) Bth. & Hook.f.	CR
Lythraceae		
29	<i>Rotala ritchiei</i> (C.B. Cl.) Koehne	CR
Malpighiaceae		
30	<i>Aspidopterys conarensis</i> Dalz.	CR
Ranunculaceae		
31	<i>Thalictrum dalzellii</i> Hook.	EN
Scrophulariaceae		
32	<i>Limnophila polystachyoides</i> Blatt.	EN
33	<i>Lindernia estaminodiosa</i> (Blatt. & Halb.) Mukh.	VU
34	<i>Striga sulphurea</i> Dalz. & Gibs.	VU
35	<i>Torenia bicolor</i> Dalz.	EN
MONOCOTYLEDONS		
Allsmataceae		
1	<i>Wiesneria triandra</i> (Dalz.) Mich.	EN

Sl. No.	Name of Taxa with family	IUCN Category
Amaryllidaceae		
2	<i>Crinum brachynema</i> Herb	CR
Araceae		
3	<i>Amorphophalus konkanensis</i> Helt., Yadav & Patil	EN
4	<i>Arisaema siavadasanii</i> Yadav, Patil & Janarthanam	EN
5	<i>Cryptocoryne cognatoides</i> Blatt. & McC.	CR
Commelinaceae		
6	<i>Belosynapsis vivipara</i> (Dalz.) Sprangue ex C.E.C. Fischer	DD
7	<i>Murdannia lanuginosa</i> (Wall. ex C.B. Cl.) Brueck.	EN
8	<i>Cyanotis papilionacea</i> (L.) R. & S. var. <i>vaginata</i> (Wight) C.E.C. Fischer	CR
Liliaceae		
9	<i>Chlorophytum bharuchae</i> Ansari <i>et al.</i>	EN
10	<i>Iphigenia magnifica</i> Ansari & Rolla Rao	VU
Orchidaceae		
11	<i>Habenaria foliosa</i> A. Rich. var. <i>foliosa</i>	EN
12	<i>H. multicaudata</i> Sedgew.	EN
13	<i>H. sauveolens</i> Dalz.	CR
14	<i>Peristylus richardianus</i> Wight	CR
Poaceae		
15	<i>Arthraxon jubatus</i> Hack.	VU
16	<i>Arundinella spicata</i> Dalz.	VU
17	<i>Bhidea burnsiana</i> Bor	EN
18	<i>Dimeria woodrowii</i> Stapf.	EN
19	<i>Glyphochloa mysorensis</i> (Jain & Hemadri) W.D. Clayton	EN
20	<i>Hubbardia heptaneuron</i> Bor	CR
21	<i>Isachne lisboae</i> Hook.f.	EN

Sl. No.	Name of Taxa with family	IUCN Category
22	<i>I. meeboldii</i> Fischer	EN
23	<i>Ischaemum raizadae</i> Hemadri & Billore	VU
24	<i>Pseudodichanthium serrafalcoides</i> (T. Cooke & Stapf) Bor	VU
25	<i>Schizachyrium paranjpyeanum</i> (Bhide) Raizada & Jain	EN

There are 2 varieties of Poaceae viz. *Arthraxon hispidus* (Thunb.) Makino var. *Junnarensis* (Jain & Hemadri) Welzen and *A. hispidus* (Thunb.) Makino var. *Santapauli* (Bor) Welzen which are not presently considered as endemic to India. Still these have been included in the present work and the reasons of it are discussed in the chapter on enumeration (Chapter-V).

49 taxa, which were earlier considered as endemic to Maharashtra State only, are presently excluded from the endemic plant list of the state (Table 9). The reasons for excluding these taxa are (a) discovery of new localities outside the state (b) merger of some taxa with others, which are not endemic to the state and (c) overlooking the information regarding distribution mentioned in herbaria and literature.

Table-9: List of taxa which are excluded from the endemic plant list of Maharashtra State only.

DICOTYLEDONS

Acanthaceae

1. *Barleria prattensis* Sant.
2. *Dyschoriste dalzellii* (T. And.) Kuntze.
3. *Neesiella longipedunculata* Sreem.
4. *Pleocaulis ritchiei* (Clarke) Bremek.

Apiaceae

5. *Pimpinella katrajensis* Rolla & Hamadri

Asclepiadaceae

- *6. *Ceropegia oculata* Hook.
- *7. *Heterostemma deccanense* (Talb.) Swarupanandan & Mangaly
- *8. *H. urceolatum* Dalz.
- *9. *Seshagiria sahyadrica* Ansari & Hemadri

Asteraceae

- 10. *Centrantherum tenue* (Wt.) Clarke
- 11. *Senecio hewrensis* (Dalz.) Hook.f.

Begoniaceae

- *12. *Begonia concanensis* A.DC.

Cucurbitaceae

- 13. *Cucumis setosus* Cogn.
- 14. *Dicoelospermum ritchiei* C.B. Cl.

Fabaceae

- *15. *Crotalaria naikiana* Zate
- 16. *Desmodium ritchie* Sanjappa
- 17. *Smithia purpurea* Hook.

Gentianaceae

- *18. *Canscora concanensis* C.B.Cl.

Lentibulariaceae

- 19. *Utricularia purpurascens* Graham

Lythraceae

- *20. *Rotala ritchiei* (C.B. Cl.) Coehne

Rubiaceae

- 21. *Hedyotis maheshwarii* (Sant. & Merch.) Rolla Rao & Hemadri

MONOCOTYLEDONS

Alismataceae

- *1. *Wiesneria triandra* (Dalz.) Mich.

Amaryllidaceae

- *2. *Crinum brachynema* Herb.

Araceae

3. *Cryptocoryne tortuosa* Blatt. & McC.

Commelinaceae

4. *Cyanotis wightii* Clarke

Cyperaceae

5. *Fimbristylis junnarensis* Hemadri

Eriocaulaceae

6. *Eriocaulon bombayanum* Ruhl.
7. *E. humile* Mold.
8. *E. indicum* Mold.
9. *E. lanceolatum* Miq. ex Steud. var. *pilosum* Mold.
10. *E. talboti* Ansari & Balak.
11. *E. vanheurckii* Muell.-Arg. f. *minima* Mold.

Hydatellaceae

- *12. *Trithuria konkanensis* Yadav & Janarthanam

Liliaceae

13. *Asparagus jacquemontii* Baker
*14. *Iphigenia magnifica* Ansari & Rolla Rao

Orchidaceae

15. *Habenaria gibsonii* Hook.f. var. *foliosa* (A. Rich.) Sant. & Kap.

Poaceae

16. *Aristida stocksii* (Hook.f.) Domin.
*17. *Bhidea burnsiana* Bor
18. *Heteropogon polystachyos* (Roxb.) Schult.
19. *H. ritchiei* (Hook.f.) Blatt. & McC.
20. *Ischaemum diplopogon* Hook.f.
21. *I. impressum* Hack.

- *22. *Ischaemum santapaui* Bor
- 23. *Oryza nivara* S.D. Sharma & Sashtri
- 24. *Paspalum compactum* Roth var. *fimbriatum* Bor
- 25. *Pseudanthistria intermedia* Birari & D'Cruz
- *26. *Pseudodichanthium serrafalcoides* (Cooke & Stapf.) Bor
- 27. *Triplopogon ramosissimus* (Hack.) Bor
- 28. *Urochloa panicoides* P. Beauv. var. *velutina* (Henr.) Bor

* Included in the present work.

In the present study the percentage of endemism for a particular family is calculated by taking into consideration the actual number of endemic taxa as compared to the total number of reported taxa from the state (Table 10).

Table-10: Number of taxa endemic to Maharashtra State only, under each family and percentage of their endemism :

Sl. No.	Family	Total No. of taxa reported from the State	No. of endemic species	No. of endemic infraspecific taxa	Total No. of endemic taxa	Percentage endemic taxa
1.	Poaceae	383	23	2 var.	25	6.52%
2.	Asclepiadaceae	69	17	x	17	24.63%
3.	Cyperaceae	174	12	1 ssp.	13	7.47%
4.	Fabaceae	292	10	3 var.	13	4.45%
5.	Liliaceae	39	12	x	12	30.76%
6.	Acanthaceae	149	7	x	7	4.69%
7.	Eriocaulaceae	36	6	x	6	16.66%
8.	Euphorbiaceae	118	5	x	5	4.23%
9.	Amaryllidaceae	17	3	1 forma	4	23.52%
10.	Apiaceae	17	4	x	4	23.52%
11.	Convolvulaceae	69	4	x	4	5.79%
12.	Araceae	27	3	x	3	11.11%
13.	Asteraceae	143	2	1 var.	3	2.09%

1	2	3	4	5	6	7
14.	Ranunculaceae	11	2	1 var.	3	27.27%
15.	Zingiberaceae	28	3	x	3	10.71%
16.	Amaranthaceae	34	2	x	2	5.88%
17.	Aponogetonaceae	5	2	x	2	40.00%
18.	Gentianaceae	27	1	1 var.	2	7.40%
19.	Orchidaceae	114	2	x	2	1.75%
20.	Rhamnaceae	24	x	2 var.	2	8.33%
21.	Scrophulariaceae	71	2	x	2	2.81%
22.	Begoniaceae	7	1	x	1	14.28%
23.	Caesalpiniaceae	29	1	x	1	3.44%
24.	Celastraceae	21	1	x	1	4.76%
25.	Lamiaceae	76	1	x	1	1.31%
26.	Loranthaceae	18	1	x	1	5.55%
27.	Lythraceae	25	1	x	1	4.00%
28.	Malvaceae	61	1	x	1	1.63%
29.	Rubiaceae	92	1	x	1	1.08%

Out of the total number of 29 families having endemic taxa from Maharashtra State only, Poaceae is the largest one comprising 25 endemic taxa (Diagram 2). However, the percentage of endemism of this family is (6.52%) quite less. On the contrary, the family Aponogetonaceae has only 2 endemic taxa, but the percentage of its endemism is (40%) is the highest of all.

Other noteworthy families having considerable percentage of endemism are Liliaceae (30.76%), Ranunculaceae (27.27%), Asclepiadaceae (24.63%), Amaryllidaceae (23.52%) and Apiaceae (23.52%).

There are some families viz. Begoniaceae, Caesalpiniaceae, Celastraceae, Lamiaceae, Loranthaceae, Lythraceae, Malvaceae and Rubiaceae having only one endemic taxon each.

The endemic taxa of the state belong to 81 genera, of which 4 are monotypic. These are *Bonnayodes* Blatt. & Hallb., *Frerea* Dalz., *Pinda* Mukh. & Const. and *Pogonachne* Bor. *Ceropegia* L. is the largest genus

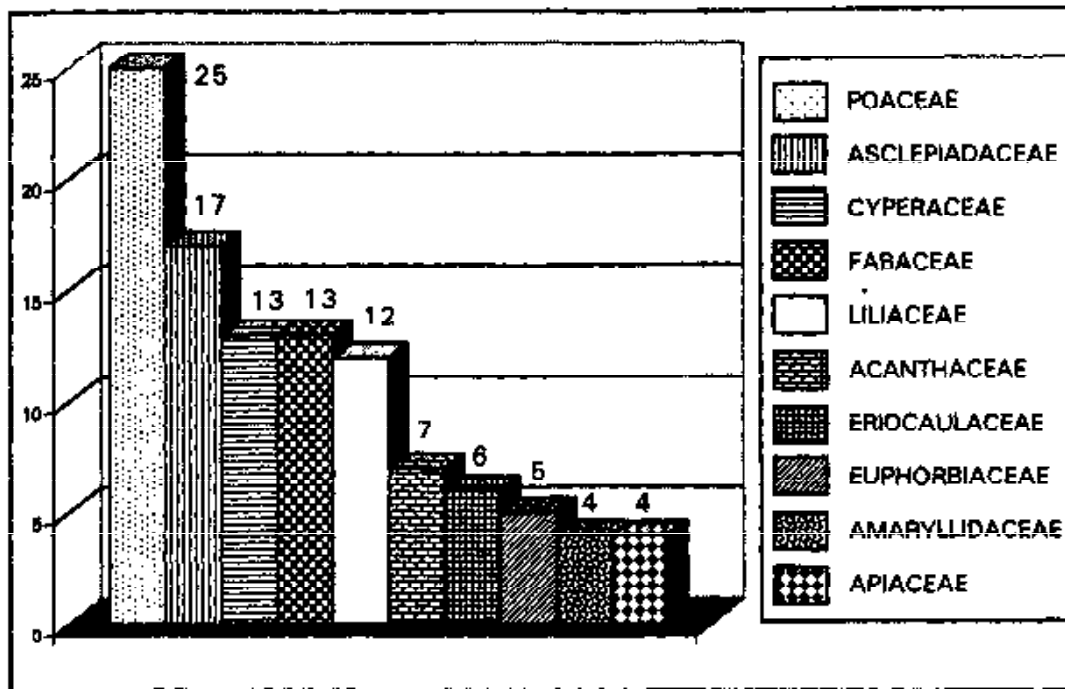


Diagram-2: Ten Dominant Families, Based on the Number of Taxa Endemic to Maharashtra State

having 13 endemic species. *Dichanthium* Willem. and *Eriocaulon* L. are the other major genera having more than 5 endemic species each (Table 11).

Table 11: Number of species and infraspecific taxa endemic to Maharashtra State only under 10 dominant genera (based on endemism).

Sl. No.		No. of species	No. of Infraspecific taxa
1.	<i>Ceropegia</i> L.	13	x
2.	<i>Dichanthium</i> Willem	6	x
3.	<i>Eriocaulon</i> L.	6	x
4.	<i>Dipacdi</i> Medic.	5	x
5.	<i>Euphorbia</i> L.	4	x
6.	<i>Panicum</i> L.	4	1 var.
7.	<i>Alysicarpus</i> Desv.	3	1 var.
8.	<i>Crinum</i> L.	2	1 forma
9.	<i>Fimbristylis</i> Vahl.	3	x
10.	<i>Isachne</i> Bor	3	x

In the volumes of Red Data Book of Indian Plants (eds. Nayar & Sastry, 1987-90) a total number of 82 taxa have been included from Maharashtra. Of these 10 are Endangered (EN), 14 Vulnerable (VU), 53 (R) and 5 Indeterminate (Indt.). However, in the present study, a total of 8 Possibly Extinct Taxa and 178 threatened taxa have been included (Table 7 & 8). Among these threatened taxa 65 species and 5 infraspecific taxa are CR, 68 species and 4 infraspecific taxa are EN and 33 species and 3 infraspecific taxa are VU.

In the present study 9 taxa (Table 12) mentioned in Red Data Books under different categories are not enumerated due to different reasons, such as merger of some taxa with some common plants, some not being endemic to India, etc.

Table-12: List of taxa included in Red Data Books, but not enumerated in the present work.

1. *Allophyllus concanensis* Radlk. (Sapindaceae)
2. *Asparagus jacquemontii* Baker (Liliaceae)
3. *Crotalaria stocksii* Benth. ex Baker (Fabaceae)
4. *Cryptocoryne tortuosa* Blatt. & McC. (Araceae)
5. *Eriocaulon humile* Mold. (Eriocaulaceae)
6. *Hedyotis cyanantha* Kurz (Rubiaceae)
7. *Heliotropium calcareum* Stocks (Boraginaceae)
8. *Pimpinella katrajensis* Rolla & Hemadri (Apiaceae)
9. *Typhonium incurvatum* Blatt. & McC. (Araceae)

10 taxa (Table 13) which were earlier considered as threatened by different authors have been categorised into Low Risk in the present study. The reason for such treatment is already mentioned alongwith the enumeration of concerned species.

Table 13: List of taxa earlier considered as threatened but now grouped into Low Risk.

1. *Ceropegia oculata* Hook. (Asclepiadaceae)
2. *Chlorophytum borivillianum* Sant. & Fernand. (Liliaceae)

3. *Crotalaria filipes* Benth. var. *trichophora* (Benth. ex Baker) Cooke (Fabaceae)
4. *C. lutescens* Dalz. (Fabaceae)
5. *Decaschistia trilobata* Wight (Malvaceae)
6. *Erinocarpus nimmonii* Graham (Tiliaceae)
7. *Indigofera trifoliata* L. var. *duthiei* (Drum. ex Naik) Sanjappa (Fabaceae)
8. *Ischaemum santapau* Bor (Poaceae)
9. *Lepidagathis lutea* Dalz. (Acanthaceae)
10. *Rungia crenata* T. Anders. (Acanthaceae)

In the present work 113 threatened taxa occur in Maharashtra as well as 5 Possibly Extinct Taxa (Table 14) have been included which are not found in Red Data Books (eds. Nayar & Sastry, 1987-90)

Table - 14: List of threatened taxa occurring in Maharashtra as well as Possibly Extinct taxa which are not found in Red Data Books.

DICOTYLEDONS

Acanthaceae

1. *Barleria grandiflora* Dalz.
2. *Dicliptera nasikensis* Lakshminarasimhan & Sharma
3. *Lepidagathis bandraensis* Blatt.
4. *Nilgirianthus ciliatus* (Nees) Bremek.
5. *N. membranaceus* (Talb.) Bremek.
6. *N. warreensis* (Dalz.) Bremek
7. *Rungia linifolia* Nees
- *8. *Synnema anomalum* (Blatt.) Sant.

Amaranthaceae

9. *Amaranthus caturus* Heyne ex Hook.f.

Apiaceae

10. *Heracleum dalgadianum* Almeida

11. *Pimpinella rollae* Billore & Hemadri

Apocynaceae

12. *Beaumontia jerdoniana* Wight

Asclepiadaceae

13. *Brachystema malwanense* Yadav & Singh
14. *B. naorojii* P. Tatali, D.K. Kulk., S. Tetali & Kumbh.
15. *Ceropegia media* (Huber) Ansari
16. *Heterostemma urceolatum* Dalz.

Asteraceae

17. *Blumea venkataramanii* Rolla Rao & Hemadri
18. *Cyathocline purpurea* (Buch.-Ham. ex D. Don) O. Ktze. var. **alba** Sant.
19. *C. purpurea* (Buch.-Ham. ex D. Don) O. Ktze var. **bicolor** Sant.

Begoniaceae

20. *Begonia concanensis* A. DC.

Boraginaceae

21. *Heliotropium cornutum* Johnst.

Caesalpinaceae

22. *Cassia kolabensis* Kotharui, Moorthy & Nayar

Celastraceae

23. *Maytenus puberula* (Laws.) Loes.
24. *Salacia brunoniana* Wight & Arn.

Convolvulaceae

25. *Argyreia boseana* Sant. & Patel
26. *Ipomoea salsettensis* Sant. & Patel
27. *Merremia rhyncorhiza* (Dalz.) Hallb.
28. *Operculina tansaensis* Sant. & Patel

Euphorbiaceae

29. *Epiprinus mallotiformis* (Muell. -Arg.) Crozatin
30. *Euphorbuia concanensis* Janarthanam & Yadav
31. *E. khandalensis* Blatt. & hallb.
32. *Jatropha nana* Dalz.

Fabaceae

33. *Alysicarpus luteo-vexillatus* Naik. & Pokle
34. *Crotalaria decasperma* Naik
35. *C. naikiana* Zate
36. *Flemingia nilgheriensis* (Baker) Wight ex Cooke
37. *F. rollae* (Billore & Hemadri) A. Kumar
38. *Indigofera deccanensis* Sanjappa
39. *I. santapau* Sanjappa
40. *I. triata* Linn. var. *purandharensis* Sanjappa
41. *Smithia oligantha* Blatt.
42. *Sphenostylis bracteata* (Baker) Gillett

Gentianaceae

43. *Conscora concanensis* C.B. Cl.
44. *C. diffusa* (Vahl.) R. Br. ex Roem & Schult. var. *tetraptera* Naik
45. *C. khandalensis* Sant.

Lamiaceae

46. *Leucas deodikarii* Billore & Hemadri
47. *Pogostemon salicifolius* (Dalz. ex Hook.f.) El. Gazzar & L. Watson

Lauraceae

48. *Litsea wightiana* (Nees) Bth. & Hook.f.

Loranthaceae

49. *Scurrula stocksii* (Hook.f.) Dans.

Lythraceae

50. *Rotala floribunda* (Wight) Koehne

Ranunculaceae

51. *Delphinium malabaricum* (Huth) Munz var. *malabaricum*
52. *D. malabaricum* (Huth) Munz var. *ghaticum* Billore
53. *Thalictrum obovatum* Blatt.

Rhamnaceae

54. *Ventilago madaraspatana* Gaertn. var. *fructifida* Sant.

Rubiaceae

55. *Neanotis sahyadrica* Billore & Mudaliar

Scrophulariaceae

56. *Bonnayodes limnophiloides* Blatt. & Hallb.
57. *Limnophila polystachyoides* Blatt,
58. *Lindernia estaminodiosa* (Blatt. & Hallb.) Mukh.
59. *L. quinqueloba* (Blatt. & Hallb.) Mukh.
60. *Striga sulphurea* Dalz. & Gibs.
61. *Torenia bicolor* Dalz.

MONOCOTYLEDONS**Alismataceae**

1. *Wiesneria triandra* (Dalz.) Mich.

Amaryllidaceae

2. *Crinum brachynema* Herb.
- *3. *C. eleonora* Blatt. & McC. f. *purpurea* Blatt. & McC.
- *4. *C. woodrowii* Baker
5. *Pancratium sanctae-mariae* Blatt. & Hallb.

Aponogetonaceae

6. *Aponogeton bruggenii* Yadav & Govekar

Araceae

7. *Arisaema caudatum* Engl.
8. *A. sahyadricum* Yadav, Patil & Bachulkar

9. *A. sivadasanii* Yadav, Patil & Janarthanam

Commelinaceae

10. *Belosynapsis vivipara* (Dalz.) Sprague ex C.E.C. Fischer

11. *Murdania lanuginosa* (Wall. ex C.B. Cl.) Brueck.

12. *Cyanotis papilionacea* (L.) R. & S. var. *vaginata* (Wight) C.E.C. Fischer

Cyperaceae

13. *Cyperus pentabracteatus* Govind. & Hemadri

14. *Eleocharis lankana* Koyama subsp. *mohamadii* Wadood Khan

15. *Fimbristylis unispicularis* Govind. & Hemadri

16. *Mariscus blatteri* McC.

17. *Pycneus bolei* S.M. Almeida

18. *P. lanceolotii* S.M. Almeida

19. *Scirpus naikianus* Wadood Khan

20. *Scleria poklii* Wadood Khan

Eriocaulaceae

21. *Eriocaulon bolei* Bole & Almeida

22. *E. ratnagriticus* Yadav, Gaikwad & Sardesai

23. *E. rouxianum* Steud.

24. *E. santapaui* Moldenke

25. *E. tuberiferum* A. R. Kulkarni & Desai

Liliaceae

26. *Camptorrhiza indica* Yadav, Singh & Mathew

27. *Chlorophytum bharuchae* Ansari

28. *Dipcadi concanense* (Dalz.) Baker

*29. *Drimys polyphylla* (Hook.f.) Ansari & Raghavan

Orchidaceae

30. *Habenaria foliosa* A. Rich. var. *foliosa*

31. *H. multicaudata* Sedgew.

32. *H. sauveolens* Dalz.

*33. *H. caranjensis* Dalz.

34. *Peristylus richardianus* Wight

Poaceae

35. *Arthraxon jubatus* Hack.

36. *Arundinella spicata* Dalz.

37. *Chrysopogon castaneus* Veldkamp & Salunkhe

38. *Dichanthium jainii* (Deshpande & Hemadri) Deshpande

39. *Glyphochloa mysorensis* (Jain & Hemadri) W.D. Clayton

40. *G. ratnagirica* (Kulkarni & Hemadri) W.D. Clayton

41. *Isachne bicolor* Naik & Patunkar

42. *I. meeboldii* Fischer

43. *I. swaminathanii* Ved Prakash & Jain

44. *Ischaemum bolei* Almeida

45. *I. bombaiense* Bor

46. *I. huegelii* Hack.

47. *Panicum deccanense* Naik & Patunkar

48. *P. johnii* S.M. Almeida

49. *P. paianum* Naik & Patunkar var. *paianum*

50. *P. paianum* Naik & Patunkar var. *minor* Naik & Patunkar

51. *P. phoinicladus* Naik & Patunkar

52. *Pogonachne racemosa* Bor

53. *Pseudodichanthium serrafalcoides* (T. Cooke & Stapf) Bor

54. *Sacciolepis indica* (L.) A. Chase var. *intermedia* S.M. Almeida

55. *Tripogon polyanthus* Naik & Patunkar

Zingiberaceae

56. *Hitchenia caulina* (Grah.) Baker

* Possibly Extinct Taxa.

In the present study the IUCN Red List Status of 40 taxa have been changed (Table 15). Reasons of such changes are already explained in the enumeration chapter.

Table 15: Comparison between pre-revised and revised IUCN Red List Status of threatened and endemic taxa of Maharashtra State only.

Sl. No.	List of taxon with family	Pre-revised IUCN status*	Revised IUCN status
DICOTYLEDONS			
Acanthaceae			
1.	<i>Barleria gibsonioides</i> Blatt.	R	CR
2.	<i>Dicliptera ghatika</i> Sant	Indt.	CR
3.	<i>Hypoestis lanata</i> Dalz.	R	PE
Amaranthaceae			
4.	<i>Achyranthus coynei</i> Sant.	R	EN
Asclepiadaceae			
5.	<i>Bidaria khandalense</i> (Sant.) Jagtap & Singh	R	CR
6.	<i>Ceropegia evansii</i> McC.	VU	CR
7.	<i>C. huberi</i> Ansari	VU	EN
8.	<i>C. jainii</i> Ansari & Kulkarni	R	CR
9.	<i>C. maccannii</i> Ansari	R	EN
10.	<i>C. mahabalei</i> Hemadri & Ansari	EN	CR
11.	<i>C. noorjahaniae</i> Ansari	R	EN
12.	<i>C. panchganiensis</i> Blatt. & McC.	EN	CR
13.	<i>C. rollae</i> Hemadri	R	CR
14.	<i>C. sahyadrica</i> Ansari & Kulkarni	R	VU
15.	<i>C. santapau</i> Wadhwa & Ansari	R	EN
16.	<i>C. vincaefolia</i> Hook.	R	EN
17.	<i>Frerea indica</i> Dalz.	EN	CR
Begoniaceae			
18.	<i>Begonia phrixophylla</i> Blatt. & McC.	R	CR
Convolvulaceae			
19.	<i>Ipomoea clarkei</i> C.B. Cl.	R	EN

* Based mainly on Red Data Book of Indian Plants (1987-1990)

Sl. No.	List of taxon with family	Pre-revised IUCN status*	Revised IUCN status
Euphorbiaceae			
20.	<i>Euphorbia katrajensis</i> Gage	R	VU
21.	<i>E. panchganiensis</i> Blatt. & McC	R	EN
Fabaceae			
22.	<i>Smithia agharkarii</i> Hemadri	R	VU
Malvaceae			
23.	<i>Abutilon ranadei</i> Woodr. & Stapf.	EN	CR
MONOCOTYLEDONS			
Amaryllidaceae			
1.	<i>Crinum eleonora</i> Blatt. & McC. f. <i>eleonora</i>	R	PE
Aponogetonaceae			
2	<i>Aponogeton satarensis</i> Sundararaghavan, Yadav & Kulkarni	VU	EN
Araceae			
3.	<i>Cryptocoryne cognata</i> Schott	Indt.	CR
Liliaceae			
4.	<i>Dipcadi maharashtrensis</i> Deb & Dasgupta	EN	CR
5.	<i>D. minor</i> Hook.f.	Indt.	CR
6.	<i>D. saxorum</i> Blatt.	VU	CR
7.	<i>D. ursulae</i> Blatt. var. <i>ursulae</i>	VU	EN
8.	<i>Drimia razii</i> Ansari	R	CR
9.	<i>Scilla viridis</i> Blatt. & Hallb.	EN	PE
Orchidaceae			
10.	<i>Habenaria panchganiensis</i> Sant. & Kap.	R	EN
Poaceae			
11.	<i>Coelachne minuta</i> Bor	R	EN

Sl. No.	List of taxon with family	Pre-revised IUCN status*	Revised IUCN status
12.	<i>Dichanthium armatum</i> (Hook.f.) Blatt. & McC.	R	VU
13.	<i>D. compressum</i> (Hook.f.) Jain & Deshpande	R	EN
14.	<i>D. maccannii</i> Blatt.	VU	DD
15.	<i>D. panchganiensis</i> Blatt. & McC.	R	EN
16.	<i>D. woodrowii</i> (Hook.f.) Jain & Deshpande	VU	EN
17.	<i>Dimeria blatteri</i> Bor	R	VU

* Based mainly on Red Data Book of Indian Plants (1987-1990)

The total number of threatened taxa enumerated in the present work are 178 belonging to 35 families, of which Poaceae is the largest one having 37 threatened taxa from this state. Asclepiadaceae is the other major family having 22 threatened species (Diagram 3).

However, regarding the percentage of taxa belonging to threatened category Begoniaceae is the largest family having 42.85% threatened taxa. Aponogetonaceae is the next family having 40% threatened taxa. Ranunculaceae and Asclepiadaceae are the other major families having more than 30% threatened taxa.

The families having highest number of Critically Endangered and Endangered taxa are Asclepiadaceae (10 taxa) and Poaceae (22 taxa) respectively. Also for the Vulnerable category Poaceae is the largest family having 11 taxa.

Regarding the percentage of Critically Endangered and Vulnerable categories Aponogetonaceae and Begoniaceae are the largest families having 20% and 14.28% taxa respectively. For the percentage of Endangered category Alismataceae and Aponogetonaceae are the largest families having 20% taxa each (Table-16).

Table 16: Number of threatened taxa in Maharashtra State and their percentage :

Sl. No.	Family	Total No. of Taxa reported from the state	No. and Percentage of threatened taxa							
			CR	% of CR	EN	% of EN	VU	% of VU	Total (CR+EN +VU)	Total %
1.	Poaceae	383	4	1.04	22	5.74	11	2.87	37	9.65%
2.	Asclepiadaceae	69	10	14.49	7	10.14	5	7.24	22	31.88%
3.	Fabaceae	292	3	1.02	4	1.36	7	2.39	14	4.79%
4.	Liliaceae	39	6	15.38	2	5.12	2	5.12	10	25.64%
5.	Acanthaceae	149	6	4.02	2	1.34	1	0.67	9	6.04%
6.	Cyperaceae	174	8	4.59	x	x	x	x	8	4.59%
7.	Ataceae	27	2	7.40	4	14.81	x	x	6	22.22%
8.	Euphorbiaceae	118	2	1.69	3	2.54	1	0.84	6	5.08%
9.	Scrophulariaceae	71	2	2.81	2	2.81	2	2.81	6	8.45%
10.	Convolvulaceae	69	1	1.44	4	5.79	x	x	5	7.24%
11.	Eriocaulaceae	36	4	11.11	1	2.77	x	x	5	13.88%
12.	Orchidaceae	114	2	1.75	3	2.63	x	x	5	4.38%
13.	Asteraceae	143	1	0.69	3	2.09	x	x	4	2.79%
14.	Ranunculaceae	11	2	18.18	1	9.09	1	9.09	4	36.36%

Sl. No.	Family	Total No. of Taxa reported from the state	No. and Percentage of threatened taxa							Total % (CR+EN +VU)
			CR	% of CR	EN	% of EN	VU	% of VU	Total	
15.	Apiaceae	17	2	11.76	x	x	1	5.88	3	17.64%
16.	Begoniaceae	7	1	14.28	1	14.28	1	14.28	3	42.85%
17.	Amaranthaceae	34	1	2.94	1	2.94	x	x	2	5.88%
18.	Amaryllidaceae	17	1	5.88	1	5.88	x	x	2	11.76%
19.	Aponogetonaceae	5	1	20.00	1	20.00	x	x	2	40%
20.	Celastraceae	21	1	4.76	1	4.76	x	x	2	9.52%
21.	Commelinaceae	46	1	4.34	1	2.17	x	x	2	4.34%
22.	Gentianaceae	27	x	x	x	x	2	7.40	2	7.40%
23.	Lamiaceae	76	x	x	2	2.63	x	x	2	2.63%
24.	Lythraceae	25	1	4.00	1	4.00	x	x	2	8.00%
25.	Rhamnaceae	24	1	4.16	x	x	x	x	1	4.16%
26.	Alismataceae	5	x	x	1	20.00	x	x	1	20.00%
27.	Apocynaceae	22	1	4.54	x	x	x	x	1	4.54%
28.	Boraginaceae	34	x	x	1	2.94	x	x	1	2.94%
29.	Caesalpiniaceae	29	x	x	1	3.44	x	x	1	3.44%

Sl. No.	Family	Total No. of Taxa reported from the state	No. and Percentage of threatened taxa							
			CR	% of CR	EN	% of EN	VU	% of VU	Total (CR+BN +VU)	Total %
30.	Lauraceae	19	1	5.26	x	x	x	x	1	5.26%
31.	Loranthaceae	18	1	5.55	x	x	x	x	1	5.55%
32.	Malpighiaceae	7	1	14.28	x	x	x	x	1	14.28%
33.	Malvaceae	61	1	1.63	x	x	x	x	1	1.63%
34.	Rubiaceae	92	1	1.08	x	x	x	x	1	1.08%
35.	Zingiberaceae	28	x	x	x	x	1	3.57	1	3.57%

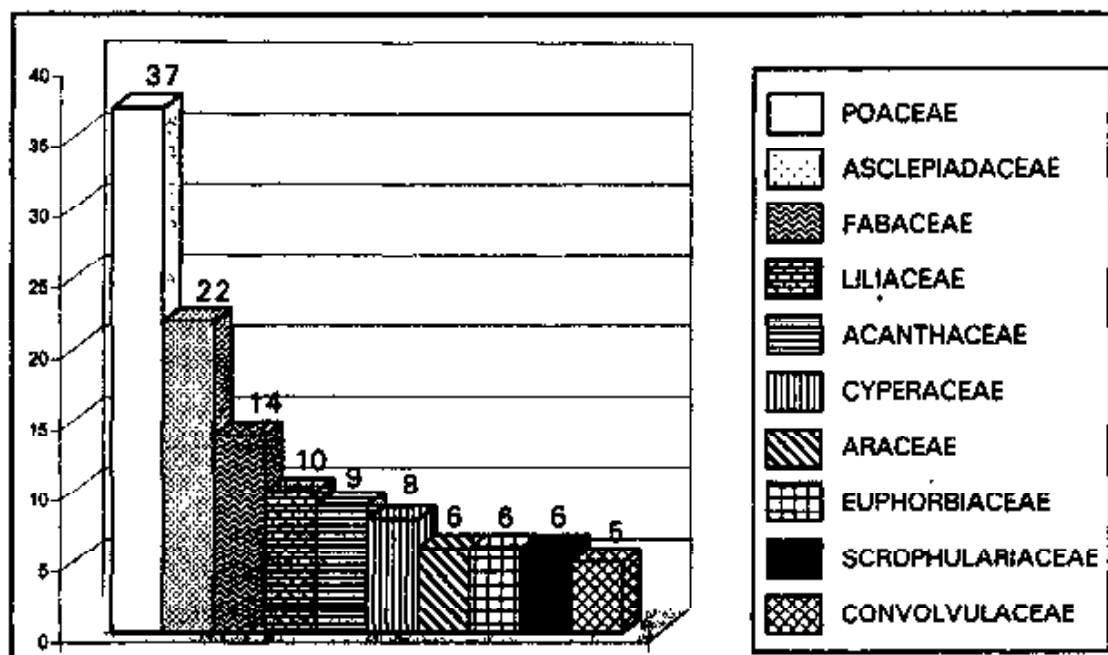


Diagram-3: Ten Dominant Families, Based on the Number of Threatened Taxa in Maharashtra State

Out of the total 86 genera having threatened taxa from this state *Ceropegia* L. is the largest genus having 15 threatened species. *Dichanthium* Willem., *Dipcadi* Medic., *Eriocaulon* L. and *Isachne* R. Br. are other major genera having 5 threatened species each (Table- 17).

Table-17: Number of threatened species and infraspecific taxa in Maharashtra State under 9 dominant genera (based on threatened taxa).

Sl. No.	Genus	No. of Species	No. of infraspecific taxa
1.	<i>Ceropegia</i> L.	15	X
2.	<i>Dichanthium</i> Willem.	05	X
3.	<i>Dipcadi</i> Medic.	05	X
4.	<i>Eriocaulon</i> L.	05	X
5.	<i>Isachne</i> R. Br.	05	X
6.	<i>Euphorbia</i> L.	04	X
7.	<i>Habenaria</i> Willd.	04	X
8.	<i>Ischaemum</i> L.	04	X
9.	<i>Panicum</i> L.	04	1 var.

During the present study 25 taxa have been collected from new localities which were not known earlier (Table 18). All these taxa are either endemic only to Maharashtra or India including Maharashtra and most of these are categorised into threatened categories.

Table 18: List of collected taxa with their new localities.

Sl. No.	Name of taxon with family	Name of new localities
Apiaceae		
1.	<i>Polyzygous tuberosus</i> Dalz.	Dajipur in Kolhapur district and Jarandeshwar in Satara district.
Araceae		
2.	<i>Cryptocoryne cognata</i> Schott	Achirne in Sindhudurg district.
Asclepiadaceae		
3.	<i>Ceropegia lawii</i> Hook.f.	Gaganbawda in Kolhapur district.
4.	<i>C. media</i> (Huber) Ansari	Kalsubai in Ahmednagar district.
5.	<i>C. noorjahaniae</i> Ansari	Jarandeshwar in Satara district.
6.	<i>C. panchganiensis</i> Blatt. & McC.	Kate's point of Mahabaleshwar in Satara district.
7.	<i>C. rollae</i> Hemadri	Malshej ghat in Pune district.
8.	<i>Frerea indica</i> Dalz.	Randha falls in Ahmednagar district.
Begoniaceae		
9.	<i>Begonia trichocarpa</i> Dalz.	Borbet and Gagangarh in Kolhapur district and Amboli in Sindhudurg district.
Fabaceae		
10.	<i>Crotalaria decasperma</i> Naik	Aundah in Hingoli district and Pandara in Osmanabad district.
11.	<i>C. filipes</i> Benth. var. <i>trichophora</i> (Benth. ex Baker) Cooke	Lingmala of Mahabaleshwar in Satara district.
12.	<i>C. lutescens</i> Dalz.	Palgarh in Ratnagiri district.

Sl. No. family	Name of taxon with family	Name of new localities
13.	<i>Flemingia nilgheriensis</i> (Baker) Wight ex Cooke	Kas in Satara district.
Liliaceae		
14.	<i>Iphigenia magnifica</i> Ansari & Rolla Rao	Between Dajipur and Radhanagari in Kolhapur district.
Malvaceae		
15.	<i>Decaschistia trilobata</i> Wight	Between Kadamwadi and Radhanagari in Kolhapur district.
Orchidaceae		
16.	<i>Habenaria panchganiensis</i> Sant. & Kap.	Kas in Satara district.
Poaceae		
17.	<i>Coelachne minuta</i> Bor	Kas plateau in Satara district.
18.	<i>Glyphochloa mysorensis</i> (Jain & Hemadri) W.D. Clayton	Dajipur in Kolhapur district.
19.	<i>Isachne bicolor</i> Naik & Patunkar	Dajipur in Kolhapur district.
20.	<i>I. lisboae</i> Hook.f.	Kalsubai in Ahmednagar district and Kas plateau in Satara district.
21.	<i>I. swaminathanii</i> Ved Prakash & Jain	Kumbharli ghat in Ratnagiri district.
22.	<i>Ischaemum santapauli</i> Bor	Harnai, near Dapoli in Ratnagiri district.
23.	<i>I. raizadae</i> Hemadri & Billore	Durga khilla, near Junnar in Pune district.
24.	<i>Pseudodichanthium serrafalcoides</i> (T. Cooke & Stapf) Bor.	Matheran in Raigad district.
25.	<i>Schizachyrium paranjpyeanum</i> (Bhide) Raizada	Dajipur in Kolhapur district.

8 species have been collected during this work for the first time after type collection from their type localities (Table-19).

Table-19: Species collected for the first time from type locality after type collection.

Sl. No.	Name of species with family	Date of type collection
Amaryllidaceae		
1.	<i>Crinum brachynema</i> Herb.	During Cooke's period
Apiaceae		
2.	<i>Pimpinella rollae</i> Billore & Hemadri	15.7.1969
Aponogetonaceae		
3.	<i>Aponogeton bruggenii</i> Yadav & Govekar	10.9.1992
Asclepiadaceae		
4.	<i>Ceropegia sahyadrica</i> Ansari & Kulkarni	30.8.1967
5.	<i>C. santapau</i> Wadhwa & Ansari	19.8.1966
Eriocaulaceae		
6.	<i>Eriocaulon tuberiferum</i> A.R. Kulkarni & Desai	8.7.1968
Euphorbiaceae		
7.	<i>Euphorbia concanensis</i> Janarthanam & Yadav	20.9.1993
Fabaceae		
8.	<i>Crotalaria decasperma</i> Naik	15.11.1964

CHAPTER - VIII

CONCLUSION

The result of the present studies is the outcome of a pioneering attempt of its kind on the endemic and threatened plants in Maharashtra State. However, somewhat similar studies on some medicinal plants [Molur *et al.*, 1995, Molur & Walkar, 1996, Tetali *et al.*, 1998 (*ined.*)] have been done which are mostly based on literature. Recently, Gopalan & Henry (2000) published one book categorising the endemic plants of Agasthyamalai Hills, into threatened categories according to revised IUCN recommendations. Earlier threatened plants were categorised based only on qualitative characters. The conception of the combination of both qualitative as well as quantitative characters for categorising the threatened plants has come into light only after the publication of revised IUCN Red List Categories in 1994. In the present studies this revised system has been implemented while categorising the threatened plants of Maharashtra State with slight modifications (of course with some caution).

The present work is restricted to a specific region (Maharashtra State) only. Out of the 215 taxa studied, red list status determined for 142 taxa can be considered at national as well as global level, because these are endemic to the state. However, the status ascertained for the remaining 73 taxa are at state level only as these are not endemic to Maharashtra. The national or global status of these taxa can be found out only after studying these throughout their geographical range of distribution. Therefore, just like the present work, studies in this field should be done in all regions of the country, particularly where a maximum number of endemic plants are concentrated. After getting the regional status of all these endemic taxa, it will be possible to compile their status at national or global level.

The Red List Categories that have been determined for different taxa during the present study are fixed as per the current knowledge. But these have to be re-evaluated after a specific period and the status should be updated, wherever necessary. The specific period of re-evaluation will depend on the disturbances caused to the habitat. However, there are certain rules to govern the movement of taxa between categories (Anonymous, 1994). These are (a) a taxon may be moved from a category of higher threat to a category of lower threat if none of the criteria of the

higher category has been applied for 5 years or more, (b) if the original classification is found to have been erroneous (based on re-analysis of the data or new information), the taxon may be transferred to the appropriate category or removed from the threatened categories altogether, without delay and (c) transfer from lower risk to higher risk categories of threat should be made without delay.

In the present study there are 15 taxa which have been categorised into Data Deficient. This is due to lack of sufficient information on these taxa. However, efforts have to be made to place these taxa into proper categories at the earliest.

In Chapter VI of the present work, a list of plants has been provided which are regularly exported to different countries by various private agencies. However, from this list it is clear that, not a single plant belongs to threatened or endemic category of this state. Most of these are widely distributed and common. Hence, the international trade is not guided by the rarity factor of the threatened plant taxa found in the state. The potential threatened plants having commercial value within the country may be *Camptorrhiza indica* and *Iphigenia* spp. for colchicine, *Hitchenia caulina* for arrowroot, *Drimia* spp. as well as *Crinum* spp. for glycosides. The bulbs of different species of *Ceropegia* and *Brachystelma* are eaten by local people and tribals in raw condition. Corms of different *Dipcadi* spp. are also edible. There are several threatened plants, like species of *Amorphophallus*, *Arisaema*, *Habenaria*, etc., whose corms and tubers are eaten by wild animals. These are a few important threat factors of these species besides their habitat destruction.

For the conservation of wildlife in Maharashtra, all the existing protected areas are mainly due to protection of large animals. There is not a single protected area in the state specifically for wild plants. During conservation movement, only the category of threat is not necessarily sufficient to determine priorities for such action. The category of threat simply provides an assessment of the likelihood of extinction under current circumstances, whereas a system for assessing priorities for action will include numerous other factors concerning conservation action such as costs, logistics, chances of success and even perhaps the taxonomic distinctiveness of the subject (Anonymous, 1994).

Different types of protective measures have been proposed by various scientists from time to time to conserve the threatened plants. However, based on the present study the following measures are suggested:

1. It is very likely that some of the rare and threatened plants are possibly being exported, either as plant parts directly or in some other forms like extracts/ powders etc. under the names of unrestricted plants. Therefore, it is necessary that samples/ voucher specimens must be kept for these for subsequent scrutiny.
2. Like Pitcher Plant Sanctuary of Meghalaya, those endemic taxa, which are Critically Endangered and restricted in a single locality should be conserved by creating protected areas at the community or species level.
3. Developmental activities cannot be stopped, but during such activity efforts have to be made to do minimum harm to the habitat of threatened plants. If any construction or developmental work is essential at any place, the area should be explored properly and all the endemic as well as threatened plants to be transferred carefully to other similar habitats and should also be preserved in botanical gardens as an *ex-situ* method.
4. The plants like species of *Ceropegia* are very much climate sensitive and can be propagated at their natural habitat only. These can be transplanted to other habitats having similar climatic as well as edaphic conditions.
5. *Ex-situ* conservation of some plants, particularly those having aesthetic value like *Abutilon ranadei*, *Arisaema* spp., *Begonia* spp., *Delphinium malabaricum*, *Frerea indica*, etc. should also be attempted.
6. Overgrazing must be controlled particularly to conserve the threatened grasses and other herbaceous species.
7. Awareness should be created among the local people regarding the importance of conserving the plant species also, as they are aware of importance in conserving wild animals at present.
8. Natural calamities like land slides and soil erosion should be controlled by various available methods to save the critical habitat of threatened plants.

9. University and college teachers should be made aware about the threatened plants, which will subsequently refrain the students from collecting it, particularly on mass scale. In fact, teachers can keep a specimen or a photo of such plants to show to students.
10. However, the most effective method to conserve the threatened plants is considered to multiply these plants through tissue culture technique and then transplanting the offspring to the natural habitats. This should be given top priority where habitat destruction is contemplated in the immediate future.

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LIST OF ABBREVIATIONS

Acc. no.	-	Accession number
<i>auct. Plur.</i>	-	<i>auctorum plurimorum</i> : of most authors
<i>auct. non</i>	-	<i>auctorum non</i> : not of other-authors
<i>auct. mult.</i>	-	<i>auctorum multorum</i> : of many authors
<i>ca</i>	-	<i>circa</i> : about
Coll.	-	Collector
<i>comb. nov.</i>	-	<i>Combinatio nova</i> : new combination
<i>emend.</i>	-	<i>emendavit</i> : emended
<i>et</i>	-	and
<i>et al.</i>	-	<i>et aliorum</i> : and others
ex	-	published by
e.g.	-	<i>exempli gratia</i> : for example
f. (after author name)	-	<i>filius</i> : the son
f.	-	figure
f. (before plant name)	-	forma
Fls.	-	Flowers
Fls. & Frts.	-	Flowering and Fruiting period
Flb.	-	Flower bud
Fr. ex.	-	Fruit extract
Gm.	-	Gum
Lvs.	-	Leaves
<i>ibid.</i>	-	<i>ibidem</i> : the same
Ic.	-	<i>Icon</i> : Illustration
<i>ined.</i>	-	<i>ineditus</i> : unpublished
Mce.	-	Mace
n.s.	-	new series
<i>nom.nud.</i>	-	<i>nomen nudum</i> : naked name
<i>op.cit.</i>	-	<i>opero citato</i> : in the work cited.
Pds.	-	Pods
p.	-	page
pl.	-	plate
Pl. ex.	-	Plant extract
<i>p.p.</i>	-	<i>pro parte</i> : partly
Rsn.	-	Resin
Rts.	-	Roots

Repr.ed.	Reprinted edition
Rhz.	Rhizome
Rev. ed.	Revised edition
Rt. ex.	Root extract
Sds.	Seeds
Sd. ex.	Seed extract
<i>s.n.</i>	<i>sine numero</i> : without number
Stb.	Stem bark
Stb. ex.	Stem bark extract
Tws.	Twigs
Tb. ex.	Tuber extract
Tbs.	Tuber
var.	variety
W.P.	Whole Plant

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