

**FLORA
OF
PACHMARHI & BORI RESERVES**

DR A.K. MUKHERJEE

BOTANICAL SURVEY OF INDIA

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FOREWORD

Pachmarhi in Madhya Pradesh is Darjeeling of Bengal, Abu of Rajasthan or Nainital and Mussorie of Uttar Pradesh. The hills of Pachmarhi are the highest mountains in Central India, and their flora is botanically and phytogeographically unique.

The present work provides a systematic account of over 750 flowering plants belonging to 101 families. Representation of over one hundred families in even part of a political district is indicative of richness and diversity of flora.

Treatment of the flora of Bori Valley provides an opportunity of comparison and contrast between the flora of hills and valleys.

Several works are available on the flora of the plains regions of Madhya Pradesh, e.g. the recent work on Bhopal by Oonachan and several papers of Tiwari on grasses and other groups.

Mukherjee's work on Pachmarhi and Bori Valley will, therefore, fill a significant gap in our knowledge of the plants of the Central Indian region.

Above all, it will provide a handy manual for comparison of the floras of Himalayan mountains in north and northeast, the western ghats and Nilgiris in South with the Central Indian mountain flora.

Botanical Survey of India
Howrah
18-4-1984.

S.K. Jain

PREFACE

Pachmarhi and Bori forest ranges are very interesting botanically. University students often visit the area for plant collections. Some check-lists have been published on the area, but they lack proper treatment of nomenclature and reference to other Indian floras. There is no detailed flora for the area which can be consulted by the students and forest officials to assess the natural plant wealth and identify the plants of the area.

The main objective of this flora are (i) to provide a census of the rich resources and a means of identifying the plants of the area ; (ii) to give up to date nomenclature ; (iii) to record ecological conditions responsible for different types of forest vegetation ; (iv) to aid the conservation of flora.

The introductory section gives a brief resume of geographical features and topography, geology and soil, climate, survey of previous explorations and effects of biotic factors.

The flora deals with the systematic analysis of 778 species belonging to 452 genera and 101 families. In addition, data are provided on forest types, phytogeographical and statistical analysis.

The author expresses his deep sense of gratitude to Dr. S. K. Jain, Director ; Dr. A. S. Rao, former Joint Director and Dr. N. P. Balakrishnan, Deputy Director, Botanical Survey of India for guidance and facilities.

He is also indebted to the research scholars, officers and staff of the Central Circle, Botanical Survey of India, Allahabad for providing all types of help during the preparation of this work.

Botanical Survey of India
Allahabad
26th March, 1984

A. K. Mukherjee
Systematic Botanist

PACHMARI AND BORI ENVIRONS

SCALE 1 CM = 5 Km.

N

TO CALCUTTA

PIPARIA

SOHAGPUR

MADRAS

BHAGRA

DARMAKA

DEOYA R.

CHHINOWA DIST.

PEYUL DIST.

PO MADRAS

TO DELHI

TO BOMBAY

TO TAKU

TO BORI

TO PACHMARI

TO SOHAGPUR

TO PIPARIYA

TO CALCUTTA

INTRODUCTION

Satpura National Park consists of two forest ranges namely, Pachmarhi Forest Range and Bori Forest Range.

Pachmarhi Forest Range is situated in the Pachmarhi Plateau of the Mahadev hills of Madhya Pradesh. Pachmarhi town is the only hill station of Madhya Pradesh which attracts tourists and students, being an excellent place for botanizing.

The Bori Forest Range lies in the valley of Bori River, which flows west from Dhupgarh, the highest point in the Madhya Pradesh, for a distance of about 20 km to join the Sonbhadra River. The valley is more or less wedge shaped, the point starts from the foot of the Mahadev hills among whose peaks lies the Pachmarhi Plateau and gradually widens as it extends westwards to the Sonbhadra River where the base of the wedge is about 12 km wide. The valley is bounded on the north by the precipitous sandstone scrap of a long spur running west from the main massif of the Mahadeo Range, and rising up to a height of 1150 m like a vast wall. The average elevation of the bottom of the valley is about 430 m. To the west of the valley the country is a flat plateau. Thus, Bori forest range lies in a long funnel like depression of about 100 sq. km. and provides contrast with the Pachmarhi forest range which lies on a Plateau of about 60 sq. km at an elevation of about 1,000 m surrounded by prominent peaks like Mahadeo (1,328m) on the south, Chauradeo (1,312 m) on the south - east and Dhupgarh (1,350 m) on the South - west. The remarkable feature in the configuration of the Plateau is the vast and unexpected ravines in the solid rock. The Pachmarhi and Bori forest ranges are situated between 22°15'-22°28' N latitude and 78°13'-78°26' E longitude. Pachmarhi town is about 51 km from Pipariya, the nearest railway station and Bori forest range is about 65 km from Sohangpur, the nearest railway station on Calcutta - Bombay railway lines in the Hoshangabad district of Madhya Pradesh.

GEOLOGY AND SOIL

The rocks of Pachmarhi and Bori forest ranges belong to Upper and Lower Gondwana series. In Pachmarhi hills these rocks consist chiefly of coarse sand stones and conglomerates while in Bori valley these consist of sand stones and large masses of extruded or inter bedded trap besides sandy shales.

CLIMATE

It is well known that the type of vegetation depends on climatic, edaphic and biotic factors. Thus high annual rainfall, high relative humidity, high temperature and small variations in these factors characterise the rather monotonous environment of the rich and luxuriant tropical flora.

Pachmarhi and Bori forest ranges because of their altitudinal and latitudinal location are much away from the dust storms and heat waves of the Indo-Gangetic Plains. The climate is comparatively cooler than the northern districts of the Vindhyan Plateau, with rainfall mainly confined to S.W. monsoon.

TEMPERATURE

The hottest months are May and June with 40°C as the average maximum and 22°C as the average minimum temperature. January and February are the coldest months with 8°C as the average minimum temperature.

RAINFALL

The pre-monsoon showers are usually experienced as early as the end of May and the heaviest rain come in July and August after which there is a gradual diminution till the monsoon ends in October. In most years there are occasional storms from December to February.

The peculiar configuration of the Bori valley, open as it is to the west and to some extent to the south and with abrupt obstacle to the S.W. monsoon winds by the Dhupgarh ranges accounts for the heavy rainfall received.

The average rainfall at Pachmarhi is about 200 cm and at Bori 250 cm. Due to the peculiar configuration of the valley heavy dew continue frequently up to March so that the forest remains green in Bori valley for a considerably longer period than does the ordinary teak forest of the Madhya Pradesh.

RELATIVE HUMIDITY

The relative humidity is highest during July and August and the lowest in April and May. The Bori valley, owing to its peculiar configuration, remains naturally more humid than that of the Pachmarhi plateau.

Thus, the combined favourable factors of high rainfall, high relative humidity coupled with moderate temperature characterize the Pachmarhi and Bori forest ranges where the vegetation assumes tropical luxuriance. The Bori forest range where the soil derived from the trap is very fertile and which enjoys a long growing season harbours one of the finest teak forests in India.

PREVIOUS EXPLORATIONS

Captain Forsyth, the author of the most interesting book (*The Highlands of Central India, 1871*) was the first explorer of the area who reached Pachmarhi in 1862, built the first bungalow there, the famous 'Bison Lodge' and explored the Pachmarhi and Bori forests. Attracted by the descriptions and the informations given by Captain Forsyth, many botanists visited the area and made important contributions to the flora of the area namely, Stewart & Brandis (1874), Gamble (1892), Hole (1906), Witt (1916) Graham (1914-15), Haines (1916), Mukherjee (1923), Rao and Narayanaswami (1960), Kapoor & Yadav (1962), Joseph (1964) Panigrahi *et al.* (1965a, 1965b, 1966a, 1966b, 1967), Patel *et al.* (1962), Ram Lal & Panigrahi (1967), Shukla & Panigrahi (1967), Tiwari (1954, 1955, 1963, 1964), Tiwari & Maheshwari (1963, 1964, 1965) and Saxena (1973).

EFFECTS OF BIOTIC FACTORS

Before 1859 the Pachmarhi and Bori forest areas had been subjected to continuous shifting cultivation or *dahya* by the then considerable local population of Gonds and Korkus. In the *dahyas* some of the larger trees were left standing after pollarding and the rest of the forest ruthlessly cut down and burnt. In 1862 when the forests were taken over by the newly formed Forest Department, the *dahya* cultivation was rigorously suppressed and systematic fire protection was introduced in 1884. In 1865, the Bori forest was notified as a Reserve under the Forest Act (first in India). The local population were induced to settle elsewhere and only two villages were settled in the Reserve. Thus Bori range has remained undisturbed by normal biotic factors for over one hundred years.

But biotic factors are more and more active in the Pachmarhi forest range owing to the establishment of the township and other development projects.

THE FLORA

GENERAL

Present Studies

The results presented in this flora are based on the collections of V. Narayanaswamy, August, 1949 (*CAL*) ; J. Joseph, September and October, 1960 and April, May & July, 1961 (*BSA* and *MH*) ; G. Panigrahi, December, 1962 and July, 1964 (*BSA*) ; P.C. Pant, February, 1978 (*BSA*) ; and publications made on Pachmarhi and Bori forest ranges specially by the officers of the Botanical Survey of India, viz. Rao & Narayanaswami (1960), Kapoor & Yadav (1962), Joseph (1964), Panigrahi *et al.* (1965a, 1965b, 1966a, 1966b, 1967), Patel *et al.* (1962), Ram Lal & Panigrahi (1967), Shukla & Panigrahi (1967), Tiwari (1954, 1955, 1963, 1964), Tiwari & Maheshwari (1963, 1964, 1965), Saxena (1973), and Verma & Chandra (1979 & 1981) have been consulted.

The plan

The families are arranged according to a modified system of Bentham & Hooker (1862-1883) as adopted by Kew and British Museum (N.H.) and reflected by the reorganisation of the Central National Herbarium (*CAL*) (See Table 1).

The genera within families and species within genera are arranged in alphabetical sequence and numbered serially. The keys are constructed for easy identification of the plants of Pachmarhi and Bori forest ranges.

The nomenclature contains the correct name with full reference of author(s), basionym, if any, and reference to the names accepted in the "Flora of British India" and to the local flora or monographs and taxonomic revisions, if any. Abbreviations of periodicals are according to the present usage.

Area of collection with approximate altitude, habitat with abundance, flowering and fruiting time follows the concise description of each species.

Forest types

There are broadly two types of forests in Pachmarhi and Bori forest ranges namely, I. Sub-tropical Hill Forests and II. Tropical Moist Deciduous Forests.

The first type is localised at high elevations around Pachmarhi receiving high rainfall over 175 cm. The forest is characterised by larger proportion of evergreen species like *Syzygium cumini* (L.) Skeels, *Rhus ellipticus* J.F. Sm., *Melastoma malabathricum* L., *Murraya paniculata* (L.) Jack., *Dillenia pentagyna* Roxb., *Sterculia villosa* Roxb., *Mangifera indica* L., *Salix tetrasperma* Roxb. etc.

Flemingia bracteata (Roxb.) Wt. *F. macrophylla* (Willd.) Prain, *Sophora interrupta* Bedd. are common in the undergrowth. The important climbers are *Acacia torta* (Roxb.) Craib, *Clematis triloba* Heyne, *C. roylei* Rehder, *Milletia auriculata* Baker, *Butea superba* Roxb. etc.

Tree ferns namely, *Cyathea gigantea* (Wall.) Holt. and *C. latebrosa* (Wall.) Copel. are found in the deep gorges with perennial waters.

In lower elevations around Pachmarhi the second type of forest is found. This type occurs in locations having annual rainfall of 100 to 170 cm. The species which are characteristic of these forests are *Shorea robusta* Gaertn. f., *Kydia calycina* Roxb., *Lagerstroemia parviflora* Roxb., *Pterocarpus marsupium* Roxb., *Bridelia retusa* Spr. along with common forest species of Madhya Pradesh like *Terminalia alata* Heyne ex Roxb., *Bombax ceiba* L., *Emblica officinalis* Gaertn., *Hymenodictyon excelsum* (Roxb.) Wall., *Buchanania lanza* Spr., *Diospyros melanoxylon* Roxb., *Ougeinia oojeinensis* Benth. etc.

Indigofera pulchella Roxb., *Desmodium* spp., *Crotalaria* spp., *Flemingia bracteata* (Roxb.) Wt. etc. are found as the undergrowth.

In Bori forest range *Tectona grandis* L.f. is the dominant species. The forest is well stocked and the height of the stand is over 25 meters. *Pterocarpus marsupium* Roxb., *Terminalia alata* Heyne ex Roth, *Ougeinia oojeinensis* Benth., *Aegle marmelos* Correa, *Adina cordifolia* Hook. f. *Anogeissus latifolia* (DC.) Wall. ex Bedd. are commonly found along with the common species of Madhya Pradesh. *Bauhinia vahlii* Wt. & Arn., *Butea superba* Roxb. and *Acacia pennata* (L.) Willd. are common climbers.

There are a number of interesting plants which do not occur elsewhere in Madhya Pradesh, except in Pachmarhi namely, *Melastoma malabathricum* L., *Murraya paniculata* (L.) Jack., *Holmskioldia sanguinea* Retz., *Blumea lanceolaria* (Roxb.) Druce and *Sophora interrupta* Bedd.

It is interesting to note that *Shorea robusta* Gaertn. f. is the dominant species of Pachmarhi, and apparently this is the western limit of distribution of the species in the midst of the teak areas of Madhya Pradesh, while teak (*Tectona grandis* L. f.) is absent from this plateau.

(vi)

On the contrary the teak is the dominant tree in the Bori valley. It flourishes on trap soil but is invariably poor and stunted on sandstones. The alluvial soil along the banks of the large streams and of the Bori river produces some exceptionally fine teak forest also but the low hills along both sides of the valley which have trap soil produces the best teak stands.

The above facts indicate that the teak is a moisture loving species and grows well in heavy soil usually up to an altitude of 900 m. On the other hand 'Sal' (*Shorea robusta* Gaertn. f.) favours well drained soil derived from sand stones and conglomerates as found at Pachmarhi and can grow at higher altitudes than that of teak. Moreover, *Shorea* being an element of a primitive family than that of *Tectona* (Takhtajan, 1969), it cannot compete with teak in the habitat suitable for teak. On the other hand soil moisture becomes the limiting factor for the growth of teak at Pachmari 'Sal' forest. Therefore, the distribution of 'Sal' and teak is so markedly distinct in Pachmarhi and Bori forest ranges and proves that the edaphic factor is very important for the distribution of certain plants.

TABLE I. SEQUENCE OF FAMILIES AFTER
BENTHAM & HOOKER (1862-1883)

1. Ranunculaceae	52. Stylidiaceae
2. Dilleniaceae	53. Campanulaceae
3. Magnoliaceae	54. Plumbaginaceae
4. Menispermaceae	55. Primulaceae
5. Berberidaceae	56. Myrsinaceae
6. Papaveraceae	57. Sapotaceae
7. Brassicaceae	58. Ebenaceae
8. Capparaceae	59. Oleaceae
9. Violaceae	60. Apocynaceae
10. Flacourtiaceae	61. Asclepiadaceae
11. Cochlospermaceae	62. Loganiaceae
12. Polygalaceae	63. Gentianaceae
13. Caryophyllaceae	64. Menyanthaceae
14. Diplocrepaciaceae	65. Boraginaceae
15. Malvaceae	66. Convolvulaceae
16. Bombacaceae	67. Solanaceae
17. Sterculiaceae	68. Scrophulariaceae
18. Tiliaceae	69. Lentibulariaceae
19. Linaceae	70. Gesneriaceae
20. Geraniaceae	71. Bignoniaceae
21. Oxalidaceae	72. Pedaliaceae
22. Balsaminaceae	73. Acanthaceae
23. Rutaceae	74. Verbenaceae
24. Burseraceae	75. Lamiaceae
25. Meliaceae	76. Amaranthaceae
26. Celastraceae	77. Chenopodiaceae
27. Rhamnaceae	78. Polygonaceae
28. Vitaceae	79. Lauraceae
29. Lecaceae	80. Loranthaceae
30. Sapindaceae	81. Santalaceae
31. Anacardiaceae	82. Euphorbiaceae
32. Papilionaceae	83. Ulmaceae
33. Caesalpiniaceae	84. Urticaceae
34. Mimosaceae	85. Moraceae
35. Rosaceae	86. Salicaceae
36. Drosophilaceae	87. Pinaceae
37. Combretaceae	88. Cupressaceae
38. Myrtaceae	89. Orchidaceae
39. Lecythidaceae	90. Zingiberaceae
40. Melastomataceae	91. Costaceae
41. Lythraceae	92. Musaceae
42. Onagraceae	93. Hypoxidaceae
43. Passifloraceae	94. Dioscoreaceae
44. Cucurbitaceae	95. Liliaceae
45. Begoniaceae	96. Commelinaceae
46. Cactaceae	97. Arecaceae
47. Aizoaceae	98. Araceae
48. Apiaceae	99. Eriocaulaceae
49. Araliaceae	100. Cyperaceae
50. Rubiaceae	101. Poaceae
51. Asteraceae	

TABLE 2. ARRANGEMENT OF TAXA OF PACHMARHI AND BORI
FOREST RANGES ACCORDING TO PHYLOGENETIC
CLASSIFICATION OF TAKHTAJAN, 1969.

Class-Magnoliatae

Sub-class A-G ; Super orders 1—XV ; Orders 1—74.

Sl. no.	Family	No. of genera	No. of species	Occurrence
1	2	3	4	5
1. A I 1.	Magnoliaceae	1	1	Pachmarhi
2. A I 2.	Lauraceae	1	1	Pachmarhi & Bori
3. B II 9.	Menispermaceae	1	1	Pachmarhi
4. B II 9.	Ranunculaceae	3	3	Pachmarhi
5. B II 9.	Berberidaceae	1	2	Pachmarhi
6. B II 10.	Papaveraceae	1	2	Pachmarhi & Bori
7. C III 18.	Ulmaceae	1	1	Pachmarhi & Bori
8. C III 18.	Moraceae	2	12	Pachmarhi & Bori
9. C III 18.	Urticaceae	5	7	Pachmarhi & Bori
10. D IV 27.	Aizoaceae	2	3	Pachmarhi & Bori
11. D IV 27.	Cactaceae	1	1	Bori
12. D IV 27.	Caryophyllaceae	3	3	Pachmarhi & Bori
13. D IV 27.	Amaranthaceae	8	10	Pachmarhi & Bori
14. D IV 27.	Chenopodiaceae	1	1	Pachmarhi & Bori
15. D IV 28.	Polygonaceae	3	5	Pachmarhi
16. D IV 29.	Plumbaginaceae	1	1	Pachmarhi & Bori
17. E V 31.	Dilleniaceae	1	1	Pachmarhi
18. E V 33.	Dipterocarpaceae	1	1	Pachmarhi
19. E V 34.	Violaceae	2	2	Pachmarhi
20. E V 34.	Flacourtiaceae	2	2	Pachmarhi & Bori
21. E V 34.	Cochlospermaceae	1	1	Pachmarhi
22. E V 35.	Passifloraceae	1	1	Pachmarhi
23. E V 36.	Cucurbitaceae	7	10	Pachmarhi & Bori

Sl. no.	Family 2	No. of genera 3	No. of Species 4	Occurrence 5
24. E V 37.	Begoniaceae	1	2	Pachmarhi & Bori
25. E V 38.	Capparaceae	1	2	Pachmarhi & Bori
26. E V 38.	Brassicaceae	5	5	Pachmarhi & Bori
27. E V 40.	Salicaceae	1	1	Pachmarhi
28. E V 43.	Ebenaceae	1	1	Pachmarhi & Bori
29. E VI 43.	Sapotaceae	1	1	Pachmarhi & Bori
30. E VI 44.	Myrsinaceae	1	1	Pachmarhi
31. E VI 44.	Primulaceae	2	3	Pachmarhi
32. E VII 45.	Tiliaceae	3	12	Pachmarhi & Bori
33. E VII 45.	Sterculiaceae	4	5	Pachmarhi
34. E VII 45.	Bombacaceae	1	1	Pachmarhi
35. E VII 45.	Malvaceae	6	14	Pachmarhi & Bori
36. E VII 46.	Euphorbiaceae	12	24	Pachmarhi & Bori
37. F VIII 49.	Rosaceae	3	3	Pachmarhi & Bori
38. F VIII 50.	Mimosaceae	4	9	Pachmarhi & Bori
39. F VIII 50.	Caesalpiniaceae	4	12	Pachmarhi & Bori
40. F VIII 50.	Fabaceae	31	66	Pachmarhi & Bori
41. F VIII 52.	Droseraceae	1	2	Pachmarhi
42. F IX 54.	Lythraceae	4	8	Pachmarhi & Bori
43. F IX 54.	Combretaceae	2	5	Pachmarhi & Bori
44. F IX 54.	Lecythidaceae	1	1	Pachmarhi
45. F IX 54.	Myrtaceae	1	1	Pachmarhi & Bori
46. F IX 54.	Melastomataceae	3	3	Pachmarhi
47. F IX 54.	Onagraceae	5	5	Pachmarhi & Bori
48. F X 56.	Anacardiaceae	5	5	Pachmarhi
49. F X 56.	Burseraceae	2	2	Pachmarhi

Sl. no. 1	Family 2	No. of genera 3	No. of Species 4	Occurrence 5
50. F X 56.	Rutaceae	3	4	Pachmarhi & Bori
51. F X 56.	Meliaceae	3	3	Pachmarhi
52. F X 57.	Sapindaceae	2	2	Pachmarhi
53. F X 58.	Linaceae	2	2	Pachmarhi
54. F X 58.	Oxalidaceae	2	6	Pachmarhi & Bori
55. F X 58.	Geraniaceae	1	1	Pachmarhi
56. F X 58.	Balsaminaceae	1	3	Pachmarhi & Bori
57. F X 59.	Polygalaceae	1	3	Pachmarhi
58. F X 60.	Araliaceae	1	1	Pachmarhi
59. F XI 60.	Apiaceae	7	12	Pachmarhi & Bori
60. F XII 61.	Celastraceae	2	2	Pachmarhi
61. F XII 62.	Rhamnaceae	4	7	Pachmarhi & Bori
62. F XII 62.	Vitaceae	3	4	Pachmarhi & Bori
63. F XII 62.	Leeaceae	1	2	Pachmarhi
64. F XII 63.	Oleaceae	2	5	Pachmarhi
65. F XII 64.	Santalaceae	1	1	Pachmarhi
66. F XII 64.	Loranthaceae	3	4	Pachmarhi & Bori
67. G XIV 68.	Loganiaceae	3	4	Pachmarhi & Bori
68. G XIV 68.	Apocynaceae	5	6	Pachmarhi & Bori
69. G XIV 68.	Asclepiadaceae	10	12	Pachmarhi & Bori
70. G XIV 68.	Gentianaceae	4	8	Pachmarhi & Bori
71. G XIV 68.	Rubiaceae	16	22	Pachmarhi & Bori
72. G XIV 68.	Menyanthaceae	1	1	Bori
73. G XIV 69.	Convolvulaceae	4	11	Pachmarhi & Bori
74. G XIV 69.	Boraginaceae	6	10	Pachmarhi & Bori
75. G XIV 70.	Solanaceae	4	9	Pachmarhi & Bori
76. G XIV 70.	Scrophulariaceae	12	22	Pachmarhi & Bori

FLORA OF PACHMARHI

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Sl. no.	Family 2	No. of genera 3	No. of Species 4	Occurrence 5
77. G XIV 70.	Bignoniaceae	4	4	Pachmarhi & Bori
78. G XIV 70.	Pedaliaceae	1	1	Bori
79. G XIV 70.	Gesneriaceae	2	2	Pachmarhi & Bori
80. G XIV 70.	Lentibulariaceae	1	6	Pachmarhi
81. G XIV 70.	Acanthaceae	22	34	Pachmarhi & Bori
82. G XIV 71.	Verbenaceae	10	12	Pachmarhi & Bori
83. G XIV 71.	Lamiaceae	13	24	Pachmarhi & Bori
84. G XV 72.	Styliadiaceae	1	1	Pachmarhi
85. G XV 72.	Campanulaceae	3	3	Pachmarhi & Bori
86. G XV 74.	Asteraceae	33	50	Pachmarhi & Bori
Class - Liliatae				
Sub - class A-D; Super order I-V ; Orders 75-94.				
87. B II 79.	Hypoxidaceae	1	1	Pachmarhi
88. B II 79.	Dioscoreaceae	1	7	Pachmarhi & Bori
89. B II 79.	Liliaceae	6	7	Pachmarhi & Bori
90. B II 81.	Musaceae	1	1	Pachmarhi
91. B II 81.	Costaceae	1	1	Pachmarhi & Bori
92. B II 81.	Zingiberaceae	5	6	Pachmarhi & Bori
93. B II 82.	Orchidaceae	13	21	Pachmarhi
94. C III 84.	Cyperaceae	8	39	Pachmarhi & Bori
95. C IV 86.	Commelinaceae	4	9	Pachmarhi & Bori
96. C IV 87.	Eriocaulaceae	1	5	Pachmarhi & Bori
97. C IV 89.	Poaceae	57	102	Pachmarhi & Bori
98. C V 90.	Arecaceae	1	3	Pachmarhi & Bori
99. C V 92.	Araceae	5	5	Pachmarhi
Gymnosperms				
100. Pinaceae		1	1	Pachmarhi
101. Cupressaceae		1	1	Pachmarhi

TABLE 3. ANALYSIS OF TAXA OF PACHMRHI AND BORI FOREST RANGES.

No. of families	No. of genera	No. of species		
101	452	778	Trees &	
			Shrubs	247
			Herbs	531

Ten dominant families

Sl. no.	Flora of Pachmarhi and Bori forest ranges	No. of genera	No. of species
1.	Poaceae	57	102
2.	Fabaceae (Papilionaceae Caesalpiniaceae & Mimosaceae)	39	87
3.	Asteraceae	33	50
4.	Cyperaceae	8	39
5.	Acanthaceae	22	34
6.	Euphorbiaceae	12	24
7.	Lamiaceae	13	24
8.	Rubiaceae	16	22
9.	Scrophulariaceae	12	22
10.	Orchidaceae	13	21
	Total	224	325
	Percentage of total :	49.5	41.7

Statistics

The flora of Pachmarhi and Bori forest ranges is made up of 101 families consisting of 452 genera and 778 species. The species consist of 247 trees and shrubs and 531 herbs (Table-3).

The 3rd position of Asteraceae and 7th position of Lamiaceae, which are more temperate in nature, indicates the semi-temperate nature of the vegetation. The monocotyledonous families namely, Poaceae, Cyperaceae and Orchidaceae account 50% species under the ten dominant families of the area. It indicates the dominance of monocotyledonous plants in the area (Table-3).

The flora of Pachmarhi and Bori forest ranges represent all the Subclasses and Super orders of Magnoliatae except Super order XIII Proteacae, (mostly Southern Hemispheric plants) and all the Subclasses and Super orders of Liliatae except Subclass A-Alismidae (mostly aquatic plants) according to phylogenetic classification of Takhtajan, 1962 (Table-2).

According to Jaccard (1912), the generic coefficient of a flora, i.e. the number of genera expressed as a percentage of the number of species provides information on the variety of habitats, or on the relative intensity of intergeneric and intrageneric competition in the area. The higher the generic coefficient the more varied are the habitats and intergeneric and intra-generic competition in the area.

The generic coefficient for the Flora of Pachmarhi and Bori Forest Ranges (Table-3) is : $G = \frac{452 \times 100}{778} = 58.0\%$. This high percentage of generic coefficient indicates that the present composition of the area is the result of intense intergeneric and intrageneric competition in varied types of microclimates which may be utilised for the introduction of species growing in similar microclimates elsewhere in the country. It is supported by the fact that these microclimates are naturally supporting both the tropical and temperate elements.

Out of 101 families of the flora of Pachmarhi and Bori forest ranges, 36 are restricted to Pachmarhi range and 4 to Bori range. Out of 36 families restricted to Pachmarhi range, 17 families are represented by only 1 genus (Table-2).

In the flora, out of 101 families, 31 are represented by 1 species, 13 by 2 species and 11 by 3 species. In case of genera, 43 families are represented by 1 genus, 13 by 2 genera and 12 by 3 genera (Table-2).

Such a low number of species and genera in more than 50% families of the flora indicate its relict nature.

Darwin (*On the Origin of species*, 6th ed. 1876, p. 403) concluded that as a general rule, the number of species of each group gradually increases towards the maximum, and then, sooner or later, a gradual decrease of the species number occurs.

The area of Pachmarhi and Bori forest ranges is existing from the Gondwana time. The flora had undergone many changes during the past ages owing to migration to and fro during the past periods of glaciation, climatic changes, pressure of succession and intense biotic interference in the recent times. All the above factors together contributed to the relict nature of the flora.

Bews, J. W. (*Studies in the Ecological Evolution of the Angiosperms*: Wheldon & Wesley Ltd, London, 70, 1927) observed that while the species which appear relatively late in the plant succession are usually very rigid in their requirement and show a small range of variation in their physiological processes, the species which act as pioneers or appear early in the plant succession are much more plastic physiologically. But the climax species belong to more primitive types of plant form than the pioneer species. An increase of physiological plasticity, therefore, has been one of the trends of evolutionary development.

Out of 86 dicot families having 568 species the primitive 32 families have only 100 species (i.e. 37% primitive families having only 18% species). This indicates that the flora of the area is heavily disturbed by human interference and the primitive families are represented by relict species only.

The presence of many temperate elements of the area, common with the Himalayas, poses the problems of migration across the gangetic plain. W. T. Blanford, one of the greatest workers in the field of Indian geology and natural history, as quoted by Wadia (*Geology of India* 1957 ; P-379) says that a great portion of the temperate fauna and flora of the South Indian hills has inhabited the country from a much more distant epoch than the glacial period may be considered as almost certain, there being so many peculiar forms. It is possible that the species common to Ceylon, the Nilgiris and the Anamalay may have migrated at a time when the country was damper without the temperature being lower.

Bews (*loc. cit.* P. 289) says that the tropical rain forests has existed in certain tropical regions ever since the rise of the Angiosperms, when the climate of the world during Jurassic times, and at least until the close of the Cretaceous, was far more uniformly warm and moist than it is now, and the land surfaces were mostly reduced nearly to sea level, such conditions must have been much more widespread. With increasing climatic differentiation, however, with the advent of pronounced dry seasons, with

a general lowering of temperatures as the land surfaces of the world became upraised into great mountain ranges, the moist tropical belt became more and more contracted.

The distribution of fossil Cretaceous reptiles points to unrestricted inter-migration of land animals over Mesozoic Indo-African-American continent or archipelago. The northern frontier of this continent was washed by the waters of the Tethys. This southern continent persisted till the commencement of the Cainozoic age, when, collaterally with other physical revolution in India, (volcanic activities) large segments of it drifted away, or subsided, permanently, under the ocean, to form what are now the Bay of Bengal, the Arabian Sea, etc., thus isolating the Peninsula of India, with sea on all sides (Wadia, loc. cit. p. 173).

The angiosperms undoubtedly originated long before the Cretaceous period. The specialised character and astonishingly modern facies of many cretaceous angiosperms confirm the belief that they might have originated in the lower Mesozoic. (Takhtajan, 1969, P. 122).

Owing to higher evolutionary plasticity the angiosperms could adapt themselves to the sudden changes in physio-geographical conditions of upper cretaceous period (continental drift and volcanic activities) and were able to colonise not only mountains but also extensive areas of lowlands (Takhtajan, loc. cit. P. 131).

The present distribution of the more primitive living angiosperms leads to the conclusion that the original centre of distribution of the angiosperms was situated somewhere between eastern India and Polynesia, i.e. the south-east Asia of to-day (Takhtajan, loc. cit. p. 156).

The presence of entire phylogenetic series linking temperate forms with subtropical and tropical ones in the eastern Himalayas, Assam, Yunnan, Upper Burma, North Vietnam and Eastern Asia is evidence that this part of the Asian continent is the primary centre of origin of the temperate flora of the northern hemisphere (Takhtajan, loc. cit. p. 171).

The Rajmahal-Assam gap is of recent origin, the two being connected underground at a small depth. The downwarp which produced the Gangetic geosyncline must have started as a concomitant of the Himalayan elevation to the north somewhere in the mid-Eocene (Wadia, loc. cit. p. 391).

The Assam plateau must be regarded as a plateau of erosion, a detached outlying fragment of the Peninsula, connected with it through the intermittent Rajmahal hills (Wadia, loc. cit. P. 434).

The foregoing facts indicate that the present temperate elements of South India and Ceylon migrated from their place of origin in the South-

East Asia of to day, i.e. the north-east portion of the Gondwana land of Cretaceous epoch, much earlier than the Pleistocene glaciation.

It is probable that they migrated in the Cretaceous period when Peninsular India and the adjacent areas were damper without the temperature being lower and were covered with tropical rain forest. With increasing climate differentiation with the advent of pronounced dry seasons, with a general lowering of temperatures as the land surfaces of the world became upraised into great mountain ranges, the moist tropical belt became more and more contracted in the Tertiary period when the temperate elements of the moist tropical forest had to take refuge to the hill tops of the Peninsular India and Ceylon. Thus it created a serious problem for the present phytogeographers to correlate the occurrence of these temperate elements both in the Himalayas and on the hill tops of Peninsular India and Ceylon.

Key to Groups of Seed Plants from Pachmarhi and Bori forest ranges.

1a. Seeds and ovules enclosed in megasporophyll (Carpel).
Stigma present :

2a. Flowers usually 4-5 merous. Venation usually reticulate. Stem with central pith and or surrounded by concentric rings of woody tissue, bark separable.
Cotyledons usually 2 :

3a. Perianth absent (achlamydous) or uniserrate (monochlamydous)

Group 1

3b. Perianth biserrate or multiseriate :

4a. Petals all united, at least at base

Group 2

4b. Petals free or only some united :

5a. Ovary inferior or half-inferior

Group 3

5b. Ovary superior :

6a. Stamens more than twice as many as petals

Group 4

6b. Stamens twice as many as petals or fewer

Group 5

2b. Flowers usually 4-merous. Venation usually striate. Stem without central pith, Woody substance in scattered bundles. Outer rind firmly attached. Cotyledon 1

Group 6

1b. Seeds and ovules borne on surface of megasporophylls.
Stigma none

Group 7

**GROUP I. ACHLAMYDOUS AND
MONOCHLAMYDOUS DICOTS**

Key To Families

- 1a. Perianth none :
 - 2a. Flowers in cyathia ... EUPHORBIACEAE 82
 - 2b. Flowers in spikes ... SALICACEAE 86
- 1b. Perianth present :
 - 3a. Ovary inferior or apparently so, being tightly invested by persistent hypanthium :
 - 4a. Plants herbaceous :
 - 5a. Leaves alternate. Flowers unisexual. Ovary truly inferior ... BEGONIACEAE 45
 - 5b. Leaves opposite. Flowers bisexual, ovary appearing to be inferior ... LYTHRACEAE 41
 - 4b. Plants woody :
 - 6a. Plants parasitic ... LORANTHACEAE 80
 - 6b. Plants not parasitic :
 - 7a. Stamens 10, twice as many as calyx lobes ... COMBRETACEAE 37
 - 7b. Stamens 3 - 5, as many as calyx lobes ... SANTALACEAE 81
 - 3b. Ovary superior :
 - 8a. Anthers dehiscing by 2 or 4 upcurled lids ... LAURACEAE 79
 - 8b. Anthers not dehiscing by lids :
 - 9a. Pistils 2 or more (carpels free) :
 - 10a. Trees ... STERCULIACEAE 17
 - 10b. Herbs ... RANUNCULACEAE 1
 - 9b. Pistils solitary (carpels 1 or united) :
 - 11a. Ovary 2 - 5 locular :
 - 12a. Ovary axile ... EUPHORBIACEAE 82
 - 12b. Ovules all or mostly basal :
 - 13a. Herbs. Capsule circumscissile ... AZOACEAE 47

13b. Woody. Capsule not circumscissile :

14a. Plants armed. Leaves simple, triplinerved ... RHAMNACEAE 27
(*Ziziphus*)

14b. Plants unarmed. Leaves compound, or if simple then not triplinerved ... SAPINDACEAE 30

11b. Ovary 1-locular :

15a. Plants twining (single petal in female flower; corolline cupule in male) ... MENISPERMACEAE 4
(*Cissampelos*)

15b. Plants not twining :

16a. Herbs :

17a. Stipules ochreate ... POLYGONACEAE 78

17b. Stipules absent or not ochreate :

18a. Perianth and bracts scarious. Stamens often connate below ... AMARANTHACEAE 76

18b. Perianth and bracts not scarious. Stamens free :

19a. Flowers unisexual.
Style undivided.
Leaves triplinerved ... URTICACEAE 84

19b. Flowers bisexual.
Style 2 - more-branch-
ed. Leaves pinnately
veined ... CHENOPodiACEAE 77

16b. Woody plants :

20a. Leaves compound :

21a. Flowers regular ... MIMOSACEAE 34

21b. Flowers zygomorphic :

22a. Corolla papilio-
naceous ... PAPILIONACEAE 32

22b. Corolla not papilio-
naceous ... CAESALPINIACEAE 33

20b. Leaves simple :

23a. Stipules present :

24a. Style branched :

- 25a. Anthers inflexed and reversed in bud. Ovule 1, apical ... MORACEAE 85
- 25b. Anthers erect in bud :
- 26a. Ovule solitary, apical ... ULMACEAE 83
- 26b. Ovules 2, basal ... EUPHORBIACEAE 82
(*Antidesma*)
- 24b. Style undivided :
- 27a. Placentaion parietal ... FLACOURTIACEAE 10
(*Casearia*)
- 27b. Placentaion not so :
- 28a. Ovule apical ... MORACEAE 85
- 28b. Ovule basal ... URTICACEAE 84
- 23b. Stipules none ... FLACOURTIACEAE 10
(*Flacourtie*)

GROUP 2. SYNPETALOID DICOTS

- 1a. Stamens more than corolla lobes :
- 2a. Ovary inferior ... CACTACEAE 46
- 2b. Ovary superior :
- 3a. Leaves compound :
- 4a. Flowers regular ... MIMOSACEAE 34
- 4b. Flowers zygomorphic :
- 5a. Corolla papilionaceous ... PAPILIONACEAE 32
- 5b. Corolla not papilionaceous ... CAESALPINIACEAE 33
- 3b. Leaves simple :
- 6a. Corolla urceolate. Flowers usually unisexual ... EBENACEAE 58

- 6b. Corolla rotate to campanulate. Flowers bisexual ... SAPOTACEAE 57
- 1b. Stamens as many as petals or fewer :
- 7a. Ovary partly or wholly inferior :
- 8a. Tendril-bearing vines ... CUCURBITACEAE 44
- 8b. Plants not tendriliferous :
- 9a. Anthers syngenesious :
- 10a. Stamens 2 ... STYLIDIACEAE 52
- 10b. Stamens more than 2 :
- 11a. Flowers in involucral heads. Ovary 1-locular ... ASTERACEAE 51
- 11b. Flowers not in heads. Ovary 2- or more-locular ... CAMPANULACEAE 53
- 9b. Anthers free :
- 12a. Leaves opposite ... RUBIACEAE 50
- 12b. Leaves alternate ... CAMPANULACEAE 53
- 7b. Ovary superior :
- 13a. Stamens opposite the petals :
- 14a. Ovary 2-many-locular. Placentation axile :
- 15a. Leaves compound. Stamens united by filaments ... LECACEAE 29
- 15b. Leaves simple. Stamens free from each other :
- 16a. Corolla urceolate. Stamens free from petals. Flowers usually unisexual ... EBENACEAE 58
- 16b. Corolla rotate. Stamens epipetalous. Flowers bisexual ... SAPOTACEAE 57
- 14b. Ovary 1-locular. Placentation free-central :
- 17a. Styles 5. Flowers long-tubular. Calyx with stalked glands ... PLUMBAGINACEAE 54
- 17b. Style 1. Flowers rotate. Calyx not glandular :
- 18a. Herbs. Leaves usually opposite. Perianth not gland-dotted. Fruit circumscissile ... PRIMULACEAE 55
- 18b. Shrubs. Leaves alternate. Perianth gland-dotted. Fruit fleshy ... MYRSINACEAE 56

13b. Stamens alternate with the petals :

19a. Corolla irregular. Stamens 4 or 2 :

20a. Fruit elastically dehiscent. Seeds often on upcurved processes. Inflorescence usually with conspicuous bracts. ... ACANTHACEAE 73

20b. Not as above :

21a. Ovules and seeds few :

22a. Ovary 4-lobed. Style arising from between the lobes of the ovary ... LAMIACEAE 75

22b. Ovary entire. Style apical :

23a. Plants viscid-pubescent ... PEDALIACEAE 72

23b. Plants not viscid-pubescent ... VERBENACEAE 74

21b. Ovules and seeds many :

24a. Leaves compound. Seeds winged ... BIGNONIACEAE 71

24b. Leaves simple. Seeds not winged :

25a. Placentation free-central. Plants aquatic or of wet places, typically with small insectivorous bladders ... LENTIBULARIACEAE 69

25b. Placentation parietal or axile. Plants not insectivorous :

26a. Placentation axillary, solid and unbranched ... SCROPHULARIACEAE 68

26b. Placentation parietal, often intruded and meeting below middle of locule but branched or winged :

27a. Perianth 4-5 merous. Corolla contorted ... GENTIANACEAE 63

- 27b. Perianth 5-metrous.
Corolla imbricate or valvate ... **GESNERIACEAE 70**
- 19b. Corolla regular. Stamens usually 5 :
- 28a. Leaves alternate :
- 29a. Ovules and seeds many :
- 30a. Plants aquatic. Placentation parietal ... **MENYANTHACEAE 64**
- 30b. Plants terrestrial. Placentation axile ... **SOLANACEAE 67**
- 31a. Fruits capsular. Corolla usually plicate. Plants usually climbing...
CONVOLVULACEAE 66
- 31b. Fruits dry with 4 nutlets or drupaceous with 1-4-locular pyrene ... **BORAGINACEAE 65**
- 28b. Leaves opposite :
- 32a. Stamens 2, fewer than corolla lobes ... **OLEACEAE 59**
- 32b. Stamens 4 or more, as many as the corolla lobes :
- 33a. Carpels free at base. Sap usually milky :
- 34a. Carpels united only at stigmatic disk. Pollen aggregated into masses which are connected in pairs to stigmatic glands ... **ASCLEPIADACEAE 61**
- 34b. Carpels united by styles. Pollen not aggregated into pollinia ... **APOCYNACEAE 60**
- 33b. Carpels entirely united :
- 35a. Sap milky ... **APOCYNACEAE 60**
- 35b. Sap clear :
- 36a. Herbs :
- 37a. Plants hispid. Ovary 4-locular, 4-ovuled ... **BORAGINACEAE 65**

- 37b. Plants glabrous. Ovary 1 locular, many-ovulate ... GENTIANACEAE 63
- 36b. Plants woody :
- 38a. Ovules pendulous. Seeds or pyrene solitary. Fruit drupaceous with persistent calyx ... VERBENACEAE 74
- 38b. Ovules axile. Seeds 2 or more ... LOGANIACEAE 62

GROUP 3. POLYPETALOID DICOTS WITH INFERIOR OVARY

- 1a. Stamens many, more than twice as many as petals :
- 2a. Styles more than one. Flowers unisexual ... BEGONIACEAE 45
- 2b. Style 1. Flowers bisexual :
- 3a. Petals many. Plants armed, succulent, virtually leafless ... CACTACEAE 46
- 3b. Petals few. Plants unarmed, woody, leafy :
- 4a. Leaves opposite, gland-dotted ... MYRTACEAE 38
- 4b. Leaves alternate, not gland-dotted ... LECYTHIDACEAE 39
- 1b. Stamens few, twice as many as petals or fewer :
- 5a. Styles more than 1 :
- 6a. Herbs. Fruits of two mericarps ... APIACEAE 48
- 6b. Woody plants. Fruit drupaceous or capsular ... ARALIACEAE 49
- 5b. Style 1 :
- 7a. Herbs :
- 8a. Leaves cauline, alternate; venation pinnate. Anthers longitudinally dehiscent ... ONAGRACEAE 42

8b. Leaves basal or opposite; venation palmate. Anthers poricidal	...	MELASTOMATA - CEAE 40
7b. Woody plants	...	MELASTOMATA - CEAE 40

**GROUP 4. POLYPETALOID DICOTS WITH SUPERIOR
OVARY AND MANY STAMENS**

1a. Pistils more than 1 :

2a. Stamens monadelphous	...	MALVACEAE 15
2b. Stamens free :		
3a. Stamens perigynous (arising from hypanthium)	...	ROSACEAE 35
3b. Stamens hypogynous (arising from receptacle) :		
4a. Perianth multiseriate	...	MAGNOLIACEAE 3
4b. Perianth 2-3-seriate	...	DILLENIACEAE 2

1b. Pistil 1 :

5a. Stamens perigynous (arising from hypanthium) :		
6a. Leaves opposite. Fruit a capsule	...	LYTHRACEAE 41
6b. Leaves alternate. Fruit a drupe	...	ROSACEAE 35 (Prunus)
5b. Stamens hypogynous (arising from receptacle) :		
7a. Stamens monadelphous :		
8a. Leaves digitately compound	...	BOMBACACEAE 16
8b. Leaves simple	...	MALVACEAE 15
7b. Stamens free or polyadelphous :		
9a. Ovary stipitate (on gynophore) :		
10a. Stamens in 5 phalanges of 3 stamens each. Venation palmate	...	Sterculiaceae 17
10b. Stamens free. Venation pinnate	...	CAPPARACEAE 8
9b. Ovary sessile :		
11a. Flowers unisexual	...	EUPHORBIACEAE 82
11b. Flowers bisexual :		
12a. Venation palmate :		
13a. Flowers axillary. Placenta axile	...	TILIACEAE 18

13b. Flowers terminal, Placenta-		
parietal	...	COCHLOSPER-
		MAEAE 11
12b. Venation pinnate :		
14a. Sepals 2, caducous. Leaves		
lacerate. Herbs	...	PAPAVERACEAE 6
14b. Sepals 5, persistent. Leaves		
entire-serrate. Woody	...	DIPLOCAR-
		PACEAE 14

GROUP 5. POLYPETALOID DICOTS WITH SUPERIOR OVARY AND FEW STAMENS

1a. Ovary 1-locular :

2a. Leaves compound :

3a. Styles 3-4. Ovule 1 ... ANACARDIACEAE 31

3b. Style 1. Ovules more than 1 :

4a. Flowers regular ... MIMOSACEAE 34

4b. Flowers zygomorphic :

5a. Corolla papilionaceous ... PAPIONACEAE 32

5b. Corolla not papilionaceous ... CAESALPINIACEAE 33

2b. Leaves simple :

6a. Ovules 1-2 :

7a. Flowers 3-merous, unisexual. Climbers ... MENISPERMACEAE 4

7b. Flowers 4-6-merous, bisexual. Plants erect ... BERBERIDACEAE 5

6b. Ovules 5-many :

8a. Placentation free-central :

9a. Stamens alternate with petals ... CARYOPHYLLACEAE 13

9b. Stamens opposite petals :

10a. Plants woody. Leaves alternate,
gland - dotted ... MYRSINACEAE
(Embelia) 56

10b. Herbs. Leaves opposite not gland-
dotted ... PRIMULACEAE 55

8b. Placentation parietal or marginal :

11a. Ovules marginal, on 1 ventral placenta :

12a. Flowers regular ... MIMOSACEAE 34

12b. Flowers zygomorphic :

13a. Corolla papilionaceous ... PAPILIONACEAE 32

13b. Corolla not papilionaceous ... CAESALPINIA-CRÆ 33

11b. Ovules parietal on 2 or more placentas :

14a. Plants insectivorous, covered with glandular hairs : ... DROSERACEAE 36

14b. Plants not insectivorous nor covered with glandular hairs :

15a. Plants with tendrils. Leaves cordate ... PASSIFLORACEAE 43

15b. Plants not climbing. Leaves cuneate :

16a. Ovary on elongate gynophore ... CAPPARACEAE 8

16b. Ovary subsessile :

17a. Anther connectives produced beyond cells ... VIOLACEAE 9

17b. Anther connectives not produced ... FLACOURTIACEAE 10

1b. Ovary 2-more-locular :

18a. Herbs :

19a. Stamens tetrodynamicous, 4 long and 2 short ... BRASSICACEAE 7

19b. Stamens not tetrodynamicous :

20a. Leaves compound :

21a. Stamens monadelphous ... OXALIDACEAE 21

21b. Stamens free ... GERANIACEAE 20

20b. Leaves simple :

22a. Flowers irregular :

23a. Anthers sessile. Ovary 5-locular, Ovules many ... BALSAMINACEAE 22

23b. Anthers on split sheath. Ovary 2-locular, Ovule 1 per locule ... POLYGALACEAE 12

- 22b. Flowers regular :
- 24a. Leaves opposite ... LYTHRACEAE 41
- 24b. Leaves alternate :
- 25a. Flowers unisexual ... EUPHORBIACEAE 52
- 25b. Flowers bisexual :
- 26a. Plants glabrous ... LINACEAE 19
- 26b. Plants pubescent ... STERCULIACEAE 17
- 18b. Woody plants :
- 27a. Leaves opposite ... CELASTRACEAE 26
- 27b. Leaves alternate :
- 28a. Stamens as many as and opposite petals or fewer :
29a. Style short or none. Plants with tendril.
Leaves compound or cordate. Petals thickened at apex. ... VITACEAE 28
- 29b. Styles as many as locules. Plants without tendril. Leaves simple. ... RHAMNACEAE 27
- 28b. Stamens as many as and alternate with petals or twice as many as petals :
- 30a. Leaves pellucidly glandular-punctate ... RUTACEAE 23
- 30b. Leaves not pellucid-punctate :
- 31a. Leaves compound :
32a. Disc extrastaminal. Flower often irregular ... SAPINDACEAE 30
- 32b. Disc intrastaminal. Flower regular :
33a. Filaments of stamens bifid at anther, often united beyond anthers ... MELIACEAE 25
- 33b. Filaments of stamens not bifid, never united up to anthers :
- 34a. Stamens as many as petals ... MELIACEAE 25
(Toona)
- 34b. Stamens twice as many as petals ... BURSERACEAE 24

31b. Leaves simple :

35a. Flowers unisexual or bisexual :

36a. Ovules basal. Flowers staminate or bisexual... CELASTRACEAE 26

36b. Ovules axile. Flowers strictly unisexual ... EUPHORBIACEAE 82

35b. Flowers bisexual :

37a. Venation palmate :

38a. Stamens united below ... STERCULIACEAE 17

38b. Stamens free TILIACEAE 18
(*Trichilia*)

37b. Venation pinnate CELASTRACEAE 26

GROUP 6. MONOCOTS

1a. Perianth not petaloid, reduced to scales or bristles or absent :

2a. Plants woody :

3a. Leaves pinnately divided ARECACEAE 97

3b. Leaves entire POACEAE 101

2b. Plants herbaceous :

4a. Inflorescence of heads or spikelets of florets in the axils of glumaceous bracts :

5a. Inflorescence a solitary head on spirally ribbed peduncle ERIOSYCEAE 29

5b. Inflorescence various but not as above :

6a. Style 1. Seeds 2 + 3-angled CYPERACEAE 100

6b. Style 2. Seeds round POACEAE 101

4b. Inflorescence not in heads nor in glumaceous spikelets

ARACEAE 98

1b. Perianth petaloid, at least in part :

7a. Flowers staminate :

8a. Plants climbing DIOSCOREACEAE 94

8b. Plants not climbing, herbaceous MUSACEAE 92

7b. Flowers pistillate or bisexual :

- 9a. Ovary superior :
 - 10a. Perianth with 3 petaloid parts COMMELINACEAE 96
 - 10b. Perianth with 6 petaloid parts :
 - 11a. Perianth in 1 series HYPOXIDACEAE 93
 - 11b. Perianth in 2 series of 3 each LILIACEAE 95
- 9b. Ovary inferior :
 - 12a. Plants climbing DIOSCOREACEAE 94
 - 12b. Plants not climbing :
 - 13a. Perianth tubular, split on one side. Leaves over 2 m long MUSACEAE 92
 - 13b. Perianth parts variously united but not in a split tube. Leaves less than 1 m long. Flowers regular :
 - 14a. Fertile stamens 6 :
 - 15a. Perianth in 1 series HYPOXIDACEAE 93
 - 15b. Perianth in 2 series of 3 each LILIACEAE 95
 - 14b. Fertile stamens 1(2). Flowers irregular :
 - 16a. Staminodia not petaloid. Stamen and style united in a column ORCHIDACEAE 89
 - 16b. Staminodia petaloid. Stamen and style separate :
 - 17a. Aerial stem straight. Leaves 2-ranked ; sheaths open ZINGIBERACEAE 90
 - 17b. Aerial stem twisting. Leaves spirally arranged ; sheaths closed COSTACEAE 91

GROUP 7. GYMNOSPERMS

- 1a. Leaves scale-like, less than 5 mm CUPRESSACEAE 88
- 1b. Leaves needle-like, more than 100 mm PINACEAE 87

FAMILIES

1. RANUNCULACEAE Juss.

- 1a. Leaves alternate. Petiole with stipule-like auricles. Erect herbs *Thalictrum* 3
- 1b. Leaves opposite. Petiole without basal auricle. Climbers :
- 2a. Terminal leaflet modified into a tendril. Petaloid staminode present *Naravelia* 2
 - 2b. Terminal leaflet normal. Staminode absent *Clematis* 1

1. CLEMATIS L.

- 1a. Sepals erect with recurved tips. Filaments hairy *C. roylei* 1
- 1b. Sepals spreading from the base. Filaments glabrous *C. triloba* 2

1. *Clematis roylei* Rehder in Journ. Arn. Arb. 22 : 575. 1941 ; Babu, Herb. Fl. Dehra Dun 40. 1977. *Clematis nutans* Royle, Ill. Bot. Himal. 51. 1834 (*non* Crantz, 1763) ; Hook. f. & Thoms. in Hook. f. Fl. Brit. Ind. 1 : 5. 1872.

Slender, petiolar climber. Leaves 3 foliolate to bipinnately decom-pound, 10 - 20 cm long ; leaflets 2 - 3 cm long on twining petiolules, ovate - lanceolate, with a rounded or often oblique base, acute acuminate or 2-3 lobulate, glabrous or villous. Flowers white, in axillary pubescent or villous panicles ; pedicels up to 3 cm long. Sepals broadly oblong, tomentose outside. Filaments 1.5 - 2 cm long ; anthers mucronate. Achenes ovoid ellipsoid, silky ; styles plumose.

PACHMARHI : Rorighat (1000 m). In shady rocky places. Occasional.

Fl. & Fr. : December - April.

2. *Clematis triloba* Heyne ex Roth, Nov. Pl. Sp. 251. 1821 ; Hook. f. & Thoms. in Hook. f. Fl. Brit. Ind. 1 : 3. 1872. "Murhari".

An extensive climber, villous or tomentose. Stems sulcate. Leaves opposite, simple or once ternate or lobed, ovate, acute or orbicular, base rounded, cuneate or cordate, 3 nerved ; petioles slender, twining, 2 - 8 cm long. Panicles many - flowered. Flowers white, 2 - 2.5 cm ; bracts leafy. Sepals 4 - 6, oblong or obovate, cuspidate. Stamens many, filaments ligulate, glabrous. Carpels many. Fruit a head of ovoid, compressed, villous achenes with long feathery styles.

PACHMARHI : Dhupgarh (1200 m). BORI : Reserve forest (460 m). On hill slopes as climber on shrubs. Common.

Fl. & Fr. : October December.

2. NARAVELIA Adans. mut. DC.

Naravelia zeylanica (L.) DC. Syst. Nat. 1 : 167. 1817 ; Hook. f. & Thoms. in Hook. f. Fl. Brit. Ind. 1 : 7. 1872 ; Gandhi in Sald. & Nicol. Fl. Hassan 63. 1976. *Atragene zeylanica* L. Sp. Pl. 542. 1753.

Scendent or climbing woody shrubs. Roots tuberous. Leaves 3 foliolate, two opposite leaflets ovate cordate and the terminal one modified into 3 branched tendrils. Flowers in panicles. Petaloid staminodes 10 - 14. Stamens many ; anthers with prominent connectives. Achenes red with long feathery styles.

PACHMARHI : Dhupgarh (1200 m). On hill slopes as climber on shrubs. Common.

Fl. & Fr. : November February.

3. THALICTRUM L.

Thalictrum foliosum DC. Syst. Nat. 1 : 175. 1818 ; Hook. f. & Thoms. in Hook. f. Fl. Brit. Ind. 1 : 14. 1872 ; Babu, Herb. Fl. Dehra Dun 44. 1977. "Pilazari".

Erect, rigid, perennial herbs, up to 2.4 m tall. Rootstocks fibrous. Leaves pinnately decompound ; leaflets 4 - 6 mm ; sub-orbicular. Flowers pale green or dingy purple, polygamous, in branched panicles. Filaments filiform ; anthers beaked. Achenes 2 - 5, 3.5 cm long, acute at both ends and sharply ribbed.

PACHMARHI : Mahadco hills. (1100 m). 27 7 64, Panigrahi 4565 (BSA). On slopes of ravines. Rare.

Fl. & Fr. : July September.

It is a Himalayan species.

2. DILLENIACEAE Salisb.

DILLENSIA L.

Dillenia pentagyna Roxb. Pl. Cor. 1 : 21, t. 20. 1795 ; Hook. f. & Thoms. in Hook. f. Fl. Brit. Ind. 1 : 38. 1872 ; Hoogland in Blumea 7 : 117. 1952 ; Ramam. in Sald. & Nicol. Fl. Hassan 114. 1976. "Aggai".

A large deciduous tree, 10–15 m, with a straight cylindrical bole. Leaves up to 60 × 20 cm, oblong lanceolate with acute tip and narrow base, strongly serrate, densely hairy when young ; veins 40–50 pairs ; petiole 2.5–5 cm, winged at base. Flowers yellow, fragrant, 2.5 cm in diam. borne in umbels along thick leafless branches ; pedicels 3–5 cm, red. Sepals 5, orbicular, brown, thick, accrescent. Petals 5, obovate, bright yellow. 10 innermost stamens longer than the rest, recurved. Carpels 5, unilocular. Fruit indehiscent, covered with fleshy, yellow sepals.

PACHMARHI : Around (1000 m). On sandy loam in the sal forest. Occasional.

Fl. & Fr. : January April.

3. MAGNOLIACEAE Juss.

MICHELIA L.

Michelia champaka L. Sp. 536. 1753 ; Hook. f. & Thoms. in Hook. f. Fl. Brit. Ind. 1 : 42. 1872 ; Gandhi in Sald. & Nicol. Fl. Hassan 34. 1976. "Champa".

Tall evergreen trees, up to 30 m in height. Bark grey or brownish. Leaves ovate lanceolate, acute to acuminate, coriaceous, 15–20 × 7–9 cm. Flowers usually axillary, solitary, golden yellow or orange, fragrant. Perianth segments 9 or more, oblong, fleshy. Fruits 5–10 cm long ; ripe carpels ovoid or ellipsoid, woody. Seeds brown, angular, with pink fleshy aril.

PACHMARHI : Mahadev hill (1200 m).

Fl. & Fr. March August.

Cultivated for the fragrant flowers which are sold in the flower market.

4. MENISPERMACEAE Juss.

CISSAMPЕLOS L.

Cissampelos pareira L. Sp. Pl. 1031. 1753. var. *hirsuta* (Buch. Ham. ex DC.) Forman in Kew Bull. 22 : 356. 1968. Gandhi in Sald. & Nicol. Fl. Hassan 66. 1976. *Cissampelos hirsuta* Buch. Ham. ex DC. Syst. 1 : 535. 1817. *Cissampelos pareira* sensu Hook. f. & Thoms. in Hook. f. Fl. Brit. Ind. Ind. 1 : 103. 1872, p. p. : Babu, Herb. Fl. Dehra Dun 45. 1977. "Akanadi".

Slender, twining, softly tomentose, perennial, herbaceous climbers. Leaves ovate to orbicular, apiculate, peltate - cordate at base, 2.5 - 5.5 × 2.5 - 4 cm, densely hairy beneath ; venation obscure ; petiole equaling the leaf-blade or longer. Female inflorescence longer than the male, with many conspicuous, imbricate bracts. Flowers greenish white. Drupes ovoid subglobose, red, pilose, with sub-basal persistent stylar scars.

PACHMARHI : Mahadev hills (1200 m) ; BORI : Dhain (462 m). Climbers on hedges along the edges of forests. Abundant.

Fl. & Fr. : June November.

5. BERBERIDACEAE Juss.

BERBERIS L.

- | | | |
|---|-----|------------------------|
| 1a. Anthers truncate at apex. Leaves obovate,
oblong - obovate or elliptic | ... | <i>B. asiatica</i> 1 |
| 1b. Anthers apiculate. Leaves lanceolate
or oblanceolate | ... | <i>B. lychnoides</i> 2 |

1. *Berberis asiatica* Roxb. ex DC. Syst. Nat. 2 : 13. 1821 ; Hook. f. & Thoms. in Hook. f. Fl. Brit. Ind. 1 : 110. 1872 ; Babu, Herb. Fl. Dehra Dun 47. 1977. "Chitra".

Spinescent shrubs with terete stem. Spines 1 - 3 cm long. Leaves thick, rigid, acute, mucronate. Inflorescence 15 - 20 flowered. Pedicels glabrous, red, 1.5 - 2.5 cm long. Outer sepals smaller than the inner. Petals obovate ; glands obovate. Berries oblong - ovoid, black.

PACHMARHI : Vicinity (1050 m). Growing on hill slopes. Occasional.

Fl. & Fr. : March - June.

2. *Berberis lycium* Royle in Trans. Linn. Soc. Bot. 17 : 94. 1834 ; Hook. f. & Thoms. in Hook. f. Fl. Brit. Ind. 1 : 110. 1872 ; Babu, Herb. Fl. Dehra Dun 47. 1977. "Chatrai".

Spinescent, bushy undershrubs ; stem subterete, internodes 2-2.5 cm long. Spines in clusters of 3, middle one longer, lateral ones 0.7-1.2 cm long. Leaves subsessile, obovate oblanceolate. Flowers yellow in axillary, subsessile, 5-7 cm long racemes. Pedicels 1-1.5 cm long. Outer sepals ovate, subobtuse, inner oblong rounded, obtuse. Petals obovate with a pair of glands inside. Berries ovoid, black.

PACHMARHI : Dhupgarh (1300 m). On hill slopes. Abundant.

Fl. & Fr. : April - June.

6. PAPAVERACEAE Juss.

ARGEMONE L.

- | | |
|--|----------------------------|
| 1a. Petals pale yellow or white, up to 3.5×2 cm. Stigma - lobes spreading | ... <i>A. ochroleuca</i> 2 |
| 1b. Petals bright yellow, up to 2.5×1.5 cm. Stigma - lobes more or less appressed | ... <i>A. mexicana</i> 1 |

1. *Argemone mexicana* L. Sp. Pl. 508. 1753 ; Hook. f. & Thoms. in Hook. f. Fl. Brit. Ind. 1 : 117. 1872 ; Babu, Herb. Fl. Dehra Dun 49. 1977. "Bhar band".

Erect, prickly annual herbs with yellow and milky juice. Leaves sinuate pinnatifid, spinulose dentate, prickly on both surfaces, lower ones petioled, upper sessile, with base semi-amplexicaule. Flowers terminal, shortly pedicelled ; bract leafy. Sepals 3, oblong, apex horned, back prickly. Petals obovate. Stigma subsessile, 3-6 lobed, dark red. Capsule oblong ellipsoid, 3-6 valved, spiny ; seeds numerous, reticulate ribbed.

PACHMARHI : Apsara Behar, Downfall, Jatashankar, Rajat Prapat. (900-1050 m). In waste places along road side. common.

Fl. & Fr. : January - December.

2. *Argemone ochroleuca* Sweet, Brit. Fl. Gard. 3 : t. 242. 1828 ; Ownb. in Mem. Torrey Bot. Cl. 21 : 29-31. 1958 ; Babu, Herb. Fl.

Dehra Dun 50. 1977. *Argemone mexicana* L. var. *ochroleuca* (Sweet) Lindl. Bot. Reg. 1343. 1830.

Erect, prickly, glaucous, annual herbs. Leaves sinuate pinnatifid, spinulose dentate, prickly on the nerves. Flowers sessile, stigma 5 lobed, spreading, dark red. Capsule ovate lanceolate or lanceolate, clothed with spines.

BORI : Reserve forest (450 m). In waste places along road side. Occasional.

Fl. & Fr. : January December.

7. BRASSICACEAE Burn.

1a. Fruit a silicle :

2a. Silicle 2 - seeded	...	<i>Coronopus</i> 4
2b. Silicle many seeded	...	<i>Cochlearia</i> 3

1b. Fruit a siliqua :

3a. Siliqua beaked. Lateral sepals saccate at base. Seeds 2 - seriate in each cell	...	<i>Brassica</i> 1
3b. Siliqua not beaked. Lateral sepals not saccate at base. Seeds 1 - seriate or 2 - seriate in each cell :		
4a. Siliqua turgid. Seeds 2 - seriate or irregularly 1 - seriate in each cell.	...	<i>Rorippa</i> 5
4b. Siliqua compressed. Seeds 1 - seriate in each cell ...		<i>Cardamine</i> 2

1. BRASSICA L.

Brassica napus L. Sp. Pl. 666. 1753 ; Babu, Herb. Fl. Dehra Dun 54, 1977. *Brassica campestris* L. subsp. *napus* (L.) Hook. f. & T. Anders. in Hook. f. Fl. Brit. Ind. 1 : 156. 1872. "Tori".

Erect, glaucous, annual herbs. Basal leaves lyrate pinnatipartite ; upper ones entire, dentate. Flowers yellow. Pods up to 10 cm long (incl. up to 2.5 cm. long beak).

PACHMARHI : Vicinity (1050 m). Cultivated as winter crop.

2. CARDAMINE L.

Cardamine scutata Thunb. in Trans. Linn. Soc. Lond. 2 : 339. 1794 ; Babu, Herb. Fl. Dehra Dun 57. 1977. *Cardamine hirsuta* L. var. *sylvatica* sensu Hook. f. & T. Anders. In Hook. f. Fl. Brit. Ind. 1 : 138. 1872.

Annual herbs with variable habit, size, shape and number of leaflets. Basal leaves orbicular - rounded, sinuate dentate to lobed leaflets ; upper ones ovate rounded to lanceolate, entire crenulate leaflets. Flowers in racemes. Pedicels erectopatent. Petals white, truncate. Stamens 4, rarely with 2 staminodes. Pods 2-2.5 cm long.

BORI : Reserve forest. (500 m). In moist localities among grasses. Abundant.

Fl. & Fr. : February April.

3. COCHLEARIA L.

Cochlearia cochlearioides (Roth) Sant. & Mahesh. in Journ. Bombay Nat. Hist. Soc. 54 : 804. 1957. *Alyssum cochlearioides* Roth, Nov. Pl. Sp. 322. 1821. *Cochlearia flava* Buch. Ham. ex Hook. f. & T. Anders. in Hook. f. Fl. Brit. Ind. 1 : 145. 1872.

Erect, glabrous, annual herbs. Roots long, fusiform. Leaves lanceolate, pinnatifid, lower petioled, upper smaller and auricled ; lobes sinuate toothed. Racemes many. Flowers yellow. Pods globose, smooth. Seeds many, rugose, with filiform funicles.

BORI : Dhain (450 m), 22° 12' 62", Panigrahi 6284 (BSA). Along the bank of streams. Rare.

Fl. & Fr. : December February.

4. CORONOPUS Zinn.

Coronopus didymus (L.) J. E. Smith, Fl. Brit. 2 : 691. 1804 ; Jafri in Fl. W. Pak. 55 : 62. 1973 ; Gandhi in Sald. & Nicot. Fl. Hassan 189. 1976. *Lepidium didymum* L. Syst. 2 : 433. 1759 & Mant. I : 92. 1767.

Prostrate annual biennial herbs. Stems covered with simple and bifid hairs. Leaves pinnatipartite pinnatifid; uppermost part lanceolate, apiculate, entire. Flowers greenish, in racemes. Sepals ovate rounded. petals linear. Stamens 2. Pod small, notched, reticulate.

PACHMARHI : Vicinity (1000 m). Among the grasses, roadside. Occasional.

Fl. & Fr. : November June.

Native of South America ; naturalised.

5. RORIPPA Scop.

Rorippa indica (L.) Hiern, Cat. Afr. Pl. Welw. 1 : 26. 1896 ; Jasri in Fl. W. Pak. 55 : 189. 1973 ; Babu, Herb. Fl. Dehra Dun 61. 1977. *Sisymbrium indicum* L. Mant. 1 : 93. 1767. *Nasturtium indicum* (L.) DC. Syst. Nat. 2 : 199. 1818 ; Hook. f. & T. Anders. in Hook. f. Fl. Brit. Ind. 1 : 134. 1872, p. p. *Rorippa dufia* Hara, Fl. E. Himal. 110. 1966.

Erect, glabrous, annual biennial herbs. Leaves lyrate pinnatipartite or pinnatifid; lower ones petioled, upper sessile with amplexicaul base, often lanceolate oblong. Flowers yellow in elongate racemes. Petals oblanceolate. Stigma subsessile. Pods erect or erecto patent, slightly curved, 1-2.5 cm. long. Seeds subreniform, minutely granulate.

BORI : Reserve forest (450 m). Along roadside, among the grasses. Occasional.

Fl. & Fr. : December July.

8. CAPPARACEAE Juss.

CLEOME L.

- | | | |
|--------------------------|-----|---------------------------|
| 1a. Stamens 6 | ... | <i>C. monophylla</i> 1 |
| 1b. Stamens more than 10 | ... | <i>C. simplicifolia</i> 2 |

1. *Cleome monophylla* L. Sp. Pl. 672. 1753 ; Hook. f. & Thoms. in Hook. f. Fl. Brit. Ind. 1 : 168. 1872 ; Ramam. in Sald. & Nicol. Fl. Hassan 187. 1976.

Annual herbs with glandular pubescence. Leaves simple, ovate lanceolate, acute acuminate, subcordate. Petals purple to white. Capsule 5-8 cm long. Seeds black, tubercled.

BORI : Reserve forest (450 m). A roadside weed in the forest. Occasional.

Fl. & Fr. : May - August.

2. Cleome simplicifolia (Camb.) Hook. f. & Thoms. in Hook. f. Fl. Brit. Ind. 1 : 169. 1872. *Polanisia simplicifolia* Camb. in Jacq. Voy. Bot. 20. t. 20. 1844.

Much branched annuals. Stems angled. Leaves elliptic or obovate, hirsute. Flowers pink or purple, solitary, axillary. Capsule 2-2.5 cm long. Seeds muricate.

PACHMARHI : Town (1000 m). In waste places along the roads. Occasional.

Fl. & Fr. : June - September.

9. VIOLACEAE Batsch.

- | | | |
|---|-----|--------------------|
| 1a. Petals unequal in size. Sepals not produced below their insertion | ... | <i>Hybanthus</i> 1 |
| 1b. Petals equal in size. Sepals produced below their insertion | | <i>Viola</i> 2 |

I. HYBANTHUS Jacq.

Hybanthus enneaspermus (L.) F. v. Muell. Fragn. Phyt. Austr. 10 : 81. 1877 ; Babu, Herb. Fl. Dehra Dun 64. 1977. *Viola enneasperma* L. Sp. Pl. 937. 1753. *Viola suffruticosa* L. Sp. Pl. 937. 1753. *Ionidium suffruticosum* (L.) Roem. & Schult. Syst. Veg. 5 : 394. 1819 ; Ging. ex DC. Prodr. 1 : 311. 1824 ; Hook f. & Thoms. in Hook. f. Fl. Brit. Ind. 1 : 185. 1872. "Ratanpurus".

Annual perennial herbs with woody base. Leaves subsessile, linear-lanceolate, entire or faintly serrate. Stipules, subulate, gland-tipped. Flowers deep pink, axillary, solitary. Capsule ovate, 3-valved. Seeds 3 in cell, pale yellow, ovoid, longitudinally striate.

PACHMARHI : Around (1000 m). In open grassy meadows and in the crevices of rocks. Common.

Fl. & Fr. : July December.

2. VIOLA L.

Viola betonicifolia J. E. Smith in Rees, Cyclop. 37, 1 : n. 7, 1819. subsp. *nepalensis* (Ging.) Becker, Bot. Jahrb. Beibl. 54 : 120, 167, 1917 ; Babu, Herb. Fl. Dehra Dun 65, 1977. *Viola partinii* var. *nepalensis* Ging. in DC. Prodr. 1 : 293, 1824. *Viola partinii* (*auct. pl. non* DC. 1824) ; Hook. f. & Thoms. in Hook. f. Fl. Brit. Ind. 1 : 183, 1872, *p. p.*

Perennial herbs with woody rhizome. Leaves in a rosette, ovate triangular to lanceolate oblong, base cuneate to hastate, apex acute or obtuse, crenate ; petiole long, winged. Flowers lilac or blue. Sepals ovate lanceolate, acute or acuminate, short spurred, saccate. Stigma 3 lobed. Capsule ellipsoid. Seeds small.

PACHMARHI : Down fall (900 m), Saxena 8168. In damp shady valley. Rare.

Fl. & Fr. : March November.

10. FLACOURTIACEAE DC.

- | | | |
|---|-----|---------------------|
| Ia. Flowers bisexual. Fruit a capsule. Plants unarmed with pinnately veined leaves | ... | <i>Casearia</i> 1 |
| Ib. Flowers unisexual. Fruit a berry. Plants often armed, with subpalmately veined leaves | ... | <i>Flacourtie</i> 2 |

1. CASEARIA Jacq.

Casearia graveolens Dalz. in Hook. Kew Journ. 4 : 107, 1852 ; Brandis, For. Fl. N. W & C. Ind. 243, 1874 : Clarke in Hook. f. Fl. Brit. Ind. 2 : 592, 1879.

Shrubs or small trees, glabrous. Leaves elliptic, often narrower, little acuminate, rounded at the base ; petiole short. Flowers green, numerous with disagreeable odour ; pedicels jointed, pubescent below the articulation. Calyx pubescent at the base. Capsule ellipsoid, shining, 3-valved.

PACHMARHI : Mahadev hill (1200 m). BORI : Reserve forest (450 m). Common.

Fl. & Fr. : April August.

Fruits used as fish poison.

2. FLACOURTIA Comm. ex L' Herit.

Flacourtia indica (Burm. f.) Merr. Interpr. Rump. Herb. Amb. 377. 1917 ; Ramam. in Sald. & Nicol. Fl. Hassan 162. 1976. *Gmelina indica* Burm. f. Fl. Ind. 132. t. 39. f. 5. 1768. *Flacourtia ramontchi* L' Herit. Strip. Nov. 3 : 59. t. 30 & 30B. 1785 ; Hook. f. & Thoms. in Hook. f. Fl. Brit. Ind. 1 : 193. 1872. "Bilangra".

Shrubs or small trees, usually armed ; spines often branched at the base of the trunk. Leaves obovate - ovate, acute, acuminate or sometimes emarginate, crenate-serrate. Tepals 4, connate below. Anthers versatile. Berry fleshy, globose, red when ripe.

PACHMARHI : Dhupgarh (1200 m). Along the margin of the forest. Common.

Fl. & Fr. : March September.

11. COCHLOSPERMACEAE Planch.

COCHLOSPERMUM Kunth

Cochlospermum religiosum (L.) Alston in Trimen, Handb. Fl. Ceylon 6 : 14. 1931 ; Ramam. in Sald. & Nicol. Fl. Hassan 171. 1976. *Bombax religiosum* L. Sp. Pl. 552. 1753. *Cochlospermum gossypium* DC. Prodr. 1 : 527. 1824 ; Hook. f. & Thoms. in Hook. f. Fl. Brit. Ind. 1 : 190. 1872. "Kumbi".

Deciduous trees. Leaves alternate, long petioled, palmately 5 lobed, cordate at base, 7 nerved; lobes acute. Flowers in terminal panicle, up to 8 cm across; petals golden yellow. Pedicels with grey pubescence. Anthers linear, falcate. Capsule up to 10 x 8 cm, obovoid, 5 valved. Seeds reniform, brown, woolly.

PACHMARHI : Karanjia (1000 m), Saxena 83510. On rocky slopes in sal forest. Rare.

Fl. & Fr. : January March.

Leafless at the time of flowering. Leaves appear in May.

12. POLYGALACEAE Juss.

POLYGALA L.

1a. Raceme much longer than leaves	...	<i>P. elongata</i> 2
1b. Raceme shorter than or slightly longer than the leaves :		
2a. Petaloid sepals falcate. Caruncle with three appendages		<i>P. arvensis</i> 1
2b. Petaloid sepals obovate, symmetrical. Caruncle without appendages	...	<i>P. persicariifolia</i> 3

1. *Polygala arvensis* Willd. Sp. Pl. ed 3, 2 : 876. 1802 ; Burtt in Notes Roy. Bot. Gard. Edinb. 32 : 404. 1973 ; Babu, Herb. Fl. Dehra Dun 67. 1977. *Polygala chinensis* (auct. pl. non Linn. 1753) ; Bennett in Hook. f. Fl. Brit. Ind. I : 204. 1872. "Meradu".

Annual herbs, short hairy. Leaves very variable, obovate, suborbicular or linear oblong. Flowers yellow in axillary or extra axillary short, almost capitate, few flowered racemes. Bracts persistent. Outer sepals ovate, sharply acuminate, white margined. Petals obovate, keel with a bearded crest. Capsule broadly oblong orbicular, notched at apex, narrowly winged, oblique at the top, ciliate. Seeds black, patently hairy.

PACHMARHI : Jatasankar, Jambudeep (1000 m). On hill slopes and among the grasses along road side. Common.

Fl. & Fr. : July November.

2. *Polygala elongata* Klein ex Willd. Sp. Pl. 3 : 879. 1803 ; Bennett in Hook. f. Fl. Brit. Ind. I : 203. 1872 ; Ramam. in Sald. & Nicol. Fl. Hassan 412. 1976.

Erect herbs. Leaves subsessile, linear lanceolate, apiculate emarginate, hairy, membranous. Racemes usually terminal. Flowers yellow. Lateral petals obovate. Capsule oblique at tip with one locule longer.

PACHMARHI : Vicinity (1000 m). Growing amidst grasses on hill slopes and in waste places. Common.

Fl. & Fr. : August November.

3. *Polygala persicariifolia* DC. Prodr. 1 : 326. 1824 ; Bennett in Hook. f. Fl. Brit. Ind. I : 202. 1872 ('*persicariaefolia*') ; Babu, Herb. Fl. Dehra Dun 68. 1977.

Erect, slender, annual herbs. Leaves sessile, linear lanceolate, shortly acute, hairy. Flowers in slender, terminal and axillary racemes, pink or rose. Petaloid sepal obovate, symmetrical. Seeds villous ; caruncle minute.

PACHMARHI : Vicinity (1000 m). Growing among the grasses along roadsides. Occasional.

Fl. & Fr. : October November.

13. CARYOPHYLLACEAE Juss.

1a. Sepals united into a distinct calyx tube. Petals long-clawed, inserted together with the stamens on a short gynophore	...	<i>Vaccaria</i> 3
1b. Sepals free or connate at the base only. Petals subsessile, inserted together with the stamens on a disk :		
2a. Sepals thin, scarious throughout. Style 3 - fid ...		<i>Polycarphaea</i> 1
2b. Sepals keeled, scarious only on margins. Style 3 - toothed	...	<i>Polycarpon</i> 2

1. POLYCARPAPA Lamk.

***Polycarphaea corymbosa* (L.) Lamk.** Tab. Encycl. 2 : 129. 1797 ; Edgew. & Hook. f. in Hook f. Fl. Brit. Ind. I : 245. 1874 ; Ramam. in Sald. & Nicol. Fl. Hassan 99. 1976. *Achyranthes corymbosa* L. Sp. Pl. 205. 1753.

Tomentose, branching annual or perennial herbs. Leaves fascicled at nodes, up to 1.1×0.1 cm, linear, with a small mucro at tip. Stipules fimbriate. Cymes terminal and axillary. Sepals scarious, silvery. Petals entire or erose, completely enclosed in calyx.

BORI : Reserve forest (550 m). On moist hill slopes. Occasional.

Fl. & Fr. : August December.

2. POLYCARPON L.

Polykarpon prostratum (Forsk.) Aschers. & Schweinf. Oesterr. Bot. Zeitschr. 39. 128. 1889 ; Babu, Herb. Fl. Dehra Dun 72. 1977. *Alsine prostrata* Forsk. Fl. Aegypt. Arab. 207. 1775. *Hapalosa loeflingiae* Wall. ex Wt. & Arn. Prodr. 358. 1834. *Polycarpon loeflingiae* (Wall. ex Wt. & Arn.) Benth. & Hook. f. Gen. Pl. 1 : 153. 1862 ; Edgew. & Hook. f. in Hook. f. Fl. Brit. Ind. 1 : 245. 1874. "Sureta".

Decumbent or prostrate, annual biennial herbs. Stem subpubescent or clothed with simple and branched hairs. Leaves opposite ; lower ones crowded to simulate whorls of 4, obovate oblanceolate to spatulate. Flowers greenish white in dense, repeatedly forked cymes. Stamens 5. Capsule ovoid. Seeds reticulate.

PACHMARJI : Mahadev hill (1250 m). On rocky surfaces. Common.

Fl. & Fr. : April June.

3. VICCARIA Medik.

Viccaria pyramidata Medik. Phil. Bot. 1 : 96. 1789 ; Babu, Herb. Fl. Dehra Dun 76. 1977. *Saponaria viccaria* L. Sp. Pl. 409. 1753 ; Edgew. & Hook. f. in Hook. f. Fl. Brit. Ind. 1 : 217. 1874. "Musna"

Erect, glabrous, annual herbs. Stems corymbosely branched in the upper part. Leaves sessile, upper ones much smaller passing into bracts. Flowers pink or red in axillary and terminal corymbose cymes. Stamens

10 ; alternate filaments shorter. Style 2, bearded above the middle. Capsule ovoid globose, concealed within the calyx. Seeds blackish, somewhat angled.

PACHMARHI : Vicinity (900 m), Feb., 78, Pant 27228 (BSA). Along roadside. Rare.

Fl. & Fr. : February March.

14. DIPTEROCARPACEAE Bl.

SHOREA Roxb. ex Gaertn.

Shorea robusta Gaertn. f. Fruct. 3 : 48. t. 186. 1805 ; Dyer in Hook. f. Fl. Brit. Ind. 1 : 306. 1874 ; Anonymous, Wealth of Ind. 9 : 313. 1972. "Sal".

Semideciduous trees with longitudinally fissured, reddish brown or grey barks. Leaves 10—30 × 5—18 cm, ovate oblong, coriaceous, shining when mature. Flower in lax, axillary or terminal panicles, yellowish, small. Fruits 10—15 mm long, ovoid, reddish to pale yellowish green, indehiscent, one-seeded with five, some what unequal, 5—7 cm long, wing-like persistent sepals. Seeds ovoid, with fleshy, unequal cotyledons.

PACHMARHI : Mahadeo hill (1200 m). On gravelly soil derived from sand stone. Common.

Fl. & Fr. : November June.

Available only around Pachmarhi range but completely absent in Bori forest range.

15. MALVACEAE Juss.

1a. Style simple	...	<i>Thespesia</i> 5
1b. Style branched :		
2a. Trees. Flowers polygamous, stamens pentadelphous, each phalange with united anthers.	...	<i>Kydia</i> 3

2b. Shrubs or herbs. Flowers bisexual. Stamens usually monadelphous. Anthers always free :		
3a. Antheriferous filaments apical on column :		
4a. Ovules 2 - many per locule. Cacci 2 - many seeded ...		<i>Abutilon</i> 1
4b. Ovule 1 per locule. Cacci 1 - seeded ...		<i>Sida</i> 4
3b. Antheriferous filaments lateral on column :		
5a. Styles twice the number of carpels ...		<i>Urena</i> 6
5b. Styles as many as carpels ...		<i>Hibiscus</i> 2

I. ABUTILON Mill.

Abutilon persicum (Burm. f.) Merr. in Philipp. Journ. Sci. 19 : 364. 1921 ; Babu, Herb. Fl. Dehra Dun 83, 1977. *Sida persica* Burm. f. Fl. Ind. 148, t. 47, f. 1. 1768. *Sida polyandra* Roxb. Fl. Ind. 3 : 173. 1832. *Abutilon polyandrum* (Roxb.) Wt. & Arn. ex Wt. Cat. 12. 1833 ; Prodr. 1 : 55. 1834 (non G. Don, 1831) ; Mast. in Hook. f. Fl. Brit. Ind. 1 : 325. 1874.

Perennial herbs. Leaves rounded cordate, long acuminate, dentate, pubescent. Flowers in terminal racemes. Staminal tube with a ring of hairs at apex ; filaments free throughout. Mericarps hispidly hairy with erect awns.

PACHMARHI : Bee fall (1300 m). On hill slopes. Occasional.

Fl. & Fr. November - June.

2. HIBISCUS L.

1a. Epicalyx absent or minute ...		<i>H. lobatus</i> 1
1b. Epicalyx present and conspicuous :		
2a. Stem prickly ...		<i>H. sabdariffa</i> 3
2b. Stem hairy :		
3a. Involucral bracts connate at base ...		<i>H. panduriformis</i> 2
3b. Involucral bracts free ...		<i>H. vitifolius</i> 4

1. *Hibiscus lobatus* (J. A. Murr.) O. Kuntze, Rev. Gen. Pl. 3 (2) : 19. 1898 ; Babu, Herb. Fl. Dehra Dun 87. 1977. *Solandra lobata* J. A. Murr. Comm. Soc. Reg. Sci. Goett. 6 : 20. t. 1. 1785. *Hibiscus solandra* L'Herit. Strip. Nov. 1 : 103. t. 49. 1788 ; Mast. in Hook. f. Fl. Brit. Ind. 1 : 336. 1874.

Erect annual herbs, 30–40 cm tall. Leaves dimorphic; lower ones orbicular-ovate, 1–5 cm in diam.; upper ones often palmately 3-lobed. Flowers white, solitary or in racemes, 1–1.5 cm across. Pedicels articulate. Capsule ovoid, shortly beaked.

PACHMARHI : Mahadev hill (1250 m). On hill slopes and in waste lands. Common.

Fl. & Fr. : September–November.

2. *Hibiscus panduriformis* Burm. f. Fl. Ind. 151, t. 47, f. 2. 1768 ; Mast. in Hook. f. Fl. Brit. Ind. 1 : 338. 1874 ; Ramam. in Sald. & Nicol. Fl. Hassan 152. 1976.

Erect herbs. Stem and branches covered with rigid spreading hairs. Leaves ovate cordate, 5–9 × 3–7 cm. Petiole shorter than the blade. Flowers axillary, solitary, yellow with purple centre, 4–5 cm across. Capsules ovoid, densely bristly.

BORI : Reserve forest (500 m), 23° 12' 62. *Panigarhi* 6367 (BSA). Under shade of forest trees. Rare.

Fl. & Fr. : October–February.

3. *Hibiscus sabdariffa* L. Sp. Pl. 695. 1753 ; Mast. in Hook. f. Fl. Brit. Ind. 1 : 340. 1874 ; Babu, Herb. Fl. Dehra Dun 88. 1977. "Lal-ambari,".

Erect, glabrous annual herbs. Stem prickly, tinged with red. Leaves 3–5 palmatilobed, glandular beneath. Corolla yellow. Capsule ovoid, villous, shorter than the calyx. Seeds reniform, subglabrous.

PACHMARHI : Vicinity (1000 m). In waste places. Occasional.

Fl. & Fr. : April–November.

Escape from cultivation, calyx edible.

4. *Hibiscus vitifolius* L. SP. Pl. 696. 1753 ; Mast. in Hook. f. Fl. Brit. Ind. 1 : 338. 1874 ; Babu, Herb. Fl. Dehra Dun 88. 1977.

Erect, hispidly hairy, perennial herbs. Leaves rounded cordate, 3–5 palmatilobed. Flowers solitary, axillary. Sepals connate below. Corolla yellow with a purple centre. Capsule 5-winged hairy, beak shorter than the fruiting calyx. Seeds tubercled.

BORI : Churna (436 m). Amidst grasses on wayside. Common.

Fl. & Fr. : April–November.

3. KYOTIA Roxb.

Kydia calycina Roxb. Pl. Cor. 3 : 12 t. 215. 1819 ; Mast. in Hook. f. Fl. Brit. Ind. 1 : 348. 1874 ; Ramam. in Sald. & Nicol. Fl. Hassan 152. 1976. "Pula".

Small trees. Leaves up to 15×15 cm, ovate orbicular, 7 ribbed, stellately pubescent above, glaucous below, distantly crenate or with angular lobes. Flowers in axillary or terminal panicles, with dense tomentum. Epicalyx persistent with 4-6 spathulate oblong segments. Calyx lobes broadly triangular, acute. Petals obovate, emarginate, sibriate along margin, clawed and hairy below, white.

PACHMARHI : Rorightat (1000 m). In sal forest on gravelly soil. Common.

Fl. & Fr. : September January.

4. SIDA L.

1a. Coccii aristata :

- | | | |
|-------------------------------------|-----|------------------------|
| 2a. Arista retroflexely ciliate | ... | <i>S. cordifolia</i> 3 |
| 2b. Arista not retroflexely ciliate | ... | <i>S. spinosa</i> 5 |

1b. Coccii acute :

- | | | |
|------------------------------------|-----|-------------------------|
| 3a. Pedicel jointed below middle | ... | <i>S. rhombifolia</i> 4 |
| 3b. Pedicel jointed above middle : | | |
| 4a. Pedicels longer than leaves | ... | <i>S. cordata</i> 2 |
| 4b. Pedicels shorter than leaves | ... | <i>S. acuta</i> 1 |

1. **Sida acuta** Burm. f. Fl. Ind. 147. 1768, *emend.* K. Schum. Fl. Bras. 12 : 326. 1891 ; Borss. in Blumea 14 : 187. 1966 ; Babu, Herb. Fl. Dehra Dun 90. 1977. *Sida carpinifolia* *sensu* Mast. in Hook. f. Fl. Brit. Ind. 1 : 323. 1874, *p.p.* (*non* Linn. f. 1781) "Bariara".

Erect, woody, glabrous herbs. Leaves up to 5×1 cm, ovate to linear, subcordate at base, serrate, cuneate. Stipules of the pair dissimilar. Pedicels as long as the petiole or longer. Coccii 7, glabrous.

PACHMARHI : Vicinity (1000 m). Under shade of forest trees. Common.

Fl. & Fr. : September January.

2. *Sida cordata* (Burm. f.) Borss. in Blumea 14 : 182. 1966 ; Babu, Herb. Fl. Dehra Dun 91. 1977. *Melochia cordata* Burm. f. Fl. Ind. 143. 1768. *Sida veronicifolia* Lamk. Encycl. 1 : 5. 1783 ('veronicaefolia'). *Sida humilis* Cav. Diss. 5 : 277. t. 136. f. 2. 1783 ; Mast. in Hook. f. Fl. Brit. Ind. 1 : 322. 1874.

Erect or trailing herbs ; branches covered with hairs. Leaves orbicular, cordate at base, crenate serrate, sparsely hairy. Pedicel jointed near the tip. Cacci 5, muticous.

PACHMARHI : Jambudeep (1000 m). BORI : Reserve Forest (550 m). On rocky shaded places in forests and along waysides. Common.

Fl. & Fr. : April December.

3. *Sida cordifolia* L. Sp. Pl. 684. 1753 ; Mast. in Hook. f. Fl. Brit. Ind. 1 : 324. 1874 ; Babu, Herb. Fl. Dehra Dun 91. 1977. "Kungyi".

Tomentose herbs. Leaves 1.5 x 1 cm, ovate, acute, cordate at base, crenate serrate. Pedicel jointed above middle. Cacci 12, aristate ; arista retrorsely ciliate.

PACHMARHI : Mahadev hill (1250 m). Along the paths in the forest. Common.

Fl. & Fr. : July October.

4. *Sida rhombifolia* L. Sp. Pl. 684. 1753. *emend.* Mast. in Hook. f. Fl. Brit. Ind. 1 : 323. 1874 ; Borss. in Blumea 14 : 193. 1966 ; Babu, Herb. Fl. Dehra Dun 92. 1977. *Sida rhomboidea* Roxb. ex Flem. Asiat. Res. 6 : 178. 1810. *Sida rhombifolia* L. var. *rhomboidea* (Roxb. ex Flem.) Mast. in Hook. f. Fl. Brit. Ind. 1 : 324. 1874. "Bhunni".

Woody annual herbs. Leaves alternate, 2.5 x 2 cm, variable, obovate, rhomboid, occasionally lanceolate. Pedicel jointed below the middle. Cacci 7, acute.

PACHMARHI : Vicinity (1000m). In the sal forest and along road side. Common.

Fl. & Fr. : April November.

5. *Sida spinosa* L. Sp. Pl. 683. 1753 ; Mast. in Hook. f. Fl. Brit. Ind. 1 : 323. 1874 ; Ramam. in Sald. & Nicol. Fl. Hassan 155. 1977. "Gulsakari".

Diffuse herbs ; branches often with spiny tubercles below the leaves. Leaves lanceolate, acute, nearly truncate at base, serrate. Pedicel jointed above middle. Coccii 5, aristate, not hairy.

BORI : Reserve forest (550m). Along the pathways and waste places. Abundant.

Fl. & Fr. : July December.

5. THESPESIA Soland. ex Correa

Thespesia lampas (Cav.) Dalz. ex Dalz. & Gibson, Bomb. Fl. 19. 1861 ; Mast. in Hook. f. Fl. Brit. Ind. 1 : 345. 1874 ; Ramam. in Sald. & Nicol. Fl. Hassan 156. 1976. *Hibiscus lampas* Cav. Diss. 3 : 154. t. 56. f. 2. 1787. "Jangli - bhindi."

Shrubs covered with stellate hairs. Leaves ovate, acute, cordate at base, 3-5 ribbed. Flowers solitary. Corolla bright yellow with purple base.

PACHMARHI : Vicinity (1000m). BORI : Reserve forest (450 m), Churna (430 m). In forest and waste lands. Abundant.

Fl. & Fr. : October December.

6. URENA L.

- | | | |
|--|-----|---------------------|
| 1a. Mericarps smooth, unarmed | ... | <i>U. repanda</i> 2 |
| 1b. Mericarps armed with hooked bristles | ... | <i>U. lobata</i> 1 |

1. *Urena lobata* L. Sp. Pl. 692. 1753 ; Mast. in Hook. f. Fl. Brit. Ind. 1 : 329. 1874 ; Borss. in Blumea 14 : 141. 1966 ; Babu, Herb. Fl. Dehra Dun 93. 1977. "Bachita."

Erect annual herbs or undershrubs, pubescent to tomentose. Leaves up to 5 x 6 cm, distantly sinuate, not lobed, acute at apex, truncate at base. Epicalyx cupular in fruit. Corolla pink. Capsule densely clothed with hooked bristles and stellate hairs.

BORI : Reserve forest (500 m). Under shade of forest canopy. Common.

Fl. & Fr. : July December.

2. *Urena repanda* Roxb. ex Sm. in Rees, Cyclop. 37. n. 6. 1819 ; Mast. in Hook. f. Fl. Brit. Ind. 1 : 330. 1874 ; Babu, Herb. Fl. Dehra Dun 93. 1977.

Stellate pubescent undershrubs. Leaves rounded cordate, 5-7-palmatislobed, repand serrate. Flowers in clusters, pink with a dark centre. Epicalyx bracteoles as long as the calyx. Seeds smooth.

BORI : Reserve forest (500 m). In open spaces near the forest. Common.

Fl. & Fr. : July December.

16. BOMBACACEAE Kunth

BOMBAX L.

Bombax ceiba L. Sp. Pl. 511. 1753, *p. p. quod. plantae ariaticae, exel. syn. Bauhin* ; Robins. in Taxon 10 : 157. 1961. *Bombax malabaricum* DC. Prodr. 1 : 479. 1824 : Mast. in Hook. f. Fl. Brit. Ind. 1 : 349. 1874. "Semul".

Spreading trees. Leaves palmately compound. Petiole 12-16 cm, pulvinate ; leaflets 8-16 x 3-7 cm, elliptic, acute, narrowd below, entire ; petiolule, 5-7 cm. Flowers 5-7 cm, dark red. Calyx woolly within. Petals oblong, acute, hairy externally. Capsule velvety.

PACHMARHI : Dhupgarh (1200 m). On the edge of the forest. Abundant.

Fl. & Fr. : February June.

17. STERCULIACEAE Vent.

1a. Herbs	...	Walteria 4
1b. Shrubs or trees :		
2a. Petals present	...	Helicteres 2

2b. Petals absent :

- | | |
|--|------------------------|
| 3a. Follicles membranous,
Inflorescence covered with
orange - red tomentum | ... <i>Firmiana</i> 1 |
| 3b. Follicles woody. Inflorescence
not covered with orange - red
tomentum | ... <i>Sterculia</i> 3 |

1. FIRMIANA Marsili

Firmiana colorata (Roxb.) R. Br. in Bennet & Brown, Pl. Jav. Rar. 235. 1844 ; Ramam. in Sald. & Nicol. Fl. Hassan 141. 1976. *Sterculia colorata* Roxb. Pl. Cor. t. 25. 1795 ; Mast. in Hook. f. Fl. Brit. Ind. 1 : 359. 1874.

Medium deciduous trees. Leaves alternate, palmately 3 lobed, pilose. Flowers unisexual, regular in bright red panicles. Calyx up to 2 cm long with 5 triangular acute lobes, with red tomentum outside ; bearded inside at base or stellately hairy. Stamens with sessile anthers borne at the tip of an elongate black gynandrophore. Carpels 5, free ; each 2 locular, with 2 ovules per locule. Fruit of 5, free, follicles.

PACHMARHI : Dhupgarh (1300 m). Near the top of the hill. Occasional.

Fl. & Fr. : January March.

2. HELICTERES L.

Helicteres isora L. Sp. Pl. 963. 1753 ; Mast. in Hook. f. Fl. Brit. Ind. 1 : 365. 1874 ; Ramam. in Sald. & Nicol. Fl. Hassan 141. 1976. "Marorphali".

Stellately tomentose arborescent shrubs. Leaves alternate, up to 11 x 8 cm, oblong obovate, shallowly cordate and unequal, acute acuminate, crenate-serrate, 3-5 ribbed. Flowers up to 5 cm long. Calyx with brown tomentum. Petals reflexing, glandular on the inside. Stamens 10 on the gynandrophore. Carpels 5, each many ovuled ; styles 5. Fruit of spirally twisted follicles.

PACHMARHI : Dhupgarh (1250m). BORI : Dhain (462 m). In the forest along the way side. Common.

Fl. & Fr. : October. February.

3. STERCULIA L.

- 1a. Leaves 3 - 5 lobed. Panicles erect.
Follicles bristly ... *S. urens* 1
- 1b. Leaves 5 - 7 lobed. Panicles pendulous.
Follicles not bristly ... *S. villosa* 2

1. **Sterculia urens** Roxb. Pl. Cor. 1 : 25, t. 24. 1795 ; Mast. in Hook. f. Fl. Brit. Ind. 1 : 355. 1874 ; Ramam. in Sald. & Nicol. Fl. Hassan 144. 1976. "Gular"

Large trees. Bark peeling. Leaves 20 - 25 cm, orbicular, digitately 3 - 5 lobed, glaucous below. Calyx hairy. Follicles 4 - 6, ovoid oblong, up to 2.5 cm diam., coriaceous, red, covered with stinging hairs. Seeds 3 - 6, oblong, black.

PACHMARHI : Apsara Bihar (1000 m). In the forest. Occasional.
Fl. & Fr. : October - March.

2. **Sterculia villosa** Roxb. Fl. Ind. 3 : 153. 1832 ; Mast. in Hook. f. Fl. Brit. Ind. 1 : 355. 1874. "Udal".

Moderate sized, spreading trees. Bark grey, somewhat warty. Leaves 30 - 45 cm, orbicular, digitately 5 - 7 lobed. Follicles 2 - 5, spreading, oblong, 3.5 - 7.5 cm long, scarlet, coriaceous. Seeds oblong, black, shining.

PACHMARHI : Vicinity (1000 m). On the hill slopes in the forest. Occasional.

Fl. & Fr. : November - April.

4. WALTHERIA L.

Waltheria indica L. Sp. Pl. 673. 1753 ; Mast. in Hook. f. Fl. Brit. Ind. 1 : 374. 1874 ; Babu, Herb. Fl. Dehra Dun 94. 1977. **Waltheria americana** L. Sp. Pl. 673. 1753 ; Ramam. in Sald. & Nicol. Fl. Hassan 144. 1976.

Erect or procumbent, pubescent herbs. Leaves 5 x 3 cm, crenate serrate, ovate, cordate at base, tip rounded. Calyx tube long. Petals spatulate, long clawed. Capsule 1 seeded, enclosed in the hairy calyx.

PACHMARHI : Mahadev hill (1300 m). As weed in forests. Common.

Fl. & Fr. July December.

The species is claimed to be an indicator of the presence of copper, lead or zinc in the soil.

18. TILIACEAE Juss.

1a. Fruits echinate or bristly	...	<i>Triumfetta</i> 3
1b. Fruits not echinate, nor bristly :		
2a. Petals eglandular at base. Fruit capsular, elongate	...	<i>Corchorus</i> 1
2b. Petals glandular at base. Fruit drupaceous, often 2 - 4 lobed.	...	<i>Grewia</i> 2

1. CORCHORUS L.

Corchorus aestuans L. Syst. Nat. ed. 10. 1079. 1757 ; Babu, Herb. Fl. Dehra Dun 95. 1977. *Corchorus acutangulus* Lamk. Encycl. 2 : 104. 1786 ; Mast. in Hook. f. Fl. Brit. Ind. 1 : 398. 1874.

Suffrutescent herbs. Leaves crenate-serrate, acute to rounded at tip, sub-cordate at base. Sepals lanceolate. Petals obovate. Stamens 15. Ovary 3-locular. Capsule 6-angled.

PACHMARHI : Vicinity (1000 m). A weed in waste places. Common.

Fl. & Fr. : September February.

2. GREWIA L.

1a. Leaves 4 - 5-ribbed :

2a. Peduncles nearly twice longer than petioles. Gland large :

3a. Leaves orbicular - ovate, stellate pubescent.
Stipules linear, lanceolate ...*G. subinaequalis* 5

3b. Leaves ovate, sparsely pubescent. Stipules subacute auricled ...

G. tiliifolia 62b. Peduncles shorter or just longer than petiole.
Gland small :4a. Leaves obliquely cordate, obscurely 3-lobed.
Stipules linear ...*G. elastica* 1

4b. Leaves ovate-oblong or lanceolate. Stipules linear-ligulate ...

G. rothii 4

1b. Leaves 3-ribbed :

5a. Peduncles as long as or shorter than pedicels. Buds cylindric ...

G. flavescens 2

5b. Peduncles longer than pedicels. Buds ovoid ...

G. helicterifolia 3

1. *Grewia elastica* Royle, Ill. Bot. Himal. 104, t. 22, 1834. *Grewia asiatica* L. var. *vestita* Mast. in Hook. f. Fl. Brit. Ind. I : 387, 1874. "Pharsia".

Deciduous trees. Bark greyish white. Leaves obliquely cordate, ovate or elliptic, acuminate, crenate-serrate. Flowers yellow in axillary cymes. Drupe globose, indistinctly lobed, black when ripe, edible.

PACHMARHI : Dhupgarh (1250 m). In the forests on hill slopes. Occasional.

Fl. & Fr. : February April.

2. *Grewia flavescens* Juss. Ann. Mus. Par. 4 : 91, 1804 ; Ramam. in Sald. & Nicol, Fl. Hassan 135, 1976. *Grewia pilosa* Lamk. Encycl. Suppl. 3 : 43, 1813 ; Mast. in Hook. f. Fl. Brit. Ind. I : 388, 1874.

Small trees or shrubs. Leaves 7 × 5 cm, oblong, acute, cordate below, serrate, glaucous, stellate hairy beneath ; harshly stellate hairy above. Peduncles shorter than petioles and pedicels. Sepals linear-lanceolate, densely stellate hairy outside. Petals yellow, spatulate. Drupes entire or slightly lobed, edible.

FLORA OF PACHMARHI

PACHMARHI : Vicinity (1000 m). In the sal forest. Occasional.

Fl. & Fr. : August December.

3. *Grewia helicterifolia* Wall. ex G. Don, Gen. Syst. 1 : 548. 1831 ; Ghafur in Fl. W. Pak. 75 : 10. 1974. *Grewia polygama* (auct. non Roxb. 1832) ; Mast. in Hook. f. Fl. Brit. Ind. 1 : 391. 1874, p. p.

Shrubs or small trees with spreading branches and small rounded crown. Young shoots densely hirsute. Leaves narrowly lanceolate or lanceolate, 3-7 x 0.5-1.2 cm, oblique-obtuse at the base, serrulate, acute. Stipules setose, deciduous. Flowers polygamous, small, white, becoming yellowish. Sepals linear-oblong, acute, densely hairy outside. Petals oblong, claws hairy outside. Ovary densely hairy. Drupe somewhat 4-lobed, subglobose, fleshy, sparsely stellate hairy, shining brown.

BORI : Reserve forest (550 m). Growing in the teak forest. Occasional.

Fl. & Fr. : July December.

4. *Grewia rothii* DC. Prodr. 1 : 509. 1824. *Grewia excelsa* Vahl, Symb. Bot. 1 : 35. 1790 ; Mast. in Hook. f. Fl. Brit. Ind. 1 : 385. 1874.

Shrubs. Leaves ovate oblong or lanceolate, acuminate, serrulate, base rounded. Flowers small. Sepals linear. Petals oblong, half the length of the sepals. Drupe very small, unlobed, edible.

PACHMARHI : Gahra Nala (900 m). BORI : Reserve forest (550 m). In teak bamboo mixed evergreen forest. Common.

Fl. & Fr. : August December.

5. *Grewia subinaequalis* DC. Prodr. 1 : 511. 1824. *Grewia asiatica* (auct. non L. 1767) Mast. in Hook. f. Fl. Brit. Ind. 1 : 386. 1874. "Phalsa".

Small trees or large straggling shrubs. Leaves variable in shape, broadly cordate to ovate with oblique base, irregularly toothed. Flowers yellow in mostly 3-flowered cymes, 2-6 together in axillary clusters. Sepals oblong, hairy outside. Petals oblong with a ring of hairs around the gland. Ovary globose, striate ; stigma 4-lobed. Drupe dark purple, edible.

PACHMARHI : Dhupgarh (1300 m). In sal forest. Occasional.

Fl. & Fr. : March - August.

6. *Grewia tiliifolia* Vahl, Symb. Bot. 1 : 35. 1790 ; Mast. in Hook. f. Fl. Brit. Ind. 1 : 386. 1874 ("tiliaeefolia") ; Ramam. in Sald. & Nicol. Fl. Hassan 137. 1976. "Dhamni"

Trees, up to 8 m. Leaves orbicular ovate, acute, cordate and oblique at base, serrate, pubescent, glabrous with age. Cymes clustered, usually 3 flowered. Buds globose. Sepals lanceolate, acute, hairy outside. Petals yellow. Drupe globose, glabrous with age, turning black, edible.

BORT : Reserve forest (556 m). In the mixed forest. Occasional.

Fl. & Fr. : March August.

3. TRIUMFETTA L.

1a. Fruits ovoid :

- 2a. Flowers 1 cm or more across. Capsules less than 1 cm across ... *T. pilosa* 3
- 2b. Flowers 0.6 cm or less. Capsules less than 1 cm across :
 - 3a. Capsules covered with hairs and hooked spines. Inflorescence terminal or axillary :
 - 4a. Inflorescence of terminal racemes. Bristles of fruits puberulous ... *T. rotundifolia* 5
 - 4b. Inflorescence of axillary clusters. Bristles of fruits glabrous ... *T. rhomboidea* 4
 - 3b. Capsules covered with only hooked spines. Inflorescence of antiphylloous cymes ... *T. annua* 1
- 1b. Fruits oblong ... *T. pentandra* 2

1. *Triumfetta annua* L. Mant. 1 : 73. 1767 ; Mast. in Hook. f. Fl. Brit. Ind. 1 : 396. 1874 ; Babu, Herb. Fl. Dehra Dun 97. 1977.

Annual herbs. Stem glabrous except a line of crispy hairs. Leaves membranous, ovate or ovate-lanceolate, 5-7 × 2-5 cm, acuminate - acute, coarsely serrate. Stipules subulate, hirsute. Cymes 3-flowered. Flowers orange. Sepals lorate, cucullate and awned at the apex. Petals spatulate, obtuse. Stamens twice as many as petals. Carpels 4; ovary globose, 4 loculed, hairy; stigma 4 lobed. Capsule globose.

PACHMARHI : Vicinity (1000 m). In waste lands along waysides. Common.

Fl. & Fr. : August September.

2. Triumfetta pentandra A. Rich. in Guill. & Perr. Fl. Seneg. Tent. 93. t. 19. 1831 ; Babu, Herb. Fl. Dehra Dun 97. 1977. *Triumfetta neglecta* Wt. & Arn. Prodr. 1 : 75. 1834 ; Mast. in Hook. f. Fl. Brit. Ind. 1 : 396. 1874.

Erect, branched, annual herbs. Stems stellate hairy. Basal leaves rhomboid ovate, palmately 3 lobed, terminal ones ovate lanceolate, acuminate - acute, unequally coarsely serrate. Cymes antiphylloous. Flowers yellow. Sepals lorate, cucullate and awned at the apex. Petals spathulate, obtuse. Stamens 5, rarely up to 10. Carpels 2 ; ovary oblong, 2 loculed, hairy. Capsule oblong, densely tomentose with uncinate spines.

PACHMARHI : Down Fall (950 m). BORI : Reserve forest (550 m). Roadside waste places. Abundant.

Fl. & Fr. : July December.

3. Triumfetta pilosa Roth, Nov. Pl. Sp. 223. 1821 ; Mast. in Hook. f. Fl. Brit. Ind. 1 : 394. 1874 ; Babu, Herb. Fl. Dehra Dun 97. 1977.

Perennial, basally woody herbs. Stem tuberculate, hairy or glabres cent. Leaves ovate lanceolate or lanceolate, 5-12×1.2-4 cm, stellate hairy, acuminate, subcordate or obtuse basally, coarsely serrate. Stipule linear-lanceolate. Inflorescence of many flowered cymes. Flowers yellow. Sepals lorate, cuculate and minutely awned at the apex, stellate hairy outside. Petals narrowly oblanceolate, obtuse, hairy at the base. Stamens mostly 10. Carpels 4, ovary globose, 4 loculed, hairy, stigma 4 lobed. Capsule ovoid, densely tomentose. Seeds dark brown, shining, planoconvex.

PACHMARHI : Dhupgarh (1200 m). BORI : Reserve forest (500 m). In waste lands and along roadsides. Common.

Fl. & Fr. : July December.

4. Triumfetta rhomboidea Jacq. Enum. Pl. Carib. 22. 1760 ; Mast. in Hook. f. Fl. Brit. Ind. 1 : 395. 1874 ; Babu, Herb. Fl. Dehra Dun 97. 1977.

Much branched, tall herb or undershrub. Leaves generally rhomboid ovate, variable, 3-9×2.5-7 cm, hairy or glabrescent, acute at apex, cuneate cordate at base, irregularly serrate. Cymes axillary. Flowers golden yellow. Buds oblong, constricted in the middle. Petals oblong obovate. Stamens 15, rarely fewer. Carpels 2-3, syncarpous, ovary subglobose, 2-3 loculed ; stigma 2-3 lobed. Capsules ovoid, indehiscent, tomentose.

PACHMARHI : Vicinity (1000 m). Along the edges of forests and along road sides. Common.

Fl. & Fr. : August November.

5. Triumfetta rotundifolia Lamk. Encycl. 3 : 421. 1792 ; Mast. in Hook. f. Fl. Brit. Ind. 1 : 395. 1874 ; Ramam. in Sald. & Nicol. Fl. Hassan 138. 1976.

Woody shrubs or undershrubs. Leaves thick, very broadly obovate to orbicular, sparsely hairy, cuneate or obtuse at the base, irregularly and unequally serrated. Inflorescence of terminal racemes. Flowers yellow. Petals spatulate, emarginate at the apex. Stamens 10-25. Capsule ovoid, subglobose.

BORI : Reserve forest (500 m). Along path ways in the forest among the grasses. Abundant.

Fl. & Fr. : July December.

19. LINACEAE S. F. Gray

- | | | |
|--|-----|----------------------|
| 1a. Small herbs. Leaves faintly 3-nerved. Styles 5 | ... | <i>Linum</i> 1 |
| 1b. Undershrubs. Leaves pinninerved. Styles 3 | ... | <i>Reinwardtia</i> 2 |

1. LINUM L.

Linum mysorense Heyne ex Benth. in Edward's Bot. Reg. 16 : t. 1326. 1830 ; Hook. f. Fl. Brit. Ind. 1 : 411. 1874 ; Gandhi in Sald. & Nicol. Fl. Hassan 407. 1976.

Erect, slender herbs, branched at the top appearing corymbose. Leaves sessile, linear, acute, faintly 3-nerved. Flowers usually solitary. Sepals oblong or narrowly ovate, sulcate. Petals obovate, obtuse, 4-6 mm long, yellow. Capsule globose, glabrous. Seeds 10, compressed, ovoid.

PACHMARHI : Jambudeep (1000 m). **BORI** : Bori Pachmarhi Road (900 m). In open flat forest clearings. Occasional.

Fl. & Fr. : September December.

2. REINWARDTIA Dumort.

Reinwardtia indica Dumort, Comm. Bot. 19. 1822 ; Babu, Herb. Fl. Dehra Dun 99, 1977. *Linum trigynum* Roxb. in Asiat. Res. 6 : 357. 1799 (non L. 1753). *Reinwardtia trigyna* (Roxb.) Blanch. in Hook. Lond. Journ. Bot. 7 : 522. 1848 ; Hook. f. Fl. Brit. Ind. 1 : 412. 1874. "Basanthi"

Glabrous undershrubs. Leaves entire, elliptic oblong, subacute at apex, shortly narrowed at base. Flowers solitary. Sepals narrowly ovate, acuminate. Petals yellow, oblong. Stamens of various lengths. Styles 3. Capsule globose, glabrous ; seeds reniform.

PACHMARHI : Kanjighat (900 m). In forests. Occasional.

Fl. & Fr. : September - November.

20. GERANIACEAE Juss.

GERANIUM L.

Geranium mescatense Boiss. Diagn. 1 : 59. 1842 ; Babu, Herb. Fl. Dehra Dun 100, 1977. *Geranium ocellatum* Cambess. in Jacq. Voy. Ind. 33. t. 38. 1844 ; Edgew. & Hook. f. in Hook. f. Fl. Brit. Ind. 1 : 433. 1874.

Prostrate, annual biennial, pubescent herbs. Leaves orbicular subreniform, palmately 5-7 partite, sparsely pubescent, segments obovate cuneate 3-5 lobed with ovate triangular acute mucronate lobes. Flowers rose purple. Sepals ovate, mucronate, hairy outside. Petals obcordate. Capsule beaked. Mericarps transversely rugose, hairy. Seeds smooth.

PACHMARHI : Mahadev hill (1200 m), 27° 12' 62", Pantgrahi 6607 (BSA). On the hill slopes in humid condition. Rare.

Fl. & Fr. : October - December.

21. OXALIDACEAE R. Br.

- | | | |
|---------------------------------------|-----|---------------------|
| 1a. Leaves pinnately many - foliolate | ... | <i>Blophyllum</i> 1 |
| 1b. Leaves palmately 3-foliate | ... | <i>Oxalis</i> 2 |

I. BIOPHYTUM DC.

- 1a. Sepals exceeding the capsule. Pedicels shorter than flowers :
- 2a. Leaflets in 10 - 14 pairs. Seeds with transverse tubercled ridges ... *B. sensitivum* 3
- 2b. Leaflets in 5 - 7 pairs. Seeds with simple tubercles ... *B. petersianum* 1
- 1b. Sepals not exceeding the capsules. Pedicels as long as or longer than flowers ... *B. reinwardtii* 2

1. **Biophytum petersianum** Klotzsch in Peters, Reise Mossamb. Bot. 1 : 81. t. 15. 1862. *Oxalis apodiscias* Turcz. in Bull. Soc. Nat. Muscovi 36 : 430. 1863. *Biophytum apodiscias* (Turcz.) Edgew. & Hook. f. in Hook f. Fl. Brit. Ind. 1 : 437. 1874.

Annual erect herbs. Leaves with 5 - 7 pairs of leaflets. Petiole puberulous. Pedicels very short or 0. Sepals exceeding the pedicels. Seeds simply tubercled.

PACHMARHI : Beefall (1000 m), *Saxena* 1060 (*SERI*). In sheltered places on wayside. Rare.

Fl. & Fr. : July November.

2. **Biophytum reinwardtii** (Zucc.) Klotz. in Peters, Reise Mossamb. Bot. 1 : 85. 1862 ; Edgew. & Hook. f. in Hook. f. Fl. Brit. Ind. 1 : 437. 1874 ; Babu, Herb. Fl. Dehra Dun 102. 1977. *Oxalis reinwardtii* Zucc. Abh. Ak. Wiss. Munich 1 : 274. 1830.

Erect, hairy, annual herbs, 4 - 12 cm tall. Leaves even pinnate, rachis 5 - 6 cm long ; leaflets 3 - 10 pairs, subsessile. Flowers pseudo umbellate, clustered on 2 - 5 cm long peduncles. Sepals lanceolate, acute. Petals yellow, spatulate, obtuse. Stamens 10. Styles 5. Capsule globose. Seeds with spiral warts.

PACHMARHI : Down fall (900m). **BORI** : Reserve forest (550 m). In shaded locations of ravines and river banks. Common.

Fl. & Fr. : August December.

3. **Biophytum sensitivum** (L.) DC. Prodr. 1 : 690. 1824 ; Edgew. & Hook. f. in Hook. f. Fl. Brit. Ind. 1 : 436. 1874 ; Babu, Herb. Fl. Dehra Dun 102. 1977. *Oxalis sensitivum* L. Sp. Pl. 434. 1753.

Erect, hairy, annual herbs. Leaves with 10-14 pairs of leaflets. Flowering peduncles very short. Petals yellow, oblong obovate with a yellow or pale lilac striped base. Capsule covered with persistent sepals.

PACHMARHI : Vicinity (1000 m). BORI : Reserve forest (500 m). On rocky soil in shady places and along waysides. Common.

Fl. & Fr. : May October.

2. OXALIS L.

- 1a. Plants caulescent with creeping stems.
Flowers yellow. Leaves obovate ... *O. corniculata* 1
- 1b. Plants acaulescent with an underground, bulbous rootstock. Flowers purplish. Leaves not obovate :

 - 2a. Pedicels and calyces glabrous. Leaves obtiangular ... *O. richardiana* 3
 - 2b. Pedicels and calyces hairy. Leaves obocordate ... *O. corymbosa* 2

1. *Oxalis corniculata* L. Sp. Pl. 435. 1753 ; Edgew. & Hook. f. in Hook. f. Fl. Brit. Ind. 1 : 436. 1874 ; Babu, Herb. Fl. Dehra Dun 103. 1977. "Amrulsak".

Hairy, perennial herbs. Stem creeping and rooting from the under surface. Leaves digitately 3 foliolate ; leaflets cuneate or acute at the base. Flowers in umbellate clusters. Sepals lanceolate oblong, obtuse, hairy at the back. Petals oblanceolate oblong. Style hairy. Capsule oblong, narrowed at apex, pubescent. Seeds transversely ribbed.

PACHMARHI : Mahadev hill (1200m). Along waysides and forest edges. Common.

Fl. & Fr. : January December.

2. *Oxalis corymbosa* DC. Prodr. 1 : 696. 1824 ; Babu, Herb. Fl. Dehra Dun 103. 1977.

Perennial, acaulescent herbs with bulbous rootstock. Leaves erect ; petioles 8-30 cm long with dilated base ; leaflets cuneate at base, deeply notched with rounded lobes. Flowers 2 many in subumbellate

corymbs. Peduncles 5–25 cm long; pedicels 3–4 cm long. Sepals with two orange dots at apices. Petals with dark purplish streaks. Ovary glabrous; styles pubescent.

PACHMARHI : Vicinity (1067 m). On the margins of cultivated fields. Common.

Fl. & Fr. : December May.

3. *Oxalis richardiana* Babu, Herb. Fl. Dehra Dun 104, 1977. *Oxalis intermedia* A. Rich, Ess. Fl. Cuba, 315, 1845 (1842) (*non* Steud. 1841). *Oxalis latifolia* (*auct. pl. non* H. B. K. 1821); Calder in Rec. Bot. Surv. Ind. 6 : 337. 1919.

Perennial, glabrous, acaulescent herbs with bulbous rootstock. Leaves obtiangular; petioles 10–20 cm long, leaflets cuneate at base, notched with oblique, obtuse lobes with two glands below the apex. Flowers in few-flowered umbels. Peduncles 12–30 cm long, hairy. Pedicels 1–5 cm long. Sepals with two glands at apex. Petals obovate-cuneate, purple. Styles glabrous.

PACHMARHI : Jata Shankar (1050 m). At the margins of cultivated fields. Common.

Fl. & Fr. : July November.

22. BALSAMINACEAE DC.

IMPATIENS L.

- | | |
|---|---------------------------|
| 1a. Leaves all alternate | ... <i>I. balsamina</i> 1 |
| 1b. Leaves opposite and or whorled : | |
| 2a. Lip short-spurred (1/3 of lip or less) | ... <i>I. inconnexa</i> 2 |
| 2b. Lip long-spurred (more than 1/3 of lip) | ... <i>I. kleinii</i> 3 |

1. *Impatiens balsamina* L. Sp. Pl. 938. 1753; Hook. f. Fl. Brit. Ind 1 : 453. 1874; Babu, Herb. Fl. Dehra Dun 105, 1977. "Gulmendhi".

Annual herbs. Leaves 4–10 × 1.2–1.5 cm, alternate, elliptic, acute at both ends; petioles glandular. Flowers pink, in axillary 1–3 flowered fascicles. Lateral sepals ovate; lip saccate, with a short spur. Standard broad, rounded, aristate; wing unequally 2-lobed. Capsule tomentose. Seeds smooth.

PACHMARHI : Vicinity (1000 m). BORI : Bori Pachmarhi Road (900 m). In shaded locations along roadsides and waste lands. Common.

Fl. & Fr. : July October.

2. *Impatiens inconspicua* Benth. ex Wt. & Arn. Prodr. 139. 1834 ; Hook. f. Fl. Brit. Ind. 1 : 447. 1874 ; Ramam. in Sald. & Nicol. Fl. Hassan 403. 1976.

Slender annual herbs. Leaves opposite, 1.5 × 0.5 - 1.5 cm, ovate lanceolate, glaucous beneath. Flowers pink in axillary fascicles of 2-3. Sepals subulate ; lip saccate, shortly spurred or spur obscure. Standard ovate, mucronate ; wing obovate, entire with ovate, acuminate basal lobe.

PACHMARHI : Dhupgarh (1200m). Among grasses and rock crevices on hill slopes. Occasional.

Fl. & Fr. : August September.

3. *Impatiens kleinii* Wt. & Arn. Prodr. 140. 1834 ; Hook. f. Fl. Brit. Ind. 1 : 445. 1874 ; Ramam. in Sald. & Nicol. Fl. Hassan 403. 1976.

Slender annuals. Leaves 2-5 × 0.7-2 cm, ovate oblong, sometimes linear ; petiole glandular. Flowers usually solitary, pink, purple or white. Sepals subulate ; lip carinate, saccate, long spurred. Standard ovate, dorsally winged ; wing stipitate, obovate, rounded. Capsule glabrous.

PACHMARHI : Mahadev hill (1250 m). Growing gregariously on forest floors. Common.

Fl. & Fr. : July October.

23. RUTACEAE Juss.

1a. Plants armed. Leaves 1+ foliolate	...	<i>Citrus</i> 2
1b. Plants unarmed. Leaves pinnate :		
2a. Leaves even-pinnate. Fruit a capsule	...	<i>Chloroxylon</i> 1
2b. Leaves odd-pinnate. Fruit a berry	...	<i>Murraya</i> 3

1. CHLOROXYLON DC.

Chloroxylon swietenia DC. Prodr. 1 : 625. 1834 ; Hiern in Hook. f. Fl. Brit. Ind. 1 : 569. 1875 ; Gandhi in Sald. & Nicol. Fl. Hassan 383. 1976. "Bhirra".

Trees. Leaves paripinnate ; leaflets 12 - 15 pairs, oblong lanceolate, obtuse with oblique base, up to 3 x 1 cm long, membranous. Peduncles 6-10 cm long with short branches. Flowers white. Capsule ovoid or oblong, 3 x 1.5 cm long.

PACHMARHI ; Vicinity (1000 m). In the forest. Common.

Fl. & Fr. : March - July.

2. CITRUS L.

Citrus medica L. Sp. Pl. 782. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 514. 1825. "Bara nimbu".

Shrubs or small trees. Leaflets 5 - 12 cm long, ellipticovate or ovate-lanceolate ; petiole naked or winged. Flowers 5 - 10 in racemes. Stamens 20 - 60. Ovary many celled. Berry large, oblong or globose, rind leathery.

PACHMARHI : Tridhara (1000m), Feb. 78, Pant 27171 (BSA). At the edge of the forest. Rare.

Fl. & Fr. : January - December.

New record for the area.

3. MURRAYA L.

- | | | |
|--|-----|------------------------|
| 1a. Petals 5 mm long. Leaflets 10 - 20. Tree | ... | <i>M. koenigii</i> 1 |
| 1b. Petals 12 mm long. Leaflets 3 - 8. Bush | ... | <i>M. paniculata</i> 2 |

1. *Murraya koenigii* (L.) Spreng. Syst. Veg. 2 : 315. 1825 ; Hook. f. Fl. Brit. Ind. I : 503. 1875. *Bergera Koenigii* L. Mant. 565. 1767. "Kathnim".

Small trees, strong smelling. Leaves up to 30 cm long; leaflets 10-20, usually oblique ovate, obtuse acuminate, tip notched, crenulate. Flowers white, in many flowered corymbs. Sepals acute. Petals linear oblong, obtuse. Ovary 2 celled, style cylindric; stigma capitate, grooved. Fruit ovoid or subglobose, black.

BORI : Churna (413m), 26-4-61, Joseph 12422 (BSA). In the forest. Rare.

Fl. & Fr. : March June.

2. *Murraya paniculata* (L.) Jack, Mal. Misc. 1(5) : 31. 1820 ; Gandhi in Sald. & Nicol. Fl. Hassan 386. 1976. *Chaleas paniculata* L. Mant. Pl. 68. 1767. *Murraya exotica* L. Mant. Alt. 563. 1771 ; Hook. Fl. Brit. Ind. I : 502. 1875. "Kamini".

Shrubs. Leaflets 3-7, elliptic ovate, acuminate, often oblique at base. Flowers axillary, solitary or in terminal cymes. Petals white, scented. Ovary hirsute. Berry red, elliptic, apiculate. Seeds woolly.

PACHMARHI : Vicinity (1000 m). BORI : Reserve forest (500 m). On slopes. Common.

Fl. & Fr. : May August.

24. BURSERACEAE Kunth

- | | |
|--|--------------------|
| 1a. Bark peeling off in thin flakes. Fruit a 3-lobed drupe.
Hypanthium absent ... | <i>Boswellia</i> 1 |
| 1b. Bark not peeling off. Fruit entire. Hypanthium present ... | <i>Garuga</i> 2 |

1. *BOSWELLIA* Roxb. ex Colebr.

Boswellia serrata Roxb. ex Colebr. in Asiatic Res. 9 : 379. t. 5. 1807 ; Bennett in Hook. f. Fl. Brit. Ind. I : 528. 1875 ; Ramam. in Sald. & Nicol. Fl. Hassan 370. 1976. "Salai".

Deciduous trees with papery bark. Leaf axis white pubescent. Leaflets 19-23, sessile, oblong-ovate, emarginate. Panicle pubescent. Flowers 5-merous. Petals white, shortly clawed. Drupe upto 1.8×1.1 cm, green, smooth. Seeds 3, flattened, margins winged.

PACHMARHI : Kanjighat (900 m). In mixed deciduous forest. Occasional.

Fl. & Fr. : January March.

2. GARUGA Roxb.

Garuga pinnata Roxb. Pl. Cor. t. 208. 1811 ; Bennett in Hook. f. Fl. Brit. Ind. 1 : 528. 1875 ; Ramam. in Sald. & Nicol. Fl. Hassan 372. 1976. "Kharpat".

Deciduous trees. Leaflets crenate serrate, more than 10; basal ones smaller in size, glabrous with age. Inflorescence crowded. Flowers polygamous, 5-merous, yellow. Calyx lobed, pubescent. Petals arising from above mid hypanthium, ovate, pubescent. Stamens 10, free. Ovary sessile, 4-locular. Drupe globose, fleshy, black, 5-seeded.

PACHMARHI : Mahadev hill (1200 m). In the forest. Occasional.

Fl. & Fr. : February.

25. MELIACEAE Juss.

1a. Stamens connate in a tube :

- | | | |
|----------------------|-----|------------------|
| 2a. Seeds not winged | ... | <i>Melia</i> 1 |
| 2b. Seeds winged | ... | <i>Sympida</i> 2 |
| 1a. Stamens free | ... | <i>Toona</i> 3 |

1. MELIA L.

Melia azedarach L. Sp. Pl. ed. 1 : 384. 1753 ; Hiern. in Hook. f. Fl. Brit. Ind. 1 : 544. 1875. "Bakaln".

Deciduous trees. Bark dark grey with shallow longitudinal furrows. Leaves usually bipinnate; leaflets ovate or lanceolate, serrate. Flowers lilac, fragrant, in axillary panicles. Drupe ellipsoid globose. Seeds 4 - 5.

PACHMARHI : Vicinity (1000 m). Along roadside and in compounds and gardens. Abundant.

Fl. & Fr. : May December.

2. SOYMIDA A. Juss.

Soymida febrifuga (Roxb.) A. Juss. in Mem. Mus. 19 : 251. t. 22, f. 26. 1830 ; Hiern. in Hook. f. Fl. Brit. Ind. 1 : 567. 1875. *Swietenia febrifuga* Roxb. Pl. Cor. 1 : t. 17. 1795. "Rohun."

Tall deciduous trees. Leaves 20 - 40 cm long, paripinnate; leaflets 3 - 6, elliptic or oblong, obtuse, entire, base oblique. Flowers greenish white in large terminal panicles. Capsule black, woody. Seeds winged.

PACHMARHI : Kanjighat (900 m). In sal forest. Occasional.

Fl. & Fr. : March December.

3. TOONA M. Roem.

Toona ciliata Roem. Syn. Hesper. 139. 1846 ; Ramam. in Sald. & Nicol. Fl. Hassan 395. 1976. *Cedrela toona* Roxb. ex Rottl. Ges. Naturf. Freunde Berlin Neue Schriften 2 : 198. 1803 ; Hiern in Hook. f. Fl. Brit. Ind. 1 : 568. 1875. "Tun".

Deciduous trees. Leaves paripinnate; leaflets ovate - oblong. Flowers 4 - 5-merous. Petals keeled at point of insertion with disc. Ovary and disc pubescent. Capsule woody, 5 valved, with a thick central, 5 angled column. Seeds winged.

PACHMARHI : Vicinity (1000 m). Planted in avenues.

Fl. & Fr. : March August.

26. CELASTRACEAE R. Br.

- | | | |
|--|-----|--------------------|
| Ia. Leaves opposite. Disc flat. Seeds not arillate | ... | <i>Cassine</i> 1 |
| Ib. Leaves alternate. Disc cupular. Seeds arillate | ... | <i>Celastrus</i> 2 |

1. CASSINE L.

Cassine glauca (Rottb.) Kuntze, Rev. Gen. Pl. 1 : 114. 1891 ; Ramam. in Sald. & Nicol. Fl. Hassan 318. 1976. *Mangifera glauca* Rottb. Nye Saml. Kongel. Norske Vidensk. Selsk. Skr. 2 : 354. t. 4. f. 1. 1783. *Elaeodendron glaucum* (Rottb.) Pers. Syn. Pl. 1 : 241. 1805 ; Lawson in Hook. f. Fl. Brit. Ind. 1 : 623. 1875. "Jamrassi".

Trees. Leaves 5--10×5 cm, crenate serrate, orbicular - elliptic, acuminate with acumen often folded. Inflorescence branched. Flowers greenish - white. Ovary 2 locular. Drupe ovoid. Seed one.

PACHMARHI : Dhupgarh (1250 m). In mixed deciduous forest. Common.

Fl. & Fr. : February January.

2. CELASTRUS L.

Celastrus paniculatus Willd. Sp. Pl. 1 : 1125. 1797 ; Lawson in Hook. f. Fl. Brit. Ind. 1 : 617. 1875 ; Ramam. in Sald. & Nicol. Fl. Hassan 318. 1976. "Malkangni".

Deciduous, climbing shrubs. Leaves alternate, ovate, elliptic, crenulate. Inflorescence terminal. Sepals fimbriate at tip. Capsule tipped by persistent style.

PACHMARHI : Vicinity (1000 m). In the forests. Common.

Fl. & Fr. : April July.

27. RHAMNACEAE Juss.

1a. Fruit inferior, enclosed in the persistent calyx - tube	...	<i>Helinus</i> 1
1b. Fruit superior or partly enclosed in the calyx - tube :		
2a. Fruit 1 - seeded. Styles enlarged into wing	...	<i>Ventilago</i> 3
2b. Fruit 1 - 4 - seeded. Styles not enlarged into wing :		
3a. Leaves palmately veined	...	<i>Ziziphus</i> 4
3b. Leaves pinnately veined	...	<i>Rhamnus</i> 2

1. HELINUS E. Mey. ex Endl.

Helinus lanceolatus Brandis in For. Fl. 574. 1874 ; Lawson in Hook. f. Fl. Brit. Ind. I : 644. 1875 ; Babu, Herb. Fl. Dehra Dun 107. 1977.

Slender twining shrubs, glabrous except young parts. Branches angular, ending in a tendril. Leaves lanceolate oblong, acute, entire with rounded or subcordate base. Stipules small, ovate rounded. Flowers pale yellow or greenish in umbellate clusters. Calyx lobes ovate triangular, acute. Petals spatulate. Fruit globose.

PACHMARHI : Dhupgarh (1200 m). In shady moist places in the forest. Common.

Fl. & Fr. : November April.

2. RHAMNUS L.

1a. Pubescent. Young parts not drying black	...	<i>R. triqueter</i> 1
1b. Glabrous. Young parts drying black	...	<i>R. wightii</i> 2

1. *Rhamnus triqueter* (Wall.) Lawson in Hook. f. Fl. Brit. Ind. I : 639. 1875. *Ceanothus triqueter* Wall. in Roxb. Fl. Ind. 2 : 376. 1824.

Unarmed shrubs with pubescent young branches. Leaves elliptic obovate to oblong lanceolate, acute or subacuminate, finely serrate, 7-14 x 2.5-6 cm. Flowers shortly pedicelled, fascicled on leafless branches, puberulous. Petals broadly obovate, emarginate. Fruit obovoid, 3 lobed.

PACHMARHI : Fraser nala (900 m) ; Dhupgarh (1200 m). In moist situations near streams. Occasional.

Fl. & Fr. : November March.

2. *Rhamnus wightii* Wt. & Arn. Prodr. 164. 1834 ; Lawson in Hook. f. Fl. Brit. Ind. I : 639. 1875.

Large unarmed, glabrous shrubs with young parts drying black. Leaves 6—12 × 2.5—5 cm, elliptic or narrowly elliptic, shortly acuminate, closely serrate, subcoriaceous. Pedicels much shorter than the petiole. Petals 5, cuneate obovate, with a short apiculus. Styles 3—4, diverging.

PACHMARHI : Dhupgarh (1200 m). In shady places in the forest. Occasional.

Fl. & Fr. : November March.

3. VENTILAGO Gaertn.

Ventilago denticulata Willd. in Ges. Naturf. Fr. Neue Schr. 3 : 417. 1801. *Ventilago calyculata* Tul. in Ann. Sci. Nat. Ser. 4, 8 : 124. 1857 ; Lawson in Hook. f. Fl. Brit. Ind. I : 631. 1875.

Large climbing shrubs. Leaves pubescent, ovate or ovate elliptic, crenate serrate, 8—15 × 1.5—6 cm. Flowers in densely pubescent paniculate spikes. Calyx densely pubescent outside and hairy inside. Styles long, diverging. Nut subglobose, grit about the middle by the rim of the adnate calyx ; wings linear, 6 cm long, terminated by the remains of the bifid style.

BORI : Reserve forest (550 m), Churna (413 m). Near roadside streams and in the forest. Common.

Fl. & Fr. : October March.

4. ZIZIPHUS Mill.

1a. Petals absent	...	<i>Z. rugosa</i> 2
1b. Petals present :		
2a. Styles 2. Fruit less than 1 cm across. Leaves ovate, acute, hairy beneath	...	<i>Z. oenoplia</i> 1
2b. Styles 3. Fruit more than 1 cm across. Leaves orbicular, rounded, glabrous.		<i>Z. xylopyrus</i> 3

1. *Ziziphus oenoplia* (L.) Mill. Gard. Dict. ed. 8, 3. 1768 ; Lawson in Hook. f. Fl. Brit. Ind. I : 634. 1875 ; Ramam. in Sald. & Nicol. Fl. Hassan 354. 1976. *Rhamnus oenoplia* L. Sp. Pl. 194. 1753. "Makai".

Ferruginous straggling or climbing shrubs. Leaves 6×3 cm., ovate, subcordate, slightly oblique at base, hairy beneath. Petals obtangular, white. Ovary 2 locular; styles 2, united to above the middle. Drupes less than 1 cm across.

PACHMARHI : Kanjighat (900 m). In mixed forest on drier habitat. Common.

Fl. & Fr. : September January.

2. *Ziziphus rugosa* Lamk. Encycl. 5 : 319. 1789 ; Lawson in Hook. f. Fl. Brit. Ind. 1 : 636. 1875 ; Ramam. in Sald. & Nicol. Fl. Hassan 354. 1976. "Churna".

Straggling, evergreen, large shrubs, often climbing, pubescent. Leaves broadly elliptic, subcordate at base, pubescent beneath, up to 8×5 cm. Calyx lobes ovate. Petals absent. Ovary globose, villous, 2 locular. Drupe fleshy, oblong, up to 1.5×1 cm., white.

BORI : Reserve forest (550 m). On rocky slopes in the open forests. Common.

Fl. & Fr. : January April.

3. *Ziziphus xylopyrus* (Retz.) Willd. Sp. Pl. 1 : 1104. 1798 ; Lawson in Hook. f. Fl. Brit. Ind. 1 : 634. 1875 ; Ramam. in Sald. & Nicol. Fl. Hassan 354. 1976. *Rhamnus xylopyrus* Retz. Obs. Bot. 2 : 11. 1781. "Kat ber".

Shrubs or small trees. Leaves rounded, slightly oblique, $5-7 \times 3-4$ cm. Calyx lobes obconic, acute. Petals white. Ovary glabrous, 3 locular. Drupes globose, hard, up to 1.5×1.5 cm.

PACHMARHI : Vicinity (1000 m). In the mixed sal forest and open fields. Common.

Fl. & Fr. April October.

28. VITACEAE Juss.

- | | | |
|---|-----|-----------------------|
| 1a. Inflorescence tendril - bearing | ... | <i>Ampelocissus</i> 1 |
| 1b. Inflorescence not tendril - bearing : | | |

2a. Leaves not lobed. Berry 1 - seeded ...	<i>Cissus</i> 3
2b. Leaves 3 - many - lobed. Berry 2 - 4- seeded ...	<i>Cayratia</i> 2

1. AMPELOCISSUS Planch.

1a. Plant covered with woolly tomentum ...	<i>A. tomentosa</i> 2
1b. Plant not covered with woolly tomentum ...	<i>A. latifolia</i> 1

1. *Ampelocissus latifolia* (Roxb.) Planch. in J. Vigne Am. 374. 1884. *Vitis latifolia* Roxb. Fl. Ind. 1 : 661. 1820 ; Lawson in Hook. f. Fl. Brit. Ind. 1 : 652. 1875. "Panibel".

Weak climbers, usually glabrous. Leaves 15-20 cm across, rounded cordate, 3-7 lobed, glossy. Flowers reddish brown. Berry black.

PACHMARHI : Vicinity (1000 m). In mixed forest. Occasional.

Fl. & Fr. : August - November

2. *Ampelocissus tomentosa* (Heyne ex Roth) Planch. in J. Vigne Am. 374. 1884 ; Ramam. in Sald. & Nicol. Fl. Hassan 358. 1976. *Vitis tomentosa* Heyne ex Roth, Nov. Pl. Sp. 157. 1821 ; Lawson in Hook. f. Fl. Brit. Ind. 1 : 650. 1875.

Climbers covered with woolly tomentum. Leaves orbicular, cordate, often 3-5-lobed, serrate, drying brown below. Flowers red. Berry black, round.

PACHMARHI : Mahadev hill (1200 m). In forests and sheltered places. Occasional.

Fl. & Fr. : August - November

2. CAYRATIA Juss.

Cayratia trifolia (L.) Domin in Biblioth. Bot. 89 : 371. 1927 ; Babu, Herb. Fl. Dehra Dun 107. 1977. *Vitis trifolia* L. Sp. Pl. 203. 1753. *Cissus*

carnosa Lamk. Encycl. 1 : 31. 1783. *Vitis carnosa* (Lamk.) Wall. ex Lawson in Hook. f. Fl. Brit. Ind. 1 : 654. 1875. "Amal - bel"

Slender, hairy, climbers. Leaves digitately 3 foliolate ; leaflets elliptic ovate, acute with a subcordate base, serrate-dentate. Tendrils 2-3 times forked. Caylx tube truncate. Petals ovate, obtuse, hairy outside. Berry depressed globose.

BORI : Reserve forest (500 m). In the forest and shady places. Common.

Fl. & Fr. : July November

3. CISSUS L.

Cissus repanda (Wt. & Arn.) Vahl, Symb. 3 : 18. 1794. *Vitis repanda* Wt. & Arn. Prodr. 125. 1834 ; Lawson in Hook. f. Fl. Brit. Ind. 1 : 648. 1875 (excl. *Cissus vitiginea* L. Sp. Pl. 117. 1753). "Pani - bel".

Woody climbing shrubs. Leaves wide cordate, crenate, sublobate, often repand, hairy beneath, up to 10-20 x 7.5-15 cm. Fruits tipped with the persistent style. Seeds pyriform.

PACHMARHI : Vicinity (1000 m). In the mixed forest. Occasional.

Fl. & Fr. : October December

The stem contains large quantity of potable water.

29. LEEACEAE (DC.) Dum.

LEEA Royen ex L.

- | | |
|--|-----------------------|
| 1a. Leaves with distant, fewer primary nerves ; bipinnate or upper ones simple pinnate ... | <i>L. bracteata</i> 1 |
| 1b. Leaves with close, numerous primary nerves, unipinnate ... | <i>L. crispa</i> 2 |

1. *Leea bracteata* Cl. in Journ. Bot. 19 : 164. 1881 ; Duthie, Fl. Up. Gang. Plain 1 : 165. 1903. *Leea robusta* Laws. in Hook. f. Fl. Brit. Ind. 1 : 667. 1875 (excl. all syn. ; *non* Roxb. *nec* Bl.)

Large straggling shrubs. Leaves 2 pinnate or the upper simple pinnate ; leaflets large, ovate lanceolate, shortly caudate ; primary nerves distant. Flowers green. Berries brownish yellow when ripe.

PACHMARHI : Vicinity (1000 m). In the mixed forest. Occasional.

Fl. & Fr. : September - November

2. *Leea crispa* van Royen ex L. Syst. Nat. ed. 12. 627. 1767 ; Laws. in Hook. f. Fl. Brit. Ind. 1 : 665. 1875 ; Sald. in Sald. & Nicol. Fl. Hassan 356. 1976.

Rigid shrubs. Leaves 1 pinnate, 5-7 foliolate ; leaflets oblong, acute, acuminate, truncate-cordate. Flowers greenish white. Berries globose, 8 mm.

PACHMARHI : Dhupgarh (1200 m). In the mixed forest. Occasional.

Fl. & Fr. : July - September

30. SAPINDACEAE Juss.

- | | | |
|--------------------------------------|-----|----------------------|
| 1a. Leaves simple. Fruit winged | ... | <i>Dodonaea</i> 1 |
| 1b. Leaves compound. Fruit apiculate | ... | <i>Schleichera</i> 2 |

1. DODONAEA Mill.

Dodonaea viscosa Jacq. Enum. Syst. Pl. Carib. 10. 1760 ; Hiern in Hook. f. Fl. Brit. Ind. 1 : 697. 1875 ; Gandhi in Sald. & Nicol. Fl. Hassan 367. 1976. "Sinatha".

Shrubs or small trees. Leaves simple, elliptic - oblong or obovate, shining, sub coriaceous, up to 8×1.8 cm. Inflorescence shorter than the leaves. Capsule 2-3 winged.

PACHMARHI : Mahadev hill (1250 m). In mixed forest. Abundant.

Fl. & Fr. : November January and June August.

2. SCHLEICHERA Willd.

Schleichera oleosa (Lour.) Oken, Allg. Naturgesch. 3 (2) : 1341. 1841 ; Gandhi in Sald. & Nicol. Fl. Hassan 369. 1976. *Pistacia oleosa* Lour. Fl. Cochinch. 615. 1790. *Schleichera trijuga* Willd. Sp. Pl. 4 : 1096. 1805 ; Hiern in Hook. f. Fl. Brit. Ind. 1 : 681. 1875. "Kusum"

Trees. Leaves bright red when young ; even pinnate ; leaflets in 3 pairs, oblong-lanceolate, truncate at base, coriaceous, shining above, up to 16×7 cm. Flowers greenish white. Fruits up to 15×1 cm, apiculate, rough.

PACHMARHI : Apsara Bihar (1000 m). In the mixed forest. Common.

Fl. & Fr. : February May.

31. ANACARDIACEAE Lindl.

1a. Leaves compound :

2a. Leaflets 3, coarsely serrate. Plants armed ... *Rhus* 4

2b. Leaflets 5 or more, entire. Plants unarmed ... *Lannea* 2

1b. Leaves simple :

3a. Styles 3 or more :

4a. Flowers unisexual. Stamens as many as petals.
Styles 3 ... *Semecarpus* 5

- 4b. Flowers bisexual. Stamens twice as many as petals. Styles 5 - 6 ... *Buchanania* 1
- 3b. Style 1. ... *Mangifera* 3

1. BUCHANANIA Spreng.

Buchanania lanzae Spreng. in Schrad. J. Bot. 2 : 234. 1800 ; Ramam. in Sald. & Nicol. Fl. Hassan 374. 1976. ***Buchanania latifolia*** Roxb. Fl. Ind. 2 : 385. 1832 ; Hook. f. Fl. Brit. Ind. 2 : 23. 1876. "Piyar".

Small trees. Petiole swollen, tomentose ; blade 12 - 20 × 7.5 - 12 cm, broadly oblong, rounded emarginate, pubescent, glaucous below. Panicles pubescent. Petals white, ovate. Disc villous. Drupe small, globose, red.

PACHMARHI : Mahadev hill (1200 m). In sal forest. Common.

Fl. & Fr. : December - April.

2. LANNEA A. Rich.

Lannea coromandelica (Houtt.) Merr. in J. Arnold Arb. 19 : 353. 1939 ; Ramam. in Sald. & Nicol. Fl. Hassan 376. 1976. ***Dialium coromandelicum*** Houtt. Nat. Hist. Ser. 2, 2 : 39. t. 5. f. 2. 1774. ***Odina wodier*** Roxb. Fl. Ind. 2 : 293. 1832 ; Hook. f. Fl. Brit. Ind. 2 : 29. 1876. "Jhingan".

Deciduous trees. Leaflets usually 7, ovate, rounded truncate, 6 - 9 × 4 - 5 cm, drying reddish beneath. Inflorescence stellate - hairy. Sepals rounded. Petals yellow, rounded. Drupe fleshy.

PACHMARHI : Vicinity (1000 m). In sal forests. Common.

Fl. & Fr. : February - May.

3. MANGIFERA L.

Mangifera indica L. Sp. Pl. 200. 1753; Hook. f. Fl. Brit. Ind. 2 : 13. 1876; Ramam. in Sald. & Nicol. Fl. Hassan 376. 1976. "Am".

Evergreen trees. Leaves oblong lanceolate, glabrous, coriaceous, 9-20 x 3-6 cm. Panicles terminal. Flowers polygamodioecious. Sepals ovate, hairy on back. Petals oblong, white. Disc 4-5 lobed. Drupes fleshy. Seeds compressed.

PACHMARHI : Vicinity (950 m.). In mixed forests on the hill slopes. Occasional.

Fl. & Fr. : January July.

4. RHUS L.

Rhus parviflora Roxb. Fl. Ind. 2 : 100. 1832; Hook. f. Fl. Brit. Ind. 2 : 9. 1876. "Tung".

Unarmed, tomentose shrubs. Leaves palmately 3-foliate; leaflets elliptic, oblong obovate or orbicular, irregularly crenate, coriaceous. Panicles very short. Sepals ovate, hairy outside. Petals oblong. Disc 5-lobed. Drupe ovoid, compressed, reddish brown.

PACHMARHI : Vicinity (1000 m.). BORI : Reserve forest (900 m.). In mixed forest. Common.

Fl. & Fr. : May July.

5. SEMECARPUS L. f.

Semecarpus anacardium L. f. Suppl. 182. 1781; Hook. f. Fl. Brit. Ind. 2 : 30. 1876; Ramam. in Sald. & Nicol. Fl. Hassan 378. 1976. "Bhela".

Trees. Leaves simple, 20 - 35 × 10 - 15 cm., broadly obovate oblong, rounded - acute, base truncate cordate, glabrous above, white-pubescent beneath. Flowers unisexual, yellowish. Disc villous. Drupe with plenty acrid juice.

PACHMARHI : Apsara Bihar (1000 m), Gahra Nala (900 m). In sal forest. Occasional.

Fl. & Fr. : June September.

32. PAPILIONACEAE Griseke

1a. Trees :

2a. Leaves 3 - foliolate :

3a. Leaves present at the time of flowering. Pods thin, strap - shaped, indehiscent ... *Dalbergia* 8

3b. Leaves more or less absent at the time of flowering.
Pods not as above :

4a. Fruit joined ... *Ougeinia* 19

4b. Fruit not joined :

5a. Keel petal much shorter than the vexillum. Flowers red ... *Erythrina* 10

5b. Keel petal longer than or equal to the vexillum. Flowers red, tinged with orange ... *Butea* 4

2b. Leaves with more than 3 leaflets :

6a. Leaves paripinnate ... *Sesbania* 24

6b. Leaves imparipinnate :

7a. Leaflets 18 - 35. Fruit moniliform ... *Calpurnea* 5

7b. Leaflets 5 - 9. Fruit not moniliform :

8a. Fruit nearly circular, flat ... *Pterocarpus* 22

8b. Fruit ovoid - oblong, beaked ... *Pongamia* 20

1b. Shrubs, herbs or climbers :

9a. Plants climbing or prostrate :

10a. Woody climbers :

11a. Leaflets 3 :

12a. Anthers dimorphic ... *Mucuna* 18

12b. Anthers uniform :

13a. Corolla exserted, standard spurred ... *Pueraria* 23

13b. Corolla not exserted, standard not spurred .. *Galactia* 12

11b. Leaflets more than 3 :

14a. Bracts reniform ... *Flemingia* 14

14b. Bracts not as above ... *Millettia* 17

10b. Herbs, prostrate or climbing :

15a. Hairs medifixed. Stamens apiculate ... *Indigofera* 13

15b. Hairs basifixed. Stamens not apiculate :

16a. Stamens 9, monadelphous. Seeds with black spot at hilum ... *Abrus* 1

16b. Stamens and seeds not as above :

17a. Leaflets glandular - punctate or with scattered resinous dots :

18a. Leaves 2 - foliolate ... *Zornia* 31

18b. Leaves 3 - foliolate ... *Atylosia* 3

17b. Leaflets not glandular - punctate and not with resinous dots :

19a. Fruit segments terete or subterete ... *Alysicarpus* 2

19b. Fruit segments flat or nearly so ... *Desmodium* 9

20a. Leaves paripinnate, rachis ending in a tendril or bristle :

21a. Leaflets serrate. Style glabrous ... *Cicer* 6

21b. Leaflets serrate. Style usually hairy ... *Lathyrus* 15

20b. Leaves imparipinnate or trifoliolate :

22a. Anthers dimorphic ... *Teramnus* 28

22b. Anthers uniform :

23a. Style divided
into a thin
basal part
and a thick
upper part ... *Vigna* 30

23b. Style uni-
formly thick,
not divided
into two dis-
tinct parts ... *Lathyrus* 14

9b. Plants erect (herbs or shrubs) :

24a. Leaves compound :

25a. Leaves paripinnate or palmately 2-foliolate :

26a. Stamens diadelphous (3) + (5).
Fruits jointed ... *Smithia* 25

26b. Stamens diadelphous (9) + (1).
Fruits not jointed ... *Lens* 16

25b. Leaves imparipinnate or unifoliolate :

27a. Leaflets 1 — 9 :

28a. Fruit jointed, segments flat or nearly
so, enclosed in calyx, not moniliiform ... *Uraria* 29

28b. Fruit not jointed or enclosed in
calyx, moniliiform ... *Sophora* 26

27b. Leaflets 9 — 21 ... (*Tephrosia* 27)

24b. Leaves simple :

29a. Stamens monadelphous ... *Crotalaria* 7

29b. Stamens diadelphous ... *Psoralia* 21

1. ABRUS Adans.

Abrus precatorius L. Syst. Nat. ed. 12. 472. 1767; Baker in Hook.
f. Fl. Brit. Ind. 2 : 175. 1876; Babu, Herb. Fl. Dehra Dun 114. 1977.
"Ghungchi".

Climbers. Leaves paripinnate ; leaflets 12 - 16 pairs. Racemes shorter than leaves. Corolla white, tinged with pink. Stamens 9, monadelphous. Seeds red with a black spot at hilum.

PACHMARHI : Vicinity (900 m). On hedges in clay loam under shade. Common.

Fl. & Fr. : September January

2. ALYSICARPUS Desv.

- 1a. Calyx-segments not over-lapping at base. Corolla exceeding the calyx. Calyx much shorter than the 2 lowermost joints of the pod :
 - 2a. Pod compressed. Stem hirsute ... *A. hamosus* 2
 - 2b. Pod turgid. Stem glabrous or with a single line of hairs ... *A. vaginalis* 3
- 1b. Calyx-segments distinctly overlapping at base. Corolla hardly exceeding the calyx. Calyx much longer than the 2 lowermost joints of the pod. ... *A. glumaceus* 1

1. *Alysicarpus glumaceus* (Vahl) DC. Prodr. 2 : 353. 1825 [non (Roth) Schindl. 1925] ; Babu, Herb. Fl. Dehra Dun 116. 1977. *Hedysarum glumaceus* Vahl, Symb. Bot. 2 : 106. 1791. *Alysicarpus rugosus* DC. var. *styracifolius* (DC.) Baker in Hook. f. Fl. Brit. Ind. 2 : 159. 1876.

Diffuse, dwarf plants. Stem finely pubescent. Leaflets small, oblong, obtuse, pubescent beneath. Racemes short, dense. Calyx 6 mm, hairy with distinctly ciliate edges.

BORI : Reserve forest (500 m). In hedges on waste lands. Abundant.

Fl. & Fr. : July - December

2. *Alysicarpus hamosus* Edgew. in Journ. Asiatic Soc. Beng. 21 : 171. 1853 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 157. 1876 ; Babu, Herb. Fl. Dehra Dun 116. 1977.

Prostrate, much-branched, hirsute, annual herbs. Leaves suborbicular, obtuse, cordate. Flowers bluish or purplish in lax racemes. Pods falcate oblong, 4-7-jointed.

BORI : Dhain (430 m). Among grasses along waysides. Common.

Fl. & Fr. : August November.

3. *Alysicarpus vaginalis* (L.) DC. Prodri. 2 : 353. 1825 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 158. 1876 (excl. var. *heterophyllum*) ; Babu, Herb. Fl. Dehra Dun 118. 1977. *Hedysarum vaginalis* L. Sp. Pl. 746. 1753.

Prostrate, annual herbs. Stem glabrate. Leaves ovate-rounded to oblong ; upper ones ovate-lanceolate with subcordate base and acute apex, hairy beneath. Flowers in lax racemes, red in colour. Pods 5-8-jointed, turgid.

PACHMARHI : Mahadev hill (1250 m). Amidst grasses on hill slopes. Common.

Fl. & Fr. : August December.

3. ATYLOSTIA Wt. & Arn

Atylosia scarabaeoides (L.) Baker in Hook. f. Fl. Brit. Ind. 2 : 215. 1876. *Dolichos scarabaeoides* L. Sp. Pl. 726. 1753. *Atylosia scarabaeoides* (L.) Benth. in Miq. Pl. Jungh. 242. 1852, nom. nud. ; Babu, Herb. Fl. Dehra Dun 121. 1977.

Climbing or trailing perennial herbs with rusty pubescence. Leaves trifoliate ; leaflets elliptic, elliptic obovate, velvety pubescent, gland-dotted. Racemes with 2-6 flowers clustered on short axillary peduncles. Corolla yellow, crimson externally. Pods 3-6 seeded, densely grey pubescent and glandular.

BORI : Reserve forest (550 m). On dark grey soil. Common.

Fl. & Fr. : August December.

4. BUTEA Roxb. ex Willd.

Ia, Tree. Lower calyx-teeth deltoid	... <i>B. monosperma</i> 1
Ib. Climber. Lower calyx-teeth lanceolate	... <i>B. superba</i> 2

1. *Butea monosperma* (Lamk.) Taub. in Engler & Prantl, Pflanzenfam. 3 (3) : 366. 1894 ; Gandhi in Sald. & Nicol. Fl. Hassan 238. 1976. *Erythrina monosperma* Lamk. Encycl. Meth. 2 : 391. 1788. *Butea frondosa* Koen. ex Roxb. in Asiat. Res. 3 : 369. 1792 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 194. 1876. "Dhak".

Tomentose, deciduous trees. Leaves pinnately 3 foliolate, long petioled ; leaflets rhomboid, retuse, rounded at base. Racemes 8-12 cm long. Flowers showy, flame coloured. Stamens 9 + 1. Pods stalked, rounded at base, 1 seeded.

PACHMARHI : Apsara Fall (900 m). BORI : Reserve forest (500 m). In sal forests and mixed teak forests. Common.

Fl. & Fr. : January - May.

2. *Butea superba* Roxb. Pl. Cor. 1 : 23, t. 22. 1795 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 195. 1876. "*Palaslata*".

Strong woody climbers. Leaves pinnately 3-foliate, long petiolated ; leaflets rhomboid, retuse, rounded at base. Racemes up to 30 cm. Flowers showy, flame-coloured. Stamens 9 + 1. Pods stalked, rounded at base, 1 seeded.

PACHMARHI : Vicinity (1000 m). In mixed forests. Occasional.

Fl. & Fr. : January - May.

5. CALPURNIA E. Mey.

Calpurnia aurea (Lamk.) Baker in Oliv. Fl. Trop. Afric. 2 : 252. 1835 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 251. 1878. *Virgulia aurea* Lamk. Ill. 2 : 454. 1793.

Small trees. Leaves imparipinnate ; leaflets 13-21, membranous, oblong, obtuse, glabrous. Flowers yellow ; petals equal in length. Stamens free. Pods pliable, 7-10 cm long, glabrous, 5-6 seeded.

PACHMARHI : Vicinity (1000 m). In waste lands. Occasional.

Fl. & Fr. : August - October.

6. CICER L.

Cicer arietinum L. Sp. Pl. 738. 1753 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 176. 1876 ; Babu, Herb. Fl. Dehra Dun 123, 1977. "Chana".

Much branched, annual herbs with glandular - pubescent branches. Leaves paripinnate ; leaflets 9-15 pairs, subopposite or alternate, serrate. Flowers pink, axillary, solitary. Pods turgid, 1-2 seeded.

BORI : Reserve forest (500 m). Escape from cultivated fields.

Fl. & Fr. : November - January.

7. CROTALARIA L.

- 1a. Leaves digitately 3 - foliolate ... *C. trifoliastrum* 6
- 1b. Leaves simple :
 - 2a. Inflorescence a terminal umbel or capitate, often with axillary flowers below :
 - 3a. Plant much branched. Inflorescence a terminal umbel ... *C. umbellata* 8
 - 3b. Plant unbranched. Inflorescence capitate ... *C. nana* 3
 - 2b. Inflorescence a raceme or flowers solitary :
 - 4a. Stipule absent :
 - 5a. Pods as long as the calyx ... *C. linifolia* 2
 - 5b. Pods longer than the calyx :
 - 6a. Pods hairy. Leaves elliptic-lanceolate, sparsely pubescent beneath ... *C. triquetra* 7
 - 6b. Pods glabrous. Leaves oblanceolate, densely pubescent beneath ... *C. obtusa* 1
 - 4b. Stipule present :
 - 7a. Bracts linear, subulate, 6 mm or less long ... *C. retusa* 4
 - 7b. Bracts ovate, 10 mm or more long ... *C. spectabilis* 5

1. *Crotalaria albida* Heyne ex Roth, Nov. Pl. Sp. 333. 1821 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 71. 1876 ; Babu, Herb. Fl. Dehra Dun 125. 1977.

Much branched herbs with silky pubescence. Leaves obovate, obtuse or emarginate, cuneate, glabrous above. Raceme terminal. Corolla equal to the calyx, glabrous. Pods glabrous, 2 - 5 seeded.

PACHMARHI : Dhupgarh (1250 m). On sandstone on the edges of forest. Common.

Fl. & Fr. : September December.

2. *Crotalaria Unifolia* Linn. f. Suppl. 322. 1781 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 72. 1876 ; Babu, Herb. Fl. Dehra Dun 127. 1977.

Erect herbs ; branches white-hairy. Leaves oblong-linear to oblanceolate. Flowers in terminal racemes, yellow. Pod quadrate, as long as the calyx. Seeds often 4.

PACHMARHI : Mahadev hill (1200 m). BORI : Churna (430 m). On wayside and waste places in the forest. Common.

Fl. & Fr. : July November.

3. *Crotalaria nana* Burm. f. Fl. Ind. 156. t. 48. f. 2. 1768 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 71. 1876, p.p.

Erect, hairy, unbranched herbs. Leaves oblong, obtuse, membranous, sparsely hairy above, densely below. Inflorescence capitate. Upper two calyx lobes nearly connate. Corolla equal to calyx, glabrous. Pods globose, glabrous, equal to calyx, few-seeded.

PACHMARHI : Vicinity (1000 m), *Saxena* s.n. (SFRI). In forest under growth. Rare.

Fl. & Fr. : September December.

4. *Crotalaria retusa* L. Sp. Pl. 715. 1753 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 75. 1876 ; Babu, Herb. Fl. Dehra Dun 129. 1977. "Ghunghunia".

Robust undershrubs with furrowed, hairy branches. Leaves obovate, cuneate, up to 20 × 3 cm, chartaceous. Flowers in racemes. Corolla w, glabrous. Pods up to 4×1.2 cm, many-seeded.

PACHMARHI : Vicinity (900m), Feb. '78, Part 27230. In roadside waste lands. Occasional.

Fl. & Fr. : January, December.

New record for the area.

5. *Crotalaria spectabilis* Roth, Nov. Pl. Sp. 341. 1821 ; Ali in Biologia 12 : 26 1966. *Crotalaria sericea* Retz. Obs. 5 : 26. 1789 (*non* Burm. f. 1768) ; Baker in Hook. f. Fl. Brit. Ind. 2 : 75. 1876 ; Babu, Herb. Fl. Dehra Dun 129. 1977. "Jhunjhunia".

Undershrubs with subglabrous branches. Leaves up to 15 cm long, oblong-lanceolate, acute, mucronate, glabrous above, finely pubescent beneath. Stipules large, leafy. Racemes 20 - 50 flowered, terminal. Bracts 10 - 20 mm, ovate, foliaceous. Upper teeth of calyx large, triangular. Corolla yellow with purplish tinge. Pods linear-oblong, glabrous, 20 - 30-seeded.

PACHMARHI : Apsara Falls (900 m). On sandy or black moist soil near streams. Abundant.

Fl. & Fr. : October, December.

6. *Crotalaria trifoliastrum* Willd. Sp. Pl. 3 : 983. 1803 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 82. 1876 ; Babu, Herb. Fl. Dehra Dun 130. 1977.

Erect, perennial undershrubs. Leaflets obovate - oblong, obtuse, glabrous above, silky beneath. Racemes 12 - 40 flowered. Calyx - lobes twice as long as the calyx-tube. Corolla yellow. Pods subquadangular, sessile, thinly silky.

BORI : Dhain (462 m). On black moist soil in the forest. Common.

Fl. & Fr. : October, December.

7. *Crotalaria triquetra* Dalz. in Hook. J. Bot. Kew. Gard. Misc. 2 : 34. 1850 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 71. 1876 ; Gandhi in Said. & Nicol. Fl. Hassan 244. 1976.

Suffruticose herbs. Branches slender, 3 - 4 angled. Leaves elliptic-lanceolate, obtuse, glabrous above, membranous. Racemes few - flowered. Corolla exserted, glabrous. Pods oblong, 15 - 20 seeded.

BORI : Dhain (462 m). In moist situations in the forest. Common.

Fl. & Fr. : October - February.

8. *Crotalaria umbellata* Wight ex Wt. & Arn. Prodri. 191. 1834 ; Gandhi in Sald. & Nicol. Fl. Hassan 244. 1976. *Crotalaria nana* sensu Baker in Hook. f. Fl. Brit. Ind. 2 : 71. 1876, p.p.

Erect, dark brown villous herbs. Leaves oblong, obtuse, membranous, sparsely hairy above, densely below. Inflorescence 8-12 flowered umbel. Upper two calyx lobes nearly connate. Corolla equal to calyx, glabrous. Pods equaling the calyx, globose, glabrous, few-seeded.

PACHMARHI : Vicinity (1000 m), *Saxena s.n.* (SFRI). In forest undergrowth. Rare.

Fl. & Fr. : September - November.

8. DALBERGIA L. f.

- | | | |
|--|-----|-------------------------|
| 1a. Stamens 9, monadelphous | ... | <i>D. sissoo</i> 3 |
| 1b. Stamens 10, isodiadelphous (5 + 5) : | | |
| 2a. Standard longer than broad | ... | <i>D. paniculata</i> 2 |
| 2b. Standard as long as broad : | | |
| 3a. Tree. Flowers in loose panicles | ... | <i>D. lanceolaria</i> 1 |
| 3b. Woody climber. Flowers in dense panicles | ... | <i>D. volubilis</i> 4 |

1. *Dalbergia lanceolaria* L. f. Suppl. 316. 1781 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 235. 1876 ; Gandhi in Sald. & Nicol. Fl. Hassan 245. 1976. "Takoli".

Large trees with smooth bark and glabrous branches. Leaflets 11-17, ovate, obovate or elliptic, glabrous, glaucous. Inflorescence large, terminal or axillary panicles having unilaterally arranged flowers. Calyx silky pubescent, upper teeth obtuse, lower three acute and longer. Corolla dull white or pinkish, standard as long as broad. Stamens 10 in groups of 5. Pods narrowed at both ends, glabrous, usually 1-seeded, stipitate.

PACHMARHI : Dhupgarh (1200 m). On the edge of the forest. Abundant.

Fl. & Fr. : May - July.

2. *Dalbergia paniculata* Roxb. Pl. Cor. t. 114. 1799 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 236. 1876 ; Gandhi in Sald. & Nicol. Fl. Hassan 246. 1976. "Phansi".

Deciduous trees. Leaflets 13 - 15, oblong or obovate. Corolla brown ; petals clawed except the standard. Stamens 5 + 5. Pods 7 × 1 cm. glabrous.

PACHMARHI : Vicinity (1000 m). In the mixed forest. Occasional.
Fl. & Fr. : April - September.

3. *Dalbergia sissoo* Roxb. Fl. Ind. 3 : 223. 1832 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 231. 1876 ; Ali in Fl. W. Pak. 100 : 56. 1977. "Shisham".

Trees with rough bark and young branches pubescent. Leaf imparipinnate ; leaflets 3 - 5, broadly ovate or suborbicular, acuminate. Inflorescence of axillary panicles of short spikes with sessile or subsessile flowers. Bracts pubescent, caducous. Calyx teeth ciliate, unequal. Corolla yellowish white. Stamens 9, monadelphous. Pods strap-shaped, glabrous, 1 - 4 seeded.

PACHMARHI : Vicinity (1000 m). In mixed forests and on roadsides. Common.

Fl. & Fr. : March - May.

4. *Dalbergia volubilis* Roxb. Pl. Cor. t. 191. 1805 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 235. 1876 ; Gandhi in Sald. & Nicol. Fl. Hassan 247. 1976.

Large woody climbers. Leaflets 7 - 11, oblong, obovate, obtuse. Flowers in dense panicles. Corolla purple, with wings and keel ; petals clawed at base. Stamens 5 + 5. Pods obtuse, glabrous, short - stalked.

PACHMARHI : Dhupgrah (1250 m). In mixed forest near moist situations. Common.

Fl. & Fr. : December - March.

9. DESMODIUM Desv.

1a. Leaves 1 - foliolate :

2a. Annual herb. Racemes lax ... *D. rotundifolium* 52b. Perennial undershrub. Racemes dense ... *D. velutinum* 6

1b. Leaves pinnately 3 - foliolate :

3a. Lateral leaflets much smaller than terminal one ... *D. motorium* 4

3b. Leaflets subequal :

4a. Stipules foliaceous, subamplexicaul. Pods indent-ed on both sutures ... *D. dichotomum* 1

4b. Stipules linear, scarious. Pods straight on one suture :

5a. Terminal leaflet more than 3 cm broad. Joints of pod indehiscent ... *D. laxiflorum* 35b. Terminal leaflet less than 2 cm broad. Joints of pod dehiscent ... *D. heterocarpon* 3

1. *Desmodium dichotomum* (Willd.) DC. Prodr. 2 : 336. (Nov.) 1825 ; Gandhi in Sald. & Nicol. Fl. Hassan 249. 1976. *Hedysarum dichotomum* Willd. Sp. Pl. 3 : 1180. 1802. *Hedysarum diffusum* Willd. 1. c. *Desmodium diffusum* (Willd.) DC. in Ann. Sci. Nat. Paris Ser. 1, 4 : 100. (Dec.) 1825 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 169. 1876.

Much-branched, 30 - 70 cm tall herbs ; stems deeply furrowed, hairy. Leaves 3 - foliolate ; leaflets elliptic, broadly ovate. Flowers in racemes, pink. Pods 3 - 6 - jointed ; joints clothed with hooked hairs.

BORI : Dhain (462 m). Along streams. Common.

Fl. & Fr. : September - January.

2. *Desmodium heterocarpon* (L.) DC. Prodr. 2 : 337. 1825 ; Gandhi in Sald. & Nicol. Fl. Hassan 249. 1976. *Hedysarum heterocarpon* L. Sp. Pl. 747. 1753. *Hedysarum polycarpum* Poir. in Lamk. Encycl. 6 : 413. 1805. *Desmodium polycarpum* (Poir.) DC. Prodr. 2 : 334. 1825 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 171. 1876.

Subscandent herbs or undershrubs. Leaf rachis 2 - 3 cm ; terminal leaflet less than 2 cm broad, elliptic-ovate to obovate, cuneate, pubescent

beneath ; side leaflets smaller. Raceme 4 - 10 cm long ; flowers 1 - 2 per bract. Corella blue. Pod linear, pubescent on both the sutures, 6 - 8 jointed.

BORJ : Reserve forest (550 m), Dhain (460 m). Amidst grass on slopes. Abundant.

Fl. & Fr. : September January.

3. *Desmodium laxiflorum* DC. in Ann. Sci. Nat. Paris, ser. 1, 4 : 100. 1825 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 164. 1876 ; Babu, Herb. Fl. Dehra Dun 134. 1977.

Pubescent undershrubs with quadrangular branches. Leaf rachis 7 cm long ; terminal leaflet 3 cm or more broad. Racemes long, with 2 - 5 flowers per bract. Standard white, other petals blue. Pod linear, sutures straight, 6 - 10 - jointed, joints indehiscent with hooked hairs.

BORI : Reserve forest (550 m), Dhain (462 m). In forest undergrowth. Common.

Fl. & Fr. : September November.

4. *Desmodium motorium* (Houtt.) Merr. in J. Arnold Arb. 19 : 345. 1938 ; Babu, Herb. Fl. Dehra Dun 135. 1977. *Hedysarum motorium* Houtt. Nat. Hist. 2 (10) : 246. 1779. *Hedysarum gyrans* L. f. Suppl. 332. 1781. *Desmodium gyrans* (L.f.) DC. Prodr. 2 : 326. 1825 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 174. 1876.

Erect undershrubs. Leaf rachis 2 cm long ; lateral leaflets much smaller than the terminal one. Inflorescence in terminal and axillary racemes. Bracts large, concealing the bud. Calyx teeth shorter than the tube. Petals pink. Pods 3 - 4 cm long, slightly falcate, dehiscing along the ventral suture.

PACHMARHI : Mahadev hill (1250 m). In forest undergrowth. Common.

Fl. & Fr. : August - October.

5. *Desmodium rotundifolium* Baker in Hook. f. Fl. Brit. Ind. 2 : 172. 1876.

Prostrate annual herbs, 10 - 30 cm long, covered with white pubescence, often tinged with red. Leaves orbicular. Racemes lax. Flowers pink. Pods compressed, slightly curved, 3 - 5 - jointed, glabrescent.

PACHMARHI : Vicinity (1000 m). In forest undergrowth and roadside. Common.

Fl. & Fr. : August October.

6. *Desmodium velutinum* (Willd) DC. Prodr. 2 : 328. 1825 ; Babu, Herb. Fl. Dehra Dun 139. 1977. *Hedysarum velutinum* Willd. Sp. Pl. 3 : 117. 1803. *Hedysarum latifolium* Roxb. Fl. Ind. 3 : 350. 1832. *Desmodium latifolium* (Roxb.) DC. Prodr. 2 : 328. 1825 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 168. 1878.

Erect or scandent undershrubs, all parts clothed with fulvous hairs. Leaves 1-foliolate, broadly ovate. Racemes dense. Flowers pink. Pods densely clothed with hooked hairs, 4-6-jointed.

BORI : Reserve forests (500 m). At the edges of teak forests in shade near streams. Common.

Fl. & Fr. : October January.

10. ERYTHRINA L.

1a. Calyx spathaceous, not at all 2-lipped, split half way down on one side ... *E. stricta* 1

1b. Calyx campanulate, more or less distinctly 2-lipped, not split ... *E. suberosa* 2

1. *Erythrina stricta* Roxb. Fl. Ind. 3 : 251. 1832 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 189. 1876; Gandhi in Sald. & Nicol. Fl. Hassan 253. 1976.

Deciduous trees armed with prickles. Leaf trifoliolate; leaflets rotundate. Calyx split half way down on one side. Corolla red. Pods subtergid, 2-3 seeded.

PACHMARHI : Vicinity (1000 m). In mixed forest. Occasional.

Fl. & Fr. : January May.

2. *Erythrina suberosa* Roxb. Fl. Ind. 3 : 253. 1832; Baker in Hook. f. Fl. Brit. Ind. 2 : 189. 1876; Ali in Fl. W. Pak. 100 : 235. 1977. "Madar".

Erect trees; branches armed with prickles. Leaves sometimes armed, trifoliolate; terminal leaflet rhomboid - ovate, the laterals obliquely deltoid, glabrous above, densely pubescent below. Racemes 1 - 4, near the branch tip. Flowers in fascicles of 1 - 3. Calyx pubescent, becoming bilabiate. Corolla scarlet. Pods stipitate, 12 - 15 cm long, 2 - 5 - seeded.

PACHMARHI : Vicinity (1000 m). In mixed forest. Occasional.

Fl. & Fr. : March - April.

II. FLEMINGIA Roxb. ex Ait.

1a. Leaves unifoliolate. Bracts enlarged, hiding the flowers :

2a. Plants erect. Leaf acute or acuminate ... *F. bracteata* 1

2b. Plants trailing. Leaf blunt, obtuse (rarely subacute). ... *F. fruticulosa* 2

1b. Leaves trifoliolate. Bracts not hiding the flowers :

3a. Inflorescence smaller than the petiole. Leaflets
ovate-oblong ... *F. macrophylla* 3

3b. Inflorescence equal to or longer than the petiole.
Leaflets broadly lanceolate ... *F. semialata* 4

1. *Flemingia bracteata* (Roxb.) Wt. Ic. Pl. Ind. Or. t. 268. 1840 ; Ali in Fl. W. Pak. 100 : 223. 1977. *Hedysarum bracteatum* Roxb. Fl. Ind. 3 : 351. 1832. *Flemingia strobilifera* (L.) R. Br. var. *bracteata* (Roxb.) Baker in Hook. f. Fl. Brit. Ind. 2 : 227. 1876. "Kusrunt".

Erect undershrubs ; branches pubescent. Leaves unifoliolate, ovate or oblong lanceolate, acute or acuminate, glabrous above, pubescent on the nerves below. Inflorescence in axillary and terminal branched racemes. Flowers in clusters hidden by distichously arranged bracts. Bracts reniform, broader than long, hirsute. Calyx pubescent, teeth exceeding the tube. Pods 7 - 12 cm long, pubescent, 2 - seeded.

PACHMARHI : Vicinity (1000 m). BORI : Reserve forest (550 m). In mixed forests. Common.

Fl. & Fr. : October December.

2. *Flemingia fruticulosa* Wall. ex Benth. in Miq. Pl. Jungh. 245. 1852; Ali in Fl. W. Pak. 100 : 225. 1977. *Flemingia strobilifera* (L.) R. Br. var. *fruticulosa* (Wall. ex Benth.) Baker in Hook. f. Fl. Brit. Ind. 2 : 227. 1876. "Kurunt".

Trailing undershrubs ; young branches tomentose. Leaf unifoliolate, elliptic, ovate or suborbicular, obtuse, rarely subacute, pubescent on the nerves and gland dotted on the under surface. Inflorescence a terminal raceme ; flowers in clusters, hidden by distichously arranged bracts. Bracts reniform, folded, broader than long. Calyx teeth exceeding the tube. Pods small, pubescent.

PACHMARHI : Vicinity (1000 m). In the forest under shade. Common.

Fl. & Fr. : August October.

3. *Flemingia macrophylla* (Willd.) Prain ex Merr. in Philipp. J. Sci. Bot. 5 : 130. 1910 ; Gandhi in Sald. & Nicol. Fl. Hassan 254. 1976. *Crotalaria macrophylla* Willd. Sp. Pl. 3 : 982. 1802. *Flemingia congesta* Roxb. ex Ait. Hort. Kew. ed 2 (4) : 349. 1812 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 228. 1876 (excl. vars.) ; Ali in Fl. W. Pak. 100 : 225. 1977. "Bara salpan".

Erect shrubs. Young branches pubescent. Leaf trifoliolate ; petiole 4-7 cm long ; leaflets ovate oblong, acute to obtuse. Inflorescence in dense axillary racemes, shorter than petiole. Bracts small, not hiding the flowers. Calyx pubescent, dotted with black glands, teeth much longer than the tube. Pods finely brown pubescent, eglandular, 2 seeded.

PACHMARHI : Mahadev hill (1250 m). On dry hill slopes. Common.

Fl. & Fr. : October December

4. *Flemingia semialata* Roxb. ex Ait. Hort. Kew. ed. 2 (4) : 349. 1812 ; Ali in Fl. W. Pak. 100 : 226. 1977. *Flemingia congesta* Roxb. ex Ait. var. *semialata* (Roxb. ex Ait.) Baker in Hook. f. Fl. Brit. Ind. 2 : 229. 1876.

Erect shrubs. Young branches densely hairy. Leaf trifoliolate; leaflets broadly lanceolate, acuminate, lateral ones oblique. Inflorescence axillary or terminal racemes, often branched, equal to or longer than petiole. Calyx densely hairy, teeth much longer than the tube. Pods pubescent, 2 seeded.

PACHMARHI : Vicinity (1000 m). In forest under shade. Common.

Fl. & Fr. : August September.

12. GALACTIA P. Br.

Galactia tenuiflora (Klein ex Willd.) Wt. & Arn. Prodr. 206. 1834; Baker in Hook. f. Fl. Brit. Ind. 2 : 192. 1876; Gandhi in Sald. & Nicol. Fl. Hassan 225. 1976. *Glycine tenuiflora* Klein ex Willd. Sp. Pl. 3 : 1059. 1802.

Twining herbs. Leaves usually pinnately trifoliolate; leaflets ovate lanceolate, subacute, truncate at base, shining above, silky beneath, chartaceous. Racemes axillary. Calyx lobes longer than tube, upper 2 connate, middle one of the lower 3 longer. Corolla reddish purple. Stamens 9 + 1. Pods linear, flat, subseptate between seeds, glabrescent.

PACHMARHI : Jatashankar (950 m), Jambudeep (1000 m). In sal forests. Occasional.

Fl. & Fr. : July - August.

13. INDIGORERA L.

- | | | |
|--|-----|-----------------------|
| 1a. Leaves 1 - foliolate. Pods 1 - seeded | ... | <i>I. linifolia</i> 2 |
| 1b. Leaves 3 - many - foliolate. Pods
2 - many - seeded : | | |
| 2a. Flowers in dense racemes.
Pods 2 - seeded | ... | <i>I. linnaei</i> 4 |

2b. Flowers in lax racemes. Pods more than 2 - seeded :

- 3a. Pods densely hairy. Flowers 5 mm long. Plants annual herbs ... *I. astragalina* 1
- 3b. Pods glabrous. Flowers 1 cm long. Plants perennial undershrubs ... *I. cassioides* 2

1. *Indigofera astragalina* DC. Prodr. 2 : 228. 1825 ; Babu, Herb. Fl. Dehra Dun 142. 1977. *Indigofera hirsuta* (auct. pl. non L. 1753) ; Baker in Hook. f. Fl. Brit. Ind. 2 : 98. 1876, p.p.

Erect, much branched, annual herbs covered with brown hairs. Stems quadrangular. Leaflets 7-9, obovate-rounded to oblong, obtuse, retuse, terminal one larger. Flowers in dense racemes. Corolla twice as long as the calyx. Pods 4-6 seeded.

BORI : Reserve forest (500 m). Amongst the grasses in the forest. Common.

Fl. & Fr. : September - December.

2. *Indigofera cassioides* Rottl. ex DC. Prodr. 2 : 225. 1825 ; Babu, Herb. Fl. Dehra Dun 143. 1977. *Indigofera pulchella* (auct. non Roxb. 1832) ; Baker in Hook. f. Fl. Brit. Ind. 2 : 101. 1876. "Sakena".

Erect, much branched hairy undershrubs. Stems slender, zig-zag. Leaflets 5-7, obovate, terminal one longer. Flowers in lax axillary racemes. Corolla purple, 1 cm long. Pods 8-12 seeded, glabrous.

PACHMARHI : Dhupgarh (1200 m), vicinity (1000 m).

BORI : Rohatgaon (500 m). In mixed forests on rocky hill slopes. Abundant.

Fl. & Fr. : July - December.

3. *Indigofera linifolia* (L. f.) Retz. Obs. 4 : 29. 1786 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 92. 1876 ; Babu, Herb. Fl. Dehra Dun 144. 1977. *Hedysarum linifolia* L. f. Suppl. 331. 1781. "Tarki". var. *linifolia*.

Silvery canescent, diffuse herbs. Leaves 1 foliolate, subsessile, lanceolate. Racemes 2-3 cm long, 6-8 flowered. Pods silvery, globose, mucronate, 1 seeded.

PACHMARHI : Vicinity (1000 m). BORI : Dhain (430 m). In the forest under shades. Abundant.

Fl. & Fr. : July December.

Var. *campbellii* Wt. Ic. t. 313. 1840 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 93. 1876.

Leaves obovate, obtuse, 6-10 x 2-3 mm, mucronate, glaucous. Flowers axillary, solitary.

BORI : Dhain (430 m). On loamy soil under shade in ditches and dry river bed. Abundant.

Fl. & Fr. : July December.

4. *Indigofera linnaei* Ali in Bot. Notiser 111 : 549. 1958 ; Babu, Herb. Fl. Dehra Dun 144. 1977. *Hedysarum prostratum* L. Mant. 1 : 102. 1767. *Indigofera enneaphylla* L. Mant. Alt. 272, 571. 1771, *nom. superfl.* ; Baker in Hook. f. Fl. Brit. Ind. 2 : 94. 1876. "Laihai"

Trailing, much branched, slender, pubescent herbs. Leaves imparipinnate, leaflets 5-7, alternate, obovate. Inflorescence dense racemes, 10-15 flowered. Pods subovoid, hairy, 2 seeded.

PACHMARHI : Vicinity (1000 m). Along the pathways in the forest. Common.

Fl. & Fr. : July October.

14. LABLAB Adans.

Lablab purpureus (L.) Sw. Hort. Brit. ed. 1 : 481. 1927 ; Ali in Fl. W. Pak. 100 : 251. 1977. *Dolichos purpureus* L. Sp. Pl. ed. 2 : 1021. 1763. *Dolichos lablab* L. Sp. Pl. 725. 1753 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 209. 1876.

Climbing perennial or annual (under cultivation) herbs. Leaves stipulate, pinnately trifoliolate. Inflorescence axillary. Calyx bilipped, upper entire, lower 3-lobed. Corolla reddish-purple. Stamens 9+1. Pods up to 10 cm long, up to 4 cm broad, 2-5 seeded.

BORI Reserve forest (550 m). An escape from cultivation.

Fl. & Fr. : November - June.

15. LATHYRUS L.

Lathyrus sativus L. Sp. Pl. 730. 1753 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 279. 1876 ; Babu, Herb. Fl. Dehra Dun 147. 1977. "Khesari".

Glabrous annuals with winged stem. Leaves paripinnate ; leaflets narrowly lanceolate to linear ; median and upper leaves with 3 short tendrils. Flowers axillary, solitary. Calyx teeth subequal. Corolla blue. Pods 3-5 seeded ; upper suture broadly winged.

BORI : Reserve forest (500 m). Cultivated.

Fl. & Fr. : December March.

16. LENS Mill.

Lens culinaris Medic. in Vorles Churpf. Phys. Ges. 2 : 361. 1787 ; Babu, Herb. Fl. Dehra Dun 148. 1977. *Ervum lens* L. Sp. Pl. 738. 1753 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 179. 1876. "Masur".

Small, erect, hairy herbs branching from the base. Rachis ending in a short bristle, sometimes in a tendril. Leaflets 4-7 pairs, pilose on both sides, entire, tip truncate to retuse, apiculate. Inflorescence peduncled, 1-4 flowered. Calyx pilose, teeth subequal, acute. Corolla pale purple. Pods glabrous, 2 seeded, compressed.

BORI : Reserve forest (500 m). Cultivated.

Fl. & Fr. : December March.

17. MILLETTIA Wt. & Arn.

Millettia extensa Benth. in Miq. Pl. Jungh. 249. 1852 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 109. 1876 ; Ali in Fl. W. Pak. 100 : 52. 1977. "Caw".

Woody climbers. Leaves imparipinnate ; leaflets 7-9, ovate oblong, shortly acuminate, silky on both sides. Flowers in racemes. Calyx densely hairy, teeth small. Corolla greenish yellow, pubescent. Pods up to 15 cm long, 3 cm broad, velvety when young, 6-8 seeded.

PACHMARHI : Vicinity (1000 m). BORI : Dhain (413 m). In Teak-bamboo forest on hill slopes. Abundant.

Fl. & Fr. : April -July ; October February

18. MUCUNA Adans.

Mucuna pruriens (L.) DC, Prodr. 2 : 405. 1825 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 187. 1876 ; Babu, Herb. Fl. Dehra Dun 153. 1977. *Dolichos pruriens* L. in Stickman Diss. Herb. Amb. 23. 1754. "Kiwach".

Large twiners, hairy in young stage. Leaves trifoliolate. Leaflets ovate, lateral ones oblique, acute or acuminate, pubescent on both sides. Flowers in axillary, drooping racemes, dark - purple. Pods 'S' shaped, densely covered with irritant bristles.

BORI : Reserve forest (550 m). In clayey soil in the forest. Common.

Fl. & Fr. : October January.

19. OUGEINIA Benth.

Ougeinia oojeinensis (Roxb.) Hochr. in Ann. Cons. Jard. Bot. Geneve 13 & 14 : 51. 1909 ; Ali in Fl. W. Pak. 100 : 341. 1977. *Dalbergia oojeinensis* Roxb. Fl. Ind. 3 : 220. 1832. *Ougeinia dalbergioides* Benth. in Miq. Pl. Jungh. 216. 1852 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 161. 1876. "Sandan"/"Tinsa"

Deciduous trees with thin grey or light brown bark. Leaves pinnately trifoliolate ; leaflets broadly elliptic or obliquely ovate, acute. Inflorescence fascicled racemes at older nodes. Calyx pubescent, lobes shorter than the tube. Pods flat, jointed ; joints reticulately veined.

PACHMARHI : Mahadev hill (1250 m). In mixed forest on hill slopes. Common.

Fl. & Fr. : February May.

20. PONGAMIA Vent.

Pongamia pinnata (L.) Pierre, Fl. For. Cochinch. t. 385. 1899 ; Ali in Fl. W. Pak. 100 : 55. 1977. *Cytisus pinnatus* L. Sp. Pl. 741. 1753. *Pongamia glabra* Vent. Jard. Malm. 1 : 28. t. 28. 1803 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 240. 1876. "Karant".

Glabrous trees with spreading branches. Leaves imparipinnate ; leaflets 5-9, elliptic, ovate oblong, acute-acuminate. Racemes shorter than the leaves. Calyx pubescent, obscurely toothed. Corolla white, tinged violet or pinkish. Pods obliquely oblong, woody, indehiscent, 1-seeded.

PACHMARHI : Vicinity (1000 m). BORI : Reserve forest (550 m). In mixed forest and roadside. Common.

Fl. & Fr. : April May.

21. PSORALEA L.

Psoralea corylifolia L. Sp. Pl. 764. 1753 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 103. 1876 ; Ali in Fl. W. Pak. 100 : 215. 1977. "Babchi".

Erect, pubescent annual herbs. Leaves alternate, unifoliolate, cordate, rarely ovate, margin dentate, obtuse, subtruncate, mucronate, pubescent on both sides. Inflorescence a raceme of 3 flowers in the axil of each bract. Calyx bilabiate, upper lip formed of 4 teeth, lower 1. Petals all clawed. Pods ovoid, glabrous, black, 1-seeded.

BORI : Reserve forest (550 m). On black clayey soil in the forest. Abundant.

Fl. & Fr. : August December.

22. PTEROCARPUS Jacq.

Pterocarpus marsupium Roxb. Pl. Cor. t. 116. 1799 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 239. 1876 ; Gandhi in Sald. & Nicol. Fl. Hassan 261. 1976. "Bijasal".

Tall trees. Leaves imparipinnate ; leaflets elliptic - ovate, coriaceous. Panicles terminal. Flowers with dark brown calyx and yellow corolla. Pods orbicular, winged all around, inflated, biconvex.

PACHMARHI : Vicinity (1000 m). BORI : Reserve forest (550 m). In mixed forest. Abundant.

Fl. & Fr. : July January.

23. PUERARIA DC.

Pueraria tuberosa (Roxb. ex Willd.) DC. in Ann. Sci. Nat. 4 : 97. 1825 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 197. 1876 ; Ali in Fl. W. Pak. 100 : 234. 1927. *Hedysarum tuberosum* Roxb. ex Willd. Sp. Pl. 3 : 1197. 1803. "Sural".

Perennial twiners ; roots tuberous ; young branches pubescent. Leaves pinnately trifoliolate ; terminal leaflet broadly ovate, equal sided, acuminate ; the laterals ovate oblong, very oblique, acuminate, silky pubescent beneath. Flowers in axillary or terminal racemes or panicles. Calyx densely silky, teeth shorter than the tube, 2 upper teeth connate. Corolla blue. Pods constricted between the seeds, densely hairy, 3-6 seeded.

PACHMARHI : Mahadev hill (1250 m). In the mixed forest. Occasional.

Fl. & Fr. : March April.

24. SESBANIA Adans. Mut. Scop.

Sesbania bispinosa (Jacq.) W.F. Wight in U.S. Dept. Agr. Bur. Pl. Ind. Bull. 137 : 15. 1909 ; Babu, Herb. Fl. Dehra Dun 161. 1977. *Aeschynomene bispinosa* Jacq. Ic. Pl. Rat. 3 : 13. t. 564. 1793. *Coronilla aculeata* Willd. Sp. Pl. 3 : 1147. 1803. *Sesbania aculeata* (Willd.) Poir. in Lamk. Encycl. 7 : 128. 1806 (*Sesban aculeatus*) ; Baker in Hook. f. Fl. Brit. Ind. 2 : 114. 1876 (excl. vars.). "Dhunchi".

Erect, sparingly branched annual herbs with prickly stems. Leaves paripinnate, rachis aculeate ; leaflets 20 - 50 pairs, alternate or subopposite. Flowers yellow with black spots outside, in axillary racemes. Pods 15 - 25 cm long, 20 - 40 - seeded.

BORI : Reserve forest (550 m). In moist situations among the grasses. Common.

Fl. & Fr. : October December.

25. SMITHIA Ait.

1a. Calyx-lips not very densely parallel-veined with nerves branched near their ends. Flowers in terminal heads or panicle :

2a. Flowers in terminal globose heads. Bracteoles minute. Corolla half as long as the calyx ... *S. pycnantha* 3

2b. Flowers in terminal panicles. Bracteoles half as long as the calyx. Corolla twice as long as the calyx. ... *S. blanda* 1

1b. Calyx-lips densely parallel-veined with unbranched free nerves. Flowers axillary ... *S. conferta* 2

1. *Smithia blanda* Wt. & Arn. Prodr. 221. 1834 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 151. 1876.

Perennial, suffruticose, bristly herbs. Leaves paripinnate ; leaflets 6-10, obtuse, bristle tipped. Racemes terminal, forming a panicle. Calyx densely bristled ; lips equal, upper broad, truncate. Corolla twice the calyx. Lomenta 5-6-jointed.

BORI : Reserve forest (900 m). In the forest undergrowth. Common.

Fl. & Fr. : September - November.

2. *Smithia conferta* J. E. Smith in Rees, Cyclop. 33. n. 2. 1816 ; Babu, Herb. Fl. Dehra Dun 162. 1977. *Smithia geminiflora* Roth, Nov. Pl. Sp. 352. 1821 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 149. 1876.

Prostrate annual herbs. Leaf rachis up to 3 cm long ; leaflets 4-6 pairs. Calyx rigid, lips entire, subequal. Flowers in leaf axils. Lomenta with turgid joints, round, papillose.

PACHMARHI : Jambudeep (900 m). BORI : Reserve forest (430 m). In moist situations along water courses. Abundant.

Fl. & Fr. : September - February.

3. *Smithia pycnantha* Benth. ex Baker in Hook. f. Fl. Brit. Ind. 2 : 150. 1876.

Erect, bristly annual herbs. Leaves paripinnate ; rachis 1 — 1.2 cm long ; leaflets 6 - 8, linear. Flowers in globose heads formed of congested racemes. Calyx with black glands, lips equal, truncate. Corolla half as long as calyx. Lomenta 5 - 6 - jointed.

PACHMARHI : On way to Dhupgarh (1050 m), Saxena 1042 (SFRI) Along road sides. Rare.

Fl. & Fr. : September November.

26. SOPHORA L.

Sophora interrupta Bedd. Forest Man. Bot. 90. 1872 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 251. 1878.

Erect shrubs. Leaves imparipinnate ; leaflets 19 - 29, obtuse, emarginate, a few hairs beneath. Racemes axillary, peduncled, shorter than the leaves. Flowers large, yellow, developing together with the leaves ; pedicels twice the length of the calyx. Calyx oblique. Pods 7 - 10 cm long, glabrous, 5 - 6 - jointed ; joints with four distinct wings.

PACHMARHI : Dhupgarh (1200 m), vicinity (1000 m). BORI : Reserve forest (900 m). In the forest on hill slopes. Common.

Fl. & Fr. : June February.

27 TEPHROSIA Pers.

Tephrosia purpurea (L.) Pers. Syn. Pl. 2 : 329. 1807 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 112. 1876 ; Ali in Fl. W. Pak. 100 : 63. 1977. *Cracca purpurea* L. Sp. Pl. 752. 1753. "Dhamasia".

Annual biennial, erect herbs. Leaves imparipinnate ; leaflets 9 - 21, elliptic oblong, obtuse or truncate, mucronate, silky below. Flowers usually in leaf - opposed racemes. Calyx pubescent. Corolla reddish purple or bright pink. Pods pubescent, 6 - 9 seeded.

PACHMARHI : Vicinity (1000 m). In the mixed forest. Occasional.

Fl. & Fr. : July December.

28. TERAMNUS P. Br.

- Ia. Stem and pod clothed with a few short hairs. Calyx teeth as long as the tube ... *T. labialis* 1
 Ib. Stem and pod clothed with long hairs. Calyx teeth shorter than the tube ... *T. mollis* 2

1. *Teramnus labialis* (L. f.) Spreng. Syst. 3 : 235. 1826 ; Baker in Hook. f. Fl. Brit. Ind., 2 : 184. 1876, p. p. *Glycine labialis* L. f. Suppl. 325. 1781. "Mashoni".

Woody twiner clothed with short appressed white hairs. Leaves 3 - foliolate ; leaflets elliptic. Flowers in axillary lax racemes, white when fresh turning to pale red on withering. Pods linear, flat, 3 - 12 seeded.

BORI : Reserve forest (450 m). Along roadside among the grasses. Occasional.

Fl. & Fr. : September November.

2. *Teramnus mollis* Benth. in J. Linn. Soc. Bot. 8 : 265. 1865 (non *Glycine mollis* Wt. & Arn. Prodr. Fl. Pen. Ind. Or. 209. 1834) ; Gandhi in Sald. & Nicol, Fl. Hassan 266. 1977. *Teramnus labialis* (L. f.) Spreng. var. *mollis* (Benth.) Baker in Hook. f. Fl. Brit. Ind. 2 : 184. 1876.

Climbing herbs. Leaves 3 foliolate; rachis 4 cm, clothed with long hairs; leaflets subequal, elliptic ovate, subacute, truncate at base, hairy on nerves above, appressed hairy beneath, membranous. Racemes up to 10 cm long. Corolla reddish. Pods linear, flat, clothed with long hairs, 3 - 12 seeded.

PACHMARHI : Vicinity (1000 m). Along roadsides in clayey soil. Common.

Fl. & Fr. : July December.

29. URARIA Desv.

- Ia. Upper leaves 5 - 9 - foliolate. Pods glabrous ... *U. picta* 1
 Ib. All leaves 1 - 3 - foliolate. Pods hairy ... *U. rufescens* 2

1. *Uraria picta* (Jacq.) Desv. ex DC. Prodr. 2 : 324. 1825 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 135. 1876 ; Babu, Herb. Fl. Dehra Dun 169. 1977. *Hedysarum pictum* Jacq. Coll. 2 : 262. 1789. "Dabra".

Erect perennial undershrubs ; branches pubescent. Lower leaves 1 - 3 - foliolate, upper 5 - 9 - foliolate ; leaflets linear - lanceolate. Stipules

lanceolate. Corolla exserted, purple. Pods glabrous, 3-6-jointed, folded on one another.

BORI : Dhain (436 m). In the open forest on hillocks among the grasses. Common.

Fl. & Fr. : September - November.

2. *Uraria rufescens* (DC) Schindl. in Fedde Report. 21 : 14. 1925
Babu, Herb. Fl. Dehra Dun 170. 1977. *Desmodium rufescens* DC. in Ann. Sci. Nat. Paris 4 : 101. 1825. *Doodia hamosa* Roxb. Fl. Ind. 3 : 367. 1832. *Uraria hamosa* (Roxb.) Wt. & Arn. Prodr. 222. 1834 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 156. 1876.

Prostrate perennial herbs, branches hairy. Leaves 1-3-foliolate ; leaflets ovate-oblong, obtuse. Racemes lax, combined into a terminal panicle. Corolla bluish-violet. Pods 3-6-jointed, glandular hairy.

BORI : Reserve forest (430 m). On river bank. Occasional.

Fl. & Fr. : September - December.

30. VIGNA Savi

- | | | |
|---|-----|--|
| 1a. Leaflets definitely lobed | ... | <i>V. trilobata</i> 4 |
| 1b. Leaflets entire or slightly lobed : | | |
| 2a. Stipules not produced below the point of attachment. Fruits covered with dark brown hairs | ... | <i>V. vexillata</i> 7 |
| 2b. Stipules produced below the point of attachment. Fruits covered with black hairs or glabrous : | | |
| 3a. Fruits with black hairs : | | |
| 4a. Pods 4-5 cm long; rim aril round the hilum of the seed distinctly raised. Colour of the seeds dirty green | ... | <i>V. mango</i> 2 |
| 4b. Pods 4-9 cm long; rim aril round the hilum of the seed less raised. Colour of the seeds light green : | | |
| 5a. Stem mostly erect. Leaflets usually entire. Fruits and seeds usually longer ... | | <i>V. radiata</i> 3
(a) var. <i>radiata</i> |
| 5b. Stem twining or prostrate. Leaflets frequently lobed. Fruits and seeds usually smaller ... | | <i>V. radiata</i> 3
(b) var. <i>sublobata</i> |

3b. Fruits glabrous, subglabrous or minutely hairy :

6a. Fruits 10 cm or more long ... *V. unguiculata* 6

6b. Fruits less than 10 cm long :

7a. Stipules 4 mm or less long. Flowers
5 - 6 mm long ... *V. dalzelliana* 1

7b. Stipules 5 mm or more long. Flowers
9 - 12 mm long ... *V. umbellata* 5

1. *Vigna dalzelliana* (O. Kuntze) Verdc. in Kew Bull. 24 : 558. 1970; Ali in Fl. W. Pak. 100 : 247. 1977. *Phaseolus dalzellianus* O. Kuntze, Rev. Gen. Pl. 202. 1891. *Phaseolus pauciflorus* Dalzell in Hook. Kew J. 3 : 209. 1851 (*non* Sesse & Moc. ex G. Don, 1832 *nec* Benth. 1837); Baker in Hook. f. Fl. Brit. Ind. 2 : 202. 1876.

Twining or creeping herbs with glabrous stem. Leaves trifoliolate; lateral leaflets oblique, ovate or rhomboid ovate, sometimes lobed, pubescent. Stipules produced below the point of attachment. Inflorescence capitate racemes. Calyx glabrous; teeth shorter than the tube, the upper two mostly connate. Corolla yellow. Pods 3 - 5 cm long, beaked, glabrous, 8 - 10 - seeded.

BORI : Dhain (462 m). Along pathways amongst the grasses. Common.

Fl. & Fr. : September - October.

2. *Vigna mungo* (L.) Hepper in Kew Bull. 11 : 128. 1956; Ali in Fl. W. Pak. 100 : 250. 1977. *Phaseolus mungo* L. Mant. I : 101. 1767; Baker in Hook. f. Fl. Brit. Ind. 2 : 203. 1876, p.p. "Urd".

Climbing or erect, pubescent herbs; hairs brown, stiff, spreading. Stipules peltate produced below the point of attachment. Leaves trifoliolate; leaflets elliptic-ovate. Peduncles many-flowered. Corolla yellow. Pods covered with long hairs; the rim-are distinctively raised around the hilum of the seeds which are dirty green in colour.

PACHMARHI : Vicinity (1000 m). Roadside, as an escape. Common.

Fl. & Fr. : October - November.

3. *Vigna radiata* (L.) Wilczek in Fl. Congo Belge. 6 : 386. 1954; Ali in Fl. W. Pak. 100 : 248. 1977. *Phaseolus radiatus* L. Sp. Pl. 725. 1753. *Phaseolus mungo* L. var. *radiatus* (L.) Baker in Hook. f. Fl. Brit. Ind. 2 : 203. 1876. "Mung".

Twining or suberect, hairy herbs. Stipules peltate, ovate, produced below the point of attachment. Leaves trifoliolate; leaflets elliptic - ovate. Peduncles many flowered. Corolla yellow; keel curled upwards. Pods 4 - 9 cm long, linear cylindrical, 8 - 14 seeded.

(a) var. *radiata*

Stem mostly erect. Leaflets usually entire. Pods and seeds usually larger towards the upper limit of the range.

PACHMARHI : Vicinity (1000 m). Found as escape.

Fl. & Fr. : September December.

(b) var. *sublobata* (Roxb.) Verdc. in Kew Bull. 24 : 559. 1970. *Phaseolus sublobatus* Roxb. Fl. Ind. 3 : 288. 1832. *Phaseolus trinervis* Wt. & Arn. Prodr. Fl. Pen. Ind. Or. 245. 1834; Baker in Hook. f. Fl. Brit. Ind. 2 : 203. 1876.

Stem twining or prostrate. Leaflets frequently lobed. Pods and seeds usually smaller, towards the lower limit of the range.

PACHMARHI : Vicinity (1000 m). BORI : Reserve forest (450 m). Found as escape in the forest and wastelands.

Fl. & Fr. : September December.

4. *Vigna trilobata* (L.) Verdc. in Taxon 17 : 172. 1968; Ali in Fl. W. Pak. 100 : 244. 1977. *Dolichos trilobata* L. Mant. 1 : 101. 1967. *Phaseolus trilobus* sensu Baker in Hook. f. Fl. Brit. Ind. 2 : 201. 1876. "Mugam".

Trailing or prostrate, annual or perennial herbs. Leaves trifoliolate; leaflets usually 3 - lobed; the middle lobe bigger, oblong, broadly spathulate, obtuse; lateral lobes oblong, broadly spathulate, obtuse or subacute. Peduncle few-flowered. Calyx glabrous; teeth minute. Corolla yellow. Pods cylindrical, sparingly pubescent, 6 - 12-seeded.

PACHMARHI : Vicinity (1000 m). Along roadside moist places. Occasional.

Fl & Fr. : October - December.

5. *Vigna umbellata* (Thunb.) Ohwi & Ohashi in J. Jap. Bot. 44 : 31. 1968; Ali in Fl. W. Pak. 100 : 248. 1977. *Dolichos umbellatus* Thunb. in Trans. Linn. Soc. 2 : 339. 1794. *Phaseolus calcaratus* Roxb. Fl. Ind. 3 : 289. 1832; Baker in Hook. f. Fl. Brit. Ind. 2 : 203. 1876. "Sutri".

Climbing, densely pubescent herbs. Stipules peltate, lanceolate. Leaves pinnately trifoliolate; leaflets ovate acuminate. Peduncles few-flowered; bracteoles linear. Corolla yellow, all petals long clawed. Staminal tube cordate at base. Pods compressed, glabrous, 5 - 9 cm long, 8 - 12 seeded.

PACHMARHI : Vicinity (1000 m). Along roadsides in moist places. Occasional.

Fl. & Fr. : September November.

6. *Vigna unguiculata* (L.) Walp. Rep. Bot. Syst. 1 : 779. 1842 ; Babu, Herb. Fl. Dehra Dun 172. 1977. *Dolichos unguiculata* L. Sp. Pl. 725. 1753. *Dolichos catjang* Burm. f. Fl. Ind. 161. 1768. *Vigna catjang* (Burm. f.) Walp. in Linnaea 13 : 53. 1839 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 205. 1876. "Lobia".

Twining or subcreep, glabrous, annual herbs. Stems angular, often tuberculate. Leaf trifoliolate; leaflets ovate rhomboid to oblong, acuminate. Stipules ovate lanceolate. Flowers in 2 - 12 flowered axillary peduncles. Calyx segments lanceolate, acuminate. Stipules ovate lanceolate. Corolla white, greenish yellow or purple. Pods 20 - 30 cm long, glabrous, 6 - 8 seeded.

PACHMARHI : Vicinity (1000 m). Along the roadsides in moist situations as escape. Common.

Fl. & Fr. : September December.

7. *Vigna vexillata* (L.) A. Rich. Hist. Fis. Polit. nat. 1. Cuba (Spanish ed.) 11 : 191. 1845 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 206. 1876 ; Babu, Herb. Fl. Dehra Dun 173. 1977. *Phaseolus vexillatus* L. Sp. Pl. 724. 1753.

Climbing or trailing, glabrescent, perennial herbs. Leaves trifoliolate; leaflets ovate to lanceolate, acute or acuminate. Inflorescence 2 - 6-flowered, axillary, sub umbellate. Calyx pubescent, upper pair of teeth partially connate. Corolla yellow, pink or purple, glabrous. Pods 4 - 14 cm long, covered with stiff, dark brown hairs ; 10 - 18 seeded.

PACHMARHI : Mahadev hill (1200 m). In sal forest along the edges. Common.

Fl. & Fr. : September October.

31. ZORNIA J.F. Gmel.

Zornia gibbosa Span. in Linnaea 15 : 192. 1841 ; Babu, Herb. Fl. Dehra Dun 173. 1977. *Zornia diphylla* [auct. non (L.) Pers] ; Baker in Hook. f. Fl. Brit. Ind. 2 : 147. 1876.

Prostrate or ascending, glabrous or pubescent annual herbs. Leaves bifoliolate ; leaflets lanceolate with black glands. Racemes 3-12-flowered. Corolla yellow ; standard cordate. Pods 1-6-jointed, indehiscent, echinate.

PACHMARHI : Mahadev hill (1250 m). BORI : Dhain (430 m). In sandy soil. Common.

Fl. & Fr. : September - October.

33. CAESALPINIACEAE R. Br.

1a. Leaves bipinnate. Leaf rachis armed	..	<i>Caesalpinia</i> 2
1b. Leaves unipinnate or simple. Leaf rachis not armed :		
2a. Leaves simple, 2-toothed	..	<i>Bauhinia</i> 1
2b. Leaves unipinnate :		
3a. Petals absent. Anthers versatile. Pods - 1-seeded		<i>Hardwickia</i> 4
3b. Petals present. Anthers mostly basifix. Pods more than 1-seeded	..	<i>Cassia</i> 3

1. BAUHINIA L.

1a. Fertile stamens 10 :		
2a. Calyx spathaceous. Flowers in lax racemes. Pods not long-beaked	..	<i>B. racemosa</i> 2
2b. Calyx 5-clawed. Flowers in short corymbs. Pods long-beaked	..	<i>B. malabarica</i> 1

1b. Fertile stamens 3 - 5 :

- | | | |
|--|-----|-----------------------|
| 3a. Petals densely silky. Climbers with tendrils | ... | <i>B. vahlii</i> 3 |
| 3b. Petals glabrous. Erect trees | ... | <i>B. variegata</i> 4 |

1. ***Bauhinia malabarica*** Roxb. Fl. Ind. 2 : 321. 1832 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 277. 1878. "Amlī".

Deciduous, small, bushy trees. Leaves broader than long, 4 × 5 cm, deeply cleft. Flowers in short corymbs. Calyx 5 cleft. Petals spatulate, equal. Stamens 10, all fertile. Pods long beaked.

PACHMARHI : Kanjighat (950 m). BORI : Reserves forest (550 m) ; Dhain (430 m). In the forest on hill slopes. Common.

Fl. & Fr. : October - May.

2. ***Bauhinia racemosa*** Lamk. Encycl. I : 390. 1785 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 276. 1878 (excl. syns.) ; Gandhi in Said. & Nicol. Fl. Hassan 217. 1976.

Deciduous, bushy, small trees. Leaves 3 × 4 cm. Hypanthium short; limbs spathaceous. Flowers in short lax racemes. Stamens 10. Pods glabrous.

PACHMARHI : Vicinity (1000 m). BORI : Reserve forest (550 m). In mixed and sal forests. Common.

Fl. & Fr. : March - February.

3. ***Bauhinia vahlii*** Wt. & Arn. Prodr. 297. 1834 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 297. 1878 ; Ali in Fl. W. Pak. 54 : 3. 1973. "Maljan".

Huge climbers, branches densely hairy, tendrils circinate, opposite to leaves. Leaves alternate, long-petioled, lobed at apex, cordate at base, orbicular in shape, densely hairy beneath. Flowers in terminal subcorymbose racemes. Petals white, turning to buff. Fertile stamens 3. Pods woody, 20 - 30 cm long, rusty velvety.

PACHMARHI : Vicinity (1000 m) ; Dhupgarh (1200 m). BORI : Reserve forest (550 m). In sal forest and mixed teak forest. Common.

Fl. & Fr. : April June.

4. ***Bauhinia variegata*** L. Sp. Pl. 375. 1753; Baker in Hook. f. Fl. Brit. Ind. 2 : 284. 1878 ; Ali in Fl. W. Pak. 54 : 5. 1973. "Kachnar".

Deciduous, medium sized trees. Leaves orbicular, with a median cleft; lobes obtuse, base heart-shaped. Flowers in pubescent racemes. Hypanthium slender. Calyx tomentose, 5 toothed. Petals white or variegated with purple. Fertile stamens 5. Pods flat, dehiscent, 10–15 seeded.

PACHMARHI : Vicinity (1000 m). In mixed forests on slopes. Occasional.

Fl. & Fr. : February April.

2. CAESALPINIA L.

Caesalpinia decapetala (Roth) Alston in Trimen, Handb. Fl. Ceylon 6, Suppl. 89. 1931 ; Gandhi in Said. & Nicol. Fl. Hassan 218. 1976. *Richardia decapetala* Roth, Nov. Pl. Sp. 212. 1821. *Caesalpinia sepiaria* Roxb. Fl. Ind. 2 : 360. 1832 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 256. 1878.

Scandent or scrambling shrub; branches and leaf rachises armed with recurved prickles. Stipules ovate, acute, deciduous. Leaflets 8–10 pairs, obtuse at both ends. Racemes simple. Pods falcate-oblong, smooth, brown, 6–8 seeded.

PACHMARHI : Vicinity (900 m). At the edges of forests and on roadsides. Occasional.

Fl. & Fr. : All seasons.

3. CASSIA L.

1a. Sepals broad, obtuse :

2a. Pods indehiscent ... *C. fistula* 1

2b. Pods dehiscent :

3a. Leaf petiole with one large gland at the base ... *C. occidentalis* 4

3b. Leaf rachis with 1 or 2 glands :

- 4a. Leaf rachis with one gland between the lowest pair of leaflets. ... *C. obtusifolia* 3
- 4b. Leaf rachis with two glands, one between each of the lower pairs of leaflets ... *C. tora* 6
- 1b. Sepals narrow, acute :
- 5a. Gland of petiole stipitate ... *C. pumila* 5
- 5b. Gland of petiole sessile ... *C. mimosoides* 2
1. ***Cassia fistula*** L. Sp. Pl. 377. 1753 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 261. 1878 ; Gandhi in Sald. & Nicol. Fl. Hassan 219. 1976. "Amaltas".

Medium sized trees. Leaves 20 - 40 cm long ; leaflets 4 - 8 pairs, ovate or ovate-oblong. Flowers golden-yellow in long, large, drooping racemes. Pods cylindric, 30 - 50 cm long, many-seeded, indehiscent.

PACHMARHI : Vicinity (1000 m) ; Dhupgarh (1200 m). BORI : Reserve forest (550 m). In mixed and sal forests. Common.

Fl. & Fr. : March July.

2. ***Cassia mimosoides*** L. Sp. Pl. 379. 1753 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 266. 1878 ; Babu, Herb. Fl. Dehra Dun 176. 1977.

Variable annual-biennial, prostrate herbs. Leaves linear to linear-oblong ; gland usually at or near top of petiole, sessile ; leaflets sessile, 30 - 60 pairs, obliquely oblong or linear-oblong. Inflorescence 1 - 3-flowered, supra-axillary or axillary. Petals yellow. Pods linear appressed hairy.

PACHMARHI : Vicinity (1000 m). Dhupgarh (1100 m). In moist situations. Occasional.

Fl. & Fr. : September November.

3. ***Cassia obtusifolia*** L. Sp. Pl. 377. 1753 ; Babu, Herb. Fl. Dehra Dun 176. 1977. *Cassia tora* sensu Baker in Hook. f. Fl. Brit. Ind. 2 : 263. 1878, p.p. "Chakunda".

Erect undershrubs. Leaves 3 - 8 cm long ; rachis with one gland between the lowest pair of leaflets ; leaflets 3 pairs, obovate-oblong. Flowers in axillary subsessile pairs, yellow. Pods tetragonal, beaked, many seeded.

BORI : Reserve forest (550 m). In forest undergrowth. Common.

Fl. & Fr. : August October.

4. *Cassia occidentalis* L. Sp. Pl. 377. 1753; Baker in Hook. f. Fl. Brit. Ind. 2 : 962. 1878 ; Babu, Herb. Fl. Dehra Dun 177. 1977. "Kasondi"

Erect undershrubs. Leaves 10 - 20 cm long : petiole with one large gland at the base ; leaflets 3 - 5 pairs, oblong-lanceolate, long acuminate. Racemes 1 - 2-flowered, axillary. Petals yellow, clawed. Pods flat, 20 - 30 seeded.

PACHMARHI : Vicinity (1000 m). BORI : Reserve forest (550 m) ; Dhain (430 m). In forest undergrowth and in open waste lands. Common.

Fl. & Fr. : July December.

5. *Cassia pumila* Lamk. Encycl. 1 : 651. 1785 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 266. 1878 ; Babu, Herb. Fl. Dehra Dun 177. 1977.

Prostrate woody annuals, 15 - 20 cm long. Leaves 1 - 3 cm long, gland on petiole stipitate ; leaflets 9 - 15 pairs. Flowers extra-axillary, solitary, yellow. Pods flat, 6 - 12-seeded.

PACHMARHI : Vicinity (1000 m). In forests and waste places amongst grasses. Common.

Fl. & Fr. : August December.

6. *Cassia tora* L. Sp. pl. 376. 1753 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 263. 1878, p.p. ; Babu, Herb. Fl. Dehra Dun 178. 1977. "Chakunda"

Undershrubs 30 - 60 cm tall. Leaves 4 - 12 cm long ; rachis with one gland each between the two lower pairs of leaflets ; leaflets 3 pairs, orbicular to obovate. Flowers in subsessile axillary pairs, yellow. Pods sub-tetragonal, 20 - 30-seeded.

BORI : Reserve forest (550 m). Along roadsides and under tree shades. Abundant.

Fl. & Fr. : August December.

4. HARDWICKIA Roxb.

Hardwickia binata Roxb. Pl. Cor. 3 : 6. t. 209. 1819 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 270. 1878 ; Ali in Fl. W. Pak. 54 : 39. 1975. "Antan."

Large deciduous trees. Leaves alternate, bifoliolate; leaflets sessile, obliquely ovate, obtuse, coriaceous, glabrous. Flowers in long, slender racemes in terminal panicles. Calyx with distinct sepals, ovate or orbicular, petaloid, yellowish-green. Petals absent. Stamens 10; anthers versatile. Pods strap-shaped, narrowed at both ends, 1-seeded.

PACHMARHI : Vicinity (1000 m). In mixed forest. Occasional.

Fl. & Fr. : October - April.

34. MIMOSACEAE R. Br.

1a. Anthers gland-tipped. Inflorescence bicoloured ...	<i>Dichrostachys</i>	3
1b. Anthers not gland-tipped. Inflorescence unicoloured :		
2a. Filaments free. Plants armed :		
3a. Stamens definite ...	<i>Mimosa</i>	4
3b. Stamens indefinite ...	<i>Acacia</i>	1
2b. Filaments more or less connate at the base. Plants unarmed ...	<i>Albizia</i>	2

1. ACACIA Mill.

1a. Stem with prickles but without any stipular spines :		
2a. Leaflets more than 2 mm broad, truncate at base. Petiolar gland conical ...	<i>A. torta</i>	4
2b. Leaflets less than 2 mm broad, semitruncate at base. Petiolar gland not conical ...	<i>A. pennata</i>	3
1b. Stem with stipular spines, but without prickles :		
3a. Flowers in elongate, cylindrical spikes. ...	<i>A. catechu</i>	1
3b. Flowers in heads ...	<i>A. leucophloea</i>	2

1. *Acacia catechu* (L.f.) Willd. Sp. Pl. 4 : 1097. 1806 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 295. 1878. *Mimosa catechu* L. f. Suppl. 439. 1781. "Khatri".

Deciduous small trees. Leaves bipinnate; stipules spiny; pinnae 10–30 pairs; leaflets 16–50 pairs, linear, base oblique, tip obtuse. Flowers in axillary, elongate, cylindric spikes. Pods flat, dehiscent, 3–10-seeded.

PACHMARHI : Vicinity (1000 m). In mixed forests. Occasional.

Fl. & Fr. : May August.

2. *Acacia leucophloea* (Roxb.) Willd. Sp. Pl. 4 : 1083. 1806 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 294. 1878. *Mimosa leucophloea* Roxb. Pl. Cor. 2 : 27. t. 150. 1798. "Safed Kikar".

Deciduous trees, hispid; stipular spines slightly hooked. Leaves bipinnate; pinnae 8–10 pairs; leaflets 20–25 pairs. Flowers in heads. Corolla yellowish-white, twice as long as calyx. Pods slightly turgid, tomentose, 10–12 seeded.

PACHMARHI : Vicinity (1000 m). In mixed forests. Abundant.

Fl. & Fr. : July February.

3. *Acacia pennata* (L.) Willd. Sp. Pl. 4 : 1090. 1806 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 297. 1879, p.p. ; Gandhi in Sald. & Nicol. Fl. Hassan 228. 1976. *Mimosa pennata* L. Sp. Pl. 522. 1753. "Alia".

Prickly climbing shrubs or small trees. Leaf rachis with glands between upper pinnae; pinnae 12–15 pairs; leaflets 50–60 pairs, semitruncate at the base. Petiolar gland not conical. Flowers in panicles of heads. Corolla white. Pods strap-shaped.

BORI : Reserve forest (550 m). In the forest, climbing on trees. Abundant.

Fl. & Fr. : June December.

4. *Acacia torta* (Roxb.) Craib in Kew Bull. 1915 : 410. 1915 ; Gandhi in Sald. & Nicol. Fl. Hassan 229. 1976. *Mimosa Torta* Roxb. Fl. Ind. 2 : 566. 1832. *Acacia pennata* (L.) Willd. Sp. Pl. 4 : 1090. 1805 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 297. 1878, p.p. "Alia"

Shrubs or small trees, prickly. Leaf rachis with glands between upper pinnae; pinnae 8–12 pairs; leaflets 25–30 pairs, truncate at base; petiolar gland conical. Corolla white, twice as long as calyx. Pods glabrescent, 5–7 seeded.

PACHMARHI : Vicinity (1000 m). On hill slopes amongst grasses. Common.

Fl. & Fr. : March February.

2. ALBIZIA Durazz.

- 1a. Leaflets more than 13 mm broad, at least towards the end of the pinnae. Calyx teeth distinct :
- 2a. Flowers pedicellate. Pods pale straw-coloured ... *A. lebbeck* 1
 - 2b. Flowers sessile. Pods brown ... *A. procera* 3
- 1b. Leaflets less than 13 mm broad. Calyx teeth obsolete ... *A. odoratissima* 2

1. *Albizia lebbeck* (L.) Benth. in Hook. Lond. Journ. Bot. 3 : 87. 1844 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 298. 1878 ; Gandhi in Sald. & Nicol. Fl. Hassan 230. 1976. *Mimosa lebbeck* L. Sp. Pl. 516. 1753. "Siris".

Large trees with young parts hairy. Leaves bipinnate with a large gland near the base of the petiole and one below the upper most pinnae ; pinnae usually 2 pairs ; leaflets 3-4 pairs, obliquely oblong, with eccentric midrib. Heads 1 few - fascicled ; flowers sessile. Corolla white, twice as long as calyx. Pods thin, pale straw - coloured. Seeds 6-12, compressed.

PACHMARHI : Vicinity (1000 m). In mixed forests. Occasional.

Fl. & Fr. : April November.

2. *Albizia odoratissima* (L. f.) Benth. in Hook. Lond. Journ. Bot. 3 : 88. 1844 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 299. 1878 ; Gandhi in Sald. & Nicol. Fl. Hassan 231. 1976. *Mimosa odoratissima* L. f. Suppl. 437. 1981. "Kala siris".

Almost evergreen trees with brown hairy young parts. Leaves alternate, pubescent ; rachis with a large black gland near the base and another between the uppermost pair of pinnae ; pinnae 4 pairs ; leaflets 12-18 pairs, obliquely oblong with midrib near the margin. Flowers sessile in solitary heads or in panicles. Corolla covered with grey hairs outside. Pods reddish brown, 8-12 seeded.

PACHMARHI : Dhupgarh (1250 m) ; Mahadev hill (1200 m).
BORI : Dhain (413 m). In mixed forest. Common.

Fl. & Fr. : July January.

3. *Albizia procera* (Roxb.) Benth. in Hook. Lond. Journ. Bot. 3 : 89. 1844 ; Baker in Hook. f. Fl. Brit. Ind. 2 : 299. 1878 ; Ali in Fl. W. Pak. 36 : 25. 1973. *Mimosa procera* Roxb. Pl. Cor. 2 : 12. t. 121. 1798. "Safed siris".

Large deciduous trees. Leaves bipinnate; rachis with a large gland near the base of the petiole; pinnae 2-6 pairs; a gland present between the uppermost pair of leaflets; leaflets 4-16 pairs, obliquely oblong, ovate. Heads fascicled or in axillary or terminal panicles. Pods linear, 8-12 seeded.

PACHMARHI : Vicinity (1000 m). In mixed forest. Occasional.

Fl. & Fr. : June - January

3. DICHROSTACHYS Wt. & Arn.

Dichrostachys cinerea (L.) Wt. & Arn. Prod. Fl. Pen. Ind. Or. 271. 1854; Baker in Hook. f. Fl. Brit. Ind. 2 : 288. 1878; Ali in Fl. W. Pak. 36 : 37. 1973. *Mimosa cinerea* L. Sp. Pl. 520. 1753. "Vurtuh".

Shrubs, usually with hairy young branches. Larger leaves with 7-19 pairs of pinnac; glands present on the rachis; leaflets 7-19 pairs, obtuse, margins hairy. Flowers in fascicled spikes. Anthers gland tipped. Pods coiled.

PACHMARHI : Vicinity (1000 m). In mixed forest. Occasional.

Fl. & Fr. : May - December.

4. MIMOSA L.

Mimosa himalayana Gamble in Kew Bull. 1920 : 4. 1920; Ali in Fl. W. Pak. 36 : 27. 1973. *Mimosa rubicaulis* sensu Baker in Hook. f. Fl. Brit. Ind. 2 : 291. 1878 (*non* Lamk. 1783), *p.p.* "Shiah kanta".

Large straggling deciduous shrubs; branches ribbed, densely hairy, prickly. Leaves bipinnate; rachis 10-20 cm long, prickly; pinnae 5-12 pairs; leaflets 6-15 pairs. Heads in terminal panicles. Flowers pink, fading to white. Corolla 4-lobed. Stamens 8, exserted. Pods 6-10 cm long, strap-shaped, glabrous, with 4-10, one-seeded joints.

BORI : Reserve forest (550 m) ; Dhain (430 m). At the edge of Teak bamboo forest and way sides. Common.

Fl. & Fr. : June - September.

35. ROSACEAE Juss.

Ia. Plants unarmed :

2a. Leaves simple. Trees	...	<i>Prunus</i> 2
2b. Leaves compound. Herbs	...	<i>Potentilla</i> 1
1b. Plants armed	..	<i>Rubus</i> 3

1. POTENTILLA L.

Potentilla supina L. Sp. Pl. 497. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 359. 1878 ; Babu, Herb. Fl. Dehra Dun 181. 1977.

Prostrate annual herbs. Basal and lower leaves larger, with more leaflets ; upper caudine leaves nearly sessile, smaller with fewer leaflets ; leaflets 3 - 9, subsessile, obovate, cuneate, serrate dentate, hairy. Calyx divided halfway down. Petals obtuse. Achenes ovoid, smooth.

BORI : Kobra nallah (430 m), February, 78, Pant - 27244 (BSA). On rocky substratum. Rare.

Fl. & Fr. : February - May.

New record for the area.

2. PRUNUS L.

Prunus persica (L.) Batsch, Beytr. Entw. (Pragm. Geach. Natur. 30. 1801 ; Hook. f. Fl. Brit. Ind. 2 : 313. 1878. *Amygdalus persica* L. Sp. Pl. 472. 1753.

Medium sized, deciduous trees. Leaves simple, oblong-lanceolate, serrate; stipules subulate, fimbriate. Flowers rose-coloured, sessile on previous year's wood. Calyx campanulate. Drupe with succulent pericarp; the stone deep, irregularly furrowed; cotyledons large, plano-convex.

PACHMARHI : Vicinity (1000 m) ; Mahadev hill (1250 m). Cultivated on hill slopes.

Fl. & Fr : May December.

3. RUBUS L.

Rubus ellipticus J.E. Sm. in Rees, Cycl. 30 : n. 16. 1815 ; Hook. f. Fl. Brit. Ind. 2 : 336. 1878 ; Gandhi in Sald. & Nicol. Fl. Hassan 214. 1976. "Hinsali".

Straggling shrubs with stiff red bristles and short prickles. Leaves usually pinnately trifoliolate, except the young shoots; stipules linear; leaflets serrate, obovate, pubescent beneath. Flowers in corymbose panicles. Sepals lanceolate, acuminate, tomentose. Petals white, longer than sepals. Druplets globose, orange.

PACHMARHI : Kua Khad (900 m), Saxena 1003 (SFRI). Along the valleys. Rare.

Fl. & Fr. : December - January.

36. DROSERACEAE Salisb

DROSERA L.

- | | | |
|---------------------------------|-----|----------------------|
| 1a. All leaves in basal rosette | ... | <i>D. burmanii</i> 1 |
| 1b. Some leaves caudine | ... | <i>D. indica</i> 2 |

1. **Drosera burmanii** Vahl, Symb. 3 : 50. 1794 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 424. 1878 ; Ramam. in Sald. & Nicol. Fl. Hassan 159. 1976.

Acaulescent herbs with a basal rosette of obovate or orbicular, stipulate leaves. Scape terminal, circinate, few to many - flowered. Flowers white. Calyx 5 lobed ; lobes elliptic, acute. Petals 5, obovate.

PACHMARHI : Vicinity (1000 m) ; Jambudeep (950). In moist soil and on rocks along streams. Occasional.

Fl. & Fr. : August March.

2. *Drosera indica* L. Sp. Pl. 282. 1753 ; Clarke in Hook. f. Fl. Brit. Ind. 2: 224. 1878 ; Ramam. in Sald. & Nicol. Fl. Hassan 159. 1976.

Caulescent herbs with glandular-hairy stem. Leaves estipulate, filiform, glandular hairy. Flowers leaf - opposed. pink. Sepals 5, acute. Petals pink, obovate.

PACHMARHI : Jambudeep (950 m). Among rocks along streams. Occasional.

Fl. & Fr. : August October.

37. COMBRETACEAE R. Br.

- | | |
|---|---------------------|
| 1a. Inflorescence capitate. Fruit 2-winged ... | <i>Anogeissus</i> 1 |
| 1b. Inflorescence spicate. Fruit not winged or 3 or 5-winged... | <i>Terminalia</i> 2 |

1. ANOGEISSUS (DC.) Guillemin. & Perr.

- | | |
|--|-----------------------|
| 1a. Leaves ovate or ovate-lanceolate. Beak as long as or longer than fruit ... | <i>A. latifolia</i> 1 |
| 1b. Leaves obovate. Beak shorter than fruit ... | <i>A. pendula</i> 2 |

1. *Anogeissus latifolia* (Roxb. ex DC). Will. ex Bedd. Fl. Sylv. t. 15. 1869 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 450. 1878 ; Gandhi in Sald. & Nicol. Fl. Hassan 292. 1976. *Conocarpus latifolia* Roxb. ex DC. Prodr. 3 : 17. 1828. "Dhawa"

Deciduous trees. Leaves ovate or ovate lanceolate, obtuse acute, rounded cordate, glabrous. Heads solitary or in short cymes. Calyx yellow or pinkish yellow; lobes reflexed. Fruit beak long.

BORI : Reserve forest (550 m). In mixed forest. Abundant.

Fl. & Fr. : August - January.

2. *Anogeissus pendula* Edgew. in Journ. As. Soc. Beng. 21 : 171. 1853 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 451. 1878.

Small trees with pendulous branches. Leaves alternate and subopposite, obovate, obtuse or mucronate, pubescent. Flower heads small. Calyx tube short, lobes short, pubescent. Fruits with beaks shorter than the fruits.

PACHMARHI : Vicinity (1000 m). In sal forest, sometimes in pure patches. Abundant.

Fl. & Fr. : August - January.

2. TERMINALIA L.

1a. Leaves clustered at ends of branchlets, eglandular. Upper flowers often staminate ... *T. bellirica* 2

1b. Leaves not clustered, glandular. Flowers bisexual :

2a. Fruits almost entire. Spike usually simple ... *T. chebula* 3
2b. Fruit distinctly winged. Spike branched ... *T. alata* 1

1. *Terminalia alata* Heyne ex Roth, Nov. Pl. Sp. 379. 1821 ; Gandhi in Sald. & Nicol. Fl. Hassan 293. 1976. *Pentaptera tomentosa* Roxb. ex DC. Prodr. 3 : 14. 1828. *Terminalia tomentosa* (Roxb. ex DC.) Wt. & Arn. Prodr. 314. 1834 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 447. 1878. "Asan".

Trees with ash-white bark ; branchlets silky pubescent. Leaves opposite or subopposite, elliptic-lanceolate, acute, truncate cordate, coriaceous ; glands at the base of midrib. Spikes branched. Fruits elliptic, woody, dark-brown, glabrous, 5-winged.

PACHMARHI : Vicinity (1000 m). In sal forest. Abundant.

Fl. & Fr. : May January.

2. **Terminalia bellirica** (Gaertn.) Roxb. Pl. Cor. 2 : 54. t. 198. 1805 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 445. 1878 ; Gandhi in Sald. & Nicol. Fl. Hassan 294. 1976. *Myrobalanus bellirica* Gaertn. Fruct. 2 : 91. t. 97. 1791. (*bellirina*). "Bahera".

Large trees. Leaves alternate, clustered towards the ends of branchlets, eglandular ; blade broadly obovate, cuneate. Spikes clustered towards apex of branchlets, simple. Flowers yellowish white. Fruits ovoid, slightly 5 ridged, brown pubescent.

PACHMARHI : Vicinity (1000 m). In sal forest. Common.

Fl. & Fr. : February August.

3. **Terminalia chebula** (Gaertn.) Retz. Obs. Bot. 5 : 31. 1788 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 446. 1878 ; Gandhi in Sald. & Nicol. Fl. Hassan 294. 1976. *Myrobalanus chebula* Gaertn. Fruct. 2 : 91. t. 97. 1791. "Harra".

Large trees with young parts tomentose. Leaves alternate or subopposite ; glands at the apex of petiole, sessile ; blade elliptic - oblong, rounded at both ends. Spikes short, usually simple. Flowers yellowish white. Fruit ovoid oblong, almost entire, glabrous, yellow when ripe.

PACHMARHI : Vicinity (1000 m) ; Dhupgarh (1200 m). In Sal forest. Abundant.

Fl. & Fr. : January September.

38. MYRTACEAE Juss.

SYZYGIUM Gaertn.

Syzygium cumini (L.) Skeels in U. S. Dept. Agric. Bur. Pl. Bull. 248 : 1912 ; Gandhi in Sald. & Nicol. Fl. Hassan 281. 1976. *Myrtus cumini* L. Sp. Pl. 471. 1753. *Eugenia jambolana* Lamk. Encycl. 3 : 198. 1789 ; Duthie in Hook. f. Fl. Brit. Ind. 2 : 299. 1879. "Jamah".

Large trees ; bark ash - white ; branches terete, glabrous. Leaves opposite, oblong lanceolate. Flowers white in cymes arising from old leaf - scars. Fruit subglobose, ovate, dark purple, smooth, juicy when ripe, crowned with truncate calyx limbs. Seed 1, globose or cylindric, large.

PACHMARHI : Jambudeep (900 m) : Dhupgarh (1200 m). BORI : Dhain (413 m). In mixed forest and planted. Common.

Fl. & Fr. : April - July.

39. LECYTHIDACEAE Poit.

CAREYA Roxb.

Careya arborea Roxb. Pl. Cor 3 : 14. t. 218. 1819 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 511. 1879 ; Gandhi in Sald. & Nicol. Fl. Hassan 157. 1976. "Kumbi".

Deciduous trees. Leaves crenate -denticulate, obovate, shortly acuminate, cuneate, glabrous. Inflorescence in short spikes with woody peduncles. Flowers 4 - 5 merous. Calyx lobes ovate, obtuse. Petals yellowish-white, elliptic oblong, obtuse. Stamens numerous. Fruits globose, fibrous, crowned with calyx lobes, many seeded.

PACHMARHI : Dhupgarh (1200 m). In mixed forest and roadside. Abundant.

Fl. & Fr. : February - September.

40. MELASTOMATACEAE Juss.

- 1a. Stem and branches scaly. Stamens unequal ... *Melastoma* 1
- 1b. Stem and branches hairy, hispid or glabrous. Stamens all equal :

- | | |
|---|-------------------|
| 2a. Flowers 4 - 5 - merous. Anther connective produced,
horned or tubercled below. Inflorescence fasciculate ... | <i>Osbeckia</i> 2 |
| 2b. Flowers 3 - merous. Anther connective not produced.
Inflorescence scorpioid ... | <i>Sonerila</i> 3 |

1. MELASTOMA L.

Melastoma malabathricum L. Sp. Pl. 390. 1753 ('malabathrica') ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 523. 1879 ; Ramam. in Sald. & Nicol. Fl. Hassan 286. 1976.

Shrubs. Leaves elliptic lanceolate, acute at both ends, 3 nerved, scaly. Calyx lobes deciduous. Petals large, showy, broadly obovate, purplish. Larger stamens purple, smaller ones yellow.

PACHMARHI : Vicinity (1000 m). Along streams and nallas under shade. Abundant.

Fl. & Fr. : All seasons.

2. OSBECKIA L.

Osbeckia truncata D. Don ex Wt. & Arn. Prod. 322. 1834 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 514. 1879 ; Ramam. In Sald. & Nicol. Fl. Hassan 289. 1976.

Annual herbs. Leaves ovate, 3 ribbed, hairy. Flowers 4 - merous. Petals mauve coloured. Anthers short, truncate opening by single terminal pore.

PACHMARHI : Apsara Bihar (950 m). In shady places. Occasional.

Fl. & Fr. : August October.

3. SONERILA Roxb.

Sonerila tenera Royle, Ill. Bot. Himal. 215. t. 45. f. 2. 1834 ; Clarke in Hook. f. Fl. Brit. Ind 2 : 530. 1879 ; Babu, Herb. Fl. Dehra Dun 184 1977.

Slender annual herbs, hairy. Leaves ovate or ovate elliptic, nearly entire, 3 nerved from the base. Flowers a few in terminal racemes. Calyx tubular, hairy, teeth 3. Petals 3 white or pink, ovate elliptic, apiculate. Capsule oblong, 3 gonous, hairy.

PACHMARHI : Apsara Bihar (900 m), *Saxena* 1096 (SFRI). In shady places. Rare.

Fl. & Fr. : September - November.

41. LYTHRACEAE Jaum St. Hil.

1a. Trees. Stamens many	... <i>Lagerstroemia</i> 2
1b. Herbs or undershrubs. Stamens 1 - 12 :	
2a. Undershruhs. Stamens 12	... <i>Woodfordia</i> 4
2b. Herbs. Stamens 1 - 6 :	
3a. Capsule septicidally dehiscent, wall densely and finely cross - striate	... <i>Rotala</i> 3
3b. Capsule indehiscent or bursting irregularly, wall not finely cross - striate	... <i>Ammania</i> 1

1. AMMANIA L.

Ammania baccifera L. Sp. Pl. 120. 1753 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 569. 1879 ; Babu, Herb. Fl. Dehra Dun 185. 1977. "Dadmari".

var. *baccifera*

Erect, annual, glabrous herbs. Stem tetragonous. Leaves opposite, sessile, linear oblong or oblong-lanceolate. Flowers in dense axillary clusters, red. Capsule depressed globose, red, irregularly circumscissile. Seeds plano - convex, excavated on the plane face.

BORI : Reserve forest (500 m). In wet places along streams. Abundant.

Fl. & Fr. : October - December.

var. *aegyptiaca* (Willd.) Koehne in Engl. Bot. Jahrb. 1 : 258 1880. *Ammania aegyptiaca* Willd. Enum. Hort. Berol. 1 : 167. t. 6. 1809. *Ammania salicifolia* Hiern in Oliv. Fl. Trop. Afr. 2 : 478. 1871 (excl. syn. non. Monti ex Bl. 1767) ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 569. 1879. "Dadnari".

Tall, erect herbs. Leaves often cordate at base, those on the main stem more than double the size than those on the branches. Flowers larger than the type variety.

PACHMARHI : Vicinity (1000 m). In moist places and along river sides. Abundant.

Fl. & Fr. : April - December.

2. LAGERSTROEMIA L.

1a. Calyx tube smooth outside. Petals less than 1 cm long, white ... *L. parviflora* 1

1b. Calyx tube ribbed outside. Petals 2.5 cm or more long, purple ... *L. speciosa* 2

1. *Lagerstroemia parviflora* Roxb. Pl. Cor. 1 : 47. t. 66. 1795 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 575. 1879 ; Gandhi in Sald. & Nicol. Fl. Hassan 273. 1976. "Daura".

Deciduous trees ; bark white, smooth. Leaves elliptic-oblong. Flowers white, fragrant, in axillary and terminal many or few-flowered panicles. Capsule ellipsoid. Seeds winged, wings much longer than the seeds.

PACHMARHI : Vicinity (1000 m). BORI : Reserve forest (550 m). In sal forest and mixed deciduous forest. Common.

Fl. & Fr. : April - December.

2. *Lagerstroemia speciosa* (L.) Pers. Syn. Pl. 2 : 72. 1806. *Muncharia speciosa* L. Mant. 2 : 248. 1771. *Lagerstroemia flos-reginae* Retz. Obs. Bot. 5 : 25. 1788 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 577. 1879. "Jarul".

Deciduous trees. Leaves elliptic oblong, rounded at base, glabrous, thickly chartaceous. Pedicels articulate. Calyx tube ribbed outside, persistent. Petals purple. Capsule subglobose, 6-valved.

PACHMARHI : Mahadev hill (1200 m). In mixed forest. Abundant.
Fl. & Fr. : April - June.

3. ROTALA L.

1a. Flowers in terminal spikes :

- | | | |
|--|-----|---------------------------|
| 2a. Capsule 4-valved. Leaves suborbicular | ... | <i>R. rotundifolia</i> 3 |
| 2b. Capsule 2 - valved. Leaves ovate or elliptic | ... | <i>R. serpyllifolia</i> 4 |

1b. Flowers axillary :

- | | | |
|-----------------------------|-----|------------------------|
| 3a. Petals 5. Calyx lobes 5 | ... | <i>R. densiflora</i> 1 |
| 3b. Petals 0. Calyx lobes 4 | ... | <i>R. mexicana</i> 2 |

1. *Rotala densiflora* (Roth ex Roem. & Schult.) Koehne in Engl. Bot. Jahrb. 1 : 164. 1881 ; Gandhi in Sald. & Nicol. Fl. Hassan. 274. 1976. *Ammania densiflora* Roth ex Roem & Schult. Syst. 3 : 304. 1818. *Ammania pentandra* sensu Clarke in Hook. f. Fl. Brit. Ind. 2 : 568. 1879, p.p.

Herbs. Leaves lanceolate. Flowers axillary, spicate. Calyx campanulate, lobes 5, alternating with appendages. Petals 5, pink, obovate. Stamens 5, equalling the calyx lobes. Capsule 3 - valved.

PACHMARHI : Vicinity (1000 m). In wet places along the streams. Abundant.

Fl. & Fr. : November - March.

2. *Rotala mexicana* Cham. & Schecht. in Linnaea 5 : 567. 1830; Babu, Herb. Fl. Dehra Dun 186. 1977. *Ammania pygmaea* Kurz in Seem. Journ. Bot. 5 : 376. 1867 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 568. 1879.

Tufted annual herbs. Stem tetragonal. Leaves opposite, linear, obtuse. Flowers axillary, solitary. Calyx 4 - ribbed, lobes 5. Stamens 2. Capsule globose, 3 valved.

PACHMARHI : Dhupgarh (1200 m), *Saxena* 1012 (SPRI). In moist places near streams. Rare.

Fl. & Fr. : September - January.

3. *Rotala rotundifolia* (Roxb.) Koehne in Engl. Bot. Jahrb. 1 : 175 1881 ; Babu, Herb. Fl. Dehra Dun 186. 1977. *Ammania rotundifolia* Roxb. Fl. Ind. 1 : 446. 1820 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 566. 1879, p.p.

Annual herbs. Leaves orbicular, sessile. Flowers sessile, in spikes. Calyx campanulate ; lobes 4. Petals 4, obovate, rose coloured. Capsule ellipsoid, 4 valved. Seeds ellipsoid, brownish yellow.

PACHMARHI : Vicinity (1000 m). In moist places along streams. Abundant.

Fl. & Fr. : September - January.

4. *Rotala serpyllifolia* (Roth) Bremek. in Acta Bot. Neerland. 3 (1) : 149. 1954. *Micranthus serpyllifolius* Roth, Nov. Pl. Sp. 282. 1821. *Ameletta tenuis* Wt. in Pl. Ind. Or. t. 257. 1840. *Ammania tenuis* (Wt.) Clarke in Hook. f. Fl. Brit. Ind. 2 : 567. 1879.

Tiny annual herbs. Stems wiry, copper brown, shining. Leaves broadly ovate or elliptic. Flowers red in dense, terminal spicate racemes. Capsule ellipsoid. Seeds brown, polished.

Fl. & Fr. : November - February.

4. WOODFORDIA Salisb.

Woodfordia fruticosa (L.) Kurz in Journ. As. Soc. Beng. 40(2) : 56.

1871 ; Babu, Herb. Fl. Dehra Dun 187. 1977. *Lythrum fruticosum* L. Sp. Pl. ed. 2. 641. 1762. *Woodfordia floribunda* Salisb. Parad. Lond. t. 42. 1806 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 572. 1879, "Dawi".

Straggling shrubs with spreading branches. Leaves opposite or subopposite, sometimes in whorls of three, sessile, ovate lanceolate. Flowers red in axillary cymes, often from the axils of leaf scars. Capsules ellipsoid, irregularly dehiscent. Seeds numerous, obovoid, brown, smooth.

BORI : Reserve forest (550 m). In mixed forest. Abundant.

Fl. & Fr. : December - April.

42. ONAGRACEAE Juss.

- 1a. Stamens twice as many as calyx lobes. Seeds either uniseriate or pluriseriate throughout the length of each locule ... *Fissendocarpa* 1
- 1b. Stamens as many as calyx lobes. Seeds uniseriate at the proximal portion and pluriseriate at the distal portion of each locule ... *Ludwigia* 2

1. FISSENDOCARPA (Haines) Bennet

Fissendocarpa linifolia (Vahl) Bennet in Journ. Bombay nat. Hist. Soc. 67 : 126. 1970. *Jussiaea linifolia* Vahl in Ecolog. Am. 2 : 32. 1798. *Jussiaea fissendocarpa* Haines in J. As. Soc. Beng. n.s. 15 : 313. 1919. *Jussiaea hyssopifolia* (G. Don) Exell, Garcia de Orta 5 : 471. 1957.

Herbs with young parts puberulous. Leaves alternate, elliptic, acute, base narrowed. Flowers sessile, axillary, solitary or passing into terminal spike. Sepals lanceolate. Petals 4, yellow, broadly elliptic or elliptic-obovate. Stamens 8, epipetalous, one shorter. Capsule reddish or pinkish.

PACHMARHI : Vicinity (1050 m). Along water courses. Occasional.

Fl. & Fr. : November - June.

2. LUDWIGIA L.

1a. Bracteoles large, mostly persistent, placed near the middle of ovary ... *L. octovalvis* 1

1b. Bracteoles very small, deciduous early, near base of ovary ... *L. perennis* 2

1. *Ludwigia octovalvis* (Jacq.) Raven in Kew Bull. 15 : 476. 1962
Oenothera octovalvis Jacq. Enum. Syst. Pl. 19. 1760.

Subsp. *Sessiliflora* (Mich.) Raven in Kew Bull. 15 : 476. 1962.
Jussiaea octovalvis Sw. var. *sessiliflora* Mich. in Martius, Fl. Bras. 13 : 180. 1875 ; Babu, Herb. Fl. Dehra Dun 188. 1977. *Jussiaea suffruticosa* L. Sp. Pl. 388. 1753 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 587. 1879, p.p. "Bankunga".

Paludose herbs. Leaves elliptic lanceolate, acute, cuneate, hairy. Flowers solitary, tetramerous. Calyx lobes ovate, acute, hairy. Petals obovate glabrous. Stamens 4-8. Ovary elongate. Seeds not visible from without, globose.

PACHMARHI : Vicinity (1000 m). Along streams and swamps
 Abundant.

Fl. & Fr. : August - January.

2. *Ludwigia perennis* L. (excl. "foliis oppositis") Sp. Pl. 119. 1753 ;
 Babu, Herb. Fl. Dehra Dun 188. 1977. *Ludwigia parviflora* Roxb. Fl. Ind. 1 : 440. 1820 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 588. 1879.

Herbs. Leaves linear lanceolate. Flowers solitary, tetramerous. Calyx lobes acute. Petals yellow. Ovary with small, deciduous bracteoles near the base. Fruit narrowed below. Seeds many - seriate, globose, often visible from outside.

PACHMARHI : Vicinity (1000m). BORI : Reserve forest (500m). In moist places and along streams. Common.

Fl. & Fr. : November-April

43. PASSIFLORACEAE Juss.

PASSIFLORA L.

Passiflora edulis Sims. in Curtis Bot. Mag. t. 1889. 1818 ;
Chakravarty in Bull. Bot. Soc. Beng. 3 : 61. 1949.

Woody climber with grooved, pubescent branches ; tendrils simple. Leaves deeply 3 lobed. Flowers whitish blue, solitary, axillary, 5 - 7 cm across. Fruit ovoid oblong.

PACHMARHI : Vicinity (1000m), 28.7.64, Panagrahi 4592 (BSA). In gardens. Rare.

Fl. & Fr. : September March.

44. CUCURBITACEAE Juss.

1a. Corolla - lobes fimbriate	...	Trichosanthes 7
1b. Corolla - lobes or segments not fimbriate :		
2a. Tendril branched	...	Diplocyclos 3
2b. Tendril simple :		
3a. Calyx tube closed near attachment of stamens by 2 - 3 incurved scales. Male peduncle with spathaceous bracts ...		Momordica 4
3b. Calyx - tube not closed. Bracts not spathaceous :		
4a. Anthers sigmoid :		
5a. Anthers weakly sigmoid. Seeds turgid	...	Solena 6
5b. Anthers strongly sigmoid. Seeds compressed	...	Cucumis 2
4b. Anthers arcuate or straight :		
6a. Male and female peduncles 1-flowered, clustered	...	Makia 5
6b. Male flowers corymbose or sub-umbellate or racemed...		Carallocarpus 1

1. CORALLOCARPUS Welw. ex Hook. f.

Corallocarpus epigaeus (Rottl. & Willd.) Clarke in Hook. f. Fl. Brit. Ind. 2 : 628. 1879 ; Chakravarty in Rec. Bot. Surv. Ind. 17 (1) : 171. 1959. *Bryonia epigaea* Rottl. & Willd. Neve Schrift. Gest. Nat. Freunde, Berlin 4 : 223. 1803. "Akasgaddah".

Perennial climbers with large, conical tap root. Stem much branched ; branches zig zag, angular and terete. Leaves 3-5 lobed ; lobes usually lobulate, obtuse, rounded at base, pubescent. Male flowers 4-15 ; female flowers solitary or fascicled. Calyx lobes erect, lanceolate, glandular hairy outside near the base. Corolla yellowish green ; lobes ovate, acute, erect, spreading. Fruit ovoid or ellipsoid, circumscissile near the base. Seeds pyriform, turgid.

PACHMARHI : Gahra nala (900 m), Saxena s.n. (SFR). In scrub jungles on the slopes Rare.

Fl. & Fr. : August November.

2. CUCUMIS L.

1a. Lobes of leaves obtuse. Corolla 0.5-1 cm long	...	<i>C. melo</i> var. <i>cultus</i> 1
1b. Lobes of leaves acute or acuminate. Corolla 1-2 cm long	...	<i>C. sativus</i> 2

1. *Cucumis melo* L. Sp. Pl. 1011. 1753. var. *cultus* Kurz in Journ. As. Soc. Beng. 48 (2) : 102. 1872 ('*culta*'); Chakravarty in Rec. Bot. Surv. Ind. 17 (1) : 103. 1959. "Kharbuja".

Annual, prostrate, hirsute, trailing herbs. Leaves hirsute, suborbicular or reniform, 3-7 lobed, base cordate ; lobes obtuse, denticulate. Male flowers 5-6 in fascicle. Calyx narrow campanulate ; lobes subulate. Corolla segments ovate oblong, acute. Female flower peduncled. Fruits spherical. Seeds white, oblong, apex obtuse, base subacute.

BORI : Dhain (430 m). In waste lands along pathways as escape. Occasional.

Fl. & Fr. : June October.

2. *Cucumis sativus* L. Sp. Pl. 1012. 1753 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 620. 1879. (*excl. syn. e. hardwickii*) ; Chakravarty in Rec.

Bot. Surv. Ind. 17 (1) : 105. 1959 ; Babu, Herb. Fl. Dehra Dun 196. 1977.
"Khira"

Scabrous, trailing or climbing annuals. Leaves 3-5 lobed, cordate, very rough. Flowers yellow; male ones in axillary clusters and females solitary or fascicled. Fruit ovoid or oblong. Seeds numerous, white.

PACHMARHI : Vicinity (1000 m). In waste sandy places and borders of forests. Occasional.

Fl. & Fr. : May September.

3. DIPLOCYCLOS (Endl.) Corr. & Jeffrey

Diplocyclos palmatus (L.) Jeffery in Kew. Bull. 15 : 352 & 347. 1962 ; Babu, Herb. Fl. Dehra Dun 197. 1977. *Bryonia palmata* L. Sp. Pl. 1012. 1753 (excl. syn.). *Bryonia laciniata* L. Sp. Pl. 1013. 1753. p.p. (quod. syn. cit. excl. type) ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 622. 1879.

Tuberous, slender herbs. Leaves lobed; lobes sometimes pinnatifid, remotely toothed. Flowers fascicled, small, greenish yellow. Calyx campanulate; lobes subulate. Corolla campanulate, deeply partite; segments ovate. Stamens 3, one monothealous, two bithealous. Staminodes 3. Berry ovoid, brick red, with white lines.

PACHMARHI : Vicinity (1000 m). Over hedges at the edge of forests. Abundant.

Fl. & Fr. : August December.

4. MOMORDICA L.

- | | | |
|--|-----|-----------------------|
| 1a. Plants monoecious. Bracts of male flowers about the middle or below the middle of the peduncle | ... | <i>M. charantia</i> 1 |
| 1b. Plants dioecious. Bracts of the male flowers at the apex of the peduncle | ... | <i>M. dioica</i> 2 |

1. **Momordica charantia** L. Sp. Pl. 1009. 1753 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 616. 1879 ; Babu, Herb. Fl. Dehra Dun. 201. 1977. "Karela".

Weak climbers. Leaves reniform or suborbicular, often pedately 5-7-lobed. Flowers monoecious, yellow, solitary, long peduncled. Fruits oblong or fusiform, tuberculate, orange-red when ripe.

BORI : Reserve forest (550 m). On hedges in thorny forests. Abundant.

Fl. & Fr. : August November.

2. *Momordica dioica* Roxb. ex Willd. Sp. Pl. 4 : 605. 1805 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 617. 1879 (*excl. syn.*) ; Babu, Herb. Fl. Dehra Dun 201. 1977. "Kaksa".

Perennial climbers with tuberous roots and glabrous stem. Leaves ovate, often 3-lobed. Flowers pale yellow, males bracteate and females ebracteate or nearly so. Fruit ovoid, echinate, yellowish red when ripe.

PACHMARHI : Vicinity (1000m). In the mixed forest. Occasional.

Fl. & Fr. : July November.

5. MUKIA Arn.

Mukia leiosperma Wt. & Arn. in Ann. & Mag. nat. Hist. 8 : 268. 1842 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 623. 1879. *Melothria leiosperma* (Wt. & Arn.) Cogn. in DC. Monogr. Phan. 3 : 622. 1881.

Monoecious, hairy, slender climbers. Leaves broadly ovate, acute, cordate at base, hairy, 3-5-lobed, dentate. Flowers axillary ; peduncle in males very short, in females long. Calyx campanulate, densely hairy, teeth linear subulate. Corolla pubescent outside ; lobes ovate-oblong. Ovary densely hairy. Fruit globose, glabrous or slightly hairy. Seeds ellipsoid, turgid.

PACHMARHI : Dhungarh (1200 m). On hedges near the forest margins. Occasional.

Fl. & Fr. : July November.

6. SOLENA Lour.

Solena heterophylla Lour. Fl. Cochinch. 1 : 514. 1790 ; Babu, Herb. Fl. Dehra Dun 202. 1977. *Bryonia umbellata* Klein in Willd. Sp. Pl. 4 :

618. 1805. *Zehneria umbellata* Thw. Enum. Pl. Zey. 125. 1859; Clarke in Hook. f. Fl. Brit. Ind. 2 : 625. 1879. p.p. "Tarali".

Perennial, dioecious climbers. Stem glabrous, furrowed. Tendril simple. Leaves polymorphous, coriaceous, ovate, suborbicular, oblong or narrow lanceolate. Male flowers in subumbels or racemes or fascicles. Calyx glabrous, campanulate; teeth subulate, minute. Corolla pale yellow, pubescent outside; segments spreading, triangular, acute. Anthers weakly sigmoid. Female flowers solitary. Fruit oblong ovoid, subangular, bright red when ripe. Seeds turgid, scarcely compressed.

PACHMARHI : Dhupgarh (1300m); Mahadev Hill (1200 m); Vicinity (1000m). On shrubs in the forests. Common.

Fl. & Fr. : June January.

7. TRICHOSANTHES L.

- | | | |
|---------------------------------------|-----|-----------------------|
| 1a. Male flowers solitary or in pairs | ... | <i>T. dioica</i> 2 |
| 1b. Male flowers in peduncled racemes | ... | <i>T. bracteata</i> 1 |

1. *Trichosanthes bracteata* (Lamk.) Voigt, Hort. Suburb. Calc. 58. 1845; Babu, Herb. Fl. Dehra Dun 204. 1977. *Modecca bracteata* Lamk. Encycl. 4 : 210. 1796. *Trichosanthes palmata* Roxb. Fl. Ind. 3 : 704. 1832; Clarke in Hook. f. Fl. Brit. Ind. 2 : 608. 1879. "Lat indrayan"

Dioecious, perennial climbers, glabrous. Tendrils 3 fid. Leaves ovate - orbicular, 5-7 lobed, acuminate, denticulate, with white tubercles on the upper surface. Male flowers in peduncled racemes. Calyx tube hairy, striate. Petals fringed. Female flowers axillary, solitary or rarely in racemes. Fruit globose, red when ripe with 10 longitudinal orange streaks. Seeds ovate oblong, smooth.

BORI : Reserve forest (550 m). On bushes in the forest. Occasional.

Fl. & Fr. : March November.

45. BEGONIACEAE C. A. Agardh

BEGONIA L.

- | | | |
|---|-----|------------------------|
| 1a. Plants tuberous. Tepals biseriate | ... | <i>B. picta</i> 2 |
| 1b. Plants without tuber. Tepals uniserrate | ... | <i>B. malabarica</i> 1 |

Begonia malabarica Lamk. Encycl. 1 : 393. 1785 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 655. 1879 ; Ramam. in Sald. & Nicol. Fl. Hassan 174. 1976.

Perennial herbs. Leaves lanceolate, acute, serrate, cordate and oblique at base, sparsely hairy. Tepals 2 in both sexes. Ovary 3 locular ; styles 3 ; stigma many branched. Capsule winged ; wings equal.

PACHMARHI : Vicinity (1067 m), Feb. '78, Part 27196 (BSA). Along road sides. Rare.

Fl. & Fr. : All seasons.

New record for the area.

2. **Begonia picta** J. E. Smith, Exot. Bot. 2 : t. 101. 1805 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 638. 1879 ; Babu, Herb. Fl. Dehra Dun 206. 1977.

Perennial herbs with tuberous rootstock ; tubers globose ovoid. Stems annual. Leaves 1-3 on each stem, besides a radical leaf, broadly ovate cordate, obtuse or acuminate, irregularly dentate. Flowers in few flowered, peduncled cymes. In male flowers tepals 4 (2+2), scarlet or pink. In female flowers tepals 5, pinkish. Fruits trigonous, winged, setose hairy. Seeds ovoid.

PACHMARHI : Dhupgarh (1250 m). BORI : Reserve forest (900 m). On boulder beds. Common.

Fl. & Fr. : July December.

46. CACTACEAE Juss.

OPUNTIA Mill.

Opuntia elatior Mill. Card. Dict. ed. 8. n. 4. 1768 ; Babu, Herb. Fl. Dehra Dun 207. 1977. *Opuntia diffenii* [auct. pl. non (Ker-Gawler) Haw. 1819] ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 657. 1879. "Hathhathoria".

Shrubs, 1-3 m high, straggling. Stem segments obovate or oblanceolate ; areoles finally with 4-8 straw coloured thick spines and numerous small, slender bristles. Flowers 5-6 cm across, attractive light yellow. Tepals 3-4 cm long. Hypanthium 3-5 cm long, narrowly turbinate ; areoles bristled, nonspinous.

BORI : Reserve forest (550 m). On rocky hill slopes. Occasional.

Fl. & Fr. : March July.

On sandy soil the plants produce thick yellow latex, but on clayey soil they produce yellowish - watery latex.

47. AIZOACEAE Rudolphi

- | | |
|---|------------------|
| 1a. Flowers in terminal cymes. Seeds estrophiolate ... | <i>Mollugo</i> 2 |
| 1b. Flowers in axillary fascicles. Seeds strophiolate ... | <i>Glinus</i> 1 |

1. GLINUS L.

- | | |
|--|---------------------------|
| 1a. Plants stellately hairy. Flowers subsessile or up to 5 mm long, pedicelled ... | <i>G. lotoides</i> 1 |
| 1b. Plants glabrous. Flowers distinctly 4 - 18 cm long, pedicelled ... | <i>G. oppositifolia</i> 2 |

1. *Glinus lotoides* L. Sp. Pl. 463. 1753 ; Babu, Herb. Fl. Dehra Dun 208. 1977. *Mollugo hirta* Thunb. Prodr. Fl. Cap. 1 : 24. 1794 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 662. 1879. "Gandibudi".

Prostrate, stellate hairy, annual herbs. Leaves very small, obovate, rarely spatulate, obtuse or rounded. Tepals elliptic, acute, mucronate. Stamens 5-10, rarely more. Capsules oblong, little shorter than the tepals, loculicidally 5-valved. Seeds reniform, dark brown.

BORI : Reserve forest (550 m). On sandy dry riverbed. Abundant.

Fl. & Fr. : February May.

2. *Glinus oppositifolia* (L.) A. DC. Bull. Herb. Boss. Ser. 2. 1 : 559. 1901 ; Ramam. In Sald. & Nicol. Fl. Hassan 95. 1976. *Mollugo oppositifolia* L. Sp. Pl. 89. 1753. *Mollugo spargula* L. Syst. ed. 10, 881. 1759 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 662. 1879. "Jtma".

Prostrate, glabrous, annual herbs. Leaves linear - oblanceolate or spatulate, acute or rounded at apex, base narrowed down. Flowers greenish white ; pedicels 4-18 mm long, filiform. Tepals oblong. Stamens 5-10, rarely 3. Stigmas 3. Capsule ellipsoid. Seeds reniform, dark brown.

PACHMARHI : Vicinity (1000 m). In moist areas. Occasional.

Fl. & Fr. : March May.

2. MOLLUGO L.

Mollugo pentaphylla L. Sp. Pl. 89. 1753; Babu, Herb. Fl. Dehra Dun 209. 1977. *Mallugo stricta* L. Sp. Pl. ed. 2. 131. 1762; Clarke in Hook. f. Fl. Brit. Ind. 2 : 663. 1879.

Diffuse, glabrous, annual herbs with numerous stems and dichotomous, 4 angled branches. Leaves in whorls of 2 - 9, linear lanceolate to obovate or oblanceolate. Flowers white, numerous in lax corymbose terminal cymes. Capsules subglobose. Seeds many, estrophiolate.

PACHMARHI : Dhupgarh (1250 m). In moist situations. Common.

Fl. & Fr. : July December.

48. APIACEAE Lindl.

1a. Leaves simple. Flowers in simple or compound umbels :		
2a. Flowers in simple umbels :		
3a. Mericarps 7 - 9 - ribbed	...	<i>Centella</i> 2
3b. Mericarps 3 - ribbed	...	<i>Hydrocotyle</i> 3
2b. Flowers in compound umbels :		
4a. Leaves entire	...	<i>Bupleurum</i> 1
4b. Leaves dissected :		
5a. Leaves palmately 3 - 5 - partite	...	<i>Sanicula</i> 6
5b. Leaves pinnately dissected	...	<i>Pycnacycla</i> 5
1b. Leaves compound. Flowers in compound umbels :		
6a. Ovary and fruit hairy	...	<i>Trachyspermum</i> 7
6b. Ovary and fruit glabrous or papillose	...	<i>Pimpinella</i> 4

I. BUPLEURUM L.

1a. Cauline leaves broadly oblong. Bracts elliptic, foliaceous	...	<i>B. plantaginifolium</i> 1
1b. Cauline leaves linear or linear - oblong. Bracts lanceolate	...	<i>B. wightii</i> 2

1. Bupleurum plantaginifolium Wt. Icon. I (15) : t. 281. 1840 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 674. 1879.

Stout shrubs. Leaves linear oblong or broadly oblong. Bracts elliptic, foliaceous, subequal. Flowers yellow. Carpels pentagonal ; ridges thick. Seeds subterete, 5 ridged.

BORI : Reserve forest (900 m), 6 10 60, Joseph 11260 (BSA). On hill slopes amongst the grasses. Rate.

Fl. & Fr. : July December.

Reported from Nilgiris at 6,000 ft. in Shola forests.

2. Bupleurum wightii P. K. Mukh. in Ind. For. 95 : 567. 1969. *Bupleurum mucronatum* Wt. & Arn. Prod. 370. 1834 (*non* Brouss ex Spreng. 1820) ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 676. 1879. p. p.

Bushy shrubs with knotted stem. Leaves entire, linear or linear oblong, mucronate. Bracts lanceolate. Flowers in compound umbels. Carpels elliptic, ridges prominent.

PACHMARHI : Dhupgarh (1200 m), 26 12 62, Panigrahi 6552 (BSA). BORI : Reserve forest (500 m). On dry hill slopes and amongst the grasses. Occasional.

Fl. & Fr. : July December.

Reported from Nilgiris at 7000 ft.

2. CENTELLA L.

Centella asiatica (L.) Urb. in Mart. Fl. Bras. II : 287, t. 78, f. 1. 1879. Babu, Herb. Fl. Dehra Dun 213. 1977. *Hydrocotyle asiatica* L. Sp. Pl. 234. 1753 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 669. 1879. "Brahma manduki".

Trailing herbs with long stolons. Leaves in rosettes, rounded reniform, crenate or crenate - dentate. Flowers in simple umbels, usually 3, middle one sessile, lateral ones pedicellate.

PACHMARHI : Mahadev hill (1200 m). Along road side amongst the grasses. Occasional.

Fl. & Fr. : All seasons.

3. HYDROCOTYLE L.

Hydrocotyle sibthorpioides Lamk. Encycl. 3 : 153. 1799 ; Babu, Herb. Fl. Dehra Dun 215. 1977. *Hydrocotyle rotundifolia* Roxb. ex DC. Prodr. 4 : 64. 1830 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 668. 1879.

Petennial herbs with creeping stems, sometimes with ascending extremities. Leaves usually less than 3 cm across. Inflorescence solitary, sessile or short peduncled, along the creeping stems and ascending tips. Fruits up to 15 in each inflorescence, yellow to dark brown when ripe.

PACHMARHI : Jambudeep (1050 m). Along stream bank and moist places. Common.

Fl. & Fr. : March - November.

4. PIMPINELLA L.

1a. Fruits glabrous	...	<i>P. heyneana</i> 3
1b. Fruits papillose :		
2a. Cauline leaves pinnate :		
3a. Bract solitary	...	<i>P. wallichiana</i> 4
3b. Bracts several	...	<i>P. bracteata</i> 1
2b. Cauline leaves not pinnate	...	<i>P. diversifolia</i> 2

1. Pimpinella bracteata Haines in Journ As. Soc. Beng. n. s. 15 : 314. 1920 & Bot. Bihar & Orissa 2 : 427. 1922.

Stout, biennial herbs. First year leaves radical, 3-foliolate ; leaflets ovate lanceolate, cordate, pubescent. Second year caulin leaves 3-5-foliolate ; leaflets ovate in the lower region ; upper leaflets lanceolate ; uppermost leaflets pinnatifid ; lobes linear lanceolate ending in sub spinulose tips. Umbels 2.5-5.0 cm. across ; bracts 6, linear ; bracteoles 3-5. Fruit minutely papillose.

PACHMARHI : Vicinity (1000 m). In shady places in the forests. Common.

Fl. & Fr. : October - January.

2. Pimpinella diversifolia DC. Prodr. 4 : 122. 1830 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 688. 1879 ; Babu, Herb. Fl. Dehra Dun 216. 1977.

Erect, stout, herbs. Cauline leaves not pinnate. Radical leaves pinnate; leaflets 3-5, variable in shape, ovate-lanceolate, lanceolate, irregularly inciso-serrate. Flowers in compound umbels. Bracts nil or 1-3; bracteole absent. Fruit ovoid, papillose.

PACHMARHI : Vicinity (1000 m). In shady places in the forests. Common.

Fl. & Fr. : July October.

2. *Pimpinella hayneana* (DC.) Kurz in Journ. As. Soc. Bengal 46 : 115. 1877; Clarke in Hook. f. Fl. Brit. Ind. 2 : 684. 1879; Gandhi in Saal. & Nicol. Fl. Hassan 417. 1976. *Helosciadium hayneanum* DC. Prodr. 4 : 106. 1830.

Slender, erect, annual herbs with fusiform roots. Leaves cauline, trifoliolate; leaflets serrate, ovate, cuneate, glabrous; lateral leaflets sometimes deeply divided. Bracts absent; bracteoles 0-2. Flowers bisexual. Petals white. Fruits glabrous, ovoid.

PACHMARHI : Dhupgarh (1250 m). BORI : Reserve forest (550 m); Dham (462 m). In damp places and in teak forests. Common.

Fl. & Fr. : August December.

4. *Pimpinella wallichiana* (Miq.) Gandhi in Saal. & Nicol. Fl. Hassan 417. 1976. *Helosciadium wallichianum* Miq. Bot. Zeit. 7 : 775. 1849. *Pimpinella monica* Dalz. in Hook. Kew. Journ. 3 : 212. 1851; Clarke in Hook. f. Fl. Brit. Ind. 2 : 687. 1879.

Tall herbs. Radical leaves simple, if present; lower cauline leaves trifoliolate, leaflets simple; upper cauline leaves pinnate. Bract solitary; bracteoles 0-3. Flowers polygamous. Petals white. Fruit papilose.

PACHMARHI : Dhupgarh (1250 m). BORI : Reserve forest (900 m). In shady places in forests. Common.

Fl. & Fr. : August - January.

5. PYCNOCYCLA Lindl.

Pycnocycla glauca Lindl. in Royle, Ill. Bot. Himal. 232, t. 51. 1835; Clarke in Hook. f. Fl. Brit. Ind. 2 : 694. 1879.

Perennial herbs with woody root stock and rush like stems. Leaves pinnately dissected; segments filiform. Flowers white or purplish, collected

in heads, resembling a composite. Heads terminal on long, pubescent, peduncles.

PACHMARHI : Chauragarh hill (1100 m), *Saxena & Pandey* 83317 (SFRI). On hill slope. Rare.

Fl. & Fr. : June December.

6. SANICULA L.

Sanicula elata Buch. Ham. ex D. Don, Prodr. Fl. Nep. 183. 1825. *Sanicula europaea* (*auct. non* L. 1753); Clarke in Hook. f. Fl. Brit. Ind. 2 : 670. 1879.

Erect herbs ; radical leaves persistent, glabrous, mucronate serrate. Umbels compound ; umbellules few flowered. Perfect flowers sessile ; male flowers pedicelled. Fruits densely covered with hooked bristles, slightly compressed laterally.

PACHMARHI : Vicinity (1000 m), 27. 7. 64, *Panigrahi* 4563 (BSA). On hill slope. Rare.

Fl. & Fr. : July October.

New record for the area.

7. TRACHYSPERMUM Link

1a. Leaves 2 - 3 - pinnate. Ultimate segments of leaf linear, 1 mm broad ... *T. ammi* 1

1b. Leaves 2 - pinnate. Ultimate segments of leaf lanceolate, 2 - 2.5 mm broad ... *T. stictocarpum* 2

1. *Trachyspermum ammi* (L.) Sprague in Kew Bull. 1929 : 228. 1929 ; Babu, Herb. Fl. Dehra Dun 218. 1977. *Sison ammi* L. Sp. Pl. 252. 1753. *Ammi copticum* L. Mant. 1 : 56. 1767. *Carum copticum* (L.) Hiern, Fl. Trop. Afr. 3 : 12. 1871 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 682. 1879. "Ajowan"

Erect, much-branched, annual herbs. Leaves 2-3-pinnate; segments linear. Flowers in axillary or terminal compound umbels, white. Fruit 2 mm or less long, scaly hair especially on the ribs.

PACHMARHI : Dhupgarh (1250 m), 28.12.62, *Panigrahi* 6685 (BSA). On road side in waste lands. Scarce.

Fl. & Fr. : December - March.

2. **Trachyspermum stictocarpum** (Clarke) Wolff in Engl. Pflreich. 90 : 82, 1927. *Carum stictocarpum* Clarke in Hook. f. Fl. Brit. Ind. 2 : 681, 1879.

1a. Fruits small with minute hairs.	...	var. <i>stictocarpum</i>
1b. Fruits larger, densely hispid	...	var. <i>hebecarpum</i>
var. <i>stictocarpum</i>		

Erect herbs with much-branched stems. Leaves 2-pinnate; segments linear-lanceolate. Bracts 3-6, linear. Bracteoles 4-8, linear-lanceolate. Fruits small with minute hairs.

PACHMARHI : Dhupgarh (1250 m). On hill slopes. Occasional.

Fl. & Fr. : December - February.

var. *hebecarpum* (Clarke) Wolff in Engl. Pflreich. 90 : 89, 1927 ; Babu Herb. Pl. Dehra Dun 218, 1977. *Carum stictocarpum* Clarke var. *hebecarpa* Clarke in Hook. f. Fl. Brit. Ind. 2 : 681, 1879.

Erect herbs with much-branched stems. Leaves 2-pinnate; segments lanceolate-linear. Bracts 3-6, linear. Bracteoles 4-8, linear-lanceolate. Fruits larger than the type variety, densely hispid.

PACHMARHI : Dhupgarh (1250 m) ; Mahadev hill (1200 m), 28.12.62, *Panigrahi* 6685 p.p. (BSA). On hill slopes. Rare.

Fl. & Fr. : December - February.

49. ARALIACEAE Juss.

SCHEFFLERA J. R. & G. Forester

Schefflera venulosa (Wt. & Arn.) Harms in Engl. & Prantl. Pflanzenf. 3(8) : 39, 1894 ; Gandhi in Sald. & Nicol. Fl. Hassan 412, 1976. *Paratropia*

venulosa Wt. & Arn. Prodr. 377. 1834. *Heptapleurum venulosum* Seem. in Journ. Bot. 3 : 80. 1865 ; Clarke in Hook. f. Fl. Brit. Ind. 2 : 729. 1879. "Dain"/"Kath-semul".

Large climbing shrubs. Leaves elliptic-lanceolate, cuneate, coriaceous main veins distinct. Umbels on racemes ; peduncles long ; pedicels of umbels 2-3 cm long. Flowers pentamerous, pedicelled. Petals greenish-white. Ovary 5-locular ; styles short, free. Drupes subglobose, brownish-black.

PACHMARHI : Dhupgarh (1250 m). On hill slopes. Occasional.

Fl. & Fr. : April-June.

50. RUBIACEAE Juss.

1a. Inflorescence a head :

- 2a. Leaves cordate at base. Sepals distinct ... *Adina* 1
- 2b. Leaves acute-rounded at base. Sepals O. ... *Mitragyna* 10

1b. Inflorescence not a head :

3a. Herbs :

- 4a. Fruits many-seeded :
 - 5a. Anthers connate into a tube. Stigma capitate ... *Argostemma* 2
 - 5b. Anthers free, stigma 2-lobed :
 - 6a. Seeds angular :
 - 7a. Corolla divided halfway or less down. Stigma overtopped by anthers ... *Kohautia* 8
 - 7b. Corolla divided more than halfway down. Stigma not overtopped by anthers :
 - 8a. Carpels 4-angled ... *Thecagonium* 14
 - 8b. Carpels terete ... *Oldenlandia* 12
 - 6b. Seeds sea shell-shaped ... *Neanotis* 11

4b. Fruit 2-seeded :

- 9a. Inflorescence corymbose. Fruit dehiscing into 2 indehiscent cocci ... *Knoxia* 9

- 9b. Inflorescence not corymbose. Fruit dehiscent into 2 dehiscent cocci ... *Borreria* 3
- 9b. Shrubs or trees :
- 10a. Inflorescence spicate. Bract solitary, foliaceous. Corolla lobes valvate in bud. ... *Hymenodictyon* 6
- 10b. Inflorescence not spicate. Bracts otherwise. Corolla lobes contorted in bud :
- 11a. Ovary 1-locular. Stipules amplexicaul ... *Gardenia* 5
- 11b. Ovary 2-locular. Stipules otherwise :
- 12a. Inflorescence axillary or at apex of brachyblasts ... *Xeromphis* 16
- 12b. Inflorescence terminal on normal shoot :
- 13a. Flowers not in corymb or solitary :
- 14a. Corolla less than 3 mm long ... *Wendlandia* 15
- 14b. Corolla 10 - 25 mm long ... *Spermadictyon* 13
- 13b. Flowers in corymb or solitary :
- 15a. Flowers solitary or in fascicles ... *Coffea* 4
- 15b. Flowers in corymbs ... *Ixora* 7

1. ADINA Salisb.

Adina cordifolia (Roxb.) Hook. f. ex Brandis, For. Fl. 263. t. 33. 1874; Gandhi in Sald. & Nicol. Fl. Hassan 572. 1976. *Nauclea cordifolia* Roxb. Pl. Cor. i. 53. 1798. "Haldi".

Tall trees. Leaves ovate-orbicular, pubescent; petiole up to 8 cm long. Inflorescence 1-3-fascicled heads, axillary; peduncles 3-5 cm long, 2-bracteate near the middle. Corolla brownish-yellow. Capsules about 4 mm long.

PACHMARHI : Dhupgarh (1250 m). In mixed deciduous forests. Abundant.

Fl. & Fr. : June February.

2. ARGOSTEMMA Wall.

Argostemma sarmentosum Wall. in Roxb. Fl. Ind. 2 : 324. 1824 ; Hook. f. Fl. Brit. Ind. 3 : 42. 1880 ; Babu, Herb. Fl. Dehra Dun 220. 1977.

Perennial, fleshy herbs with tuberous root stock. Stems erect ; runners arising from the axils of lowest pair of caducous leaves. Leaves of upper pairs ovate-elliptic to oblong or obovate, obtuse or rounded at apex. Inflorescence umbelliform above the highest leaf-pair, 1-3-flowered, glabrous. Corolla white with greenish centre, divided almost down to the base. Anthers connate into a tube. Stigma capitate. Fruit many-seeded.

PACHMARHI : Vicinity (1000 m). On shady moist rocky slopes. Abundant.

Fr. & Fl. : August November.

3. BORRERIA G. F. W. Mey.

1a. Stem procumbent. Corolla-tube with a ring of hairs within at base ... *B. articulata* 1

1b. Stem erect. Corolla-tube without a ring of hairs ... *B. pusilla* 2

1. *Borreria articulata* (L. f.) F. N. Williams in Bull. Herb. Boiss. Ser 2, 5 : 956. 1905 ; Babu, Herb. Fl. Dehra Dun 221. 1977. *Spermacoce hispida* L. Sp. Pl. 102. 1753 ; Hook. f. Fl. Brit. Ind. 3 : 200. 1880. *Spermacoce articulata* L. f. Suppl. 119. 1781. *Borreria hispida* (L.) Schum. in Engl. & Prantl, Pflanzenf. 4(4) : 144. 1891 (*non* Spruce ex Schum. 1888).

Erect in juvenile stage, later procumbent, hispid herbs. Leaves elliptic-lanceolate. Calyx 4-lobed. Corolla bluish-white. Mericarps pubescent with septum on one mericarp ; finally separating.

PACHMARHI : Mahadev hill (1300 m). In waste lands and along pathways. Common.

Fl. & Fr. : July December.

2. *Borreria pusilla* (Wall.) DC. Prodr. 4 : 543. 1830 ; Gandhi in Sald. & Nicol, Fl. Hassan 574. 1976. *Spermacoce pusilla* Wall. in Roxb. Fl. Ind.

1 : 379. 1820. *Spermacoce stricta* L. f. Suppl. 120. 1781 ; Hook. f. Fl. Brit. Ind. 3 : 200. 1880. *Borreria stricta* (L. f.) K. Schum. in Engl. & Prantl, Pflanzenf. 4(4) : 143. 1891 (*non* Mayer, 1818).

Erect, prickly herbs. Leaves opposite or sub-verticillate, oblong, oblong-lanceolate or lanceolate, acute or acuminate ; stipules connate to the leaf-base. Flowers in axillary and terminal clusters. Corolla white, funnel-shaped. Ovary 2-celled, 1 ovule in each cell. Stigma capitate.

PACHMARHI : Mahadev hill (1300 m). In lateritic soil along road side. Common.

Fl. & Fr. : August October.

4. COFFEA L..

Coffea arabica L. Sp. Pl. 172. 1753.

Glabrous shrubs or small trees. Leaves opposite, oblong, acuminate, narrowed into short petioles. Flowers numerous in axillary fascicles or solitary. Corolla funnel-shaped ; lobes oblong, as long as the tube. Filaments as long as the anthers. Berry fleshy, purple when ripe.

PACHMARHI : Mahadev hill (1250 m). On hill slopes. Cultivated.

Fl. & Fr. : March December.

5. GARDENIA J. Ellis

- 1a. Corolla tube less than 2 cm. long. Plants sometimes armed, not resiniferous ... *G. turgida* 2
- 1b. Corolla tube more than 3 cm long. Plants unarmed, resiniferous ... *G. latifolia* 1

1. *Gardenia latifolia* Ait. Hort. Kew 1 : 294. 1789 ; Hook. f. Fl. Brit. Ind. 3 : 116. 1880 ; Gandhi in Sald. & Nicol. Fl. Hassan 576. 1976. "Papra"

Yellow resiniferous, small, deciduous trees. Leaves elliptic-obovate. Flowers solitary. Calyx lobes 5-9, lanceolate, acuminate. Corolla 5-9-lobed, becoming yellow. Berry globose, smooth ; placentas 4-5.

PACHMARHI : Dhupgarh (1200 m) ; Vicinity (1000 m). In mixed deciduous forest. Abundant.

Fl. & Fr. : March December.

2. *Gardenia turgida* Roxb. Fl. Ind. 1 : 711. 1820 ; Hook. f. Fl. Brit. Ind. 3 : 118. 1880 ; Gandhi in Sald. & Nicol. Fl. Hassan 577. 1976. "Karhar"

Deciduous shrubs or small trees, sometimes armed. Leaves obovate, obtuse-acute, pubescent. Male flowers fascicled ; female flowers solitary. Calyx lobes 5. Corolla white, 5-lobed. Berry orbicular, yellowish-brown.

PACHMARHI : Vicinity (1000 m). In mixed deciduous forest. Abundant.

Fl. & Fr. : March July.

6. HYMENODICTYON Wall.

Hymenodictyon excelsum (Roxb.) Wall. in Roxb. Fl. Ind. 2 : 149. 1824 ; Hook. f. Fl. Brit Ind. 3 : 35. 1880. *Cinchona excisa* Roxb. Pl. Cor. 2 : t. 106. 1798. "Bhulan".

Large deciduous trees ; bark furrowed, rough. Leaves ovate-elliptic, obtuse or acuminate, narrowed into short petioles, membranous, finely pubescent on both surface. Stipule caducous. Inflorescence spicate. Bracts solitary, foliaceous. Flowers small, white or greenish, fragrant. Capsules ellipsoid on decurved pedicels, provided with many lenticels. Seeds small many.

PACHMARHI : Vicinity (1000 m), Saxena 8197 (SFRI). In mixed deciduous forests. Rare.

Fl. & Fr. : July February.

The soft starchy underground portion of the saplings and seedlings are very much liked by the pigs. So the species has become threatened. This may be a source of quinine.

7. IXORA L.

Ixora arborea Roxb. ex J. E. Sm. in Rees, Cyclop. 19 : 5. 1811 ; Gandhi in Sald. & Nicol. Fl. Hassan 578. 1976. *Ixora parviflora* Vahl,

Symb. 3 : 11, t. 52, 1794 (*non* Lamk. 1791) ; Hook. f. Fl. Brit. Ind. 3 : 142. 1880. "Kotagandhal".

Glabrous, evergreen shrubs or small trees. Leaves sub-sessile, elliptic-lanceolate, sub-acute, cordate, coriaceous. Inflorescence corymbose. Peduncles reddish-brown. Buds ellipsoid. Calyx teeth obscure. Corolla white, shortly lobed. Style hairy. Drupe red, slightly lobed.

PACHMARHI : Vicinity (1000 m), 25.7.64, Panigrahi (BSA). In mixed forests. Scarce.

Fl. & Fr. : November July.

8. KOAUTIA Cham. & Schlecht.

Koautia gracilis (Wall.) DC. Prodr. 4 : 430. 1830 ; Babu, Herb. Fl. Dehra Dun 225. 1977. *Hedyotis gracilis* Wall. in Roxb. Fl. Ind. 1 : 371. 1820. *Oldenlandia gracilis* (Wall.) Hook. f. Fl. Brit. Ind. 3 : 68. 1880.

Erect, annual perennial herbs. Leaves linear, narrowly oblong, acute, glabrous, 1 nerved. Flowers in terminal, cymose, corymbiform panicles. Calyx - lobes subulate. Corolla blue, divided halfway or less down ; lobes oblong, obtuse. Stigma overtopped by anthers. Capsule obovoid.

BORI : Reserve forest (550 m). Along the pathways. Occasional.

Fl. & Fr. : July December.

9. KNOXIA L.

Knoxia sumatrensis (Retz.) DC. Prodr. 4 : 569. 1830 ; Gandhi in Sald. & Nicol. Fl. Hassan 579. 1976. *Spermacoce sumatrensis* Retz. Obs. Bot. 4 : 23. 1786. *Knoxia corymbosa* (*auct. pl. non* Willd. 1798) ; Hook. f. Fl. Brit. Ind. 3 : 128. 1880.

Erect herbs. Stems 4 - angled, pubescent. Leaves elliptic lanceolate to oblong, acute to subacuminate, narrowed to the base, thinly pubescent. Flowers blue or pinkish white in corymbose panicles. Calyx lobes unequal.

Corolla lobes ovate, obtuse. Fruit ellipsoid, dehiscent into 2 indehiscent cocci; cocci 3 ribbed.

PACHMARHI : Vicinity (1000 m). In forest undergrowth amongst the grasses.

Fl. & Fr. : September December.

10. MITRAGYNA Korth.

Mitragyna parvifolia (Roxb.) Korth. Obs. Naucl. Ind. 19. 1839; Gandhi in Sald. & Nicol. Fl. Hassan 581. 1976. *Nauclea parvifolia* Roxb. Pl. Cor. 1 : 40. t. 52. 1796. *Stephegyne parvifolia* (Roxb.) Korth. in Verh. Nat. Ges. 161. 1840; Hook. f. Fl. Brit. Ind. 3 : 25. 1880. "Kaim"/"Mundi".

Large deciduous trees. Leaves suborbicular ovate, obtuse - acute, acute rounded at base. Heads usually solitary, short peduncled. Sepals 0. Petals white, sparsely pilose within. Capsules in globose heads.

PACHMARHI : Vicinity (1000 m). BORI : Dhain (413 m). In mixed deciduous forests. Abundant.

Fl. & Fr. : April August.

11. NEANOTIS Lewis

Neanotis calycina (Hook. f.) Lewis in Ann. Miss. Bot. Gard. 53 : 37. 1966; Babu, Herb. Fl. Dehra Dun 226. 1977. *Anotis calycina* Hook. f. Fl. Brit. Ind. 3 : 73. 1880. *Hedyotis calycina* Wall. Cat. 878. 1829. *nom. nud.*

Erect annual herbs with 4-angled stems. Leaves ovate lanceolate, acute or acuminate, thinly pubescent. Flowers in few flowered cymes. Capsules didymous, truncate, often longer than the calyx lobes. Seeds shell shaped.

PACHMARHI : Jambudeep (1050 m); Vicinity (1000m). On moist shady rocks. Occasional.

Fl. & Fr. : August November.

12. OLDENLANDIA L. *emend.* Bremk.

1a. Upper inflorescences many - flowered and panicled ...	<i>O. affinis</i> . 1
1b. All inflorescences 1 - 4 - flowered :	
2a. Tip of capsule round, protruding. Erect herbs ...	<i>O. herbacea</i> 4
2b. Tip of capsule flat, not protruding. Herbs often diffuse :	
3a. Stamens and style included ...	<i>O. corymbosa</i> 2
3b. Stamens and style exserted ...	<i>O. diffusa</i> 3

1. *Oldenlandia affinis* (Roem. & Schult.) DC. Prodr. 4 : 428. 1830 ; Gandhi in Sald. & Nicol. Fl. Hassan 585. 1976. *Hedyotis affinis* Roem. & Schult. Syst. 3 : 194. 1819. *Hedyotis dichotoma* Heyne ex Roth, Nov. Pl. Sp. 93. 1821. *Oldenlandia dichotoma* (Heyne ex Roth) Hook. f. Fl. Brit. Ind. 3 : 67. 1880 (*non* Spreng. 1815).

Slender herbs. Leaves linear - lanceolate. Cymes in upper axils, many - flowered, panicled. Corolla funnel shaped, blue. Stamens inserted in the throat of corolla. Capsule loculicidal.

PACHMARHI : Vicinity (1000 m). Along waysides in the mixed forests. Common.

Fl. & Fr. : July October.

2. *Oldenlandia corymbosa* L. Sp. Pl. 119. 1753 ; Hook. f. Fl. Brit. Ind. 3 : 64. 1880 p. p. (excl. syn. *Hedyotis burmanniana* Wall. ex Wt. & Arn.) ; Babu, Herb. Fl. Dehra Dun 227. 1977. "Dhaman - papar".

Decumbent annual herbs. Stems quadrangular, thinly hairy, rooting at lower nodes. Leaves sessile, linear lanceolate. Flowers solitary or in 1 - 4 flowered, peduncled axillary cymes. Capsules broader than long, slightly compressed, with persistent calyx, opening by apical pores. Seeds 2, black, rugose.

PACHMARHI : Vicinity (1000 m). BORI : Kobra nallah (450 m). Along waysides in mixed forest. Common.

Fl. & Fr. : July December.

3. *Oldenlandia diffusa* (Willd.) Roxb. Hort. Beng. 11. 1814. (*nom. valid*) et Fl. Ind. 1 : 423. 1820 ; Hook. f. Fl. Brit. Ind. 3 : 65. 1880 ; Babu, Herb. Fl. Dehra Dun 227. 1977. *Hedyotis diffusa* Willd. Sp. Pl. 1 : 566. 1798.

Prostrate or decumbent annual herbs. Stems slender, 4 angled, glabrous. Leaves linear lanceolate to oblong, subacute, with a revolute margin, often narrowed to the base. Flowers solitary or 1-4 together. Calyx lobes subequal, ovate lanceolate, acute. Corolla white, lobes ovate, acute. Fruit glabrous, didymous.

PACHMARHI : Vicinity (1000 m). On hill slopes and along way sides. Common.

Fl. & Fr. : July October.

4. *Oldenlandia herbacea* (L.) Roxb. Fl. Ind. 1 : 445. 1820 ; Gandhi in Sald. & Nicol. Fl. Hassan 586. 1976. *Hedyotis herbacea* L. Sp. Pl. 102. 1753. *Oldenlandia hirsutiflora* R. Br. ex G. Don, Gen. Syst. 3 : 531. 1834 ; Hook. f. Fl. Brit. Ind. 3 : 65. 1880.

Herbs with quadrangular stems. Leaves linear lanceolate. Corolla white. Anthers partially exserted. Capsule loculicidal, with protruding crown.

PACHMARHI : Vicinity (1000m) ; Jambudeep (1050 m). On way-sides in the forest. Common.

Fl. & Fr. : October December.

13. SPERMADICTYON Roxb.

Spermadictyon suaveolens Roxb. Pl. Cor. 3 : 32. t. 236. 1815 ; Sant. Fl. Khandala (ed. 3) 120. 1967. *Hamiltonia suaveolens* (Roxb.) Roxb. Fl. Ind. 1 : 554. 1820 ; Hook. f. Fl. Brit. Ind. 3 : 197. 1881 "Mahabal".

Spreading shrubs. Leaves opposite, elliptic oblong or ovate. Flowers fascicled in large panicles. Calyx lobes 4-5 or 6. Corolla blue, 5 lobed. Capsule ellipsoid, 1 celled, 5 valved at the top. Seeds 5.

PACHMARHI : Mahadev hill (1200 m) ; Dhupgarh (1250 m). On hill slopes. Common.

Fl. & Fr. : September December.

14. THECAGONIUM Babu

Thecagonium ovatifolium (Cav.) Babu in Bull. Bot. Surv. India 11 : 214. 1969 et Herb. Fl. Dehra Dun 231. 1977. *Hedyotis ovatifolia* Cav.

Descr. Pl. 1c. 6 : 52. 1802. *Oldenlandia nudicaulis* Roth, Nov. Pl. Sp. 95. 1821 ; Hook. f. Fl. Brit. Ind. 3 : 70. 1880. *Oldenlandia ovatifolia* (Cav.) DC. Prodr. 4 : 427. 1830. *Gonotheca ovatifolia* (Cav.) Sant. & Wagh in Bull. Bot. Surv. India 5 : 107. 1963.

Erect annual herbs. Leaves in a few pairs, often 4 together at apex of the stem, ovate oblong or oblong rounded, obtuse, glabrous or thinly hairy on the lower surface. Flowers in many-flowered loose, corymbose panicles. Calyx lobes ovate triangular, acute. Corolla white, divided more than halfway down ; lobes lanceolate oblong, hairy within. Stamens inserted near the top of corolla tube. Fruit hemispheric, crowded with calyx lobes. Seeds ovoid globose, brown, pitted.

PACHMARHI : Vicinity (1000 m). On lateritic soil of hill slopes. Occasional.

Fl. & Fr. : August - November.

15. WENDLANDIA Bartl. ex DC.

Wendlandia heynei (Roem. & Schult.) Sant. & Mahesh. in Bull. Bot. Surv. India 3 : 110. 1961. *Rondeletia heynei* Roem & Schult. Syst. 5 : 234. 1819. *Rondeletia exserta* Roxb. Fl. Ind. 2 : 135. 1824. *Wendlandia exserta* (Roxb.) DC. Prodr. 4 : 411. 1830 ; Hook. f. Fl. Brit. Ind. 3 : 37. 1880. "Chaulai".

Grey tomentose small trees. Leaves opposite, ovate, ovate-lanceolate or oblong, pubescent. Stipules ovate, acute, recurved. Flowers in tomentose pyramidal panicles, fragrant. Corolla white, funnel-shaped. Anthers exserted. Ovary 2 celled. Capsule globose, grey tomentose, many seeded.

RORI : Reserve forest (550 m). In mixed forest. Abundant.

Fl. & Fr. : March - July.

16. XEROMPHIS Rafin.

1a. Spines axillary. Calyx - lobes persistent	...	<i>X. spinosa</i> 1
1b. Spines terminal. Calyx - lobes caducous	...	<i>X. uliginosa</i> 2

Xeromphis spinosa (Thunb.) Koay in Bull. Jard. Bot. Etat. Brux. 28 : 37. 1958 ; Gandhi in Sald. & Nicol. Fl. Hassan 592. 1976. *Gardenia spinosa* Thunb. Diss. Gard. no. 7. 1780. *Gardenia dumetorum* Retz. Obs. 2 : 14. 1781. *Randia dumetorum* (Retz.) Poir. in Lamk. Encycl. Suppl. 2 : 829. 1812 ; Hook. f. Fl. Brit. Ind. 3 : 110. 1880. "Mainphai".

Rigid shrubs or small trees with long, opposite, axillary spines. Leaves obovate, obtuse, or sub acute, pubescent, rarely glabrous, deciduous. Flowers 1 few fascicled, 5 merous. Calyx lobed. Corolla pale yellow. Berry ellipsoid.

PACHMARHI : Vicinity (1000 m). In mixed deciduous forest. Occasional.

Fl. & Fr. July December.

2. **Xeromphis uliginosa** (Retz.) Mahesh. in Bull. Bot. Surv. Ind. 3 : 92. 1962. *Gardenia uliginosa* Retz. Obs. 2 : 14. 1781. *Randia uliginosa* (Retz.) Poir. in Lamk. Encycl. Suppl. 2 : 829. 1812 ; DC. Prodr. 4 : 386. 1830 ; Hook. f. Fl. Brit. Ind. 3 : 110. 1880. "Pindatu"

Small rigid trees with spines at the end of terminal brachyblasts. Leaves elliptic-lanceolate. Flowers solitary, 6-8-merous. Calyx toothed ; lobes caducous. Corolla white. Fruit ovoid, smooth, yellow. Seeds compressed, closely packed in pulp.

BORI : Dhain (413 m). In mixed forest. Common.

Fl. & Fr : May November.

51. ASTERACEAE Dum.

1a. Florets all tubular, outer sometimes larger than inner florets :

2a. Plants white - woolly ... *Gnaphalium* 18

2b. Plants glabrous, hairy or tomentose, but not white - woolly :

3a. Leaves all opposite, sometimes the upper alternate :

4a. Head with 1 floret, in clusters surrounded by foliar bracts ... *Lagascea* 20

4b. Head with many florets :

5a. Pappus of 5 scales. Plants aromatic.
Heads in paniculate corymbs ... *Ageratum* 3

5b. Pappus of 2 - many hairs. Plants
aromatic or not. Heads in corymbs ... *Adenostemma* 2

3b. Leaves all alternate :

6a. Achenes enclosed in an indurate, spiny,
involucre. Anthers not adherent to each
other ... *Xanthium* 33

6b. Achenes not enclosed in an indurate,
spiny, involucre. Anthers adherent :

7a. Florets yellow :

8a. Anther bases tailed :

9a. Upper leaves without amplexicaule base ... *Blumea* 6

9b. Upper leaves with amplexicaule base ... *Blumiopsis* 7

8b. Anther bases obtuse, entire, not
tailed :

10a. Stem distinctly winged.
Plants often viscid ... *Laggera* 21

10b. Stem not winged. Plants
usually not viscid :

11a. Erect herbs :

12a. Leaf base cuneate,
narrowed, never
cordate ... *Conyza* 12

12b. Leaf base cordate,
amplexicaul ... *Laggera* 21

11b. Diffuse prostrate
herbs ... *Centipeda* 9

7b. Flowers not yellow :

13a. Leaves deeply pinnatisect :

14a. Pappus 0. Leaves ashy -
tomentose beneath ... *Artemisia* 4

14b. Pappus of hairs. Leaves
not ashy - tomentose be-
neath :

- 15a. Heads of equal florets
(bisexual) ... *Emilia* 16
- 15b. Heads with outer
florets (female) larger
than inner (bisexual) ... *Cyathocline* 13
- 13b. Leaves not lobed more than half
way to midrib ; margin various :
- 16a. Stem narrowly winged.
Plants aromatic ... *Sphaeranthus* 26
- 16b. Stem not winged. Plants
not aromatic :
- 17a. Leaves mostly rosulate
and a few reduced
cauline ones above ... *Elephantopus* 15
- 17b. Leaves all cauline :
18a. Involucral bracts
2 - seriate ... *Caesulia* 8
- 18b. Involucral bracts
many - seriate :
19a. Involucral
bracts with
foliaceous
upper part *Centratherum* 10
- 19b. Involucral
bracts with-
out foliace-
ous upper
part ... *Vernonia* 30
- 1b. Florets all ligulate or only the outer ligulate :
- 20a. Florets all ligulate. Sap milky ... *Sonchus* 25
- 20b. Outer florets ligulate, the inner tubular and bisexual. Sap not milky :
21a. Outer involucral bracts hooded - spinous ... *Acanthospermum* 1
- 21b. Outer involucral bracts unarmed :
22a. Leaves alternate :
23a. Leaves deeply pinnatisect ... *Senecio* 23
- 23b. Leaves never lobed more than half
way to midrib :
24a. Head solitary. Pappus
double, the outer of scales
and inner of hairs ... *Pulicaria* 22

- 24b. Heads corymbose or panicle.
Pappus single, of hairs ... *Vicoa* 31
- 22b. Leaves opposite, rarely upper leaves
alternate :
- 25a. Pappus bristles
plumose ... *Tridax* 29
- 25b. Pappus bristles retro -
sely barbellate, not plu -
mose :
26a. Leaves deeply lob -
ed :
27a. Leaves trifoli -
late ... *Bidens* 5
- 27b. Leaves pinna -
toid ... *Chrysanthemum* 11
- 26b. Leaves crenate, not
deeply lobed :
28a. Outer involucral bracts glan -
dular, clavate ... *Sigesbeckia* 24
- 28b. Outer involucral bracts not
glandular :
29a. Receptacle not paleaceous.
Paleas not enclosing
flowers :
30a. Marginal flowers
numerous, many -
seriate, white ... *Eclipta* 14
- 30b. Marginal flowers 5
to few, 1 - seriate,
yellow ... *Wedelia* 32
- 29b. Receptacle paleaceous.
Paleas enclosing flowers :
31a. Ligule large,
more than 1.5
cm long ... *Guzotia* 19
- 31b. Ligule small,
less than 1 cm
long :
32a. Heads sess -
ile, usual -
ly axil -
lary ... *Synedrella* 28
- 32b. Heads pedu -
ncled, axil -
lary and ter -
minal :

33a. Recep-
tacle
raised,
coni-
cal ;
ligule
filiform,
includ-
ed ... *Spilanthes* 27

33b. Recep-
tacle
flat ;
ligules
exsert-
ed ... *Galinsoga* 17

I. ACANTHOSPERMUM Schrank.

Acanthospermum hispidum DC. Prodr. 5 : 522. 1836 ; Babu, Herb. Fl. Dehra Dun 237. 1977.

Erect, diffusely branched, hairy, annual herbs. Leaves obovate spathulate, acute, cuneate at base, hairy. Heads sessile, solitary at the dichotomy of branches, yellow. Achenes triangular, with 2 large spines and numerous lateral hooked spinules.

PACHMARHI : Mahadev hill (1250 m). In the borders of deciduous forest in moist situations. Abundant.

Fl. & Fr. : July December.

2. ADENOSTEMMA J. R. & G. Forst.

Adenostemma lavenia (L.) O. Kuntze, Rev. Gen. Pl. 1 : 304. 1891 ; Babu, Herb. Fl. Dehra Dun 237. 1977. *Verbesina lavenia* L. Sp. Pl. 902. 1753. *Adenostemma viscosum* Forst. Char. Gen. Pl. 90. 1776 ; Hook. f. Fl. Brit. Ind. 3 : 242. 1881. p. p.

Glabrous or glandular hairy annual herbs. Leaves ovate lanceolate, acute, cuneate below, glabrescent. Heads in lax corymbs. Involucral bracts glandular hairy. Corolla and style arms white. Achenes obovoid-oblong, tuberculate. Pappus knobs 3-4.

PACHMARHI : Vicinity (900 m). Amidst rocks on the bank of hill streams. Occasional.

Fl. & Fr. : July November.

3. AGERATUM L.

Ageratum conyzoides L. Sp. Pl. 839. 1753 ; Hook. f. Fl. Brit. Ind. 3 : 243. 1881 ; Babu, Herb. Fl. Dehra Dun 238. 1977.

Erect, much-branched annual herbs with terete stem, hairy when young. Leaves rough hairy, opposite or upper ones alternate, broadly ovate. Heads blue, purple or white, crowded on terminal peduncles ; bracts acute at tip, sometimes glandular hairy. Achenes sharply 4 angled.

PACHMARHI : Dhupgarh (1200 m). BORI : Reserve forest (550 m) ; Dhain (462 m). Edges of the forests. Abundant.

Fl. & Fr. : All seasons.

4. ARTEMISIA L.

1a. Leaves densely white-lanate beneath. Stems sulcate, pubescent. Involucral bracts lanate. Disk-flowers fertile

... *A. nilagirica* 1

1b. Leaves not densely white-lanate beneath. Stems ribbed, glabrous. Involucral bracts glabrous. Disk-flowers sterile

A. parviflora 2

1. *Artemisia nilagirica* (Cl.) Pamp. Nuov. Giorn. Bot. Ital. N. S. 33 : 452. 1926 ; Babu, Herb. Fl. Dehra Dun 241. 1977. *Artemisia vulgaris* L. var. *nilagirica* Cl. Comp. Ind. 162. 1876. *Artemisia vulgaris* (auct. pl. non L. 1753) ; Hook. f. Fl. Brit. Ind. 3 : 325. 1881. "Nagdona".

Aromatic undershrub with underground stolons and many branches. Leaves sessile, pinnatipartite to 2-pinnate ; segments entire. Heads sessile. Involucral bracts ovate-oblong, obtuse, densely lanate. Ligules glandular. Florets white. Achenes glabrous.

PACHMARHI : Vicinity (1000 m) ; Mahadev hill (1250 m). In forest undergrowth. Abundant.

Fl. & Fr. : October February.

2. *Artemisia parviflora* Buch Ham. ex D. Don, Prodr. 181. 1825 ; Hook. f. Fl. Brit. Ind. 3 : 322. 1881 ; Babu, Herb. Fl. Dehra Dun 241. 1977.

Erect, perennial herbs with ribbed stems. Leaves sessile, spatulate cuneate, serrate - lobed, pubescent, upper ones linear lanceolate, entire. Heads short peduncled. Involucral bracts 2 - 3-seriate, glabrous, ovate - rounded. Florets yellow. Achenes minute.

PACHMARHI : Manadev hill (1250 m). In forest undergrowth. Occasional.

Fl. & Fr. : October February.

5. BIDENS L.

Bidens hirta (Lour.) Merr. & Sheriff ex Sheriff in Bot. Gaz. 88 : 293. 1929 ; Babu, Herb. Fl. Dehra Dun 242. 1977. *Coreopsis hirta* Lour. Fl. Cochinch. 508. 1790. *Bidens pilosa* (auct. non L. 1753) ; Hook. f. Fl. Brit. Ind. 3 : 309. 1881 p. p.

Erect, annual herbs with terete, grooved, pubescent stems. Leaves 3 - 5-foliate ; leaflets ovate lanceolate, acute to acuminate, narrowed below, dentate. Bracts hairy along margin. Ray florets present or absent, white. Outer cypselae smaller, inner longer.

PACHMARHI : Mahadev hill (1200 m). BORI : Reserve forest (900 m). In forest undergrowth and on hill slopes. Occasional.

Fl. & Fr. : All seasons.

6. BLUMEA DC.

- | | |
|--|-------------------------|
| 1a. Receptacle densely short - hairy around the pits ... | <i>B. fistulosa</i> 2 |
| 1b. Receptacle glabrous, if hairy, then the plants shrubby : | |
| 2b. Pappus pale red on drying ... | <i>B. balsamifera</i> 1 |
| 2b. Pappus - hairs white or dirty white : | |

- 3a. Corolla hairy. Leaves spinulose toothed. Heads subsessile or combined into corymbs ... *B. oxydonia* 5
- 3b. Corolla of marginal flowers glabrous, and of disk-flowers hairy. Leaves not spinulose toothed. Heads combined into a lax, terminal panicle :
 - 4a. Achenes ribbed :
 - 5a. Stems and leaves pilose, glabrous with age. Achenes hairy ... *B. membranacea* 4
 - 5b. Stems with stalked glands. Leaves glandular beneath. Achenes glabrous ... *B. virens* 6
 - 4b. Achenes angular - terete, not ribbed ... *B. lacera* 3

1. Blumea balsamifera (L.) DC. Prodr. 5 : 447. 1836 ; Hook. f. Fl. Brit. Ind. 3 : 270. 1881. *Conyza balsamifera* L. Sp. Pl. (ed. 2), 1208. 1763. "Kakaronda".

Tall, tomentose, aromatic shrubs. Leaves coriaceous, elliptic or oblong lanceolate, sometimes pinnatifid, narrowed to the base. Heads sessile or peduncled on the branches of a large spreading or pyramidal panicle. Involucral bracts tomentose. Receptacles glabrous. Achenes 10 ribbed, silky. Pappus red.

PACHMARHI : Vicinity (1000 m). In forest undergrowth and road sides. Occasional.

Fl. & Fr. : December April.

2. Blumea fistulosa (Roxb.) Kurz in Journ. Asiat. Soc. Beng. 46 : 187. 1877 ; Babu, Herb. Fl. Dehra Dun 244. 1977. *Conyza fistulosa* Roxb. Fl. Ind. 3 : 429. 1832. *Blumea glomerata* DC. in Wt. Contrib. Bot. Ind. 15. 1834 ; Hook. f. Fl. Brit. Ind. 3 : 262. 1881.

Erect, densely hairy, annual herbs. Lower leaves lyrate pinnatifid ; upper ones obovate, serrate. Heads sessile in axillary clusters, forming leafy spikes. Involucral bracts lanceolate subulate, hairy on the back. Corolla lobes hairy. Achenes 8-10-ribbed. Receptacle pubescent around the pits.

BORI : Reserve forest (550 m). On hill slopes and waysides. Common.

Fl. & Fr. : October February.

3. Blumea lacera (Burm. f.) DC. in Wt. Contrib. Bot. Ind. 14. 1834 ; Hook. f. Fl. Brit. Ind. 3 : 263. 1881 ; Babu, Herb. Fl. Dehra Dun 245. 1977. *Conyza lacera* Burm. f. Fl. Ind. 180. t. 59. f. 1. 1768. "Kakranda".

Erect, aromatic, viscid herbs. Stem terete, grooved, with stalked glands. Leaves obovate-oblong, sometimes rounded, serrate, sometimes lyrate lobed, generally with a few sharp teeth and numerous glands and hairs on both surfaces. Heads in short panicles. Receptacles alveolate, glabrous. Florets yellow. Achenes terete, slightly ribbed, sparsely hairy.

PACHMARHI : Mahadev hill (1200 m). BORI : Reserve forest (430 - 550 m). In forest undergrowth, waysides and river banks. Common.

Fl. & Fr. : September - January.

4. *Blumea membranacea* DC. Prodr. 5 : 440. 1836 ; Hook. f. Fl. Brit. Ind. 3 : 265. 1881 ; Babu, Herb. Fl. Dehra Dun 246. 1977.

Erect herbs. Stems grooved, pilose, glabrous with age. Leaves ovate-lanceolate, sometimes lyrate lobed, dentate, pubescent, glabrous with age. Heads pedunculate, in panicles. Receptacles alveolate, glabrous. Florets yellow. Achenes angled, hairy.

BORI : Reserve forest (550 m). In forest undergrowth. Common.

Fl. & Fr. : December - April.

5. *Blumea oxyodonta* DC. in Wt. Contrib. Bot. Ind. 15. 1834 ; Hook. Fl. Brit. Ind. 3 : 266. 1881 ; Babu, Herb. Fl. Dehra Dun 247. 1977.

Annual biennial herbs with a central rootstock and radiating root branches. Stems glandular hairy. Leaves sessile, oblong obovate, sharply dentate, white hairy beneath. Heads peduncled, solitary or clustered. Receptacle areolate, glabrous. Florets yellow. Achenes angled, pubescent.

PACHMARHI : Dhupgarh (1250 m). BORI : Reserve forest (550 m). By the sides of paths and open lands. Abundant.

Fl. & Fr. : November - February.

Blumea virens DC. in Wt. Contrib. Bot. Ind. 14. 1834 ; Hook. f. Fl. Brit. Ind. 3 : 264. 1881 ; Ramam. in Said. & Nicol. Fl. Hassan 606. 1976.

Tall herbs. Stem and branch tips with stalked glands. Lower leaves oblanceolate, lyrate lobed, dentate, glandular beneath. Heads peduncled, in lax panicles. Receptacle areolate, glabrous. Florets yellow. Achenes ribbed, glabrous.

PACHMARHI : Vicinity (1000 m). Along waysides and waste lands. Common.

Fl. & Fr. : November - January.

7. *BLUMEOPSIS* Cagnep.

Blumeopsis flava (DC.) Cagnep. in Bull. Mus. Hist. Nat. Paris 26 : 76. 1920 ; Babu, Herb. Fl. Dehra Dun 248. 1977. *Blumea flava* DC. Prodr. 5 : 439. 1836. *Laggera flava* (DC.) Benth. in Benth. & Hook. f. Gen. Pl. 2 : 290. 1873 ; Hook. f. Fl. Brit. Ind. 3 : 270. 1881.

Slender, erect, annual herbs. Leaves mostly in rosettes, obovate-rounded, spinulose-dentate ; upper ones lanceolate-oblong, with amplexicaul bases. Heads long-peduncled, in compound corymbose panicles, golden yellow. Involucral bracts ovate-lanceolate, glabrous, acuminate. Achenes minute, glabrous. Pappus hairs white.

PACHMARHI : Vicinity (1000 m). In mixed forests and on hill slopes. Common.

Fl. & Fr. : October January.

8. *CAESULIA* Roxb.

Caesulia axillaris Roxb. Pl. Cor. 1 : 64. t. 93. 1798 ; Hook. f. Fl. Brit. Ind. 3 : 291. 1881 ; Babu, Herb. Fl. Dehra Dun 248. 1977.

Erect or decumbent-ascending annual herbs. Stems glabrous. Leaves with semi-amplexicaul sheathing base, lanceolate-oblong, subacute, remotely denticulate. Heads globose, 3-4 connate in a compound head. Involucral bracts 2-seriate. Corolla-lobes glabrous. Anthers dark brown. Achenes dark brown, obovoid, obcordate, ribbed, winged. Pappus-scales 2, ovate-lanceolate. Receptacle flat, shortly 2-4-lobed.

BORI : Reserve forest (550 m). In the mixed forest and wayside on moist soil. Common.

Fl. & Fr. : September April.

9. *CENTIPEDA* Lour.

Centipeda minima (L.) A. Br. & Aschers. Ind. Sem. Hort. Berol. App. 6. 1867 ; Babu, Herb. Fl. Dehra Dun 251. 1977. *Artemisia minima* L. Sp.

PL 849. 1753. *Centipeda orbicularis* Lour. Fl. Cochinch. 2 : 493. 1790 ; Hook. f. Fl. Brit. Ind. 3 : 317. 1881. "Nakk-chikni".

Densely leafy, much-branched, annual herbs. Stems glabrescent except young parts. Leaves sessile, spatulate-oblong or obovate, tapering to the base, apex obtuse or rounded. Heads sessile, axillary, solitary. Involucral bracts 2-seriate, lanceolate, obtuse. Marginal florets white, inner ones yellow. Achenes oblong, 4-angular. Pappus wanting. Receptacle convex.

PACHMARI : Vicinity (1000 m). Along waysides and in waste land. Occasional.

Fl. & Fr. : All seasons.

10. CENTRATHERUM Cass.

- | | | |
|---|-----|----------------------------|
| 1a. Leaves not white beneath. Outer involucral bracts long,
linear | ... | <i>C. anthelminticum</i> 1 |
| 1b. Leaves white beneath. Outer involucral bracts short,
leafy | ... | <i>C. indicum</i> 2 |

1. **Centratherum anthelminticum** (L.) Kuntze, Rev. Gen. Pl. 1 : 320. 1891 ; Babu, Iherb. Fl. Dehra Dun 251. 1977. *Conyzia anthelmintica* L. Sp. Pl. (ed. 2) 1207. 1763. *Vernonia anthelminticum* (L.) Willd. Sp. Pl. 3 : 1634. 1803 ; Hook. f. Fl. Brit. Ind. 3 : 236. 1881. "Somraj".

Erect, annual, aromatic herbs. Stem terete, glandular-pubescent. Leaves elliptic-lanceolate, serrate, acute to acuminate, cuneate, hairy. Heads peduncled, solitary. Bracts oblong-elliptic, acute, hairy. Corolla purple. Achenes ribbed, hairy. Outer pappus short paleaceous, inner denticulate.

BORI : Reserve forest (900 m). In mixed forest. Occasional.

Fl. & Fr. : August December.

2. **Centratherum indicum** (Less) C.E.C. Fischer in Kew Bull. 1940 : 40. 1940. *Amphiraphis indica* Less. in Linnaea 6 : 686. 1831. *Decaneurum reticulatum* DC. in Wt. Contrib. Bot. Ind. 3. 1834. *Centratherum reticulatum* (DC.) Benth. in Benth. & Hook. f. Gen. Pl. 2 : 225. 1873 ; Hook. f. Fl. Brit. Ind. 3 : 227. 1881.

Erect, stout, branched herbs. Leaves sessile, ovate or oblong, base acute or cordate, white tomentose beneath. Heads subsessile. Inner

involucral bracts broad, acute, pubescent, outermost leafy, short. Pappus equaling the corolla tube, yellowish.

BORI : Dhain (462 m). On hill slopes. Common.

Fl. & Fr. : August December.

11. CHRYSANTHEMUM L.

Chrysanthemum coronarium L. Sp. Pl. 90. 1753 ; Hu in Quart. Journ. Taiw. Mus. 19 : 26. 1966 ; Babu, Herb. Fl. Dehra Dun 252, 1977. "Guldaudi".

Erect, branched, annual herbs. Leaves pinnatifid or pinnatisect; segments linear-lanceolate, mucronate, glaucous beneath. Heads on ribbed peduncles. Involucral bracts many-seriate, ovate-oblong, not keeled. Marginal flowers with tridentate ligules. Corolla yellow. Achenes triangular, glandular between ribs.

PACHMARHI : Mahadev hill (1250 m), 27-12-62. *Panigrahi* 6610 (BSA). On hill slopes. Rare.

Fl. & Fr. : December February.

12. CONYZA Less.

- | | |
|---|------------------------|
| 1a. Heads 2 - 3 mm across. Plants not viscid. Corolla white or yellow : | |
| 2a. Corolla of marginal flowers white | <i>C. canadensis</i> 1 |
| 2b. Corolla of marginal flowers yellow | <i>C. stricta</i> 3 |
| 1b. Heads 4 - 15 mm across. Plants viscid. Corolla pink or pale violet | <i>C. leucantha</i> 2 |

1. *Conyzza canadensis* (L.) Cronquist in Bull. Torr. Bot. Cl. 70 : 632. 1943. *Erigeron canadensis* L. Sp. Pl. 863. 1753 ; Hook. f. Fl. Brit. Ind. 3 ; 254. 1881 ; Babu, Herb. Fl. Dehra Dun 263. 1977.

Erect, annual herbs with hairy, ribbed stem. Leaves linear-lanceolate, acute, apiculate, glabrous. Heads combined into a large, leafy panicle. Involucral bracts 2-3-seriate, linear. Corolla filiform, white. Achenes thickly hairy. Pappus dirty-white.

PACHMARHI : Dhupgarh (1250 m). BORI : Reserve forest (550m). In mixed forests and waste moist places. Common.

Fl. & Fr. : July February.

2. *Conyza leucantha* (D. Don) Ludlow & Raven in Kew Bull. 17 : 71. 1963 ; Babu, Herb. Fl. Dehra Dun 256. 1977. *Erigeron leucanthum* D. Don, Prodr. Fl. Nep. 171. 1825. *Conyza viscidula* Wall. ex DC. Prodr. 5 : 383. 1836 ; Hook. f. Fl. Brit. Ind. 3 : 258. 1881.

Erect, much-branched, viscid herbs with ribbed stems. Lower leaves large, elliptic acute, narrowed below, crenate-serrate. Heads 5 mm across, yellow. Achenes compressed, glabrous.

BORI : Reserve forest (550 m), Feb. 78. Part 27281 (BSA). In forest clearings. Rare.

Fl. & Fr. : October February.

New record for the area.

3. *Conyza stricta* Willd. Sp. Pl. 3 : 1922. 1804 ; Hook. f. Fl. Brit. Ind. 3 : 258. 1881 ; Babu, Herb. Fl. Dehra Dun 256. 1977.

Erect, hairy, annual herbs. Leaves fastigate, oblanceolate-spathulate, crenate, subentire, hairy. Heads less than 3 mm across, in terminal, corymbose panicles. Corolla of marginal flowers white. Anthers apiculate. Achenes compressed, hairy. Pappus hairs white.

PACHMARHI : Dhupgarh (1200 m). On hill slopes amongst the grasses. Occasional.

Fl. & Fr. : July October.

13. CYATHOCLINE Cass.

Cyathocline purpurea (Buch-Ham. ex D. Don) O. Kuntze, Rev. Gen. Pl. 333. 1891 ; Babu, Herb. Fl. Dehra Dun 259. 1977. *Tanacetum purpureum* Buch Ham. ex D. Don, Prodr. Fl. Nepal, 181. 1825. *Cyathocline lyrata* Cass. in Ann. Soc. Sci. Nat. Ser. 1, 17 : 420. 1829 ; Hook. f. Fl. Brit. Ind. 3 : 246. 1881.

Erect, much-branched, densely glandular hairy annual herbs. Leaves sessile, alternate, oblanceolate, lyrate or variously irregularly lobed ; lobes dentate, acute. Heads purple, in dense terminal corymbose cymes. Achenes minute, oblong, smooth, black.

PACHMARHI : Vicinity (1000 m). In forest undergrowth near nala-s and streams. Common.

Fl. & Fr. : November - March.

14. ECLIPTA L.

Eclipta alba (L.) Hassk. Pl. Jav. Rar. 528. 1848 ; Hook. f. Fl. Brit. Ind. 3 : 304. 1881 ; Ramam. in Sald. & Nicol. Fl. Hassan 612. 1976. *Verbesina alba* L. Sp. Pl. 902. 1753. *Verbesina prostrata* L. Sp. Pl. 902. 1753. *Eclipta prostrata* (L.) L. Mant. Alt. 286. 1771. "Bhangra".

Erect or prostrate annual, often rooting at nodes. Stem and branches hairy. Leaves opposite, sessile, oblong-lanceolate or linear-lanceolate, sometimes ovate-lanceolate. Heads white, peduncled in the axils of leaves. Achenes cuneate-compressed.

PACHMARHI : Mahadev hill (1250 m). On the margins of streams. Abundant.

Fl. & Fr. : All seasons.

15. ELEPHANTOPUS L.

Elephantopus scaber L. Sp. Pl. 814. 1753 ; Hook. f. Fl. Brit. Ind. 3 : 242. 1881 ; Bahu, Herb. Fl. Dehra Dun 261. 1977. "Gobhi"/"Bajradanri".

Erect, subscapose, perennial herbs. Stems terete, corymbosely branched at the top, pubescent. Lower leaves in basal rosette, obovate, obtuse, pubescent ; caulinic leaves much smaller. Heads in fascicles, peduncled ; bracts ovate, acuminate. Involucral bracts 2 seriate. Corolla with a 5 lobed limb, pale violet. Achenes hairy between the ribs. Pappus bristles 5, hairy.

PACHMARHI : Jambudeep (1100 m). BORI : Dhain (430 m). In forest undergrowth. Abundant.

Fl. & Fr. : September - November.

16. EMILIA Cass.

Emilia sonchifolia (L.) DC. in Wt. Contrib. Bot. Ind. 24. 1834; Hook. f. Fl. Brit. Ind. 3 : 336. 1881; Babu, Herb. Fl. Dehra Dun 261. 1977. *Cacalia sonchifolia* L., Sp. Pl. 835. 1753. "Hirankhuri."

Erect or decumbent, annual perennial herbs. Leaves sessile; lower ones often rosulate, narrowed at the base with an entire - dentate lower part, passing into ovate triangular, orbicular or reniform, dentate upper part; upper ones sagittate, acute, dentate, with rounded basal auricles. Heads pink or purple. Achenes oblong, 5-gonous.

PACHMARHI: Mahadev hill (1200 m). BORI: Reserve forest (550 m); Dhain (462 m). In cool shaded places near forest margins.

Fl. & Fr.: July December

17. GALINSOGA Ruiz & Pav.

Galinsoga parviflora Cav. Ic. Descr. Pl. 3 : 41. t. 281. 1796; Hook f. Fl. Brit. Ind. 3 : 311. 1881; Babu, Herb. Fl. Dehra Dun 267. 1977.

Slender annual herbs. Leaves ovate, acute, sparsely hairy. Heads peduncled, combined into a terminal corymbiform panicle. Involucral bracts 2-seriate, ovate, obtuse. Corolla of 5 marginal florets, white, 3-dentate; of disk florets yellow, hairy. Achenes black, viscid, hairy.

PACHMARHI: Vicinity (1000 m). *Saxena* 1097 (SFRI). On hill slopes near water source. Rare.

Fl. & Fr.: August - January.

18. ONAPHALIUM L.

1a. Pappus - hairs free :

- | | |
|--|-------------------------------|
| 2a. Heads in leafless, corymbose clusters | ... <i>G. hispido-album</i> 1 |
| 2b. Heads in leafy spikes or leafy clusters : | |
| 3a. Heads in simple or branched spikes | ... <i>G. polycaulon</i> 3 |
| 3b. Heads in rounded axillary or terminal clusters | ... <i>G. pulvinatum</i> 4 |
| 1b. Pappus - hairs connate at base into a ring | ... <i>G. pensylvanicum</i> 2 |

1. **Gnaphalium Inten album** L. Sp. Pl. 851. 1753; Hook. f. Fl. Brit. Ind. 3 : 288. 1881; Babu, Herb. Fl. Dehra Dun 268. 1977.

Erect, woolly, annual herbs. Leaves oblanceolate, narrowed to the base, apiculate, woolly. Heads in terminal clusters. Involucral bracts 2-3 seriate, ovate-oblong, obtuse, golden yellow. Achenes ellipsoid, brown. Pappus hairs white.

PACHMARHI : Mahadev hill (1250 m), 27. 12.62. *Panighari* 6603 (BSA). In the forest undergrowth. Rare.

Fl. & Fr. : October January.

2. **Gnaphalium pensylvanicum** Willd. Enum. Hort. Berol. 867. 1809; Babu, Herb. Fl. Dehra Dun 269. 1977. *Gnaphalium purpuratum* (auct. pl. non L. 1753); Hook. f. Fl. Brit. Ind. 3 : 289. 1881.

Erect, cottony, annual herbs. Leaves spatulate-ovate, with a tapering base, woolly. Heads, densely white woolly at base, in clusters. Involucral bracts 2-3-seriate, ovate-lanceolate, acuminate, woolly at base. Achenes minute. Pappus hairs connate into a ring at the base.

PACHMARHI : Vicinity (1000m). In waste places in the forest and roadsides. Occasional.

Fl. & Fr. : December April.

3. **Gnaphalium polycaulon** Pers. Syn. Pl. 2 : 421. 1807; Babu, Herb. Fl. Dehra Dun 269. 1977. *Gnaphalium indicum* (auct. pl. non L. 1753); Hook. f. Fl. Brit. Ind. 3 : 289. 1881.

Slender, multicauline, woolly, annual herbs. Leaves oblanceolate-spatulate, with a narrowed, semi-amplexicaul base. Heads sessile, in simple or branched leafy spikes. Involucral bracts 2-3-seriate, woolly at base. Achenes oblong, hairy. Pappus hairs white.

BORI : Reserve forest (500 m). Along the margins of streams. Abundant.

Fl. & Fr. : November April.

4. **Gnaphalium pulvinatum** Del. Fl. Aegypt. 266, t. 44. 1812; Hook. f. Fl. Brit. Ind. 3 : 289. 1881.

Woolly, annual herbs. Stems many from the root. Leaves small, spatulate. Heads in rounded axillary or terminal clusters. Involucral bracts linear, recurved, green, with acute, hyaline tips. Achenes slender, minutely papillose.

BORI : Reserve forest (550 m). In moist places near streams. Occasional.

Fl. & Fr. : October January.

19. GUIZOTIA Cass.

Guizotia abyssinica (L.f.) Cass. in Dict. Sc. Nat. 59, 248, 1829 ; Hook. f. Fl. Brit. Ind. 3 : 308, 1881 ; Ramam. in Sald. & Nicol. Fl. Hassan 617, 1976. *Polymnia abyssinica* L.f. Suppl. 383, 1781. "Kalatil".

Tall, hirsute herbs. Stem hairy upward. Leaves opposite, lanceolate to elliptic oblong, acute, cordate at base, amplexicaule, sparsely hairy. Heads yellow. Ray achenes 3 angled ; disk achenes 4-gonous.

BORI : Reserve forest (900 m). As escape from cultivation in waste places. Abundant.

Fl. & Fr. : September December.

20. LAGASCEA Cav.

Lagascea mollis Cav. Anal. Cienc. Nat. 6 : 332, t. 44, 1803 ; Hook. f. Fl. Brit. Ind. 3 : 302, 1881 ; Ramam. in Sald. & Nicol. Fl. Hassan 618, 1976.

Much branched herbs. Stem grooved, pubescent above, glabrous below. Leaves alternate, rhomboid ovate, pubescent. Heads 1 flowered, crowded in clusters, white. Achenes cuneate, black.

BORI : Reserve forest (500 m). Along stream in the forest. Abundant.

Fl. & Fr. : July March.

21. LAGGERA Sch. Bip. ex Oliv.

Laggera alata (D. Don) Sch. Bip. ex Oliv. in Trans. Linn. Soc. 39 : 94, 1873 ; Hook. f. Fl. Brit. Ind. 3 : 271, 1881 ; Babu, Herb. Fl. Dehra

Dun 273, 1977. *Erigeron alatum* D. Don, Prodr. 171, 1826. *Blumea alata* DC. Prodr. 5 : 448, 1836.

Erect, perennial herbs with broadly winged, glandular pubescent stems. Leaves sessile, oblong lanceolate, decurrent on to wing of stem, dentate, glandular. Heads in racemose panicles; peduncle and outer involucral bracts glandular. Florets purplish. Achenes ribbed, hairy. Pappus hairs white.

PACHMARHI : Vicinity (1000 m). BORI : Reserve forest (500 m). Along roadside streams. Abundant.

Fl. & Fr. : October - December.

22. PULICARIA Gaertn.

- Ia. Involucral bracts acute. Ligules equalling the bracts. Outer scales united in a cup ... *P. wightiana* 2
- Ib. Involucral bracts acuminate. Ligules exceeding the bracts. Outer scales laciniate ... *P. angustifolia* 1

1. **Pulicaria angustifolia** DC. Prodr. 5 : 479, 1836 ; Hook. f. Fl. Brit. Ind. 3 : 299, 1881 ; Oommachan, Fl. Bhopal 223, 1977.

Branched, glaucous, annual herbs. Leaves sessile, linear oblong or obovate, entire or serrulate. Ray florets ligulate. Achenes glabrate, not ribbed. Inner pappus hairs twice as long as the achenes; outer scales laciniate.

PACHMARHI : Vicinity (1000 m). In waste land. Occasional.

Fl. & Fr. : August - February.

2. **Pulicaria wightiana** (DC.) Benth. ex Clarke, Comp. Ind. 128, 1876 ; Hook. f. Fl. Brit. Ind. 3 : 298, 1881 ; Ramam. in Sald. & Nicol. Fl. Hassan 620, 1976. *Poloa wightiana* DC. Arch. Bot. (Paris) 2 : 514, 1833.

Tall, hairy, annual herbs. Leaves oblong, rounded at tip, amplexicaul at base, serrate-dentate, pubescent. Bracts few, elliptic obovate, pubescent. Ray florets bright yellow, limbs spathulate, 2 dentate. Achenes hairy.

PACHMARHI : Vicinity (1000 m); Mahadev hill (1250 m). BORI : Reserve forest (900 m). On hill slopes. Occasional.

Fl. & Fr. : October - December.

23. SENECIO L.

- | | | |
|---|-----|-------------------------|
| 1a. Radical leaves in rosette | ... | <i>S. nudicaulis</i> 2 |
| 1b. Radical leaves not in rosette : | | |
| 2a. Leaves with cottony tomentum beneath. Achenes with pappus | ... | <i>S. bombayensis</i> 1 |
| 2b. Leaves without cottony tomentum beneath. Achenes without pappus | ... | <i>S. wightii</i> 3 |

1. **Senecio bombayensis** Balakr. in Journ. Bombay Nat. Hist. Soc. 67 : 61. 1970. *Doronicum reticulatum* Wt. in Calc. Journ. Nat. Hist. 7 : 156. 1847. *Senecio reticulatus* (Wt.) Clarke, Comp. Ind. 199. 1876 (*non* DC. 1837). *Senecio grahamii* Hook. f. Fl. Brit. Ind. 3 : 347. 1881 (*non* Benth. 1857).

Erect, much branched, glabrous herbs. Leaves rhomboid ovate, suddenly narrowed into a short petiole, with cottony tomentum beneath. Heads axillary, solitary or subcorymbose. Involucral bracts 12-18. Achenes oboconic with white pappus.

PACHMARHI : Dhupgarh (1250 m), *Saxena* 1036 (SFRI). BORI : Reserve forest (550 m), 6-10-60, *Joseph* 11266 (BSA). In forest under-growth. Rare.

Fl. & Fr. : August December.

2. **Senecio nudicaulis** Buch. Ham. ex D. Don, Prodr. Fl. Nepal. 179. 1825 ; Hook. f. Fl. Brit. Ind. 3 : 340. 1881 ; Babu, Herb. Fl. Dehra Dun 278. 1977.

Erect, perennial herbs with fleshy roots and corymbosely branched top. Basal leaves in rosette, oblanceolate spathulate, serrate dentate, glabrous above, cottony beneath ; caudine ones lanceolate oblong, obtuse, base semiamplexicaul. Heads in corymbiform panicles, yellow. Involucral bracts lanceolate, acute, glabrous, margin scarious. Achenes glandular hairy. Pappus hairs white.

PACHMARHI : Vicinity (1000 m). In the undergrowth of mixed forest and wayside. Occasional.

Fl. & Fr. : April June.

3. **Senecio wightii** (DC.) Benth. & Hook. f. Gen. Pl. 2 : 248. 1873 ; Ramam. in Sald. & Nicol. Fl. Hassan 621. 1976. *Doronicum wightii* DC. in Wt. Contrib. Bot. Ind. 23. 1834. *Senecio saxatilis* sensu Hook. f. Fl. Brit. Ind. 3 : 344. 1881 (*non* Wall. 1831).

Tall annual herbs. Leaves ovate lanceolate, acute, serrate dentate with amplexicaul base. Heads rayed. Involucral bracts oblong lanceolate, acuminate. Ligule 4 - dentate, bright yellow. Achenes ribbed, without pappus.

PACHMARHI : Vicinity (1000 m); Beedam (900 m). Along roadside and in waste land in the forest. Occasional.

Fl. & Fr. : July December.

24. SIEGESBECKIA L.

Siegesbeckia orientalis L. Sp. Pl. 900. 1753; Hook. f. Fl. Brit. Ind. 3 : 304. 1881; Babu, Herb. Fl. Dehra Dun 279. 1977.

Erect, widely branched, annual herbs. Leaves opposite, crenate, ovate triangular. Heads yellow, terminal in the centre of forks, combined into a loose panicle. Involucral bracts 2 seriate; outer ones 5, spathulate; inner ones 5-7, broadly ovate. Achenes obovoid, curved, narrowed below, truncate, glandular. Pappus nil.

PACHMARHI : Vicinity (1000 m); Jambudeep (1050 m). Along wayside and in waste land. Occasional.

Fl. & Fr. : February October.

25. SONCHUS L.

- | | | |
|--|-----|------------------------|
| 1a. Outer involucral bracts densely clothed with coarse gland-bristles. Plants perennial | ... | <i>S. brachyotus</i> 1 |
| 1b. Outer involucral bracts without gland-bristles. Plants annual | ... | <i>S. oleraceus</i> 2 |

1. **Sonchus brachyotus** DC. Prodr. 7 : 186. 1838; Babu, Herb. Fl. Dehra Dun 282. 1977. *Sonchus arvensis* (auct. pl. non L. 1753); Hook. f. Fl. Brit. Ind. 3 : 414. 1881. "Sahadevi bari".

Erect, perennial herbs with stout tap roots. Radical leaves in rosette; caudine ones remote, oblong with a semiamplexicaul base. Heads combined into branched corymbs. Involucral bracts 3-4-seriate, lanceolate. Corolla bright yellow, turning brownish on maturity. Achenes linear oblong, curved, 5-ribbed on lateral faces. Pappus hairs white.

PACHMARHI : Vicinity (900 m), Feb. 78. Pant 27181 (BSA).
Along river banks. Rare.

Fl. & Fr. : February October.

New Record for the area.

2. *Senecio oleraceus* L. Sp. Pl. 794. 1753 ; Hook. f. Fl. Brit. Ind. 3 : 414. 1881 ; Babu, Herb. Fl. Dehra Dun 282. 1977. "Dudhi".

Erect, annual herb with grooved, glabrous stems. Leaves obovate oblanceolate, rounded acute at tip ; with auricled amplexicaul base, sometimes runcinate, with long teeth, often deeply pinnately lobed, glaucous beneath. Heads in corymbs. Bracts glabrous. Corolla yellow. Achenes 3 ribbed. Pappus hairs white.

PACHMARHI : Vicinity (1000 m). In moist places near springs.
Occasional.

Fl. & Fr. : September January.

26. SPHAERANTHUS L.

Sphaeranthus indicus L. Sp. Pl. 927. 1753 ; Hook. f. Fl. Brit. Ind. 3 : 275. 1881. p. p. ; Babu, Herb. Fl. Dehra Dun 283. 1977. "Mundi".

Much branched, procumbent, annual herbs. Stem terete, toothed, winged, glandular hairy. Leaves oblanceolate or elliptic oblong, sessile, alternate, coarsely double dentate, villous. Inflorescence globose ellipsoid, winged. Involucral bracts lanceolate, acute. Corolla pale violet. Achenes glandular hairy.

BORI : Reserve forest (550 m). In moist places along streams.
Common.

Fl. & Fr. : January April.

27. SPILANTHES Jacq.

Spilanthes paniculata Wall. ex DC. Prodr. 5 : 625. 1836 ; Ramam. in Sald. & Nicol. Fl. Hassan 624. 1976. *Spilanthes gemella* [auct. non (L.) Murr. 1844] ; Hook. f. Fl. Brit. Ind. 3 : 307. 1881 p. p.

Stout herbs. Leaves broadly ovate, acute, subentire. Heads in axillary and terminal panicles. Bracts oblong elliptic, fimbriate. Florets white. Achenes of the outer florets trigonous with thickened and densely ciliate margin, of inner florets dorsally compressed, ciliate along margin; black, verrucose.

BORI : Reserve forest (550 m). In moist shaded places. Abundant.

Fl. & Fr. : November January.

28. SYNEDRELLA Gaertn.

Synedrella nodiflora (L.) Gaertn. *Fruct.* 2 : 456. t. 171. f. 7. 1791 ; Hook. f. *Fl. Brit. Ind.* 3 : 308. 1881 ; Ramam. in Sald. & Nicol. *Fl. Hassan* 624. 1976. *Verbesina nodiflora* L. in Juslenius, *Cent. I. Pl.* 28. 1755.

Annual herbs. Stem terete, grooved, hairy. Leaves opposite, broadly ovate elliptic, acute, crenate, palmately veined, sparsely hairy. Heads sessile, axillary. Involucral bracts few. Receptacle flat. Florets yellow. Achenes black.

BORI : Reserve forest (550 m), 23 12 62, *Panigrahi* 6372 (BSA). In moist shaded places. Rare.

Fl. & Fr. : July December.

29. TRIDAX L.

Tridax procumbens L. Sp. Pl. 900. 1753 ; Hook. f. *Fl. Brit. Ind.* 3 : 311. 1881 ; Babu, *Herb. Fl. Dehra Dun* 286. 1977.

Decumbent, annual or perennial herbs. Leaves opposite, short petioled, ovate - elliptic, pinnatifid, palmately veined. Heads solitary, long-peduncled. Involucral bracts 2 - 3-seriate. Ray florets white, disk florets yellow. Achenes obovate, slightly 3 -angled, hairy.

PACHMARHI : Mahadev hill (1200 m). BORI : Reserve forest (550 m). On grassy slopes and waste lands. Common.

Fl. & Fr. : All seasons.

30. VERNONIA Schreb.

Ia. Achenes densely hairy. Pappus biseriate	...	<i>V. cinerea</i> 1
1b. Achenes glabrescent. Pappus uniserial	...	<i>V. divergens</i> 2

Vernonia cinerea (L.) Less. in Linnaea 4 : 291. 1829 ; Hook. f. Fl. Brit. Ind. 3 : 233. 1881. p. p. ; Babu, Herb. Fl. Dehra Dun 287. 1977. *Conyza cinerea* L. Sp. Pl. 862. 1753. "Daudoipala".

Erect, annual herbs. Leaves alternate, mostly spatulate or lanceolate, acute, crenate, hairy. Heads purple, in terminal corymbose cymes. Achenes 2-3-angled, densely hairy. Pappus biseriate, the outer ones shorter.

PACHMARHI : Vicinity (1000 m). BORI : Reserve forest (550 m) ; Dhain (462 m). In rock crevices on hill slopes. Common.

Fl. & Fr. : July December.

Vernonia divergens (Roxb.) Edgew. ex Benth. in Benth. & Hook. f. Gen. Pl. 2 : 229. 1873 ; Hook. f. Fl. Brit. Ind. 3 : 234. 1881 ; Babu, Herb. Fl. Dehra Dun 287. 1977. *Eupatorium divergens* Roxb. Fl. Ind. 3 : 415. 1832.

Erect, perennial, shrub-like herbs. Leaves petioled, elliptic ovate or lanceolate, acute, serrate. Heads arranged in corymbose panicles. Involucral bracts elliptic, acute, mucronate, glabrous. Corolla purple. Achenes 10 ribbed, hairy. Pappus biseriate, pale reddish brown or dirty white.

PHCHMARHI : Dhupgarh (1250 m). BORI : Reserve forest (500 m). On hill slopes. Occasional.

Fl. & Fr. : December February.

31. VICOA Cass.

Ia. Leaves elliptic, acuminate, serrate. Involucral bracts recurved	...	<i>V. cernua</i> 1
1b. Leaves lanceolate or oblong-lanceolate. Involucral bracts scarcely recurved	...	<i>V. indica</i> 2

1. *Vicoa cernua* Dalz. in Dalz. & Gibbs. Bomb. Fl. 126. 1861 ; Hook. f. Fl. Brit. Ind. 3 : 297. 1881.

Slender, sparsely pubescent, annual herbs. Lower leaves shortly petioled, upper ones sessile, elliptic, acuminate, serrate. Involucral bracts with filiform, recurved tips. Achenes sparsely hairy.

PACHMARHI : Vicinity (1000 m). On hill slopes and on newly exposed soil. Occasional.

Fl. & Fr. : December April.

2. *Vicoa indica* (L.) DC. in Wt. Contrib. Bot. Ind. 10. 1834 ; Babu, Herb Fl. Dehra Dun 288. 1977. *Inula indica* L. Sp. Pl. ed. 2. 1236. 1763. *Vicoa auriculata* Cass. Ann. Sc. Nat. Paris, Ser. 1, 17 : 418. 1829 ; Hook. f. Fl. Brit. Ind. 3 : 297. 1881.

Erect, viscid, perennial herbs. Stems reddish brown, terete, grooved, glabrous with age. Leaves ovate lanceolate, acute, cordate hastate and amplexicaul below, entire, scabrid along margin, pubescent beneath. Heads usually solitary on long peduncles. Bracts lanceolate, acute, hairy, the outer shorter. Florets bright yellow. Achenes thinly hairy. Pappus hairs white, few.

PACHMARHI : Vicinity (1000 m). BORI : Reserve forest (550 m). In forest undergrowth on hill slopes and valley. Common.

Fl. & Fr. : September April.

32. WEDELIA Jacq.

Wedelia wallichii Less. in Linnaea 4 : 162. 1831 ; Hook. f. Fl. Brit. Ind. 3 : 307. 1881 ; Babu, Herb. Fl. Dehra Dun 289. 1977.

Erect or decumbent ascending or straggling perennial herbs with woody base, hairy. Leaves ovate elliptic, acute or acuminate, mucronate, serrate hispid ; upper ones smaller, lanceolate. Heads solitary. Involucral bracts 2 - seriate ; outer ones oblanceolate spathulate ; inner ones lanceolate. Ray florets 5, yellow with 3 dentate corolla. Achenes with a truncate apex, hairy at the top. Pappus of short bristles.

PACHMARHI : Vicinity (1000 m). In forest undergrowth. Occasional.

Fl. & Fr. : August November.

33. XANTHIUM L.

Xanthium strumarium L. Sp. Pl. 987. 1753 ; Hook. f. Fl. Brit. Ind. 3 : 303. 1881 ; Babu, Herb. Fl. Dehra Dun 290. 1977. *Xanthium indicum* Koen. ex Roxb. Fl. Ind. 3 : 601. 1832. "Banokra" / "Adhasisi."

Erect, annual herbs. Stem stout, terete. Leaves broadly ovate or suborbicular and slightly broader than long, acute, often 3-lobed, irregularly inciso serrate. Heads globose, in axillary and terminal short racemes. Achenes oblong ovoid, compressed, glabrous, black.

PACHMARHI : Vicinity (1000 m). In waste lands and hill slopes. Abundant.

Fl. & Fr. : September March.

52. STYLEDIACEAE R. Br.

STYLEDIUM Sw. Ex Willd.

Stylium tenuellum Sw. in Mag. Ges. Naturf. Fr. Berlin 1 : 51. t. 2. f. 3. 1807 (*non* R. Br. 1810) ; Clarke in Hook. f. Fl. Brit. Ind. 3 : 420. 1881 ; Babu, Herb. Fl. Dehra Dun 291. 1977.

Erect, glabrous, annual herbs. Leaves alternate, sessile, lanceolate oblong or obovate-spathulate, obtuse, entire, 3-nerved ; lower ones in rosette ; upper ones passing into bracts. Flowers sessile, 2-3 in cymes. Corolla purplish or pink ; lower 3 lobes minute ; upper 2 spathulate. Stamens 2. Capsule linear, pubescent.

PACHMARHI : Vicinity (1000 m), *Saxena* 414 (SFRI). In open moist places near sal forest. Rare.

Fl. & Fr. : September March.

53. CAMPANULACEAE Juss.

- | | | |
|--|-----|-----------------------|
| 1a. Flowers irregular. Stamens united by anthers | ... | <i>Lobelia</i> 2 |
| 1b. Flowers regular. Stamens free : | | |
| 2a. Capsules dehiscing loculicidally with 2-3 apical valves | ... | <i>Wahlenbergia</i> 3 |
| 2b. Capsules dehiscing by lateral pores or by 3 basal valves | ... | <i>Campanula</i> 1 |

1. CAMPANULA L.

Campanula benthamii Wall. ex Kitamura, Fl. Alg. 377. 1960. *Campanula canescens* Wall. ex DC. Prodr. 7 : 473. 1839 (*non* Roth, 1827); Clarke in Hook. f. Fl. Brit. Ind. 3 : 439. 1881. *Campanula wallichii* Babu, in Journ. Bomb. Nat. Hist. Soc. 65. 808. 1969 *et* Herb. Fl. Dehra Dun 294. 1977.

Erect, annual herbs. Stems patently hispid hairy. Basal leaves in a rosette, obovate-spathulate; higher ones sessile, linear-lanceolate, pubescent. Flowers solitary, sessile, in spiciform panicle. Corolla pale-purple, hairy on the outside, divided less than half way down. Capsule hemispheric, hispidly hairy.

PACHMARHI : Mahadev hill (1250 m), Feb. 78, Pant 27130 (BSA). In forest floor. Rare.

Fl. & Fr. : January May.

New record for the area.

2. LOBELIA L.

Lobelia nicotianifolia Roth ex Roem. & Schult. Syst. Veg. 5 : 47. 1819 (*nicotianaefolia*) ; Clarke in Hook. f. Fl. Brit. Ind. 3 : 427. 1881 ; Ramam. in Sald. & Nicol. Fl. Hassan 568. 1976. "Nala"/"narasala"

Undershrubs. Stem terete at the base, angular towards the apex, hollow, simple or apically branched. Leaves spirally arranged, crenate-serrate, lanceolate, ovate, acuminate, rounded and narrowed at base, glabrous with age. Corolla white; staminal filaments fused, hairy; anthers sparsely hairy on back, hairy at apex. Capsule dehiscent, many-seeded.

PACHMARHI : Dhupgarh (1250 m). On hill slopes. Occasional.

Fl. & Fr. : July March.

3. WAHLENBERGIA Schrad. Ex Roth

Wahlenbergia marginata (Thunb.) DC. Mongor. Camp. 143. 1830 ; Ramam. in Sald. & Nicol. Fl. Hassan 569. 1976. *Campanula marginata*

Thunb. Fl. Jap. 89. 1784. *Campanula gracilis* Forst. Prodr. 84. 1786. *Wahlenbergia gracilis* (Forst.) DC. Monogr. Camp. 142. 1830 ; Clarke in Hook. f. Fl. Brit. Ind. 3 : 429. 1881.

Erect, perennial herbs. Leaves linear, oblong. Flowers solitary, purple. Petals fused below. Staminal filaments widened below. Ovary 3-locular, oboconical, bell-shaped. Fruits oboconical to bell-shaped.

BORI : Reserve forest (550 m). In moist places along streams. Common.

Fl. & Fr. : March April.

54. PLUMBAGINACEAE Juss.

PLUMBAGO L.

Plumbago zeylanica L. Sp. Pl. 151. 1753 ; Clarke in Hook. f. Fl. Brit. Ind. 3 : 480. 1882 ; Babu, Herb. Fl. Dehra Dun 296. 1976. "Chita".

Erect or straggling, perennial undershrubs. Leaves ovate-lanceolate or oblong. Flowers white, in terminal and axillary racemes combined into a leafy panicle ; rachis glandular. Calyx glandular hairy ; lobes linear-subulate. Corolla white, lobes oblong, apiculate. Style glabrous. Fruits oblong acute, longitudinally furrowed, with a patent or recurved calyx.

PACHMARHI : Vicinity (1000 m). BORI : Reserve forest (900 m). In moist places in forest undergrowth. Common.

Fl. & Fr. : August March.

55. PRIMULACEAE Vent.

- 1a. Corolla blue or white rarely pink. Plants not gland-dotted. Capsule circumscissile ... *Anagallis* 1
- 1b. Corolla mostly yellow, rarely white. Plants mostly gland-dotted. Capsule dehiscing with valves or irregularly bursting ... *Lysimachia* 2

1. ANAGALIS L.

- 1a. Leaf 3-nerved. Petals blue, rarely pink longer than calyx. Filament villous ... *A. arvensis* 1
- 1b. Leaf 1-nerved. Plants white, shorter than calyx. Filament glabrous ... *A. pumila* 2

1. *Anagallis arvensis* L. Sp. Pl. 148. 1753; Hook. f. Fl. Brit. Ind. 3 : 506. 1882; Babu, Herb. Fl. Dehra Dun 297. 1977. "Jonkh-mari".

Erect or decumbent-ascending, annual herbs. Stems 4-angular, narrowly winged. Leaves opposite, ovate or ovate-lanceolate. Flowers blue with red throat, axillary, solitary. Pedicels long, recurved in fruiting. Capsule globose.

PACHMARHI : Vicinity (1000 m), Feb. 78, Pant 27187 (BSA). In moist places along forest margins. Abundant.

Fl. & Fr. : December - March.

New record for the area.

2. *Anagallis pumila* Sw. Prodr. Veg. Ind. Occid. I : 40. 1788; Babu, Herb. Fl. Dehra Dun 298. 1977. *Centunculus tenellus* Duby in DC. Prodr. 8 : 72. 1844; Hook. f. Fl. Brit. Ind. 3 : 506. 1882.

Erect annual herbs. Leaves alternate or the lower ones opposite, ovate-oblong or lanceolate. Flowers white or pale pink, axillary, solitary. Pedicels very short. Filaments glabrous. Capsules subglobose, as long as the calyx. Seeds trigonous.

PACHMARHI : Jata Shankar (1050 m), Saxena 1087 (SFRI). In moist places. Rare.

Fl. & Fr. : September - December.

2. LYSIMACHIA L.

Lysimachia candida Lindl. in Journ. Hort. Soc. 1 : 301. 1846. ssp. *obovata* (Buch-Ham. ex Hook. f.) Kunth in Engl. Pflanzent. 22: 301. 1905. *Lysimachia obovata* Buch.-Ham. ex Hook. f. Fl. Brit. Ind. 3 : 502. 1882; Babu, Herb. Fl. Dehra Dun 292. 1977.

Erect, simple or sparsely branched, more or less glaucous herbs. Leaves usually petioled, minutely gland-dotted, acute or obtuse. Flowers in elongate racemes. Bracts as long as the pedicels. Corolla-segments obovate. Staminal filaments short; anthers apiculate.

PACHMARHI : Dhupgarh (1200 m), Saxena et Pandey 83553 (SFRI). Along water courses. Rare.

Fl. & Fr. : July November.

Very very rare/endangered. Duthie reported from Dehra Dun and no recent collection seen. Saxena reported from Dhupgarh, along stream only).

56. MYRSINACEAE R. Br.

EMBELIA N. Burman

Embelia tsjeriam-cottam (Roem. & Schult.) DC. in Trans. Linn. Soc. 1 : 131. 1834 ; Ramam. in Said. & Nicol. Fl. Hassan 203. 1976. *Ardisia tsjeriam-cottam* Roem. & Schult. Syst. 4 : 518. 1819. *Embelia robusta* Clarke in Hook. f. Fl. Brit. Ind. 3 : 515. 1882 (*non* Roxb. 1820). "Baber-ang".

Deciduous shrubs or small trees. Leaves ovate-obovate, acute-acuminate, crenate, eglandular, glaucous beneath. Racemes linear, sometimes dense. Sepals glabrous. Petals papillose on inner side, white.

PACHMARHI : Dhupgarh (1200 m). BORI : Dhain (413 m). On the edges of forest. Abundant.

Fl. & Fr. : All seasons.

57. SAPOTACEAE Juss.

MANILKARA Adans.

Manilkara hexandra (Roxb.) Dub. in Ann. Mus. Col. Mars. (Ser. 3) 23 : 9. t. 2. 1915. *Mimusops hexandra* Roxb. Pl. Cor. 16. t. 15. 1795 ; Clarke in Hook. f. Fl. Brit. Ind. 3 : 549. 1882. "Khirni".

Trees or shrubs. Leaves scattered, broadly obovate, obtuse, sub-coriaceous. Flowers axillary, fascicled on curved peduncles, pale yellow. Calyx lobes 6, lanceolate, reflexed, pubescent outside, outer 3 broader than the inner 3. Corolla lobes 18, the inner 6 longer than the rest and shortly clawed. Stamens 6; staminode 6, alternate with the stamens. Ovary 12 celled, pubescent. Fruits small, ovoid, smooth, red. Seed solitary.

PACHMARHI : Vicinity (1000 m). BORI : Reserve forest (550 m). On hill slopes. Abundant.

Fl. & Fr. : November April.

58. EBENACEAE Gurke

DIOSPYROS L.

Diospyros melanoxylon Roxb. Pl. Cor. 1 : 36, t. 46. 1795 ; Clarke in Hook. f. Fl. Brit. Ind. 3 : 564. 1882 ; Sald. in Sald. & Nicol. Fl. Hassan 197, 1976, "Tendu".

Trees or shrubs with softly hairy twigs. Leaves ovate elliptic, acute, pubescent beneath; venation distinct. Male flowers in cymes, female solitary. Calyx lobes acute in male, 2 winged in female. Corolla lobes densely hairy without. Stamens 10. Ovary globose, 4 locular. Fruit globose.

PACHMARHI : Vicinity (1000 m); Dhupgarh (1250 m). In sal forest and mixed deciduous forest. Common.

Fl. & Fr. : April December.

59. OLEACEAE Hoffm. & Link

- | | | |
|--|-----|--------------------|
| 1a. Shrubs, scandent or erect. Leaves simple to
1 - 7 - foliolate | ... | <i>Jasminum</i> 1 |
| 1b. Trees. Leaves 5 - 7 - foliolate | ... | <i>Schrebera</i> 2 |

1. JASMINUM L.

1a. Leaves 1 - foliolate :

- 2a. Calyx teeth twice the length of the tube... *J. sambac* 4
- 2b. Calyx teeth less than twice as long as the tube :
- 3a. Leaves ovate, obtuse or subacute, Calyx teeth minute, ovate ... *J. roxburghianum* 3
- 3b. Leaves broadly ovate or orbicular, acuminate, Calyx teeth linear sub-clavate ... *J. arborescens* 1
- 1b. Leaves 5 - 7 - foliolate *J. officinale* 2

J. Jasminum arborescens Roxb. Fl. Ind. 1 : 94. 1820 ; Clarke in Hook. f. Fl. Brit. Ind. 3 : 594. 1882 ; Naik, Fl. Osman. 196. 1979. "Bella" "Chameli"/"Mutabela"

Large climbing shrubs, densely hairy. Leaves broadly ovate or orbicular, long acuminate, 6-12 cm in diameter or broader. Flowers white, 2-2.5 cm across.

PACHMARHI : Dhupgarh (1200 m). In forest undergrowth. Occasional.

Fl. & Fr. : March October.

var. grandiflorum (L.) Bailey, Man. Cult. Pl. 789. 1949. *Jasminum gandiflorum* L. Sp. Pl. ed. 2. 9. 1762 ; Clarke in Hook. f. Fl. Brit. Ind. 3 : 603. 1882 ; Naik, Fl. Osman. 169. 1979. "Chameli jati".

Very similar to the type variety but all leaflets are of equal size. Flowers larger. Corolla lobes often streaked with red on the back.

PACHMARHI : Dhupgarh (1200 m). In forest undergrowth.

Fl. & Fr. : June October.

3. Jasminum roxburghianum Wall. ex Clarke in Hook. f. Fl. Brit. Ind. 3 : 595. 1882 ; Naik, Fl. Osman. 195. 1979.

Twining or scandent shrubs. Leaves 1 - foliolate, ovate or elliptic, 0.5-3 x 0.5-2.2 cm. Flowers white, sweet scented, in terminal, short, trichotomous cymes. Fruits ellipsoid, smooth, black.

PACHMARHI: Vicinity (1000 m). In forest undergrowth. Abundant.

Fl. & Fr. : March October.

4. *Jasminum sambac* (L.) Ait. Hort. Kew 1 : 8. 1789 ; Clarke in Hook. f. Fl. Brit. Ind. 3 : 591. 1882 ; Naik, Fl. Osman. 195. 1979. *Nyctanthes sambac* L. Sp. Pl. 8. 1753. "Bennallika" "Chamba" "Moghra".

Suberect shrubs ; young branches pubescent. Leaves opposite, broadly ovate or elliptic, 3-10 x 2-6 cm. Flowers white, in few to many flowered terminal cymes, very fragrant and often double in cultivation.

PACHMARHI : Vicinity (1000 m). In forest undergrowth. Occasional.

Fl. & Fr. : April October.

2. SCHREBERA Roxb.

Schrebera swietenioides Roxb. Pl. Cor. 2 : 1. t. 101. 1798 ; Clarke in Hook. f. Fl. Brit. Ind. 3 : 604. 1882. "Moka"/"banpalas" "Bhant".

Medium sized trees. Leaves opposite, imparipinnate, leaflets 5-9, ovate, acute, often unequal sided ; petiolules articulate. Flowers in terminal, trichotomous, many flowered cymes, white or brown, fragrant at night. Calyx campanulate, pubescent. Corolla lobes ovate, obtuse, as long as the tube, dotted on the inside with glandular brown spots. Capsule 2-2.5 cm long, rough with white raised dots. Seeds 3-4 in each cell.

PACHMARHI : Gahra Nala (900m). In sal forests. Occasional.

Fl. & Fr. : April December.

60. APOCYNACEAE Juss.

- | | |
|--|-----------------------|
| 1a. Plants with spines. Fruits fleshy berries... | <i>Carlissa</i> 1 |
| 1b. Plants without spines. Fruits follicles : | |
| 2a. Plants herbaceous ... | <i>Catharanthus</i> 2 |
| 2b. Plants woody : | |
| 3a. Trees or erect shrubs ... | <i>Wrightia</i> 5 |
| 3b. Climbing or twining shrubs : | |

4a. Climbers. Anthers more or less exserted	...	<i>Vallaris</i> 4
4b. Twiners. Anthers included...		<i>Ichnocarpus</i> 3

1. CARISSA L.

Carissa congesta Wt. Ic. t. 1289. 1848 ; Stevens in Sald. & Nicol. Fl. Hassan 431. 1976. *Carissa carandas* Graham, Cat. 116. 1839 ; Hook. f. Fl. Brit. Ind. 3 : 630. 1882 p.p. (*non* L. 1767). "Karaunda".

Erect or scandent spiny shrubs. Spines straight or slightly curved. Leaves broadly ovate ; base cuneate to slightly rounded ; apex bluntly acute, mucronate. Flowers white, fragrant. Berry spherical or ellipsoid, fleshy, black on ripening. Seeds 4, flat.

BORI : Reserve forest (550 m). On forest edges and rocky slopes. Common.

Fl. & Fr. : May October.

2. CATHARANTHUS G. Don

Catharanthus pusillus (Murr.) G. Don, Gen. Syst. 4 : 95. 1837 ; Babu, Herb. Fl. Dehra Dun 301. 1977. *Vinca pusilla* Murr. in Comm. Gotting. 3 : 66. t. 2. f. 1. 1773 ; Hook. f. Fl. Brit. Ind. 3 : 640. 1882. *Lochnera pusilla* K. Schum. in Engl. & Prantl, Pflanzenf. 4(2) : 145. 1895.

Erect, glabrous, annual herbs. Leaves lanceolate, glabrous ; base attenuate ; apex acuminate. Flowers in 1-2 flowered cymes. Corolla white ; mouth of the tube pubescent within ; lobes obovate. Follicles slender, striate, glabrous. Seeds black, muricate-ribbed.

BORI : Reserve forest (500 m). Along river banks. Abundant.

Fl. & Fr. : July December.

3. ICNOCARPUS R. Br.

Ichnocarpus frutescens (L.) R. Br. in Ait. Hort. Kew. ed. 2. 2 : 69. 1811 ; Hook. f. Fl. Brit. Ind. 3 : 669. 1882 ; Stevens in Sald. & Nicol.

Fl. Hassan 436. 1976. *Apocynum frutescens* L. Sp. Pl. 213. 1753.
"Kaliduhî" "Siamlata".

Woody, twining shrubs. Leaves lanceolate to ovate, glabrous to sparsely pubescent below; base acute; apex acute to acuminate. Corolla white to rose; lobes pubescent along margins and at base. Follicles 5-15 cm long, sometimes divergent.

PACHMARHI : Vicinity (1000 m). In mixed forest forming canopy on trees. Abundant.

Fl. & Fr. : August February.

4. VALLARIS N. Burm.

Vallaris solanacea (Roth) Kuntze, Rev. Gen. 417. 1891. *Peltanthera solanacea* Roth, Nov. Sp. 132. 1821. *Vallaris heynei* Spreng. Syst. 1 : 635. 1824; Hook. f. Fl. Brit. Ind. 3 : 650. 1882. "Ramsar"/"Chamari - ki vel".

Large, woody, twining shrubs. Leaves elliptic or obovate, acute or shortly acuminate at apex, acute at base, more or less pubescent, glandular-dotted abaxially. Flowers white, fragrant, in many flowered axillary cymes. Calyx divided to near the base, pubescent; tube short, longer than the calyx lobes. Ovary and style hairy. Fruits oblong, fibrous, fleshy.

BORI : Reserve forest (550 m). In mixed forest. Common.

Fl. & Fr. : December April.

5. WRIGHTIA R. Br.

- | | |
|---|-----------------------|
| 1a. Leaves glabrous. Coronal - scales free ... | <i>W. tinctoria</i> 1 |
| 1b. Leaves tomentose. Coronal - scales connate... | <i>W. tomentosa</i> 2 |

1. *Wrightia tinctoria* R. Br. in Mem. Wern. Soc. 1 : 73. 1809; Hook. f. Fl. Brit. Ind. 3 : 653. 1882. "Indrajau"/"Mitha - Indrajau":

Small trees. Leaves elliptic oblong, acuminate, base rounded.

Flowers white in lax, terminal cymes. Corolla tube twice the length of calyx. Corona of numerous linear scales. Fruits of 2 distinct pendulous, slender follicles cohering at the top only.

PACHMARHI : Vicinity (1000 m); Mahadev hill (1250 m). In mixed deciduous forest amongst rocks. Abundant.

Fl. & Fr. : April January.

2. *Wrightia tomentosa* Roem. & Schult. Syst. 4 : 414. 1819 ; Hook. f. Fl. Brit. Ind. 3 : 653. 1882. "Dudhi"/"Dharauli"/"Daira".

Small trees, softly tomentose. Leaves elliptic, acuminate. Flowers in subsessile, corymbose cymes, tomentose; bracts ovate, deciduous. Corolla-tube twice the length of calyx, lobes oblong, yellowish, corona fleshy, orange coloured, cleft into unequal lobes. Fruits subcylindrical, laterally compressed, lenticellate, with two shallow black furrows at the junction of the carpels.

PACHMARHI : Dhupgarh (1250 m). In mixed deciduous forest. Abundant.

Fl. & Fr. : April January.

61. ASCLEPIADACEAE R. Br.

1a. Plants erect	...	<i>Calotropis</i> 1
1b. Plants twining, procumbent, or straggling :		
2a. Leaves absent	...	<i>Sarcostemma</i> 9
2b. Leaves well developed :		
3a. Corolla more than 20 mm long, tubular	...	<i>Ceropogia</i> 2
3b. Corolla less than 20 mm long, rotate :		
4a. Corolla entirely glabrous :		
5a. Corona of 5 lobes	...	<i>Tylophora</i> 10
5b. Corona unlobed or absent :		
6a. Corona of a prominent fleshy annulus at the base of the gynostegium. Anth - ers connate	...	<i>Holostemma</i> 6

6b. Corona absent. Filaments free :	
7a. Corolla lobes valvate...	<i>Hemidesmus</i> 5
7b. Corolla lobes imbricate ...	<i>Cryptolepis</i> 3
4b. Corolla pubescent, at least within or on the margin :	
8a. Corolla with fleshy lobes within at the sinuses :	
9a. Corolla lobes valvate, margins revolute at anthesis ...	<i>Leptadenia</i> 8
9b. Corolla lobes imbricate, margins not revolute at anthesis ...	<i>Gymnema</i> 4
8b. Corolla without fleshy lobes ...	<i>Hoya</i> 7

1. CALOTROPIS R. Br.

Calotropis gigantea (L.) R. Br. in Ait. Hort. Kew. ed. 2. 2 : 78. 1811; Hook. f. Pl. Brit. Ind. 4 : 17. 1883; Stevens in Sald. & Nicol. Fl. Hassan 440. 1976. *Asclepias gigantea* L. Sp. Pl. 214. 1753. "AK".

Shrubs with white, toxic latex. Leaves elliptic ovate to obovate, densely arachnoid pubescent when young; base clasping cordate; apex obtuse or slightly acuminate. Corolla rotate, lobes purple to white. Follicles 7-10 cm long, falcately lanceolate. Seeds comose.

PACHMARHI : Mahadev hill (1200 m). On waste lands near the roads. Occasional.

Fl. & Fr. : December - May.

Roots are used for treatment of night blindness.

2. CEROPEGIA L.

1a. Corolla nearly straight; tube longer than the ciliate lobes. Leaves hirsute ... *C. hirsuta* 1

- 1b. Corolla distinctly curved ; tube not longer than the glabrous lobes. Leaves nearly glabrous ... *C. talzadiana* 2

1. *Ceropegia hirsuta* Wt. & Arn. in Wt. Contrib. Ind. Bot. 30. 1834 ; Hook. f. Fl. Brit. Ind. 4 : 71. 1883 ; Stevens in Said. & Nicol. Fl. Hassan 444. 1976. "Bosia Kand".

Stem twining, rhizome tuberous. Leaves mostly ovate elliptic. Cymes few flowered. Corolla light green and variously blotched and striped with purple ; mouth dilated ; lobes broad, folded back, ciliated on the margins and midrib. Outer corona lobes deltoid, apex cleft, long pilose, extending above the gynostegium ; inner lobes linear, hooked at the tips, 3 times longer than the outer. Gynostegium short stipitate.

PACHMARHI : Dhupgarh (1250 m). BORI : Reserve forest (550m.). In forest undergrowth. Abundant.

Fl. & Fr. : July October.

2. *Ceropegia talzadiana* Babu, Herb. Fl. Dehra Dun 305. 1977. *Ceropegia macrantha* Wt. Contrib. Ind. Bot. 31. 1834 ; Hook. f. Fl. Brit. Ind. 4 : 74. 1883.

Stout climbers with fusiform tubers and glabrous branches. Leaves ovate or elliptic oblong ; base rotundate, cuneate : apex acuminate, glabrous, rarely hispid. Inflorescence of 4-8 flowered cymes ; peduncles solitary. Calyx 5-lobed ; lobes linear, glabrous. Corolla tube curved with a swollen base, lobes lanceolate, connate only at the top. Corona scales 5, deeply 2-fid. Follicles 10-12 cm long.

PACHMARHI : Dhupgarh (1250 m). In forest undergrowth. Occasional.

Fl. & Fr. : July October.

3. CRYPTOLEPIS R. Br.

Cryptolepis buchananii Roem. & Schult. Syst. Veg. 4 : 409. 1819 ; Hook. f. Fl. Brit. Ind. 4 : 5. 1885 ; Stevens in Said. & Nicol. Fl. Hassan 446. 1976. "Karanta".

Large, glabrous, twining shrubs. Leaves elliptic oblong or oblong lanceolate. Flowers whitish or yellowish green in short paniculate cymes. Follicles fusiform, spreading, seeds black, long comose.

PACHMARHI : Mahadev hill (1250 m). BORI : Reserve forest (550 m). In the mixed forest climbing on trees and shrubs. Common.

Fl. & Fr. : April October.

4. GYMNEMA R. Br.

- | | | |
|---|-----|-----------------------|
| 1a. Leaves broadly ovate. Corolla
5 - 6 mm across | ... | <i>G. hirsutum</i> 1 |
| 1b. Leaves elliptic or obovate Corolla 2 - 3 mm
across | ... | <i>G. sylvestre</i> 2 |

1. *Gymnema hirsutum* Wt. & Arn. in Wt. Contrib. 44. 1834 ; Hook. f. Fl. Brit. Ind. 4 : 29. 1883.

Twining shrubs. Leaves broadly ovate, softly pubescent on both sides, as are the branches and petioles. Cymes 2inate, subsessile, few to many - flowered. Corolla 5 - 6 mm across, lobes thick ciliolate. Follicles slender, glabrous.

PACHMARHI : Vicinity (1000m). In mixed forest on trees and shrubs. Abundant.

Fl. & Fr. : April July.

2. *Gymnema sylvestre* (Retz.) R. Br. ex Schult. in Roem. & Schult. Syst. Veg. ed. 15, 6 : 57. 1819 ; Hook. f. Fl. Brit. Ind. 4 : 29. 1883 ; Stevens in Sald. & Nicol. Fl. Hassan 448. 1976. *Periploca sylvestris* Retz. Obs. Bot. 2 : 15. 1781. "Gur - mar" "Merasingi".

Woody twiner, pubescent. Leaves elliptic or elliptic-lanceolate. Flowers greenish - yellow in subsessile cymes. Follicles linear - lanceolate. Seeds marginated ; coma ca 3.5 cm long.

PACHMARHI : Dhupgarkh (1250 m). In mixed forest climbing on trees and shrubs. Adundant.

Fl. & Fr. : April July and Obtober - February.

The leaves, if chewed, temporarily paralyses the taste buds of the tongue ; used in diabetes in the villages.

5. HEMIDESMUS R. Br.

Hemidesmus indicus (L.) R. Br. in Ait. Hort. Kew. ed. 2, 2 : 75. 1811 ; Hook. f. Fl. Brit. Ind. 4 : 5. 1883 ; Stevens in Sald. & Nicol. Fl. Hassan 448. 1976. *Periploca indica* L. Sp. Pl. 211. 1753. "Anantamul"/ "Kapuri"/ "Hindi salsa".

Prostrate or twining shrubs. Leaves variable, ovate, elliptic, elliptic oblong or rarely obovate. Flowers dull brown outside, red within. Follicles linear lanceolate. Seeds with silvery white coma.

PACHMARHI : Dhupgarh (1250 m). In mixed forest climbing on trees and shrubs. Abundant.

Fl. & Fr. : August December.

6. HOLOSTEMMA R. Br.

Holostemma annulare (Roxb.) K. Schum. in Pflanzenf. 4 (2) : 250. t. 71. 1895 ; Babu, Herb, Fl. Dehra Dun 306. 1977. *Asclepias annulare* Roxb. Fl. Ind. 2 : 37. 1832. *Holostemma rheedii* Wall. Pl. As. Rar. 2 : 51. 1831 ; Hook. f. Fl. Brit. Ind. 4 : 21. 1883. *Holostemma rheedianum* (auct. pl. non Spreng. 1824). "Chirvel".

Large twining shrubs. Stem much - branched ; young parts minutely pubescent. Leaves ovate, acuminate, cordate and shortly cuneate at the base. Flowers pinkish purple in lateral, short, fasciculate cymes. Follicles linear - oblong, somewhat tapering to a blunt point.

PACHMARHI : Mahadev hill (1250 m). In mixed forest. Abundant.

Fl. & Fr. : July October.

7. HOYA R. Br.

Hoya wightii Hook. f. Fl. Brit. Ind. 4: 59. 1883 ; Sant. in Rec. Bot. Surv. India 16 (1) : 175. 1953 ; Stevens in Sald. & Nicol. Fl. Hassan 450. 1976.

Usually epiphytic, perennial climbers. Leaves elliptic, glabrous; base acute to attenuate; apex acuminate; margins revolute and not undulating; lateral veins at nearly right angles to the midrib. Flowers cream-coloured, scented, in lateral, many flowered umbels. Corolla lobes pubescent within. Follicles solitary or in pairs, linear, tapering at the apex. Seeds oblong; coma 5 cm long.

PACHMARHI : Vicinity (100 m). Creeping on steep hill slopes. Occasional.

Fl. & Fr. : May January.

8. LEPTADENIA R. Br.

Leptadenia pyrotechnica (Forsk.) Decne. in Ann. Sc. Nat. Ser. 2, 9 : 270. 1838 ; Sant. in Bot. Mem. Univ. Bombay 4 : 59. 1962. *Cynanchum pyrotechnicum* Forsk. Fl. Aeg. Arab. 53. 1775. *Leptadenia spartinum* Wt. Contrib. 48. 1834 ; Hook. f. Fl. Brit. Ind. 4 : 64. 1883.

Erect, much branched, nearly leafless shrubs. Stem cylindric, green, herbaceous, straggling or drooping. Leaves usually wanting, present on young shoots only, sessile, fleshy, linear, acute at the apex. Flowers very small, greenish - yellow, in lateral umbellate cymes. Calyx cupular, pubescent outside; lobes divided half-way down. Corolla rotate or nearly so; lobes lanceolate, pubescent on both sides. Follicles solitary lanceolate, beaked. Seeds ovate lanceolate; coma 4 cm long.

PACHMARHI : Vicinity (1000 m), 25. 7. 64, Panigrahi 4501 (BSA). In mixed forest. Rare.

Fl. & Fr. : October February.

9. SARCOSTEMMA R. Br.

Sarcostemma acidum (Roxb.) Voigt. Hort. Sub. Calc. 542. 1845 ; Stevens in Sald. & Nicol. Fl. Hassan 451. 1976. *Asclepias acida* Roxb. Fl.

Ind. 2 : 31. 1832. *Sarcostemma brevistigma* Wt. & Arn. in Wt. Contrib. Ind. Bot. 59. 1834 ; Hook. f. Fl. Brit. Ind. 4 : 26. 1883. "Somdata".

Leafless herbs, somewhat succulent. Cymes terminal, umbellate. Corolla campanulate ; lobes with revolute margins. Outer corona 5 - lobed ; inner corona of 5 fleshy, erect, lobes with apices strongly inflexed. Style apex short conical, not exserted.

PACHMARHI : Apsara Bihar (1000 m). Creeping on steep rocky slopes. Occasional.

Fl. & Fr. : July January.

10. TYLOPHORA R. Br.

Tylophora fasciculata Buch. Ham. ex Wt. Contrib. Ind. Bot. 50. 1834 ; Hook. f. Fl. Brit. Ind. 4 : 40. 1883 ; Stevens in Sald. & Nicol. Fl. Hassan 453, 1976.

Erect, perennial, undershrubs ; sap watery. Leaves coriaceous, ovate or lanceolate, acute or shortly acuminate, rounded or cordate at base. Cymes lateral, umbellate to paniculate. Calyx lobes deltoid, revolute at anthesis, sparsely pilose. Corolla lobes purplish brown, pilose within. Corona lobes rounded, laterally concave with a short cusp appressed to the gynostegium. Gynostegium stipitate. Follicles usually solitary, ovoid, flat above, bulging on the lower side. Seeds broadly ovate or orbicular.

PACHMARHI : Vicinity (1000 m), Saxena 83341 (SFRI). In forest undergrowth on bushes Rate.

Fl. & Fr. : May December.

62. LOGANIACEAE Mart.

1a. Trees or shrubs :

- | | | |
|---|-----|-------------|
| 2a. Flowers 4 - merous. Abaxial side of leaf always tomentose | ... | Buddleja 1 |
| 2b. Flowers 5 - merous. Abaxial side of leaf never tomentose. | ... | Strychnos 3 |
| 1b. Herbs | ... | Mitreola 2 |

1. BUDDLEJA L.

- 1a. Ovary and style glabrous. Fruit a dehiscent capsule ... *B. asiatica* 1
 1b. Ovary and style pubescent. Fruit fleshy, indehiscent ... *B. madagascariensis* 2

1. *Buddleja asiatica* Lour. Fl. Cochinch. 72. 1790 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 82. 1883 ; Babu, Herb. Fl. Dehra Dun 309. 1977.

Evergreen, suffruticose undershrubs. Leaves lanceolate oblong, acuminate, base acute, white - tomentose on the lower surface. Flowers in thyrsoid, densely tomentose panicles. Calyx divided above the middle, densely white - tomentose ; lobes triangular, acute. Corolla white, throat densely hairy ; lobes oblong, obtuse, hairy outside. Stamens inserted above the middle of the corolla tube. Fruits ellipsoid oblong, glabrous.

PACHMARHI : Mahadev hill (1200 m). Along river bank and streams. Abundant.

Fl. & Fr. : November March.

2. *Buddleja madagascariensis* Lamk. Encycl. 1 : 513. 1785 ; Leenhouts in Steenis, Fl. Males. Ser. 1, 6 : 340. 1962.

Shrubs with silvery - white tomentum. Leaves ovate oblong to ovate - lanceolate, glabrous above, densely tomentose beneath ; base rounded to acute ; margin entire ; apex acute. Inflorescence terminal, thyrsoid cymes. Flowers subsessile, sweet - scented. Calyx campanulate, outside densely tomentose, broadly triangular. Corolla orange, outside densely tomentose ; lobes rounded. Stamens inserted slightly below the mouth. Fruit globular, pubescent, at first white, when ripe purple blue. Seeds ellipsoid.

PACHMARHI : Vicinity (1000 m), 27. 12. 62, Panigrahi 6597 (BSA). In mixed forest. Rare.

Fl. & Fr. : October February.

2. MITREOLA L.

Mitreola petiolata (Gmel.) Torr. & Gray, Fl. N. Amer. 2 : 45. 1841 ; Babu, Herb. Fl. Dehra Dun 309. 1977. *Cynoctoronum petiolatum* J. F. Gmel. Syst. Nat. ed. 13, 2 : 443. 1791. *Mitreola oldenlandioides* G. Don, Syst. 4 : 172. 1837 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 79. 1883.

Erect, slender, annual herbs. Stem 4 angular, narrowly winged. Leaves 1-2 pairs, ovate-lanceolate to oblong; base rounded or subcordate; apex acute or acuminate. Flowers sessile in long-peduncled, 2 to 4 times forked cymes. Calyx divided less than halfway down; lobes linear, obtuse. Corolla white; lobes oblong, obtuse. Fruits 2-horned, erect, deeply emarginate, with upcurved lobes.

PACHMARHI : Vicinity (1000 m). BORI : Dhain (462 m). In forest undergrowth. Occasional.

Fl. & Fr. : August - November.

3. STRYCHNOS L.

Strychnos potatorum L. f. Suppl. 148. 1781; Clarke in Hook. f. Fl. Brit. Ind. 4 : 90. 1883; Stevens in Sald. & Nicol. Fl. Hassan 421. 1976. "Nirmali".

Erect trees. Leaves elliptic, acute at both ends, with a pair of ribs above the basal 3. Cymes usually on old wood. Corolla tube longer than lobes, white. Ovary and style glabrous. Berries black. Seeds circular.

BORI : Dhain (462 m). In mixed forest. Occasional.

Fl. & Fr. : September - June.

The seed paste has got good electrolytic activity and clears the turbid water. Highly poisonous in large quantities; contains strichnine and brucine.

63. GENTIANACEAE Juss.

1a. Flowers irregular :

- | | | |
|--|-----|-------------------|
| 2a. Small herbs. Flowers sessile. Stamen 1 | ... | <i>Hoppea</i> 3 |
| 2b. Large herbs. Flowers stalked. Stamens 4. | ... | <i>Canscora</i> 1 |

1b. Flowers regular :

- | | | |
|-----------------------|-----|------------------|
| 3a. Petals glandular | ... | <i>Swertia</i> 4 |
| 3b. Petals eglandular | ... | <i>Exacum</i> 2 |

I. *CANSORA* Lamk.

1a. Stem 4 -angled, but not winged	...	<i>C. diffusa</i> 3
1b. Stem 4 -winged :		
2a. Pedicels winged	...	<i>C. decussata</i> 2
2b. Pedicels not winged	...	<i>C. decurrens</i> 1

1. *Cansora decurrens* Dalz. in Kew Journ. Bot. 2 : 136, 1850 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 103, 1883 ; Ramam. in Sald. & Nicol. Fl. Hassan 423, 1976.

Herbs with winged stem. Leaves elliptic, acute at both ends. Pedicel and calyx not winged. Corolla pink.

PACHMARHI : Vicinity (1000 m). In moist places along water courses. Occasional.

Fl. & Fr. : October November.

2. *Cansora decussata* (Roxb.) J. A. & J. H. Schult. Syst. Veg. 1 : 229, 1822 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 104, 1883 ; Babu, Herb. Fl. Dehra Dun 311, 1977. *Pladera decussata* Roxb. Fl. Ind. 1 : 418, 1820. "Sankhaphuli".

Erect, slender, annual herbs. Stem 4 winged. Leaves sessile, ovate-lanceolate, oblong, with a subcordate, semi amplexicaul base. Flowers in leafy cymes. Pedicels 4 winged. Calyx lobes ovate lanceolate, acute. Corolla white ; segments unequal. Capsule oblong, as long as the calyx.

PACHMARHI : Jambudeep (900 m). In open forest under moist condition. Occasional.

Fl. & Fr. : September November.

3. *Cansora diffusa* (Vahl) R. Br. ex Roem. & Schult. Syst. Veg. 3 : 301, 1820 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 103, 1883 ; Babu, Herb. Fl. Dehra Dun 311, 1977. *Gentiana diffusa* Vahl, Symb. Bot. 3 : 47, 1794.

Erect, annual biennial herbs. Stem 4 angled, not winged. Leaves elliptic - ovate to oblong, narrowed at both ends. Flowers in a leafy, paniculate cyme, sometimes solitary. Corolla pink with a brown throat ; segments unequal. Capsule as long as the calyx.

PACHMARHI : Mahadev hill (1250 m). BORI : Reserve forest

(500 m); Dhain (430 m). In conglomerate beds and laterite soil along water courses. Common.

Fl. & Fr. : October February.

2. EXACUM L.

1a. Leaves distinctly petioled	...	<i>E. carinatum</i> 2
1b. Leaves all sessile :		
2a. Corolla 2 cm long	...	<i>E. bicolor</i> 1
2b. Corolla less than 1 cm long	...	<i>E. pumilum</i> 3

1. *Exacum bicolor* Roxb. Fl. Ind. 1 : 413. 1820 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 96. 1883 ; Ramam. in Sald. & Nicol. Fl. Hassan 425. 1976. "Baracharayata".

Erect herbs. Leaves sessile, elliptic oblong, acute. Inflorescence usually dense, many flowered cymes; occasionally flower solitary. Calyx 4 lobed, winged on back. Corolla showy, 2 cm long, 4 lobed; lobes broadly ovate acute, white with dark purple tips.

BORI : Dhain (430 m). In moist places in the forest. Occasional.

Fl. & Fr. : September January.

2. *Exacum carinatum* Roxb. Fl. Ind. 1 : 415. 1820 ; Ramam. in Sald. & Nicol. Fl. Hassan 425. 1976. *Exacum petiolare* Griseb. in DC. Prodr. 9 : 46. 1845 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 98. 1883.

Small herbs. Leaves petioled, elliptic, acute at both ends or ovate, acuminate, 3 - nerved. Cymes few - flowered. Calyx 4 lobed. Corolla 4 lobed, pale blue.

BORI : Reserve forest (900 m). On hill slopes under moist conditions. Occasional.

Fl. & Fr. : September November.

3. *Exacum pumilum* Griseb. in DC. Prodr. 9 : 46. 1845 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 98. 1883 ; Ramam. in Sald. & Nicol. Fl. Hassan 425. 1976.

Tiny herbs. Leaves sessile, ovate, 3 nerved. Cymes few flowered. Flowers subsessile. Calyx 4 lobed, winged. Corolla 4 lobed, blue.

PACHMARHI : Dhupgarh (1200 m). On moist soil in the forest. Occasional.

Fl. & Fr. : September - October.

3. HOPPEA Willd.

Hoppea dichotoma Heyne ex. Willd. Ges. Naturf. Fr. Neue. Schrifl. 3 : 435. 1801 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 100. 1883 ; Babu, Herb. Fl. Dehra Dun 314. 1977.

Erect, annual herbs. Stem tetragonal. Leaves sessile, ovate - elliptic or elliptic lanceolate, acute, 1 - nerved ; uppermost passing into bracts. Flowers many in leafy, paniculate cymes. Calyx ribbed ; lobes 4, lanceolate, acute. Corolla greenish yellow ; lobes 4, ovate - triangular, acute.

PACHMARHI : Jambudeep (1050 m). On moist slopes. Occasional.

Fl. & Fr. : September - November.

4. SWERTIA L.

Swertia minor (Griseb.) Knobl. in Bot. Centralbl. 60 : 321. 1894. *Ophelia minor* Griseb. in DC. Prodr. 9 : 126. 1845. *Pleurogyne minor* Clarke in Hook. f. Fl. Brit. Ind. 4 : 120. 1883.

Tiny herbs. Stem simple. Leaves sessile, ovate or elliptic. Flowers in panicled cymes. Calyx lobes elliptic. Corolla white or blue, nearly 5-lobed ; lobes oblong with glands near inner base. Capsule oblong.

PACHMARHI : Dhupgarh (1250 m). On hill slopes. Occasional.

Fl. & Fr. : October - December.

64. MENYANTHACEAE Dum.

NYMPHOIDES Seguier.

Nymphoides indica (L.) Kuntze, Rev. Gen. Pl. 429. 1891 ; Ramam. in Sald. & Nicol. Fl. Hassan 475. 1976. *Menyanthes indica* L. Sp. Pl. 145. 1753. *Limnanthemum indicum* (L.) Griseb. emend. Thw. Enum. 205. 1850 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 131. 1883. "Barachuli".

Aquatic herbs. Leaves floating, orbicular - peltate. Sepals ovate lanceolate, acute. Petals ovate lanceolate, densely fimbriate, white with yellow base. Fruits globose, dehiscing irregularly. Seeds smooth.

BORI : Reserve forest (440 m). In stagnant pools near the river bed. Abundant.

Fl. & Fr. ; All seasons.

65. BORAGINACEAE Juss.

1a. Herbs :

2a. Flowers more than 1 cm wide, long - pedicelled, solitary or in nonscorpoid racemes ... *Trichodesma* 6

2b. Flowers less than 1 cm wide, sessile or short-pedicelled, in scorpoid spikes or racemes :

3a. Flowers racemose, remote ; nutlets glochidiate ... *Cynoglossum* 2

3b. Flowers spikeate, crowded ; nutlets smooth ... *Heliotropium* 4

I. Woody shrubs or trees :

4a. Leaves less than 3 cm long, crowded on short lateral branches or fasciculate ... *Rottia* 5

4b. Leaves with at least some over 5 cm long, alternate to subopposite :

5a. Style dichotomously twice - branched ; endocarp unlobed ... *Cordia* 1

5b. Style once - branched ; endocarp 2 - 4 lobed ... *Ehretta* 3

1. CORDIA L.

Cordia dichotoma Forst. f. Prodr. 18. 1786 ; Naik, Fl. Osman. 212. 1979. *Cordia obliqua* Willd. Phytogr. 4 : t. 4. 1794 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 137. 1883. *Cordia myxa* (auct. Pl. non L. 1753) ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 136. 1883. "Lasara".

Medium sized trees ; young parts pubescent. Leaves alternate, ovate, elliptic or orbicular. Flowers white, polygamous in axillary and terminal cymose panicles. Drupes pale orange coloured, globose.

BORI : Reserve forest (550 m). In mixed forest. Common.

Fl. & Fr. : March June.

2. CYNOGLOSSUM L.

- 1a. Flowers deep blue. Nutlets strongly margined, glochidiate, sparingly on the faces ... *C. glocidiatum* 1
- 1b. Flowers white with bluish centre. Nutlets glochidiate on all sides, not or most obscurely margined :
 - 2a. Flowers 2 - 2.5 mm across. Leaves rough with long, white, bulbous based hairs ... *C. lanceolatum* 2
 - 2b. Flowers 5 mm across. Leaves mostly clothed with short, soft brown hairs ... *C. zeylanicum* 3

1. *Cynoglossum glocidiatum* Wall. ex Benth. in Royle Ill. 306. 1836 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 156. 1883. *Cynoglossum wallii* G. Don, Gen. Syst. 4 : 354. 1838 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 157. 1883. *Cynoglossum denticulatum* DC. Prodr. 10 : 150. 1846 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 157. 1883.

Erect, pubescent herbs. Radical leaves petiolate ; caudine ones sessile, ovate lanceolate, entire, pubescent, hairs occasionally bulbous based. Flowers in long one sided racemes. Calyx deeply 5 lobed. Corolla deep blue ; tube as long as the calyx ; lobes 5, spreading. Nutlets 4, strongly margined, glochidiate, sparingly on the faces.

PACHMARHI : Vicinity : (1000 m). In forest undergrowth. Occasional.

Fl. & Fr. : July November.

2. *Cynoglossum lanceolatum* Forsk. Fl. Aegypt. Arab. 41. 1775 ; Babu, Herb. Fl. Dehra Dun 317. 1977. *Cynoglossum micranthum* Desf. Tabl. (ed. 1) 220. 1804 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 156. 1883.

Erect, pubescent herbs. Lower leaves petioled, upper ones sessile, alternate, narrowly lanceolate, with bulbous based hairs. Flowers in long, simple or forked one-sided racemes. Calyx deeply 5 lobed, persistent. Corolla white, with blue centre ; tube as long as the calyx, 5-lobed, spreading. Nutlets 4, not or obscurely margined, glochidiate on all sides.

PACHMARHI : Dhupgarh (1250 m). In forest undergrowth and waste lands. Occasional.

Fl. & Fr. : July - October.

3. *Cynoglossum zeylanicum* (Vahl ex Horn.) Thunb. ex Lehm. Neue Schrif. Ges. Halle 3(2) : 20. 1817; Ramam. in Sald. & Nicol. Fl. Hassan 480. 1976. *Anchusa zeylanica* Vahl ex Horn. Enum. Hafn. 3. 1807. *Cynoglossum denticulatum* DC. var. *zeylanicum* (Vahl ex Horn.) Clarke in Hook. f. Fl. Brit. Ind. 4 : 157. 1883.

Erect, pubescent herbs. Radical leaves stalked; caudine ones sessile, ovate, acute at both ends. Calyx lobes ovate, bristly hairy. Corolla lobes rounded, spreading, white with a blue tinge. Nutlets 4, glochidiate on all sides, not or most obscurely margined.

PACHMARHI: Mahadev hill (1200 m). BORI: Reserve forest (550 m.); Dhain (430 m). In forest undergrowth and in frost holes. Common.

Fl. & Fr. : July - October.

3. EHRETIA P. Br.

Ehretia canarensis (Clarke) Gamble, Fl. Pres. Madras 891. (Repr. ed. 626). 1923; Ramam. in Sald. & Nicol. Fl. Hassan 481. 1976. *Ehretia laevis* Roxb. var. *canarensis* Clarke in Hook. f. Fl. Brit. Ind. 4 : 141. 1883. "Tamoiya"/"Chinor" "bholumbar".

Small trees. Leaves lanceolate oblanceolate, acuminate, cuneate to rounded at base, usually symmetrical. Calyx lobes small, ovate, campanulate. Corolla white; lobes ovate, acute to rounded, with recurved margins, reflexed. Fruits fleshy, indehiscent, 4 seeded.

BORI: Reserve forest (550 m). In mixed forest. Abundant.

Fl. & Fr. : April - October.

4. HELIOTROPIUM L.

- | | | |
|---|-----|-------------------------|
| 1a. Bracts inconspicuous. Flower spikes up to 7 cm long | ... | <i>H. brevifolium</i> 1 |
| 1b. Bracts conspicuous. Flower spikes up to 2.5 cm long | | <i>H. marifolium</i> 2 |

1. *Heliotropium brevifolium* Wall. in Roxb. Fl. Ind. 2 : 2. 1824. *Heliotropium strigosum* Willd. var. *brevifolia* (Wall.) Clarke in Hook. f. Fl. Brit. Ind. 4 : 151. 1883. "Chitiphul".

Much branched undershrubs. Leaves narrowly oblong lanceolate, white strigose hispid, margins reflexed. Flowering spikes up to 7 cm long. Nutlets ovoid, with minute grey hairs.

PACHMARHI : Vicinity (1000 m). Along the sandy river bed. Abundant.

Fl. & Fr. : December - July.

2. *Heliotropium marifolium* Retz. Obs. Bot. 2 : 8. 1810 ; Ramam. in Sald. & Nicol. Fl. Hassan 481. 1976. *Heliotropium seabrum* Retz. Obs. Bot. 2 : 8. 1810 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 152. 1883.

Prostrate, compact, spreading, strigose herbs. Leaves lanceolate elliptic, cuneate, entire, venation indistinct. Flowers in scorpioid cyme, white. Anthers apiculate, connivent by tips. Stigma conical. Fruits of 4 equal nutlets.

BORI : Dhain (430 m). Along the river bed. Abundant.

Fl. & Fr. : December - July.

5. ROTULA Lour.

Rotula aquatica Lour. Fl. Cochinch. 121. 1790 ; Ramam. in Sald. & Nicol. Fl. Hassan 482. 1976. *Rhabdia lycioides* Mart. Nov. Gen. Sp. 2 : 137. 1826 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 145. 1883. "Dantratchu"/"suvarlya"/"phanbidi".

Trailing shrubs. Leaves entire, oblong oblanceolate, apiculate. Inflorescence a few-flowered cyme. Flowers pink to purple. Drupes globose, tipped by persistent style, strongly 4 lobed breaking into four 1-seeded pyrenes.

BORI : Reserve forest (500 m). Along the sandy and rocky river bed. Abundant.

Fl. & Fr. : September - March.

6. TRICHODESMA R. Br.

- | | |
|---|-----------------------------|
| ta. Calyx lobes hastate below. Flowers white | ... <i>T. indicum</i> 1 |
| tb. Calyx lobes not hastate below. Flowers blue | ... <i>T. seychelicum</i> 2 |

1. **Trichodesma indicum** (L.) R. Br. (Prod. 496. 1810. comb. inval.) ex Lehm. Pl. Asperif. 195. 1818 (as 'indica') ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 153. 1883 ; Babu, Herb. Fl. Dehra Dun 318. 1977. *Borago indica* L. Sp. Pl. 137. 1753. "Chhota kulpha"/ "ralmandi"/ "sal knota".

Erect, hispid herbs. Leaves opposite, sessile, amplexicaule, oblong lanceolate. Flowers in leafy racemes or solitary. Calyx lobes ovate, acuminate, hastate. Corolla white ; lobes ovate, apiculate. Anthers bearded below ; connectives produced and twisted. Nutlets smooth.

PACHMARHI : Mahadev hill (1250 m) ; Dhupgarh (1200 m). On hill slopes amidst grasses. Common.

Fl. & Fr. : December July.

2. **Trichodesma zeylanicum** (Burm. f.) R. Br. Prod. 496. 1810 (as *zeylanica*) ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 154. 1883 ; Ramam. in Sald. & Nicol. Fl. Hassan 483. 1976. *Borago zeylanica* Burm. f. Fl. Ind. 41. 1768. "Hetenuria" / "jalasirasa".

Erect, hispid herbs. Leaves opposite, shortly petioled, elliptic-lanceolate, with bulbous based hairs. Flowers generally solitary, drooping ; upper ones in leafy racemes. Calyx lobes ovate, acuminate, entire below. Corolla blue with rounded, apiculate lobes. Anthers bearded below ; connectives produced and twisted. Nutlets smooth.

BORI : Reserve forest (500 m). On road side and waste lands. Abundant.

Fl. & Fr. : December August.

66. CONVOLVULACEAE Juss.

- 1a. Leafless parasitic plants, with haustoria and slender greenish or golden-yellow stems ... *Cuscuta* 2
- 1b. Non parasitic plants, with well-developed, green leaves :
 - 2a. Styles 2 ... *Evolulus* 3
 - 2b. Style 1 :
 - 3a. Fruit indehiscent, with a leathery or fleshy pericarp ... *Argyreia* 1
 - 3b. Fruit a thin-walled capsule, dehiscent by valves or irregularly dehiscing ... *Ipomoea* 4

1. ARGYREIA Lour.

- 1a. Leaves broadly ovate, cordate, acute, densely silky - white - tomentose beneath. Bracts ovate - lanceolate, caudate acuminate. Sepals ovate or orbicular, obtuse ... *A. nervosa* 2
- 1b. Leaves ovate or deltoid, acute or acuminate, rounded truncate or cordate, sparsely strigose beneath. Bracts linear - oblong. Sepals lanceolate, acute or acuminate ... *A. involucrata* 1

1. *Argyreia involucrata* Clarke in Hook. f. Fl. Brit. Ind. 4 : 187. 1883.

Large twining shrubs. Leaves ovate or deltoid, acute or acuminate, sparingly hairy or glabrescent. Peduncles shorter than the leaves. Bracts linear - oblong, persistent. Flowers subcapitate. Corolla pinkish grey.

BORI : Reserve forest (1000 m). In mixed forest. Common.

Fl. & Fr. : August November.

2. *Argyreia nervosa* (Burm. f.) Boj. Hort. Maurit. 224. 1837. *Convolvulus nervosa* Burm. f. Fl. Ind. 48. 1768. *Convolvulus speciosus* L. f. Suppl. 137. 1781. *Argyreia speciosa* (L. f.) Sweet, Hort. Brit. 289. 1827 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 185. 1883. "Samandar - ka - pat".

Large climbing shrubs. Leaves broadly ovate, cordate, acute, densely covered with silky white tomentum on the lower surface ; upper surface glabrous or nearly so. Flowers in subcapitate cymes. Bracts large, ovate-lanceolate, caudate - acuminate. Sepals unequal. Corolla large, pink - purple. Fruits globose, apiculate, yellowish brown, nearly dry.

PACHMARHI : Vicinity (1000 m). In the valley. Occasional.

Fl. & Fr. : July October.

2. CUSCUTA L.

Cuscuta reflexa Roxb. Pl. Cor. 2 : 3. t. 104. 1798 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 225. 1883 ; Babu, Herb. Fl. Dehra Dun 321. 1977. *Cuscuta santapaui* Banerji & Das. in Journ. Arn. Arb. 46 : 87. 1965. "Akasbel".

Twining, leafless herbs with greenish or golden - yellow stems. Flowers sessile or shortly pedicelled, in clusters arranged in racemes. Calyx segments ovate oblong, obtuse, verrucose on the back. Corolla whitish; lobes ovate triangular, obtuse, reflexed. Corolla scales fimbriate. Capsule globose.

PACHMARHI : Vicinity (1000 m). BORI : Reserve forest (1000 m). Parasite on trees and shrubs. Abundant.

Fl. & Fr. : September January.

3. EVOLVULUS L.

Evolvulus alsinoides (L.) L. Sp. Pl. ed. 2, 392. 1762 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 220. 1883 ; Babu, Herb. Fl. Dehra Dun 321. 1977. *Convolvulus alsinoides* L. Sp. Pl. 157. 1753. "Shyamakranta"/ "Sankha-pushpi".

Prostrate, multicaudate, perennial herbs. Leaves ovate lanceolate to oblong, with acute or rounded base ; thinly pilose. Flowers 1 - 3, in axillary cymes. Calyx segments lanceolate, acute, hairy. Corolla pale - blue, shallowly lobed. Capsule globose.

PACHMARHI : Dhupgrah (1250 m) ; Mahadev hill (1200 m). In the forest floor among the rocks. Common.

Fl. & Fr. : January December.

4. IPOMOEA L.

- | | | |
|---|-----|-------------------------|
| 1a. Inflorescence subsessile. Flowers less than 1 cm long | ... | <i>I. eriocarpa</i> 2 |
| 1b. Inflorescence distinctly peduncled. Flowers more than 1 cm long : | | |
| 2a. Sepals awned at or below the apex | ... | <i>I. hederifolia</i> 3 |
| 2b. Sepals obtuse, acute or apiculate, not awned : | | |
| 3a. Leaves lobed : | | |
| 4a. Leaves palmately 3 - lobed | ... | <i>I. nil</i> . 4 |
| 4b. Leaves palmately dissected to the base : | | |

5a. Calyx glabrous	...	<i>I. cairica</i> 1
5b. Calyx hairy outside	...	<i>I. pes-tigridis</i> 6
3b. Leaves entire :		
6a. Sepals glabrous	...	<i>I. obscura</i> 5
6b. Sepals hirsute	...	<i>I. purpurea</i> 7

1. **Ipomoea cairica** (L.) Sweet, Hort. Brit. 287. 1827 ; Babu, Herb. Fl. Dehra Dun 324. 1977. *Convolvulus cairicus* L. Syst. Nat. ed. 10, 922. 1759. *Ipomoea palmata* Forsk. Fl. Aegypt. Arab. 43. 1775 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 214. 1883.

Slender, glabrous, perennial twiners with tuberous rootstock. Leaves palmately 5 to 7 parted; segments elliptic obovate or lanceolate, narrowed at both ends; basal ones often 2 -lobed or parted. Petioles long, with a pair of glands and stipule like leaves at the axillary shoot at base. Flowers in 1 to 3 flowered cymes. Calyx segments unequal, ovate. Corolla white or purple, with red purple inside towards the base. Capsule globose, glabrous.

PACHMARHI : Dhupgarh (1250 m), Feb. 78, Pant 27161 (BSA). On roadside hedges and bushes. Occasional.

Fl. & Fr. : All seasons.

New record for the area.

2. **Ipomoea eriocarpa** R. Br. Prodri. 484. 1810 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 204. 1883 ; Babu, Herb. Fl. Dehra Dun 324. 1977. *Convolvulus hispidus* Vahl, Symb. Bot. 3 : 29. 1794. *Ipomoea hispida* (Vahl) Roem. & Schult. Syst. Veg. 4 : 238. 1819 (*non* Zucc. 1809).

Slender, twining, annual herbs. Leaves ovate-lanceolate, acuminate, cordate. Cymes subsessile, capitate. Bracts short, linear. Flowers subsessile, short. Sepals narrowly ovate, acuminate, unequal. Corolla campanulate, pink; limbs subentire. Capsule globose, hairy.

PACHMARHI : Vicinity (1000 m). In the forest on bushes. Occasional.

Fl. & Fr. : April December.

3. **Ipomoea hederifolia** L. Syst. Nat. ed. 10, 925. 1759 ; Babu, Herb. Fl. Dehra Dun 325. 1977. *Ipomoea angulata* Lamk. Encycl. 1 : 464. 1795. *Ipomoea coccinea* sensu Clarke in Hook. f. Fl. Brit. Ind. 4 : 19. 1883 (*non* Linn. 1753), p.p.

Slender, annual twiners. Stems 3-angular. Leaves ovate, acuminate, cordate, entire or 3 to 5-angular or lobed. Cymes few-many-flowered. Peduncle pilose; bracts inconspicuous. Sepals distinctly awned on the back. Corolla salverform, scarlet; limb short, subentire. Stamens exserted. Ovary 4-locular. Capsule globose. Seeds pubescent.

BORI : Reserve forest (550 m); Dhain (462 m). On bushes in the mixed forest. Occasional.

Fl. & Fr. : July December.

4. *Ipomoea nil* (L.) Roth, Cat. Bot. 1 : 36. 1797. Babu, Herb. Fl. Dehra Dun 326. 1977. *Convolvulus nil* L. Sp. Pl. ed. 2, 1 : 219. 1762. *Ipomoea hederacea* [auct. pl. non (L.) Jacq. 1786]; Clarke in Hook. f. Fl. Brit. Ind. 4 : 199. 1883. "Kaladana"/"mirchai".

Slender, villous, annual-perennial herbs. Leaves ovate, cordate, palmately 3-lobed; side lobes acute, middle one larger, acuminate. Flowers in few-flowered, umbellate cymes; bracts linear. Calyx segments equal, lanceolate, acuminate, densely villous towards the base, sparsely upwards. Corolla campanulate, purple, glabrous. Capsule subglobose. Seeds puberulous.

PACHMARHI : Vicinity (1000 m). On bushes in the forest. Occasional.

Fl. & Fr. : March November.

Ipomoea obscura (L.) Ker-Gwaler in Bot. Reg. 3 : t. 239. 1817; Clarke in Hook. f. Fl. Brit. Ind. 4 : 207. 1883; Gandhi in Sald. & Nicol, Fl. Hassan 472. 1976. *Convolvulus obscurus* L. Sp. Pl. ed. 2, 1 : 220. 1762.

Slender climbers. Leaves entire, ovate, acuminate, cordate. Cymes 1-3-flowered; bracts caducous. Sepals ovate, obtuse and apiculate. Corolla funnel-shaped, sparsely pubescent outside; limbs subentire, whitish. Capsule ellipsoid apiculate.

PACHMARHI : Vicinity (900 m). On bushes and hedges. Abundant.

Fl. & Fr. : September March.

Ipomoea pes-tigridis L. Sp. Pl. 162. 1753; Clarke in Hook. f. Fl. Brit. Ind. 4 : 204. 1883; Babu, Herb. Fl. Dehra Dun 326. 1977. "Panch-patri".

Slender, twining, sometimes prostrate, annual herbs with rigid hairs. Leaves orbicular, palmately divided nearly to the base with 5-7 segments

segments oblong to elliptic-oblong, slightly acuminate towards both ends, densely hairy. Inflorescence axillary with an involucrate, cymose, few-flowered head at the apex. Sepals slightly unequal, lanceolate, long hairy. Corolla funnel-shaped, white. Capsule ovoid, 1-celled, 4-valved. Seeds 4, sparsely grey tomentose.

PACHMARHI : Jambudeep (1000 m). On bushes in the forest. Common.

Fl. & Fr. : September December.

7. *Ipomoea purpurea* (L.) Roth. Bot. Abb. 27. 1787 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 220. 1883 ; Ooststr. in Steenis, Fl. Males. Ser. 1, 4(4) : 465. 1953. *Convolvulus purpureus* L. Sp. Pl. ed. 2, 1 : 219. 1762.

Twining, annual herbs with short hairs mixed with longer bristles. Leaves broadly ovate or orbicular, sometimes 3-lobed, cordate at base, shortly acuminate at apex, hairy on both surfaces. Inflorescence axillary, one to few-flowered at the apex. Pedicels recurved. Sepals equal in length, hairy at the base, glabrous at the apex. Corolla funnel-shaped, glabrous ; limbs inside purple-blue with reddish midpetaline bands, outside paler ; tube much paler to white. Capsule globose, glabrous, 3-celled. Seeds 6 or less.

PACHMARHI : Vicinity (1000 m). Roadside as escape. Occasional.

Fl. & Fr. : September March.

67. SOLANACEAE Juss.

- | | |
|--|------------------------|
| 1a. Anthers dehiscent by apical pores. Aculeate or armed | ... <i>Solanum</i> 4 |
| 1b. Anthers longitudinally dehiscent. Unarmed : | |
| 2a. Fruit a berry, indehiscent | ... <i>Nicandra</i> 2 |
| 2b. Fruit a capsule, dehiscent : | |
| 3a. Flowers solitary | ... <i>Datura</i> 1 |
| 3b. Flowers in cymose panicles or corymbs | ... <i>Nicotiana</i> 3 |

1. Datura L.

Datura metel L. Sp. Pl. 179. 1753 (*non auct. pl.* in Ind. Fls.) ; Babu, Herb. Fl. Dehra Dun 332. 1977. *Datura fastuosa* L. Syst. Nat. ed. 10, 2 : 932 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 242. 1883. "Datura".

Small shrubs. Leaves long petioled; blade angled or irregularly toothed, ovate, oblique, minutely pubescent. Calyx terete. Corolla white. Staminal filaments hairy at base. Capsule with deltoid spines, a recurved pedicel and distinct, enlarged calyx base, dehiscing irregularly. Seeds thickened but compressed, auricled, pale brown.

PACHMARHI : Dhupgarh (1250 m). In waste places and forest margins. Common.

Fl. & Fr. : All seasons.

2. NICANDRA Adans.

Nicandra physalodes (L.) Gaertn. Fruct. 2 : 237, t. 141, f. 2. 1791 (as "physaloides"); Clarke in Hook. f. Fl. Brit. Ind. 4 : 240. 1883; Babu, Herb. Fl. Dehra Dun 334. 1977. *Atropa physalodes* L. Sp. Pl. 181. 1753.

Small, erect, glabrous herbs. Leaves ovate or ovate-lanceolate, lobed or coarsely toothed. Flowers blue, solitary, axillary or terminal on short peduncles. Berries somewhat dry with numerous flat seeds, enclosed by calyx.

BORI : Reserve forest (550 m). In forest undergrowth and wayside. Occasional.

Fl. & Fr. : September December.

3. NICOTIANA L.

Nicotiana tabacum L. Sp. Pl. 180. 1753; Clarke in Hook. f. Fl. Brit. Ind. 4 : 245. 1883; Babu, Herb. Fl. Dehra Dun 335. 1977. "Tamaku"/"tambaku".

Erect herbs. Leaves large, ovato-lanceolate, acute. Flowers white in terminal panicles. Capsules ovoid, 2-4-valved, more or less enclosed by the calyx exposing only a conical top portion, glabrous.

PACHMARHI : Vicinity (1000 m). Near sal forest as escape from cultivation.

Fl. & Fr. : January March.

4. SOLANUM L.

1a. Plants climbing	... <i>S. seaforthianum</i> 5
1b. Plants not climbing :	
2a. Plants unarmed :	
3a. Corolla white	... <i>S. nigrum</i> 4
3b. Corolla purple	... <i>S. dulcamara</i> 1
2b. Plants armed :	
4a. Flowers unisexual	... <i>S. incanum</i> 2
4b. Flowers bisexual :	
5a. Corolla violet or blue	... <i>S. indicum</i> 3
5b. Corolla white	... <i>S. torvum</i> 6

1. ***Solanum dulcamara*** L. Sp. Pl. 185. 1753 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 229. 1883.

Unarmed, glabrous or sparingly pubescent shrubs. Leaves cordate-oblong, acute, entire, lobed or almost pinnate. Flowers in extra-axillary, lax, panicled cymes. Calyx teeth small, obtuse, in fruit almost saucer-shaped ; lobes ovate-oblong. Corolla purple. Berry globose. Seeds smooth.

PACHMARHI : Mahadev hill (1250 m). On forest margins. Occasional.

Fl. & Fr. : August January.

2. ***Solanum incanum*** L. Sp. Pl. 188. 1753 ; Naik, Fl. Osman. 227. 1979. ***Solanum coagulans*** Forsk. Fl. Aegypt-Arab. 47. 1775 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 236. 1883.

Armed undershrubs with stellate tomentum all over. Leaves ovate-elliptic, sinuately lobed. Flowers unisexual ; males cymose, females solitary. Corolla purple. Berries globose.

PACHMARHI : Mahadev hill (1250 m), Feb. 78, part 27123 (BSA). In the forest margin. Rare.

Fl. & Fr. : January June.

New record for the area.

3. ***Solanum indicum*** L. Sp. Pl. 187. 1753 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 234. 1883 ; Babu, Herb. Fl. Dehra Dun 340. 1977. "Barkanta"/"birhatta".

Armed, stellate-tomentose undershrubs. Leaves ovate-oblong, sinuate-pinnatifid, with rounded or truncate base. Flowers in lateral, cymose corymbs. Calyx lobes ovate, acute. Corolla blue; lobes elliptic-oblong, obtuse. Fruit orange-yellow. Seeds smooth.

PACHMARHI : Mahadev hill (1200 m). On hill slopes. Abundant.

Fl. & Fr. : April December.

4. *Solanum nigrum* L. Sp. Pl. 186. 1753 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 229. 1883 ; Babu, Herb. Fl. Dehra Dun 340. 1977. "Makoi".

Erect, annual herbs, unarmed, glabrous or sparsely hairy. Leaves ovate-lanceolate. Flowers white in extra-axillary 3-8-flowered short racemes. Berries black (in diploid) or red (in tetraploid), globose, smooth, shining. Seeds many, discoid, yellow, minutely pitted.

PACHMARHI : Dhupgarh (1200 m). In forest undergrowth. Common.

Fl. & Fr. : August January.

5. *Solanum seaforthianum* Andr. Bot. Rep. 8. t. 504. 1803 ; Gandhi in Sald. & Nicol. Fl. Hassan 462. 1976.

Glabrous climbers. Leaves divided to the base; lobes appear as leaflets, ovate-lanceolate, scarcely pubescent. Flowers in lateral and terminal panicled cymes. Calyx short, truncate. Corolla blue. Berries globose, red. Seeds pitted.

PACHMARHI : Vicinity (1000 m), Feb. '78, Pant 27131 (BSA). Roadside and on forest margins. Rare.

Fl. & Fr. : January October.

New record for the area.

6. *Solanum torvum* Sw. Prodr. Veg. Ind. Occ. 47. 1788 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 234. 1883 ; Babu, Herb. Fl. Dehra Dun 341. 1977.

Large, pubescent shrubs with prickles on stem and petioles. Leaves ovate-lanceolate, cordate-oblique at base, lobes shallow, somewhat triangular. Flowers in lateral, few to many-flowered, corymbose cymes. Corolla white, stellately hairy outside. Berry globose, glabrous. Seeds slightly angular, smooth.

BORI : Reserve forest (900 m). On hill slopes. Common.

Fl. & Fr. : All seasons.

68. SCROPHULARIACEAE Juss.

- 1a. Fruit dehiscent by apical pores. Corolla spurred ... *Kickxia* 4
- 1b. Fruit dehiscent not by apical pores. Corolla not spurred :
- 2a. Leaves alternate ... *Verbascum* 12
- 2b. Lower leaves opposite ; upper ones opposite or alternate :
- 3a. Corolla subrotate, nearly actinomorphic, 4-partite near to the base ... *Scoparia* 10
- 3b. Corolla not rotate, zygomorphic, 2-lipped :
- 4a. Corolla with upper lobes outside in the bud :
 5a. Fertile stamens 2 ... *Lindernia* 7
- 5b. Fertile stamens 4 :
 6a. Fruit 4-valved ... *Limnophila* 5
- 6b. Fruit 2-valved :
 7a. Anther-cells divergent ... *Mazus* 8
- 7b. Anther-cells parallel :
 8a. All the stamens with perfect cells ... *Lindenbergia* 6
- 8b. Two or all the stamens with one imperfect cell ... *Adenosma* 1
- 4b. Corolla with lower lobes outside in the bud :
 9a. Calyx campanulate, subfoliaceous ... *Melasma* 9
- 9b. Calyx tubular, not foliaceous :
 10. Anthers 2-celled but one fertile ... *Centranthera* 3
- 10b. Anthers 1-celled
 11a. Corolla-tube straight, faintly ribbed : ... *Buchnera* 2
- 11b. Corolla-tube forwardly curved, prominently ribbed ... *Striga* 11

1. ADENOSMA R. Br.

Adenosma bilabiata (Roxb.) Merr. Enum. Philipp. Fl. Pl. 3 : 434. 1923. *Eruca bilabiatus* Roxb. Fl. Ind. 3 : 92. 1832. *Adenosma capitatum* Benth. in Benth & Hook. f. Gen. Pl. 2 : 949. 1876 ; Hook. f. Fl. Brit. Ind. 4 : 264. 1884.

Stout, erect, glandular-pubescent, annual herbs. Leaves ovate or oblong, subacute, serrate. Flowers in axillary villous spikes or globose heads. Sepals lanceolate; upper one largest. Corolla blue. Capsule ovoid.

PACHMARHI : Beedall (1050 m). In moist places along waysides. Occasional.

Fl. & Fr. : December March.

2. BUCHNERA L.

Buchnera hispida Buch-Ham, ex D. Don, Prodr. Fl. Nep. 91. 1825; Hook. f. Fl. Brit. Ind. 4 : 298. 1884; Babu, Herb. Fl. Dehra Dun 347. 1977.

Erect, hispid, annual herbs. Lower leaves toothed, elliptic-lanceolate; upper ones linear-lanceolate, passing into bracts. Flowers sessile in terminal spike-like racemes. Calyx hispid; lobes ovate-lanceolate, acute. Corolla rose purple; lobes obovate. Capsule ovoid. Seeds reticulate.

PACHMARHI : Vicinity (1000 m). BORI : Reserve forest (550 m). In forest undergrowth near moist situations. Common.

Fl. & Fr. : October December.

3. CENTRANTHERA R. Br.

Centranthera nepalensis D. Don, Prodr. 88. 1825; Babu, Herb. Fl. Dehra Dun 348. 1977. *Centranthera hispida* (auct. plur. non R. Br. 1810); Hook. f. Fl. Brit. Ind. 4 : 301. 1884.

Erect, hispid, annual herbs. Leaves sessile, narrowly lanceolate-oblong, obtuse, shallowly serrate; higher ones smaller, passing into bracts. Flowers in spike-like racemes. Calyx spathaceous. Corolla white or purple; tube light-yellow, slightly curved; lobes subequal, orbicular, crenulate. Capsule ovoid.

BORI : Reserve forest (450 m), Feb. '78, Part 27242 (BSA). Along the nadas. Rare.

Fl. & Fr. : October February.

New record for the area.

4. KICKXIA Dum.

- | | | |
|---|-----|-------------------------|
| 1a. Plants villous. Leaves ovate or hastate | ... | <i>K. incana</i> t |
| 1b. Plants glabrous or slightly pubescent. Leaves variable in size ; lower ones 3 - 7-lobed | ... | <i>K. ramosissima</i> 2 |

1. *Kickxia incana* (Wall.) Pennell, Scroph. W. Himal. in Acad. Nat. Sci. Philad. Monogr. 5 : 59. 1943. *Linaria incana* Wall. Pl. As. Rar. 2 : 43. 1821 ; Hook. f. Fl. Brit. Ind. 4 : 252. 1883.

Prostrate, villous, perennial herbs. Leaves ovate or hastate. Flowers larger, yellow ; spur much shorter than the corolla-tube. Capsule subglobose. Seeds closely pitted.

PACHMARHI : Vicinity (1000 m), 22-8-49, *Narayanaswami* 3513 (CAL). In the forest undergrowth. Rare.

Fl. & Fr. : September December.

2. *Kiekzia ramosissima* (Wall.) Janchen in Oesterr. Bot. Zeitschr. 82 : 152. 1933 ; Sant. in Journ. Bombay Nat. Hist. Soc. 49 : 27. 1950 ; Naik, Fl. Osman. 235. 1979. *Linaria ramosissima* Wall. Pl. As. Rar. 2 : 43. t. 153. 1821 ; Hook. f. Fl. Brit. Ind. 4 : 251. 1883.

Perennial herb often much-branched from the base ; branches slender, glabrous. Leaves alternate, glabrous, the lower ones 3 - 7-lobed, triangular-hastate, the upper ones usually lanceolate-sagittate, apiculate. Flowers yellow, on filiform axillary pedicels, ebracteate. Capsules subglobose.

PACHMARHI : Vicinity (1000 m), 26-12-62, *Panigrahi* 6527 (CAL). In forest undergrowth. Rare.

Fl. & Fr. : September December.

5. LIMNOPHILA R. Br.

- ta. Flowers sessile, solitary or in short-peduncled, head-like spikes. Leaves opposite, serrate :

2a. Leaves faintly nerved, nerves few	... <i>L. aromatica</i> 1
2b. Leaves strongly nerved, nerves many :	
3a. Leaves pinnately nerved. Calyx lobes lanceolate	... <i>L. rugosa</i> 4
3b. Leaves parallel-nerved. Calyx lobes ovate	... <i>L. connata</i> 2
1b. Flowers pedicelled, axillary, solitary. Lower leaves in whorls, divided into several, widely patent, short, narrow segments	... <i>L. indica</i> 3

1. *Limnophila aromatica* (Lamk.) Merr. Interpr. Rumph. Herb. Amboin. 466. 1917. *Ambulia aromaticia* Lamk. Encycl. 1 : 128. 1797. *Limnophila gratissima* Bl. Bijdr. 749. 1826 ; Hook. f. Fl. Brit. Ind. 4 : 268. 1884. "Kuttra".

Tall, glabrous herbs, decumbent at base and rooting at the lower nodes, later erect. Leaves sessile, semi-amplexicaul at base, linear-oblong or lanceolate, serrulate. Flowers in axillary or terminal many-flowered racemes, rarely solitary. Bracts small. Calyx lobes glabrate. Corolla purple. Capsules oblong-acute.

PACHMARHI : Vicinity (1000 m), Saxena 7845 (SFRI). Along the streams. Rare.

Fl. & Fr. : August November.

2. *Limnophila connata* (Buch. Ham. ex D. Don) Hand. Mazz. Symb. Sin. 7 : 837. 1936 ; Babu, Herb. Fl. Dehra Dun 349. 1977. *Cybathera connata* Buch. Ham. ex D. Don, Prodr. Fl. Nep. 87. 1825. *Limnophila hypericifolia* (Benth.) Benth. in DC. Prodr. 10 : 386. 1846 ; Hook. f. Fl. Brit. Ind. 4 : 269. 1884. *Stemodia hypericifolia* Benth. Scroph. Ind. 23. 1835.

Erect, stout, glabrous herbs. Leaves all opposite, with semi-amplexicaul base, elliptic or ovate oblong, obtuse, entire, crenulate. Flowers sessile in axils of leafy bracts, combined into spikes, rose-purple. Corolla as long as the calyx. Capsule broadly ellipsoid.

PACHMARHI : Vicinity (1000 m), Saxena 445 (SFRI). Along the streams. Rare.

Fl. & Fr. : September November.

3. *Limnophila indica* (L.) Druce, Rep. Bot. Exch. Club. Brit. Isles. 3 : 420. 1924 ; Babu, Herb. Fl. Dehra Dun 349. 1977. *Hottonia indica* L. Syst. Nat. ed. 10. 919. 1759. *Limnophila gratioloides* R. Br. Prodr. 442. 1810 ; Hook. f. Fl. Brit. Ind. 4 : 271. 1884. "Kuttra".

Aquatic, aromatic herbs. Lower leaves divided into linear - filiform segments ; upper ones 3 - fid or often undivided. Flowers in the axils of immersed leaves. Calyx divided less than half - way down ; lobes linear. Corolla pale purple. Capsules ovoid - ellipsoid, as long as the calyx.

PACHMARHI : Jambudeep (900 m), BORI : Dhain (430 m). In stagnant pools along the rivers. Common.

Fl. & Fr. : July December.

4. *Limnophila rugosa* (Roth) Merr. Interpr. Rumph. Herb. Amboin. 466. 1917 ; Babu, Herb. Fl. Dehra Dun 350. 1977. *Herpestis rugosa* Roth, Nov. Pl. Sp. 290. 1821. *Limnophila roxburghii* G. Don, Gen. Syst. 4 : 543. 1838 ; Hook. f. Fl. Brit. Ind. 4 : 265. 1884.

Creeping erect, annual, aromatic herbs. Leaves opposite, ovate - elliptic to oblong, shallowly serrate ; nerves strong, pinnately arranged on the abaxial surface. Flowers sessile in head - like spikes. Bracts leaf - like. Calyx divided half way down ; segments unequal, lanceolate. Corolla - tube yellow ; limbs lilac ; upper lip emarginate ; lower lip 2 - lobed.

PACHMARHI : Vicinity (900 m). Along the streams. Occasional.

Fl. & Fr. : August December.

6. LINDENBERGIA Lehm.

Lindenbergia indica (L.) O. Kuntze, Rev. Gen. Pl. 462. 1891 ; Babu, Herb. Fl. Dehra Dun 350. 1977. *Dodartia indica* L. Sp. Pl. 633. 1753. *Lindenbergia urticaefolia* Lehm. in Link & Otto, Ind. Sem. Hort. Berol. 5. 1829 (1830) ; Hook. f. Fl. Brit. Ind. 4 : 261. 1884. *Lindenbergia polyantha* Royle ex Benth. Scroph. Ind. 22. 1835 ; Hook. f. Fl. Brit. Ind. 4 : 262. 1884.

Erect or decumbent - ascending glandular - hairy, annual herbs. Leaves ovate - elliptic, patently glandular hairy. Flowers axillary. Calyx divided less than halfway down. Corolla yellow.

PACHMARHI : Vicinity (1000 m). In damp, shaded localities on hill slopes. Occasional.

Fl. & Fr. : July - February.

7. LINDERNIA All.

1a. Leaves palmately 3 - 5 - nerved :		
2a. Stamens 4	...	<i>L. procumbens</i> 6
2b. Stamens 2 : staminodes 2	...	<i>L. hyssopoides</i> 4
1b. Leaves pinninerved :		
3a. Capsule shorter or as long as the calyx :		
4a. Calyx divided halfway down or less :		
5a. Corolla 1 cm. long. Calyx - ribs keeled or narrowly winged. Calyx patently long - hairy	...	<i>L. hookeri</i> 3
5b. Corolla 0.5 - 0.6 cm. long. Calyx - ribs not keeled or winged. Calyx glabrous	...	<i>L. crustacea</i> 2
4b. Calyx divided very near to the base	...	<i>L. viscosa</i> ?
3b. Capsule much longer than the calyx :		
6a. Fertile stamens 4	...	<i>L. nummulariifolia</i> 5
Fertile stamens 2	...	<i>L. ciliata</i> 1

1. *Lindernia ciliata* (Colsm.) Penn. in Brittonia 2 : 182. 1936 ; Babu, Herb. Fl. Dehra Dun 353. 1977. *Gratiola ciliata* Colsm. Prodri. Desc. Grat. 14. 1793. *Bonnaya brachiata* Link & Otto. Ic. Pl. Select 25. t. 11. 1820 ; Hook. f. Fl. Brit. Ind. 4 : 284. 1884.

Erect, annual herbs. Leaves sessile, oblong or obovate, obtuse, pinninerved, serrate. Flowers in terminal racemes. Corolla pinkish white. Stamens 2 ; staminodes 2. Capsule more than twice the length of the calyx, cylindric.

PACHMARHI : Vicinity (100 m). In moist shady places. Occasional.

Fl. & Fr. : August November.

2. *Lindernia crustacea* (L.) F. Muell. Syst. Cens. Austral. Pl. 1 : 97. 1882 ; Babu, Herb. Fl. Dehra Dun 354. 1977. *Capraria crustacea* L. Mant. Pl. 1 : 87. 1767. *Vandellia crustacea* (L.) Benth. Scroph. Ind. 35. 1835 ; Hook. f. Fl. Brit. Ind. 4 : 279. 1884.

Erect or decumbent ascending annual herbs. Leaves petiolate, ovate, pinninerved. Flowers axillary, solitary. Calyx shortly lobed during anthesis, afterwards divided near to the base. Corolla purple ; lower lip with a yellow spot at the base. Stamens 4 ; anterior filaments appendiculate. Capsules obovate, slightly exceeding the calyx.

PACHMARHI : Dhupgarh (1250 m) ; Mahadev hill (1200 m). On moist slopes of hills. Common.

Fl. & Fr. : July October.

3. *Lindernia hookeri* (Clarke) Wettst. in Engl. & Prantl, Pflanzenfam. 4 (3b) : 79. 1891. *Vandellia hookeri* Clarke in Hook. f. Fl. Brit. Ind. 4 : 280. 1884. subsp. *kumaunensis* Penn. in Acad. Nat. Sci. Philad. Mongr. 5 : 30. 1943 ; Babu, Herb. Fl. Dehra Dun 354. 1977.

Erect, annual herbs with 4 genous stems. Leaves ovate, lanceolate, rounded subcordate, acute or obtuse, entire in the lower part, crenate serrate in the upper part. Calyx slightly 2 lobed, shortly lobed during anthesis, divided half-way down afterwards ; lobes unequal. Corolla bluish - purple. Fertile stamens 4. Capsule oblong, acute. Seeds rugulose.

PACHMARHI : Vicinity (900 m), Saxena & Pandey 81342 (SFRI). In marshy places near streams. Rare.

Fl. & Fr. : September November.

4. *Lindernia hyssopoides* (L.) Haines, Bot. Bihar & Orissa 635. 1922 (as 'hyssopoides') ; Sald. in Sald. & Nicol. Fl. Hassan 522. 1976. *Gratiola hyssopoides* L. Mant. Alt. 174. 1771 (as 'hyssopoides'). *Hysanthes hyssopoides* (L.) Benth. in DC. Prodr. 10 : 419. 1846 (as 'hyssopoides') ; Hook. f. Fl. Brit. Ind. 4 : 283. 1884.

Erect, simple, annual herbs. Leaves linear lanceolate, narrowed to the base, palmately nerved. Pedicels long. Corolla white tinged with bluish, purple. Stamens 2 ; staminodes 2, glandular, clavate. Capsules elongated, deflexed.

BORI : Kobra nala (430 m), Feb. '78. Pant 27257 (BSA). In swampy places near the streams. Rare.

Fl. & Fr. : August - March.

New record for the area.

5. *Lindernia nummularifolia* (D. Don) Wettst. in Engl. & Prantl, Pflanzenfam. 4 (3b) : 79. 1891 (as 'nummularifolia') ; Babu, Herb. Fl. Dehra Dun 355. 1977. *Vandellia nummularifolia* D. Don, Prodr. Fl. Nepal. 86. 1825 (as 'nummularifolia') ; Hook. f. Fl. Brit. Ind. 4 : 282. 1884. *Lindernia sessiliflora* (Benth.) Wettst. in Engl. & Prantl, Pflanzenfam. 4(3b) : 79. 1891.

Erect decumbent to ascending, annual herbs. Leaves subsessile, suborbicular, serrate, crenate - serrate, glabrous. Flowers in 1 - 4 - flowered, subumbellate racemes. Calyx segments lanceolate, acute. Corolla whitish or tinged with purple ; lip brown ; lower lip white with a purple centre. Fertile stamens 4. Capsule cylindrical, apiculate, glabrous.

PACHMARHI : Vicinity (1000 m). In moist shaded places and moist rocks. Occasional.

Fl. & Fr. : September - November.

6. *Lindernia procumbens* (Krock.) Philcox in Taxon 14 : 30. 1965 ; Babu, Herb. Fl. Dehra Dun 356. 1977. *Anagalloides procumbens* Krock. Fl. Siles. 2 : 398. t. 26. 1970. *Vandellia erecta* Benth. Scroph. Ind. 26. 1835. p. p. ; Hook. f. Fl. Brit. Ind. 4 : 281. 1884.

Erect, glabrous, annual herbs. Leaves sessile, ovate - lanceolate, obtuse, 3 - 5 - nerved. Flowers axillary, solitary, forming into a leafy raceme. Calyx segments linear, acute. Corolla white. Fertile stamens 4. Capsules ovoid.

PACHMARHI : Jambudeep (900 m), Feb. '78, Pant 27204 (BSA). In moist shady places. Rare.

Fl. & Fr. : September - February.

New record for the area.

7. *Lindernia viscosa* (Hornem.) Merr. in Bur. Sci. Publ. Manila 12 : 14. 1918 ; Babu, Herb. Fl. Dehra Dun 357. 1977. *Gratiola viscosa* Hornem. Enum. Pl. Hort. Hafin. 19. 1807. *Vandellia hirsuta* Benth. Scroph. Ind. 36. 1835 ; Hook. f. Fl. Brit. Ind. 4 : 280. 1804.

Erect ascending, annual herbs with 4 - angular stems. Leaves sub - sessile, ovate - elliptic, crenate serrate, hairy. Flowers in lax, terminal racemes. Calyx divided very near to the base ; segments linear - lanceolate, acute. Corolla white ; upper lip brown ; lower lip white. Fertile stamens 4. Capsule globose.

PACHMARHI : Jambudeep (900 m). On hill slopes and shaded localities. Occasional.

Fl. & Fr. : September - November.

8. MAZUS Lour.

Mazus pumilus (Burm. f.) Steenis in Nova Guinea N. S. 9 : 31. 1958 ; Babu, Herb. Fl. Dehra Dun 358. 1977. *Lobella pumila* Burm. f. Fl. Ind. 186. t. 60. f. 3. 1768. *Mazus rugosus* Lour. Fl. Cochinch. 385. 1790 ; Hook. f. Fl. Brit. Ind. 4 : 259. 1884.

Erect - ascending, often multicaudate, annual herbs. Basal leaves in a rosette, oblanceolate - obovate to spatulate, crenate dentate. Flowers in lax, flexuous racemes. Calyx elongates after anthesis, divided halfway down ; segments ovate - lanceolate, subacute. Corolla whitish purple. Capsules 2 -valved.

PACHMARHI : Vicinity (1000 m). In moist shady places. Occasional.

Fl. & Fr. : July February.

9. MELASMA Thunb.

Melasma thomsonii (Hook. f.) Wettst. in Engl. & Prantl, Pflanzenfam. 4 (3b) : 91. 1891. *Alectra thomsonii* Hook. f. Fl. Brit. Ind. 4 : 297. 1884.

(Erect, stiff, annual parasitic herbs. Leaves reduced to green, brown or purple scales, the largest oblong, obtuse. Flowers in lax racemes. Calyx in fruit hemispheric ; lobes broadly triangular. Corolla yellow with red nerves. Capsules globose, as long as the calyx. Seeds linear.

PACHMARHI : Vicinity (1000 m). In shady places. Occasional.

Fl. & Fr. : September - November.

10. SCOPARIA L.

Scoparia dulcis L. Sp. Pl. 116. 1753 ; Hook. f. Fl. Brit. Ind. 4 : 289. 1884 ; Babu, Herb. Fl. Dehra Dun 359. 1977.

Erect, annual perennial herbs with angular stems. Leaves opposite or in whorls of 3, elliptic obovate, serrate. Corolla white, 4 lobed. Anther cells divergent. Capsule subglobose, 2 valved. Seeds pitted.

PACHMARHI : Vicinity (1000 m). BORI : Reserve forest (550 m). In forest undergrowth and sides of pathways. Common.

Fl. & Fr. : August February.

11. STRIGA Lour.

Striga gesneroides (Willd.) Vatke in Oesterr. Bot. Z. 11. 1975 ; Sald. in Sald. & Nicol. Fl. Hassan 527. 1976. *Buchnera gesnerioides* Willd. Sp. pl. 3 : 338. 1800. *Buchnera orobanchoides* R. Br. ex Endl. Flora 15 : 388. t. 2. 1832. *Striga orobanchoides* (R. Br. ex Endl.) Benth. Com. Bot. Mag. 1 : 361. 1836. (as 'orobanchoides') nom. illegit. ; Hook. f. Fl. Brit. Ind. 4 : 299. 1884.

Erect, tuberous, parasitic herbs. Leaves scale like, ovate lanceolate, acute ; higher ones passing into bracts. Flowers in terminal spikes. Calyx 4 ribbed ; lobes lanceolate. Corolla purple. Capsule ovoid - globose.

PACHMARHI : Vicinity (1000 m). Amidst grasses, parasitic on *Lepidagathis* sp. on hill slopes. Occasional.

Fl. & Fr. : August October.

12. VERBASCUM L.

Verbascum chinense (L.) Sant. Fl. Purandhar 90. 1958 ; Babu, Herb Fl. Dehra Dun 362. 1977. *Scrophularia chinensis* L. Mant. Pl. 2 : 250. 1771. *Celsia coromandeliana* Vahl, Symb. Bot. 3 : 79. 1794 ; Hook. f. Fl. Brit. Ind. 4 : 251. 1883. *Verbascum coromandelianum* (Vahl) O. Kuntz, Rev. Gen. Pl. 1 : 468. 1891. "Gadartambaku".

Erect, pubescent, annual herbs. Leaves radical, long petioled lyrate or pinnatisect, rarely entire, elliptic oblong or oblanceolate, acute, crenate ; caudine leaves passing into bracts, all coarsely dentate. Flowers in terminal racemes. Capsules globose, 4 valved.

BORI : Reserve forest (550 m). On hill slopes. Occasional.

Fl. & Fr. : January June.

69. LENTIBULARIACEAE Rich.

UTRICULARIA L.

- 1a. Free - floating aquatic herbs. Leaves divided into filiform segments ... *U. exoleta* 1
- 1b. Terrestrial or epiphytic herbs. Leaves entire or apparently leafless :
 - 2a. Epiphytic herbs. Leaves orbicular - reniform. Seeds glochidiate ... *U. striatula* 5
 - 2b. Terrestrial herbs. Leaves linear - spatulate or peltate. Seeds not glochidiate :
 - 3a. Flowers yellow :
 - 4a. Leaves peltate. Capsule ellipsoid ... *U. scandens* 4
 - 4b. Leaves not peltate. Capsule globose ... *U. pubescens* 3
 - 3b. Flowers light blue or purple :
 - 5a. Calyx lobes longer than wide in fruit, not denticulate. Plants erect or twining ... *U. graminifolia* 2
 - 5b. Calyx lobes nearly as wide as long, minutely denticulate. Plants always erect ... *U. uliginosa* 6

1. *Utricularia exoleta* R. Br. Prodr. 1 : 430. 1810 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 329. 1884 ; Gandhi in Sald. & Nicol. Fl. Hassan 564. 1976. *Utricularia gibba* L. Sp. Pl. 18. 1753. subsp. *exoleta* (R. Br.) P. Taylor in Mitt. Bot. Staat. Munch. 4 : 101. 1961 ; Babu, Herb. Fl. Dehra Dun 367. 1977.

Aquatic, free floating herbs. Leaves numerous, alternate on stolons, capillary, forked. Traps with lateral mouth ; upper lip with two branched appendages. Scape emergent. Scale and bracts basifixed. Flowers 2-3, pedicelled. Calyx lobes subequal. Corolla yellow, often with pink striations. Capsules globose.

PACHMARHI : Kanjigbat (1000 m), *Saxena* 8214 (SFRI). In stagnant water pool near a stream. Rare.

Fl. & Fr. : September - March.

Occurrence of the species at this altitude is interesting.

2. ***Utricularia graminifolia*** Vahl, Enum. 1 : 195. 1804 ; Gandhi in Sald. & Nicol. Fl. Hassan 564. 1976. *Utricularia caerulea* (auct. pl. non L. 1753) ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 331. 1884.

Terrestrial herbs. Leaves 3 nerved. Traps with basal mouth ; upper lip with simple appendages. Scape erect or twining ; scales, bracts and bracteoles basifix. Pedicels usually longer than calyx. Calyx lobes sub-equal, longer than wide in fruit, acute or acuminate. Corolla blue ; upper lip obovate ; lower lip ovate orbicular, truncate ; spur narrowly conic, curved. Capsules depressed globose. Seeds ovoid.

PACHMARHI : Vicinity (1000 m) ; Dhupgarh (1200 m). Along streams. Occasional.

Fl. & Fr. : September - March.

3. ***Utricularia pubescens*** J. E. Smith in Rees, Cyclop. 37. n. 53. 1819 ; Babu, Herb. Fl. Dehra Dun 368. 1977.

Terrestrial herbs. Stolons much branched, many. Leaves peltate, petiolate. Traps globose. Scape filiform, 1-4 flowered. Calyx segments slightly unequal. Corolla bluish-purple, slightly longer than the calyx. Capsule ellipsoid. Seeds reticulate.

PACHMARHI : Jambudeep (900 m). In boggy open ground by stream near sal forest, among grasses and sedges. Occasional.

Fl. & Fr. : September - November.

4. ***Utricularia scandens*** Benj. in Linnaea 20 : 309. 1847 ; P. Taylor in Hutch. & Dalz. Fl. W. Trop. Afr. ed. 2, 2 : 378. 1963 ; Babu, Herb. Fl. Dehra Dun 368. 1977. *Utricularia wallichiana* Wt. Ic. 4 : 9. t. 1572. f. 1. 1850 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 332. 1884.

Terrestrial herbs with rhizoids. Stolons branched with traps and leaves. Leaves alternate, linear oblanceolate. Traps globose, mouth basal. Scape usually twining on other herbs. Flowers yellow. Calyx lobes sub-equal ; upper sub acuminate ; lower lobe bifid trifid. Capsule compressed. Seeds ellipsoid.

PACHMARHI : Vicinity (1000 m). Boggy area near stream in sal forest. Occasional.

Fl. & Fr. : September - March.

5. *Utricularia striatula* J. E. Smith in Rees, Cyclop. 37. n. 17. 1817 ; P. Taylor in Kew Bull. 18 : 91. 1964 ; Babu, Herb. Fl. Dehra Dun 369. 1977. *Utricularia orbiculata* Wall. ex DC. Prodr. 8 : 18. 1844 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 334. 1884.

Epiphytic herbs. Leaves orbicular reniform. Traps on stolon, mouth lateral. Scape filiform, erect. Calyx lobes very unequal. Corolla pale blue, often with white and orange spots ; lower lip suborbicular, 5 lobed along the margin ; spur curved under the lower lip of corolla. Capsule nearly globose. Seeds ovoid, glochidiolate.

PACHMARHI : Mahadev hill (1250 m). On moist mossy barks and hill slopes, Occasional.

Fl. & Fr. : June - October.

6. *Utricularia uliginosa* Vahl, Enum. 1 : 203. 1804 ; Gandhi in Sald. & Nicol. Fl. Hassan 566. 1976. *Utricularia affinis* Wt. Ic. 4(4) : 11, t. 1580. f. 1. 1850 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 330. 1884.

Erect herbs. Leaves spathulate. Traps with basal mouth. Scapes simple or branched. Flowers 3 - 6 per scape. Calyx lobes subequal, minutely denticulate, longer than wide ; lower lobe shortly bifid. Corolla pale blue ; spur slightly deflexed. Capsule depressed globose. Seeds subglobose.

PACHMARHI : Vicinity (1000 m). Amongst grasses in slightly moist situation in sal forest. Common.

Fl. & Fr. : July - September.

70. GESNERIACEAE Dum.

- | | |
|---|---------------------------|
| 1a. Stigmas oblique, emarginate. Leaf one only. Stem absent | ... <i>Didymocarpus</i> 2 |
| 1b. Stigmas shortly bifid. Leaves two only. Stem present | ... <i>Chirita</i> 1 |

1. CHIRITA Buch. Ham.

Chirita bifolia D. Don, Prodr. 90. 1825 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 357. 1884 ; Babu, Herb. Fl. Dehra Dun 370. 1976.

Herbs ; stem 2-leaved at the top, leafless at the flowering time. Leaves sessile, orbicular-rounded, thinly villous. Inflorescence 1 - 3-flowered. Calyx deeply 5-fid, villous, petaloid in the upper part. Corolla purple blue with a yellowish base. Staminal filaments hairy at the top. Ovary and style pubescent. Stigma shortly bifid on maturity.

PACHMARHI : Dhupgarh (1250 m) ; Vicinity (1000 m). On hill slopes. Abundant.

Fl. & Fr. : July - September.

Himalayan herb.

2. DIDYMOCARPUS Wall.

Didymocarpus pygmaea Clarke in DC. Monogr. Phan. 5 : 82. 1885 et in Hook. f. Fl. Brit. Ind. 4 : 345. 1884.

Small, pubescent, stemless herbs. Leaf one only, sessile, falcate, obtuse at both ends, sinnuate. Sepals linear. Corolla tubular. Stamens : 2 fertile, 2 rudimentary. Ovary and style villous. Stigma oblique, emarginate. Capsule nearly straight, 2-valved. Seeds ellipsoid.

BORI : Reserve forest (1000 m). On hill slopes in rock crevices. Occasional.

Fl. & Fr. : August - October.

Himalayan herb.

71. BIGNONIACEAE Juss.

1a. Fertile stamens 3

... *Oroxylum* 2

1b. Fertile stamens 4 :

- 2a. Leaves bipinnate. Capsule strongly tuberculate. ... *Radermachera* 3
 2b. Leaves unipinnate. Capsules not tuberculate :
 3a. Leaflets distinctly serrate. Anthers pubescent ... *Tecoma* 4
 3b. Leaflets entire or minutely crenulate or toothed.
 Anthers glabrous ... *Dolichandrone* 1

1. DOLICHANDRONE (Fenzl) Seemann

Dolichandrone falcata Seem. in Journ. Bot. 8 : 381. 1870 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 380. 1884 ; Naik, Fl. Osman. 242. 1979.

Deciduous trees ; bark grey ; young parts densely white-tomentose. Leaves 1-pinnate ; rachis pubescent ; leaflets orbicular or obovate, emarginate or rounded with short acumen. Flowers white in terminal few-flowered racemes. Capsules flat, falcately curved, acute at apex.

BORI : Reserve forest (550 m). In mixed forest. Common.

Fl. & Fr. : April February.

2. OROXYLUM Vent.

Oroxylum indicum (L.) Vent. Dec. Gen. Nov. 8. 1808 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 378. 1884. *Bignonia indica* L. Sp. Pl. 625. 1753. "Ullu"/"arlu"/"saona".

Small trees ; branching at top ; bark light-brown, often with corky lenticels. Leaves very large, 2-3-pinnate ; pinnae opposite, leaflets 2-4 pairs, ovate or elliptic, acuminate. Flowers in erect racemes. Calyx oblong-campanulate, glabrous. Corolla purple, fleshy. Stamens 5, one shorter. Capsule 30-90 cm long. Seeds numerous, winged.

PACHMARHI : Vicinity (1000 m). In mixed forest. Occasional.

Fl. & Fr. : July February.

3. RADERMACHERA Zoll. & Mor.

Radermachera xylocarpa (Roxb.) K. Schum. in Engl. & Prantl, Pflanzenfam. 4(3b) : 243. 1895 ; Gandhi in Sald. & Nicol. Fl. Hassan 536.

1976. *Bignonia xylocarpa* Roxb. Fl. Ind. 3 : 108 1832. *Stereospermum xylocarpum* Wt. Ic. 4(2) : 8. t. 1335-36. 1848 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 383. 1884. "Paral"/"jaimangal".

Large deciduous trees. Leaves bipinnate ; pinnae 3 pairs. Inflorescence densely tomentose. Calyx campanulate, 1 cm long. Corolla white, 3 cm long, glabrous. Capsules up to 90 cm long, woody. Seeds winged.

BORI : Reserve forest (550 m). In mixed forest. Common.

Fl. & Fr. : April February.

4. TECOMA Juss.

Tecoma stans (L.) Kunth in H. B. K. Nov. Gen. Spec. 3 : 144. 1819 ; Gandhi in Sald. & Nicol. Fl. Hassan 537. 1976. *Bignonia stans* L. Sp. Pl. ed. 2. 871. 1763.

Small trees, glabrous. Leaves once pinnate ; leaflets 3 - 7, opposite, lanceolate, acuminate, acute and slightly unequal sided at base, serrate. Flowers bright-yellow, large, in terminal, few-flowered corymbose racemes often shorter than the leaves. Capsules 10 - 12 cm long, flat, brown, acute. Seeds thin, winged.

PACHMARHI : Vicinity (1000 m), Mahadev Hill (1200 m). In mixed forest. Occasional.

Fl. & Fr. : September - February.

72. PEDALIACEAE R. Br.

SESAMUM L.

Sesamum orientale (L.) Graham, Cat. Pl. Bomb. 126. 1839. *Sesamum orientale* L. Sp. Pl. 634. 1753 ; Babu, Herb. Fl. Dehra Dun 372. 1977. *Sesamum indicum* L. Sp. Pl. 634. 1753 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 387. 1884.

Erect, glandular pubescent, annual herbs. Upper leaves lanceolate, entire; lower ones often lobed, glabrous above, puberulous beneath. Flowers white, pink or pale purple, axillary, solitary, appears as false raceme at the end of branches. Capsules bluntly quadrangular, shortly beaked, pubescent. Seeds oblong, slightly compressed, glabrous, black or white.

BORI : Dhain (430 m). Along pathways as an escape from cultivation.

Fl. & Fr. : August October.

73. ACANTHACEAE Juss.

1a. Fertile stamens 4 :

- 2a. Anthers 1 -celled ... *Blepharis* 4
- 2b. Anthers 2 -celled :
 - 3a. Corolla without well developed upper lip ... *Strobilanthes* 21
 - 3b. Corolla with a well developed upper lip :
 - 4a. Corolla - segments contorted in bud :
 - 5a. Seeds without retinacula. Calyx entire or shallowly lobed. Capsule long - beaked ... *Thunbergia* 22
 - 5b. Seeds with retinacula. Calyx usually deeply lobed. Capsule not beaked :
 - 6a. Ovary cells 3 to 17 -ovuled. Cells of the capsule 3 or more - seeded :
 - 7a. Corolla distinctly 2 - lipped ... *Hygrophila* 11
 - 7b. Corolla not distinctly 2 - lipped, subequally 5 - lobed :
 - 8a. Capsule fusiform, not clavate, seminiferous throughout ... *Hemigraphis* 10
 - 8b. Capsule clavate with a sterile, solid, stalk - like base ... *Dipteracanthus* 7
 - 6b. Ovary cells 1 to 2 - ovuled. Cells of the capsule 1 to 2 - seeded. Valves of the capsule with 1 - 2 retinacula :
 - 9a. Anther cells basally spurred ... *Petalidium* 18
 - 9b. Anther cells not spurred :

- 10a. Leaves sessile, amplexicaule.
Flowers in dense spikes ... *Perilepta* 16
- 10b. Leaves petioled, not amp -
lexicaule. Flowers in clon -
gate spikes :
- 11a. Leaves usually 3-nerved.
Bracteoles present ... *Nilgirianthus* 15
- 11b. Leaves with 8 - 16 pairs
of nerves. Bracteoles
absent ... *Corvia* 5
- 4b. Corolla - segments imbricate in bud :
- 12a. Two anterior stamens exserted, the other
ones minute, often reduced to staminodes.
Corolla 4 - 10 cm long ... *Barleria* 3
- 12b. All stamens perfect, included. Corolla
less than 2 cm long ... *Lepidagathis* 13
- 1b. Fertile stamens 2 :
- 13a. Seeds without retinacula ... *Nelsonia* 14
- 13b. Seeds with retinacula :
- 14a. Anther cells not unequally placed :
- 15a. Flowers subtended by abortive branches ... *Haplanthodes* 9
- 15b. Flowers not subtended by abortive branches :
- 16a. Ovary - cells 2 - ovuled. Cells of cap -
sules 2 - seeded ... *Eranthemum* 8
- 16b. Ovary - cells 6 - 10 - ovuled. Cells of
the capsules 6 - 10 - seeded ... *Andrographis* 2
- 14b. Anther cells unequally placed :
- 17a. Anther cells without a basal spur :
- 18a. Bracts mucronate. Lateral walls of the
capsule - valves membranous, basally
separating from the placentae when the
capsule bursts, and form a wind ... *Dicliptera* 6
- 18b. Bracts (not) mucronate. Lateral walls
of the capsule - valves permanently
attached to the placentae throughout
their length ... *Peristrophe* 17
- 17b. Both or one of the anther - cells with a
basal spur :
- 19a. Inflorescence axillary ... *Adhatoda* 1
- 19b. Inflorescence terminal :
- 20a. Calyx - segments 4, if 5, then the
posterior one much smaller than
others, sometimes minute ... *Rostellularia* 19

20b. Calyx - segments 5, nearly equal :		
21a. Both cells of anthers with basal spurs, Bracts linear.	...	<i>Justicia</i> 12
21b. Only one cell of the anthers with a basal spur. Bracts broadly lanceolate to ovate	...	<i>Rungia</i> 20

1. ADHATODA Mill.

Adhatoda zeylanica Medic. Hist. & Commentat. Acad. Elect. Sci. Theod. Palat. 6 : 393. 1790 ; Ramam. in Sald. & Nicol. Fl. Hassan 540. 1976. *Justicia adhatoda* L. Sp. Pl. 15. 1753. *Adhatoda vasica* Nees in Wall. Pl. As. Bar. 3 : 103. 1832 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 540. 1885 ; Babu, Herb. Fl. Dehra Dun 376. 1977. "Arusha".

Shrubs or small trees. Leaves ovate lanceolate, acute acuminate, narrowed below. Bracts broadly elliptic, acute, pubescent ; bracteoles narrower. Flowers in axillary dense spikes shorter than the leaves. Calyx-lobes shorter than bracteoles, acute. Corolla white, hairy without. Capsules club shaped, subacute, shortly pointed, pubescent.

BORI : Reserve forest (550 m), 23 12 62, Panigrahi 6350 (BSA).- In mixed forest and clearings. Occasional.

Fl. & Fr. : August December.

New record for the area.

2. ANDROGRAPHIS Wall. ex Nees

Andrographis paniculata (Burm. f.) Wall. ex Nees in Wall. Pl. As. Rar. 3 : 116. 1832 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 501. 1884. *Justicia paniculata* Burm. f. Fl. Ind. 9. 1768. "Kiravat".

Erect annual herbs ; branches 4 angled. Leaves lanceolate, slightly undulate, narrowing towards base. Flowers solitary, whitish, spotted with

rose purple. Bracts opposite, lanceolate. Corolla 2 lipped. Anthers bearded at the base. Capsule linear oblong. Seeds yellowish brown.

PACHMARHI : Apsara Bihar (1000 m). On hill slopes and waste lands. Common.

Fl. & Fr. : October December.

3. BARLERIA L.

- | | |
|---|---------------------------|
| 1a. Plants armed. Flowers yellow | ... <i>B. prionitis</i> 2 |
| 1b. Plants unarmed. Flowers blue, purple or white | ... <i>B. cristata</i> 1 |

1. **Barleria cristata** L. Sp. Pl. 636. 1753 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 488. 1884 ; Babu, Herb. Fl. Dehra Dun 378. 1977.

Erect, perennial herbs. Stems 4-gonous, appressed hairy. Leaves elliptic oblong, acute or acuminate. Flowers purple in axillary and terminal short spikes. Capsules ellipsoid, acute at both ends, 4 seeded.

PACHMARHI : Vicinity (1000 m) ; Mahadev hill (1200 m).

BORI : Reserve forest (550 m). On forest edges and clearings. Common.

Fl. & Fr. : September December.

2. **Barleria prionitis** L. Sp. Pl. 636. 1753 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 482. 1884 ; Babu, Herb. Fl. Dehra Dun 379. 1977. "Jhanti" / "Katsareya".

Spinescent shrubs, branching from the base, glabrous. Leaves elliptic to oblong - elliptic, acute and bristle tipped. Flowers sessile, yellow, solitary, axillary passing into short terminal spikes. Capsules ovoid with a long, tapering, solid beak ; 5 seeded.

PACHMARHI : Vicinity (1000 m). In open forest and waste places. Occasional.

Fl. & Fr. : November January.

4. BLEPHARIS Juss.

Blepharis maderaspatensis (L.) Heyne ex Roth, Nov. Pl. Sp. 320. 1821; Babu, Herb. Fl. Dehra Dun 380. 1977. *Acanthus maderaspatensis* L. Sp. Pl. 639. 1753. *Blepharis boerhaviaefolia* Pers. Syn. Pl. 2 : 180. 1806; Clarke in Hook. f. Fl. Brit. Ind. 4 : 478. 1884.

Prostrate, perennial herbs. Leaves in whorls of 4, unequal, long petioled, ovate-elliptic to lanceolate, lower surface whitish. Flowers sessile, 1-4 together, apparently axillary, often combined into a leafy spike. Calyx segments 4, unequal, ciliate. Corolla white with a yellow spot on the throat. Stamens 4; anthers 1-celled. Capsule ellipsoid.

PACHMARHI : Dhupgarh (1250 m). BORI : Reserve forest (550 m). On hill slopes and cliffs. Common.

Fl. & Fr. : September November.

5. CARVIA Bremek.

Carvia callosa (Nees) Bremek. in Verh. Nederl. Akad. Wet. (II) 40 (1) : 187. 1944. *Strobilanthes callosus* Nees in Wall. Pl. As. Rar. 3 : 85. 1832; Clarke in Hook. f. Fl. Brit. Ind. 4 : 451. 1884. "Maruadana".

Large gregarious shrubs. Stems simple, 4-angular, white, tubercled. Leaves in unequal pairs, elliptic-lanceolate, acuminate, cuneate at the base, crenate. Flowers axillary in strobiliform spikes. Bracts ovate, rounded; bracteoles absent. Disk orange. Calyx divided nearly to the base. Corolla tube white; lobes purple. Capsule obovoid, 2-seeded.

PACHMARHI : Dhupgarh (1250 m). On hill slopes. Occasional.

Fl. & Fr. : September April.

6. DICLIPTERA Juss.

Dicliptera roxburghiana Nees in Wall. Pl. As. Rar. 3 : 111. 1832; Clarke in Hook. f. Fl. Brit. Ind. 4 : 553. 1885 [incl. var. *bupleuroides*]

(Nees) Clarke; Babu, Herb. Fl. Dehra Dun 380. 1977. *Dicliptera bupleuroides* Nees in Wall. Pl. As. Rar. 3 : III. 1832.

Perennial herbs with somewhat woody base. Leaves ovate, acuminate, subentire. Flowers in 2 to 4-flowered, axillary, flabelliform groups, often combined into a terminal spike. Bracts in unequal pairs, forming a flat involucre enclosing a cyme of 3 flowers. Calyx segments unequal, linear. Corolla purplish or rarely white. Capsule clavate, pubescent.

PACHMARHI : Vicinity (1000 m); Dhupgarh (1250 m). In forest undergrowth. Common.

Fl. & Fr. : All seasons.

7. DIPTERACANTHUS Nees *emend.* Bremek.

Dipteracanthus suffruticosus (Roxb.) Voigt. Hort. Suburb. Calc. 483. 1845. *Ruellia suffruticosa* Roxb. Fl. Ind. 3 : 53. 1832; Clarke in Hook. f. Fl. Brit. Ind. 4 : 413. 1884.

Undershrubs with tuberous rootstock. Leaves narrowly elliptic, acute or obtuse. Inflorescence few-flowered. Bracteoles petioled, leaf-like, elliptic, acute. Sepals linear. Corolla tube with cylindric base and swollen upper part, white. Capsule markedly clavate.

PACHMARHI : Vicinity (900 m), 25-7-64, *panigrahi* 4483 (BSA). On wayside. Occasional.

Fl. & Fr. : July November.

New record for the area.

8. ERANTHEMUM L. *emend.* Radik.

Eranthemum purpurascens Nees in Wall. Pl. As. Rar. 3 : 106. 1832; Babu, Herb. Fl. Dehra Dun 383. 1977. *Daedalacanthus purpurascens* (Nees) T. Anders. in Journ. Linn. Soc. Bot. 9 : 488. 1867; Clarke in Hook. f. Fl. Brit. Ind. 4 : 420. 1884.

Erect-ascending, perennial herbs with woody base. Leaves ovate-elliptic. Bracts ovate-lanceolate, acuminate. Bracteoles lanceolate, acute, ciliolate. Calyx lobes lanceolate. Corolla blue, lobes obvate. Style hairy. Capsule glabrous.

BORI : Dhain (462 m). On forest edges. Occasional.

Fl. & Fr. : September December.

9. HAPLANTHODES Kuntze

Haplanthodes verticillatus (Roxb.) Majumdar in Bull. Bot. Soc. Bengal 25 (1 & 2) : 76. 1971. *Justicia verticillata* Roxb. Fl. Ind. 1 : 135. 1832. *Haplanthus verticillatus* (Roxb.) Nees in DC. Prodr. 11 : 513. 1847 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 506. 1884. *Bremekamia verticillata* (Roxb.) Sreem. in Bull. Bot. Surv. India 6 : 323. 1965. "Kastula".

Erect, herbs. Leaves ovate, acuminate or acute, abruptly cuneate at the base. Flowers sessile, subtended by abortive branches. Calyx-segments lanceolate, pointed, glandular-pubescent. Corolla lilac with darker lines. Capsules narrowly oblong, acute, glabrous.

BORI : Reserve forest (550 m), Feb. 78, Pant 27262 (BSA). On hill slopes. Occasional.

Fl. & Fr. : December February.

New record for the area.

10 HEMIGRAPHIS Nees

Hemigraphis latibrosa (Heyne ex Roth) Nees var. *heyneana* Bremek. in Mat. Mon. Strob. 139. 1944. *Hemigraphis latibrosa* (Heyne ex Roth) Nees in DC. Prodr. 11 : 723. 1847 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 423. 1884 ; Ramam. in Sald. & Nicol. Fl. Hassan 549. 1976. *Ruellia latibrosa* Heyne ex Roth, Nov. Pl. Sp. 307. 1821.

Procumbent, pubescent herbs. Leaves ovate, shortly or broadly acuminate or acute. Bracts foliaceous. Flowers blue in axillary and terminal heads. Calyx lobes shorter, unequal, lanceolate. Corolla lobes rounded. Staminal filaments hairy. Capsule fusiform, 4-angled, pubescent.

BORI : Dhain (430 m). Along edges of mixed forest. Common.

Fl. & Fr. : October - January.

II. HYGROPHILA R. Br.

- | | |
|---|----------------------------|
| 1a. Plants armed. Calyx 4-segmented. Flowers in axillary whorls | <i>H. auriculata</i> 1 |
| 1b. Plants unarmed. Calyx 5-segmented. Flowers in terminal spikes : | |
| 2a. Leaves glabrous or puberulous. Fertile stamens 2 | ... <i>H. polysperma</i> 2 |
| 2b. Leaves hairy. Fertile stamens 4 | ... <i>H. serpyllum</i> 3 |

1. **Hygrophila auriculata** (Schum.) Holne in Kew Bull. 16(2) : 172. 1962 ; Babu, Herb. Fl. Dehra Dun 385. 1977. *Barleria auriculata* Schum. in Schum. & Thonn. Beskr. Guin. Pl. 285. 1827. *Barleria longifolia* L. Cent. Pl. 2 : 22. 1756 (*non Hygrophila longifolia* Nees 1841). *Asteracanthus longifolia* (L.) Nees in Wall. Pl. As. Rar. 3 : 90. 1832. *Hygrophila spinosa* T. Anders. in Thwaites, Enum. Pl. Zeyl. 225. 1860 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 408. 1884.

Erect herbs ; spines developed during developmental stage. Leaves sessile, oblong-lanceolate in verticels of 6 at a node, the two outer leaves large, the inner 4 much smaller. Flowers purple, whorled in axils of leaves, often 8 in 4 pairs of 2 each. Capsule linear-oblong, pointed, 4 - 8-seeded.

BORI : Reserve forest (1000 m). Along nala. Common.

Fl. & Fr. : September - February.

2. **Hygrophila polysperma** (Roxb.) T. Anders. in Journ. Linn. Soc. Bot. 9 : 456. 1867 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 406. 1884 ; Babu, Herb. Fl. Dehra Dun 385. 1977. *Justicia polysperma* Roxb. Fl. Ind. 1 : 119. 1832.

Prostrate or decumbent-ascending, slender, annual-perennial herbs. Leaves subsessile, elliptic-lanceolate to ovate, higher ones passing into

bracts. Flowers in dense spikes. Bracts leafy, ovate-lanceolate, hairy. Bracteoles linear, ciliate. Corolla white. Capsules hairy at the top.

BORI : Reserve forest (500 m). Feb. 78. Pant 27248 (BSA).

Near streams in moist places. Rare.

Fl. & Fr. : September - April.

New record for the area.

3. *Hygrophila serpyllum* (Nees) T. Anders. in Journ. Linn. Soc. 9 : 456. 1867 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 406. 1884. *Physichillus serpyllum* Nees in Hook. Comp. Bot. Mag. 2 : 511. 1837.

Small, procumbent herbs with woody rootstocks. Leaves elliptic or suborbicular, entire. Flowers in terminal dense or lax spikes. Bracts and bracteoles hairy. Calyx densely ciliate. Corolla white, 2-lipped. Capsules linear-oblong, pointed ; valves grooved at the back. Seeds orbicular, ovoid.

BORI : Reserve forest (550 m). In moist places in the forest. Common.

Fl. & Fr. : September - February.

12. JUSTICIA L.

Justicia betonica L. Sp. Pl. 15. 1753 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 525. 1885 ; Ramam. in Sald. & Nicol. Fl. Hassan 551. 1976. "Mokandar".

Erect or procumbent shrubs. Leaves ovate or ovate-elliptic. Flowers white in axillary and terminal spikes. Spikes short or long, with white, foliaceous, membranous, ovate-lanceolate, acuminate, veined, bracts and bracteoles. Calyx 5-lobed. Corolla white with pink patches ; nerves on corolla hairy. Staminal filament short hairy. Capsules subclavate, acute, with a flat solid base, glabrous.

PACHMARHI : Vicinity (1000 m). BORI : Reserve forest (550 m) ; Dhain (462 m). In waste lands in the forests. Common.

Fl. & Fr. : August - December.

13. LEPIDAGATHIS Willd.

1a. Seeds 2	...	<i>L. cristata</i> 1
1b. Seeds 4 :		
2a. Erect undershrub. Leaves entire	...	<i>L. cuspidata</i> 2
2b. Prostrate herbs. Leaves crenate or crenate - serrate ...		<i>L. fasciculata</i> 3

1. *Lepidagathis cristata* Willd. Sp. Pl. 3 : 400. 1801; Clarke in Hook. f. Fl. Brit. Ind. 4 : 516. 1885; Ramam. in Sald. & Nicol. Fl. Hassan 553, 1976.

Creeping herbs with stout rootstocks. Leaves linear oblong, glabrous. Spikes capitate, mostly on lower nodes. Bracts pubescent, white - margined, spinescent. Calyx lobes with a short spine at apex. Corolla white, hairy, middle lobe of lower lip larger and pinkish. Anther cells unequally placed.

BORI : Dhain (462 m). In forest undergrowth. Occasional.

Fl. & Fr. : All seasons.

2. *Lepidagathis cuspidata* Nees in Wall. Pl. As. Rar. 3 : 97. 1832; Clarke in Hook. f. Fl. Brit. Ind. 4 : 519. 1885; Babu, Herb. Fl. Dehra Dun 386. 1977.

Erect undershrubs. Leaves subsessile in unequal pairs, obovate spatulate, acuminate or acute, cuspidate with an acicular tip, glandular pubescent. Flowers in long spikes. Bracts ciliate. Bracteoles lanceolate, spine - tipped. Calyx segments unequal, lanceolate, gland ciliate, hairy on the back. Corolla white. Capsule glabrous.

BORI : Reserve forest (530 m), 26 12 62, Panigrahi 6531 (RSA). In forest undergrowth. Occasional.

Fl. & Fr. : December May.

New record for the area.

3. *Lepidagathis fasciculata* (Retz.) Nees in Wall. Pl. As. Rar. 3 : 95. 1832; Clarke in Hook. f. Fl. Brit. Ind. 4 : 522. 1885. *Ruellia fasciculata* Retz. Obs. 4 : 28. 1786.

Diffuse, villosus herbs. Leaves ovate or lanceolate, crenate - serrate, acuminate, obtuse and then acuminate decurrent at base. Flowers in soft heads in axillary or terminal leafy cymes. Bracts ovate, 3 - ribbed. Calyx lobes narrow, 1 nerved. Corolla white with purple spots. Anther cells separated. Capsule thin, pubescent.

PACHMARHI : Vicinity (900 m). BORI : Reserve forest (550 m) ; Dhain (462 m). Near the edges of forests. Common.

Fl. & Fr. : December May.

14. NELSONIA R. Br.

Nelsonia canescens (Lamk.) Spreng. Syst. Veg. 1 : 42. 1825 ; Babu, Herb. Fl. Dohra Dun 387. 1977. *Justicia canescens* Lamk. Encycl. 1 : 41. 1791. *Nelsonia campestris* R. Br. Prodr. 1 : 481. 1810 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 394. 1884.

Erect, villous, perennial herbs with tuberous roots. Lower caudate leaves long petioled, obovate elliptic ; higher ones sessile, elliptic ovate to obovate, entire. Flowers in axillary and terminal spikes. Bracts obovate, ciliate. Bracteoles a pair of tufted hairs. Calyx - segments unequal : the largest one 2 fid. Corolla purple. Capsule ovoid, acute.

BORI : Reserve forest (550 m). Along forest edges. Common.

Fl. & Fr. : February June.

15. NILGIRIANTHUS Bremek.

- | | | |
|---|-----|--------------------------|
| 1a. Plants less than 25 cm high. Leaves with 4 - 5 pairs of nerves, not prominent | ... | <i>N. campanulatus</i> 1 |
| 1b. Plants 50 - 90 cm high. Leaves with 6 - 8 pairs of raised nerves | ... | <i>N. heyneanus</i> 2 |

1. *Nilgirianthus campanulatus* (Wt.) Bremek. in Verh. Nederl. Acad. Wet. Nat. 40 (1) : 271. 1944. *Strobilanthes campanulatus* Wt. Jc. t. 1562. 1850. *Strobilanthes heyneanus* Nees var. *campanulatus* (Wt.) Clarke in Hook. f. Fl. Brit. Ind. 4 : 444. 1884.

Small shrubs, reaching up to 25 cm. Leaves small, ovate, subacute, obtuse or subcordate at base, softly villous, 4 × 2.5 cm, main nerves 4 - 5 pairs, not prominent. Spikes subglobose, solitary or a few together. Bracts obovate, deflexed. Corolla campanulate.

PACHMARHI : Vicinity (900 m). BORI : Reserve forest (550 m). Along forest pathways and hill slopes. Occasional.

Fl. & Fr. : July December.

2. **Nilgirianthus heyneanus** (Nees) Bremek. in Verh. Nederl. Akad. Wet. Nat. 40 (1) : 277. 1944 ; Ramam. in Said. & Nicol. Fl. Hassan 555. 1976. *Strobilanthes heyneanus* Nees in Wall. Pl. As. Rar. 3 : 85. 1832 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 443. 1884.

Gregarious shrubs up to 90 cm high. Leaves ovate, unequal below. Spikes subglobose. Bracts pink, orbicular, concave, glabrous. Bracteoles nil. Calyx lobes linear oblong, slightly emarginate. Corolla purple ; lobes acute. Stamens 4, included ; filaments pilose below.

BORI : Reserve forest (900 m). On hill slopes. Common.

Fl. & Fr. : July December.

16. PERILEPTA Bremek.

Perilepta auriculata (Nees) Bremek. in Verh. Kon. Ned. Ak. Wet. A'dam. Sect. 2. 41 : 194. 1944 ; Babu, Herb. Fl. Dehra Dun 388. 1977. *Strobilanthes auriculata* Nees in Wall. Pl. As. Rar. 3 : 69. t. 295. 1832 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 453. 1884. [incl. var. *edgeworthiana* (Nees) Clarke]. *Strobilanthes edgeworthiana* Nees in DC. Prodr. 11 : 190. 1847. *Perilepta edgeworthiana* (Nees) Bremek. Verh. Kon. Ned. Ak. Wet. A'dam. Sect. 2. 41 : 195. 1944.

Erect, suffruticose undershrubs with 4 gonous stems. Leaves elliptic oblong to ovate lanceolate, amplexicaule, acuminate, serrate, setose. Flowers in axillary and terminal dense spikes. Bracts obovate-cuneate, glandular pubescent. Bracteoles linear. Calyx segments subequal, lanceolate spathulate, obtuse, pubescent. Corolla bluish violet ; lobes retuse. Filaments hairy.

PACHMARHI : Vicinity (1000 m). In forest undergrowth. Common.

Fl. & Fr. : September December.

17. PERISTROPHE Nees

Peristrophe bicalyculata (Retz.) Nees in Wall. Pl. As. Rar. 3 : 113. 1832 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 554. 1885. *Dianthera bicalyculata* Retz. Syst. Vetensk. Handl. 36. 297. t. 9. 1775 et Obs. Bot. I : 10. 1779. "Atrilal".

Erect, pilose, annual perennial herbs. Leaves ovate lanceolate, acute or acuminate, subentire crenulate. Flowers crowded, 2-8 in an involucle of 2 bracts. Bracts unequal. Bracteoles linear lanceolate, ciliolate. Calyx - segments nearly equal, ciliate. Corolla purple, with a purple dotted throat. Capsule hairy, beaked.

BORI : Reserve forest (500 m). In forest undergrowth. Occasional.

Fl. & Fr. : September December.

18. PETALIDIUM Nees

Petalidium barlerioides (Roth) Nees in Wall. Pl. As. Rar. 3 : 82. 1832 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 416. 1884 ; Babu, Herb. Fl. Dehra Dun 389. 1977. *Ruellia barlerioides* Roth, Nov. Sp. Pl. 310. 1821.

Erect, perennial undershrubs. Leaves ovate lanceolate, rounded at base, acute or acuminate, crenate serrate. Flowers axillary, in pairs, forming leafy racemes. Bracts absent. Bracteoles leaf-like, ovate-lanceolate, acute, whitish, reticulately veined, densely hairy. Calyx - segments linear-lanceolate, hairy. Corolla white ; lobes obovate suborbicular, crenulate. Ovary hairy.

BORI : Reserve forest (550 m). In forest undergrowth. Common.

Fl. & Fr. : April June.

19. ROSTELLULARIA Reichb.

1a. Spikes cylindric. Bracts and bracteoles as long as or longer than calyx lobes :

- 2a. Leaves with raphides regularly arranged in the middle, transversely near the margins ... *R. neesii* 4
- 2b. Leaves with raphides concentrically transverse :
- 3a. Bracts and bracteoles linear ... *R. proenmbens* 5
- 3b. Bracts and bracteoles elliptic ovate :
- 4a. Leaves up to 2.5 cm long, main nerves about 6 pairs. Plants pale when dry ... *R. japonica* 2
- 4b. Leaves up to 5 cm long, main nerves about 4 pairs. Plants nearly black when dry. ... *R. latispica* 3
- 1b. Spikes linear. Bracts and bracteoles shorter than the calyx lobes :
- 5a. Bracts, bracteoles and calyx lobes obtuse at apex ... *R. quinqueangularis* var. *papooides* 6
- 5b. Bracts, bracteoles and calyx lobes acute at apex... *R. diffusa* 1

Rostellularia diffusa (Willd.) Nees in DC. Prodr. 11 : 372. 1847.
Justicia diffusa Willd. Sp. Pl. 1 : 87. 1789; Clarke in Hook. f. Fl. Brit. Ind. 4 : 538. 1885.

Slender herbs with more or less 4 angled and grooved stems. Leaves usually thin, ovate, obtuse or acute. Spikes slender with small pinkish or white flowers. Bracts, bracteoles and sepals membranous with green midrib. Capsules glabrous or hairy, oblong with a short solid base.

PACHMARHI : Vicinity (1000 m); Dhangarh (1200 m). BORI : Reserve forest (550 m). In forest undergrowth among the grasses.

Fl. & Fr. : July January.

2. **Rostellularia japonica** (Thunb.) Ellis in Bull. Bot. Surv. India 22 : 196. 1982. *Justicia japonica* Thunb. Fl. Jap. 20. 1784. *Jasticia simplex* D. Don, Prodr. Fl. Nep. 118. 1825 (*non Rostellularia simplex* Wt. 1850); Clarke in Hook. f. Fl. Brit. Ind. 4 : 539. 1885. *Rostellularia mollissima* Nees in Wall. Pl. As. Rat. 3 : 101. 1832. *Rostellularia mollissima* (Nees) Nees in DC. Prodr. 11 : 373. 1847; Babu, Herb. Fl. Dehra Dun 391. 1977.

Erect or prostrate annual herbs with 4 gonous, hairy stems. Leaves ovate lanceolate to elliptic, subentire crenulate. Flowers in densely villosus spikes. Bracts elliptic, oblanceolate. Bracteoles longer than the calyx. Corolla pale purple or lilac, with a purple spotted throat. Capsules ciliate at the top. Seeds 1 cm across.

PACHMARHI : Dhupgarh (1200 m). BORI : Dhain (450 m). In forest undergrowth among the grasses. Common.

Fl. & Fr. : September March.

3. **Rostellularia latispica** (Clarke) Bremek. in Verh. Nederl. Akad. Wet. Amst. Afd. Natuurk. Sect. 2, 45 (2) : 69. 1948. *Justicia latispica* (Cl.) Gamble, Fl. Pres. Madras 1000, 1924. *Justicia procumbens* L. var. *latispica* Clarke in Hook. f. Fl. Brit. Ind. 4 : 539. 1885.

Undershrubs, somewhat woody below, turning nearly black on drying, covered with scattered stiff strigose hairs. Leaves ovate or elliptic, up to 5 × 2.5 cm, main nerves about 4 pairs. Flowers in spikes, pale lilac, spotted white. Bracts and bracteoles elliptic ovate. Capsule papery, glabrous.

PACHMARHI : Vicinity (1000 m), Feb. '78, Pant 27089 (BSA).

In forest undergrowth. Rare.

Fl. & Fr. : September March.

New record for the area.

4. **Rostellularia neesii** (Ramam.) Comb. nov. *Justicia neesii* Ramam. in Sald. & Nicol. Fl. Hassan 551. 1976. *Justicia micrentha* Wall. ex Clarke in Hook. f. Fl. Brit. Ind. 4 : 536. 1885 (*non* Pohl ex Nees, 1847); *Rostellularia crinita* Nees in Wall. Pl. As. Rat. 3 : 101. 1832 (*non* *Justicia crinita* Thunb. 1784).

Erect herbs. Leaves elliptic rounded, with cystoliths transversely oriented towards margin. Flowers in spikes. Bracts and bracteoles similar to calyx lobes, with white bulbous based hairs along margins. Calyx 4 - lobed : lobes scarious along margin. Corolla pink. Capsules small, pubescent.

PACHMARHI : Vicinity (1000 m), Feb. '78, Pant 27101 (BSA).

In forest undergrowth amongst the grasses. Occasional.

Fl. & Fr. : February August.

5. **Rostellularia procumbens** (L.) Nees in Wall. Pl. As. Rat. 3 : 101. 1832 ; Sch. in Bull. Bot. Surv. India 2 : 5. 1960. *Justicia procumbens* L. Sp. Pl. 1 : 15. 1753 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 539. 1885 ; Naik, Fl. Osman. 255. 1979.

Procumbent annual herbs. Stems rooting at lower nodes. Leaves narrow to broadly elliptic, acute at both ends. Flowers pink in dense cylindric spikes. Capsules oblong, pointed, pubescent at the tip.

PACHMARHI : Vicinity (1000 m). BORI : Dhain (462 m). In moist places as forest undergrowth. Common.

Fl. & Fr. : August December.

6. Rostellularia quinqueangularis (Koen. ex Roxb.) Nees in DC. Prodr. 11 : 375. 1847.

var. **peploides** (Nees) Babu, Herb. Fl. Dehra Dun 392. 1977. *Rostellularia peploides* Nees in Wall. Pl. As. Rar. 3 : 101. 1832. *Rostellularia peploides* (Nees) Nees in DC. Prodr. 11 : 375. 1847. *Justicia quinqueangularis* Koen. ex Roxb. var. *peploides* (Nees) Clarke in Hook. f. Fl. Brit. Ind. 4 : 537. 1885.

Erect, prostrate, annual herbs. Leaves long petioled, ovate lanceolate to oblong, narrowed to the base, subobtuse, glabrous. Flowers in interrupted spikes. Bracts and bracteoles oblong, obtuse. Corolla purple with a purple streaked throat. Capsule acute, glabrous.

BORI : Reserve forest (500 m), 26 12 62, Panigrahi 6530 (BSA).

In forest undergrowth amongst the grasses. Occasional.

Fl. & Fr. : July December.

New record for the area.

20. RUNGIA Nees

- | | |
|---|---------------------------|
| 1a. Sterile and fertile bracts similar | ... <i>R. repens</i> 2 |
| 1b. Sterile and fertile bracts dissimilar | ... <i>R. pectinata</i> 1 |

1. Rungia pectinata (L.) Nees in DC. Prodr. 11 : 469. 1847 ; Babu, Herb. Fl. Dehra Dun 392. 1977. *Justicia pectinata* L. in Torner, Cent. II. Pl. 3. 1756. *Rungia parviflora* var. *pectinata* (L.) Clarke in Hook. f. Fl. Brit. Ind. 4 : 550. 1885.

Usually much branched, prostrate or decumbent herbs. Leaves subsessile, ovate elliptic. Spikes short, mostly axillary. Fertile bracts

ovate, very much hyaline margined, hairy on back and margins ; barren ones reduced in size, not hyaline margined. Calyx lobes linear lanceolate, acuminate. Corolla purple, hairy. Capsule glabrous.

PACHMARHI : Vicinity (1000 m). BORI : Reserve forest (500 m). In forest undergrowth and waste places. Common.

Fl. & Fr. : November - May.

2. *Rungia repens* (L.) Nees in Wall. Pl. As. Rar. 3 : 110. 1832 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 549. 1885 ; Ramam. in Sald. & Nicol. Fl. Hassan 559. 1976. *Justicia repens* L. Sp. Pl. 15. 1753. "Khamor".

Erect or decumbent herbs, often rooting at nodes near the base. Leaves shortly petioled, elliptic lanceolate, acute. Flowers blue or pale purple in erect, terminal spikes. Bracts orbicular, apiculate ; margin hyaline. Calyx lobes 5, linear. Capsules ovoid oblong, acute, compressed, pubescent.

BORI : Reserve forest (500 m). In forest undergrowth. Common.

Fl. & Fr. : September January.

21. STROBILANTHES Blume

Strobilanthes walkeri Arn. ex Nees in Hook. Comp. Bot. Mag. 2 : 312. 1836 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 440. 1884.

Nearly glabrous, gregarious shrubs. Leaves broadly elliptic acuminate at apex and base, crenate ; nerves 7-8 pairs. Flowers in ovoid, few flowered cymose spikes, sometimes compound. Bracts leaf-like. Bracteoles sublinear. Sepals linear-lanceolate, obtuse, nearly glabrous. Corolla subsymmetric, glabrous without, hairy within, white or purplish. Capsules ellipsoid.

PACHMARHI : Vicinity (1000 m). In forest along pathways. Occasional.

Fl. & Fr. : October - December.

Flowers after every six years.

22. THUNBERGIA Retz.

Thunbergia alata Bojer ex Sims, Bot. Mag. t. 2591. 1825; Clarke in Hook. f. Fl. Brit. Ind. 4 : 391. 1884; Ramam. in Sald. & Nicol. Fl. Hassan 560. 1976.

Climbing undershrubs. Leaves ovate, sagittate; petioles winged. Flowers solitary, long pedicellate. Bracteoles broadly ovate. Calyx 10 fid; lobes linear. Corolla bright yellow with a dark center. Anther cells 2, slightly unequally placed, spurred below, glandular hairy. Capsules pubescent; beak splitting into 2.

PACHMARHI: Vicinity (1000 m), Aug. '49, Narayanaswami s. n. (CAL). Along the roads and in waste places. Rare.

Fl. & Fr.: September - December.

74. VERBENACEAE J. St. Hil.

- 1a. Corolla - lobes 4 - 8, conorted. Stamens 2. Ovary 2 - celled ... *Nyctanthes* 7
- 1b. Corolla - lobes 4 - 5, imbricate. Stamens 4 or 5 - 6. Ovary 2 - 4 - celled :
 - 2a. Inflorescence spike, raceme or narrow panicles :
 - 3a. Flowers sessile ... *Lantana* 6
 - 3b. Flowers pedicelled :
 - 4a. Stamens 4. Ovary 4 - carpelled :
 - 5a. Inflorescence racemose, centripetal ... *Duranta* 3
 - 5b. Inflorescence cymose, centrifugal ... *Gmelina* 4
 - 4b. Stamens 5. Ovary 2 - carpelled ... *Citharexylum* 1
 - 2b. Inflorescence compound with partial inflorescence cymose :
 - 6a. Trees. Flowers regular or nearly so. Stamens 5 - 6 ... *Tectona* 9
 - 6b. Shrubs. Flowers actinomorphic or zygomorphic; 4 or 5 merous :
 - 7a. Flowers actinomorphic, 4 - merous ... *Premna* 8
 - 7b. Flowers zygomorphic, 5 - merous :
 - 8a. Leaves digitate ... *Vitex* 10
 - 8b. Leaves simple :

9. Corolla - tube slender. Drupe exserted ... *Clerodendrum* 2
 9b. Corolla - tube widened upwards. Drupe included within large showy calyx ... *Holmskioldia* 5

1. CITHAREXYLUM Mill.

Citharexylum subserotinum Sw. Prodr. Veg. Ind. Occ. 91. 1768; Haines, Fl. Bihar & Orissa, 708. 1922.

Small trees, glabrous. Leaves ovate elliptic or obovate, shining above, remotely shallowly serrate towards the apex, petioled. Flowers in long, drooping racemes, white, fragrant. Calyx shortly 5 lobed. Corolla 5 fid. Drupe succulent.

PACHMARHI : Vicinity (1000 m), 28 7 64, *Panigrahi* 4599 (BSA). In sal forest, Rare.

Fl. & Fr. : July October.

New record for the area.

2. CLERODENDRUM L.

- 1a. Leaves cordate, tomentose abaxially. Calyx divided to the base, red ... *C. viscosum* 2
 1b. Leaves neither cordate nor tomentose. Calyx truncate, green ... *C. serratum* 1

1. *Clerodendrum serratum* (L.) Moon. Cat. 46. no. 382. 1824; Clarke in Hook. f. Fl. Brit. Ind. 4 : 592. 1885; Babu, Herb. Fl. Dehra Dun 398. 1977. *Volkameria serrata* L. Mant. Pl. 1 : 90. 1767. "Barangi".

Erect, perennial undershrubs. Leaves sessile, usually in whorls of 3, oblong elliptic or obovate, glabrous. Flowers in axillary cymes, forming a terminal panicle. Calyx minutely truncate, glandular within. Corolla violet. Drupe purple.

BORI : Reserve forest (500 m). In mixed forest. Common.

Fl. & Fr. : August December.

2. *Clerodendrum viscosum* Vent. Jard. Malm. 1 : t. 25. 1803 ; Babu, Herb. Fl. Dehra Dun 398. 1977. *Clerodendrum infortunatum* (auct. pl. non L. 1753) ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 594. 1885. "Rhant".

Erect, perennial herbs. Stems 4 - angular. Leaves ovate with a cordate base, acute or acuminate, crenate dentate, tomentose beneath. Flowers in cymes combined into a terminal panicle. Bracts foliaceous, caducous. Calyx pubescent ; segments ovate-lanceolate. Corolla white ; segments obovate oblong. Ovary glabrous. Fruiting calyx bright red.

BORI : Reserve forest (550 m). In forest undergrowth. Common.

Fl. & Fr. : March - June.

3. DURANTA L.

Duranta repens L. Sp. Pl. 637. 1753 ; Gandhi in Sald. & Nicol. Fl. Hassan 488. 1976.

Pubescent, straggling shrubs ; branches terete. Leaves elliptic - ovate, acute, crenate, chartaceous. Inflorescence racemose. Flowers subirregular, pedicelled. Fleshy calyx orange or yellow. Corolla violet, occasionally white, pubescent. Drupe enclosed in fleshy calyx with four 2 - seeded pyrenes.

PACHMARHI : Vicinity (1000 m), Mahadev hill (1200 m).

On forest margins and roadsides. Common.

Fl. & Fr. : All seasons.

4. GMELINA L.

Gmelina arborea Roxb. Pl. Cor. 3 ; 42. t. 246. 1815 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 581. 1885 : Gandhi in Sald. & Nicol. Fl. Hassan 489. 1976. "Kumber".

Unarmed, deciduous trees. Leaves entire, ovate, acuminate, subcordate, chartaceous. Flowers in paniculate cymes, irregular. Calyx lobes 5. Corolla brownish yellow, pubescent. Drupe turning yellow when ripe.

PACHMARHI : Vicinity (1000 m). BORI : Reserve forest (550 m).

In mixed deciduous forest. Common.

Fl. & Fr. : January April.

5. HOLMSKIOLDIA Retz.

Holmskioldia sanguinea Retz. Obs. Bot. 6 : 31. 1791 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 596. 1885 ; Naik, Fl. Osman. 265. 1979. "Kapni".

Straggling evergreen shrubs with drooping, angular branches. Leaves ovate, crenate - serrate or subentire, acuminate. Flowers dark - red in panicled cymes at the end of branches. Drupes included in the enlarged calyx.

PACHMARHI : Vicinity (1000 m), Feb. '78, Pant 27132 (BSA).

In the forest. Rare.

Fl. & Fr. : November March.

New record for the area.

6. LANTANA L.

Lantana camara L. Sp. Pl. 627. 1753 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 562. 1885 ; Babu, Herb. Fl. Dehra Dun 399. 1977. *Lantana aculeata* L. Sp. Pl. 627. 1753, *Lantana camara* L. var. *aculeata* (L.) Moldenke Torreya 34 : 9. 1934. "Ralmuniya".

Straggling shrubs with recurved prickles on branches and stems, pubescent. Leaves ovate to oblong - ovate, crenate - dentate. Flowers

orange red, turning scarlet, in corymbose heads, flat topped, on stout axillary peduncles. Drupes globose, shining black when ripe, with 2 bony nutlets.

PACHMARHI : Vicinity (1000 m). BORI : Reserve forest (550 m). Near forest margins and roadsides. Common.

Fl. & Fr. : All seasons.

7. NYCTANTHES L.

Nyctanthes arbor tristis L. Sp. Pl. 6. 1753 ; Clarke in Hook. f. Fl. Brit. Ind. 3 : 603. 1882 ; Naik, Fl. Osman. 259. 1979. "Harsinghar".

Large shrubs or small trees, covered with stiff, whitish hairs ; branches 4 angular, hairy. Leaves opposite decussate, ovate, acute or often shortly acuminate. Flowers fragrant, white with orange red corolla tube, sessile, fascicled in axillary and terminal panicled cymes. Capsules nearly orbicular, compressed, 2 - celled ; cells 1 - seeded.

PACHMARHI : Vicinity (1000 m). In sal forest. Occasional.

Fl. & Fr. : September December.

8. PREMNA L.

1a. Large shrub or small tree. Leaves petiolate, somewhat ovate ... *P. barbara* 1

1b. Small, almost stemless undershrub. Leaves almost sessile, obovate ... *P. herbacea* 2

1. *Premna barbara* Wall. ex Schauer in DC. Prodr. 11 : 636. 1847 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 579. 1885 ; Jafri & Ghaffoor in Fl. W. Pak. 77 : 22. 1974.

Erect, deciduous shrubs. Leaves ovate, acuminate with 4 - 6 pairs of lateral nerves. Flowers in terminal, trichotomous, villous, short panicles.

Bracts small; linear, deciduous. Calyx subequally 4-toothed. Corolla greenish, sub-bilabiate, 4-toothed. Drupe globose or somewhat obovoid.

PACHMARHI : Vicinity (1000 m). In forest undergrowth. Common.

Fl. & Fr. : April - July.

2. *Prema herbacea* Roxb. Fl. Ind. 3 : 80. 1832 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 581. 1885 ; Babu, Fl. Dehra Dun 400. 1977. *Pygmaeoprema herbacea* (Roxb.) Moldenke in Phytologia 2 : 54. 1941. "Bharangi".

Almost stemless undershrubs with underground runners which gives annual flowering shoots. Leaves obovate, coarsely serrate-dentate, sessile, in 2 - 3 close pairs forming a rosette. Cymes terminal, trichotomous, not exceeding the leaves. Flowers greenish-yellow. Calyx cup-shaped, subequally 5-toothed. Corolla obscurely 2-lipped, 4-toothed. Drupe globose, black.

PACHMARHI : Vicinity (1000 m). In sal forest under shaded and moist places. Common.

Fl. & Fr. : April - June.

9. TECTONA L. f.

Tectona grandis L. f. Suppl. 151. 1781 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 570. 1885 ; Gandhi in Said. & Nicol Fl. Hassan 493. 1976. "Sagwan".

Large deciduous trees ; branches 4-angular, densely clothed with tomentum. Leaves elliptic or obovate, acute or acuminate, adaxial surface glabrous, abaxial tomentose. Flowers white, shortly pedicellate in large, terminal, tomentose, cymose panicles. Fruits subglobose, somewhat 4-toothed.

BORI : Reserve forest (550 m) ; Dhain (460 m). In the forest specially on the hill slopes. Common.

Fl. & Fr. : July - December.

Dominant and commercially the most important species of Bori area.

10. VITEX L.

Vitex negundo L. Sp. Pl. 638. 1753 ; Clarke in Hook. f. Fl. Brit. Ind. 4 : 583. 1885 (excl. var.) ; Gandhi in Sald. & Nicol. Fl. Hassan 494. 1976. "Sambhalu".

Shrubs or small trees ; branches 4-angular, densely covered with ash-grey tomentum. Leaves 3 to 5-foliolate ; leaflets lanceolate. Flowers pale bluish purple, in large axillary or terminal panicles. Drupes globose, black. Seeds 4, obovate-oblong.

PACHMARHI : Vicinity (1000 m). Along roadsides and near the streams. Common.

Fl. & Fr. : January - July.

75. LAMIACEAE Lindl.

1a. Stamens declinate :

2a. Lower lip of corolla 1-lobed. Stamens usually exserted. Basal scar of outlets not oblique :

3a. Lower lip of corolla flat ... *Orthosiphon* 11

3b. Lower lip of corolla concave :

4a. Corolla distinctly 2-lipped. Lower lip longer than the upper :

5a. Upper lip of calyx rounded, deflexed or the calyx subequally 5-toothed ... *Plectranthus* 12

5b. Upper lip of calyx beaked or truncate or calyx 1-lipped ; the upper lip absent. ...

Anisochilus

4b. Corolla 5-lobed, the lowest lobe shorter than or equaling the other lobes ...

Hyptis 4

2b. Lower lip of corolla 3-fid. Stamens included. Basal scar of outlets oblique ...

Lavandula 6

1b. Stamens straight or descending :

6a. Anthers 1 or 2-celled, not separated, perfect stamens 2 or 4 :

7a. Stamens subequal, not didynamous :

8a. Calyx 5-toothed ; teeth neither feathery nor longer than the tube ...

Pogostemon 13

8b. Calyx 5-partite, segments feathery, longer than the tube	...	<i>Colebrookea</i> 3
7b. Stamens didynamous	...	<i>Micromeria</i> 9
6b. Anthers 2-celled, cells at length diverging. Perfect stamens 4 :		
9a. Calyx 15-nerved	...	<i>Nepeta</i> 10
9b. Calyx 5 - 10-nerved :		
10a. Upper lip of corolla flat, not hooded.	...	<i>Anisomeles</i> 2
10b. Upper lip of corolla hooded :		
11a. Anther-cells hairy	...	<i>Lamium</i> 5
11b. Anther-cells glabrous :		
12a. Upper lip of corolla shorter than the lower	...	<i>Leucas</i> 8
12b. Upper lips of corolla longer than the lower	...	<i>Leonotis</i> 7

1. ANISOCHILUS Wall.

1a. Calyx glabrous or pubescent with minute hairs	...	<i>A. carnosus</i> 1
1b. Calyx villous with long white hairs	...	<i>A. eriocephalus</i> 2

1. *Anisochilus carnosus* (L. f.) Wall. Pl. As. Rar. 2 : 18. 1831 ; Hook. f. Fl. Brit. Ind. 4 : 627. 1885 ; Babu, Herb. Fl. Dehra Dun 405. 1977. *Lavandula carnosa* L. f. Suppl. 273. 1781.

Perennial herbs, becoming fleshy with age. Leaves ovate, cordate, serrate, pubescent, membranous. Flowers in strobiloid heads. Upper lip of fruiting calyx conspicuous, depressed, closing the mouth. Corolla purple. Nutlets suborbicular, smooth, brown.

BORI : Dhain (430 m). In forest undergrowth and wayside. Common.

Fl. & Fr. : October - January.

2. *Anisochilus eriocephalus* Benth. in DC. Prodr. 12 : 81. 1848 ; Hook. f. Fl. Brit. Ind. 4 : 627. 1885 ; Mukherjee in Rec. Bot. Surv. India 14(1) : 58. 1940.

Slender annual herbs. Leaves thick, orbicular-ovate, obtuse, cordate, crenate. Spikes compact, cylindric. Upper lip of fruiting calyx deflexed, closing the mouth. Corolla pale lilac.

PACHMARHI : Vicinity (1000 m). In the forest under shades. Common.

Fl. & Fr. : October - January.

2. ANISOMELES R. Br.

Anisomeles indica (L.) O. Kuntze, Rev. Gen. Pl. 2 : 512. 1881 ; Babu, Herb. Fl. Dehra Dun 406. 1977. *Nepeta indica* L. Sp. Pl. 571. 1753. *Anisomeles ovata* R. Br. in Ait. Hort. Kew (ed. 2) 2 : 364. 1811 ; Hook. f. Fl. Brit. Ind. 4 : 672. 1885.

Erect, annual-perennial herbs ; branches quadrangular, densely grey-tomentose. Leaves ovate, acute, crenate-serrate. Flowers pink or pale-purple, sessile or shortly pedicellate, in dense axillary whorls which are distant below but approximate above to form a dense spicate inflorescence. Nutlets broadly ovoid with rounded ends, smooth, black.

PACHMARHI : Vicinity (1000 m) ; Mahadev hill (1200 m). In waste lands and forest undergrowth. Common.

Fl. & Fr. : August - January.

3. COLEBROOKEA J. E. Smith

Colebrookea oppositifolia J. E. Smith, Exct. Bot. 2 : Ill. t. 115. 1805 (as 'Colebrookia') ; Hook. f. Fl. Brit. Ind. 4 : 642. 1885 ; Babu, Herb. Fl. Dehra Dun 407. 1977. "Binda".

Erect, aromatic, tomentose, shrubs. Leaves opposite or in whorls of 3, elliptic-lanceolate. Flowers in dense verticillasters, combined into spiciform panicles. Calyx densely tomentose. Corolla white. Nutlets hairy at the top.

BORI : Reserve forest (550 m). Under teak forest. Common.

Fl. & Fr. : December - April.

4. HYPTIS Jacq.

Hyptis suaveolens (L.) Poit. in Ann. Mus. Natl. Hist. Nat. 7 : 472. t. 29. f. 2. 1806 ; Hook. f. Fl. Brit. Ind. 4 : 630. 1885 ; Babu, Herb. Fl. Dehra Dun 409. 1977. *Ballostia suaveolens* L. Syst. Nat. ed. 10. 1100. 1759. "Wilayati tulsi".

Erect, woody, glandular-tomentose, sweet-scented herbs. Leaves ovate or the lower ones ovate-cordate. Flowers blue, sessile, 2-4 in peduncled cymes in upper leaf axils. Nutlets oblong, rugose, glabrous, brown.

PACHMARHI : Vicinity (1000 m) ; Dhupgash (1250 m). In forest undergrowth. Common.

Fl. & Fr. : September December.

5. LAMIUM L.

Lamium amplexicaule L. Sp. Pl. 579. 1753 ; Hook. f. Fl. Brit. Ind. 4 : 679. 1885 ; Mukherjee in Rec. Bot. Surv. India 14 (1) : 161. 1940.

Slender, decumbent herbs. Leaves long petioled below, subsessile or sessile above, orbicular, inciso-crenate, lower almost lobulate, base rounded or cordate, glabrous. Flowers in distant axillary whorls. Calyx villous, converging in fruit. Corolla purple. Nutlets brown with very prominent scaly marks all over.

PACHMARHI : Vicinity (1000 m), Feb. '78, Pant 27180 (BSA).

Along roadsides. Rare.

Fl. & Fr. : December - March.

A temperate plant. New record for the area.

6. LAVANDULA L.

Lavandula bipinnata (Roth) Kuntze, Rev. Gen. 521. 1891. *Bystero-pogon bipinnatus* Roth, Nov. Sp. 253. 1821. *Lavandula burmannii* Benth. Lab. Gen. et. Sp. 151. 1833 ; Hook. f. Fl. Brit. Ind. 4 : 631. 1885.

Erect herbs. Leaves sessile or nearly so, deeply divided into linear segments ; segments entire, cut or toothed, obtuse or subacute, pubescent on both surfaces. Flowers white with blue tinge, in terminal simple or branched spikes. Bracts broadly ovate. Nutlets oblong - ellipsoid, smooth, black with a large white oblong areole on the dorsal side.

BORI : Reserve forest (900 m). On hill slopes. Common.

Fl. & Fr. : September - January.

7. LEONOTIS R. Br.

Leonotis nepetifolia (L.) R. Br. Prodr. 504. 1810 ; Hook. f. Fl. Brit. Ind. 4 : 691. 1885 ; Babu, Herb. Fl. Dehra Dun 410. 1977 ('*nepetaefolia*'). *Phlomis nepetifolia* L. Sp. Pl. 586. 1753 ('*nepetaefolia*') . "Hejurche".

Glabrous undershrubs. Leaves ovate - lanceolate, membranous. Verticillasters in dense spikes. Bracts spine - tipped. Calyx prominently ribbed, hairy ; tube hairy, bent above the middle ; teeth 8, spinescent, unequal, posterior tooth longest. Corolla orange - brown. Nutlets obliquely truncate.

BORI : Reserve forest (550 m), 23 12 62, Panigrahi 6384 (BSA).

In forest undergrowth. Occasional.

Fl. & Fr. : September - December.

New record for the area.

8. LEUCAS R. Br.

1a. Calyx mouth oblique :

- 2a. Bracts imbricating and forming an involucre, covering the floral heads ... *L. cephalotes* 1
- 2b. Bracts neither imbricating nor forming an involucre ... *L. martinicensis* 3

1b. Calyx mouth not oblique :

- 3a. Leaf margin entire :

4a. Calyx - teeth 2.5 mm long ; the upper teeth much longer ...	<i>L. stricta</i> 6
4b. Calyx - teeth 1 mm long ; almost subequal ...	<i>L. zeylanica</i> 7
3b. Leaf margin crenate or serrate :	
5a. Hairs on stem and branches erect or spreading ...	<i>L. lanata</i> 3
5b. Hairs on stem and branches reflexed :	
6a. Leaves obtuse, rounded at the base. Petiole very short ...	<i>L. montana</i> 5
6b. Leaves acute, cuneate at the base. Petiole up to 2.5 cm long ...	<i>L. mollissima</i> 4

1. *Leucas cephalotes* (Roth) Spreng. Syst. 2 : 743. 1825 ; Hook. f. Fl. Brit. Ind. 4 : 689. 1885 ; Babu, Herb. Fl. Dehra Dun 410. 1977. *Phlomis cephalotes* Roth, Nov. Pl. 262. 1821. "Dhurpi sag".

Erect annual herbs. Leaves broadly lanceolate, subacute, membranous, crenate - serrate. Flowers in dense, globose, verticillasters. Bracts involucrate, lanceolate. Calyx 10 - dentate, mouth oblique. Corolla white. Nutlets oblong, 3-gonous, smooth.

PACHMARHI : Vicinity (1000 m). In forest clearings. Common.

Fl. & Fr. : August - November.

2. *Leucas lanata* Benth. in Wall. Pl. As. Rar. 1 : 61. 1830 ; Hook. f. Fl. Brit. Ind. 4 : 681. 1885 ; Babu, Herb. Fl. Dehra Dun 411. 1977.

Erect, woolly, perennial herbs. Leaves ovate, obtuse or acute with rounded or cuneate base, crenate or subserrate, softly tomentose. Flowers in many flowered verticillasters. Bracts setaceous. Calyx teeth triangular-subulate. Corolla white. Nutlets oblong - obovoid, obliquely truncate at apex.

PACHMARHI : Vicinity (1000 m) ; Mahadev hills (1200 m) ; Dhupgarh (1250 m). In forest undergrowth and waste lands. Common.

Fl. & Fr. : November - March.

3. *Leucas martinicensis* (N. Jacq.) R. Br. Prodr. 504. 1810 ; Hook. f. Fl. Brit. Ind. 4 : 688. 1885 ; Gandhi in Sald. & Nicol. Fl. Hassan 504. 1976. *Clinopodium martinicensis* N. Jacq. Amer. Hist. 173. 1763.

Stout herbs. Leaves ovate or ovate lanceolate, broadly crenate - serrate, obtuse or broadly acuminate. Flowers white in dense or occasionally few - flowered axillary clusters. Nutlets oblong.

BORI : Reserve forest (550 m), 22° 12' 62", Panigrahi 6308 (BSA).

In forest undergrowth. Occasional.

Fl. & Fr. : October - March.

New record for the area.

4. *Leucas mollissima* Wall. ex Benth. in Wall. Pl. As. Rar. 1 : 62. 1830 ; Hook. f. Fl. Brit. Ind. 4 : 682. 1885 ; Gandhi in Sald. & Nicol. Fl. Hassan 504. 1976.

Tomentose stragglers. Leaves long petioled, ovate, truncate at base, coarsely serrate ; verticillasters axillary, with 2-5 subsessile flowers on each side. Calyx teeth 10, nearly equal ; mouth even ; throat glabrous. Upper lip equaling lower lip.

PACHMARHI : Vicinity (1000 m). BORI : Reserve forest (500 m).

In forest clearings and on the edges of forest. Common.

Fl. & Fr. : July December.

5. *Leucas montana* (Roth) Spreng. Syst. 2 : 742. 1825 ; Hook. f. Fl. Brit. Ind. 4 : 682. 1885. *Phlomis montana* Roth, Nov. Sp. 263. 1821.

Small woolly shrubs with straggling branches. Leaves oval, obtuse, rounded at base, crenate. Verticillasters few many flowered, axillary. Bracts minute, linear, villous. Calyx subsessile ; teeth minute, triangular, alternately shorter. Corolla white, tube annulate within.

BORI : Reserve forest (550 m). In forest undergrowth. Common.

Fl. & Fr. : December - May.

6. *Leucas stricta* Heyne ex Benth. in Wall. Pl. As. Rar. 1 : 61. 1830 ; Hook. f. Fl. Brit. Ind. 4 : 688. 1885.

Erect herbs. Leaves linear oblong or oblong lanceolate, entire. Upper calyx teeth much longer. Flowers white, subsessile in solitary terminal whorls. Nutlets oblong.

PACHMARHI : Vicinity (1000 m). Along roadside and edges of forest. Common.

Fl. & Fr. : July November.

7. *Leucas zeylanica* (L.) R. Br. Prodr. 504. 1810 ; Hook. f. Fl. Brit. Ind. 4 : 689. 1885. *Phlomis zeylanica* L. Sp. Pl. 820. 1753.

Erect annual herbs. Leaves opposite, decussate, ovate lanceolate or lanceolate, acute, entire. Flowers sessile or subsessile in terminal verticil-

lasters. Calyx - teeth almost subequal, spinescent at the tip. Corolla white, middle lobe large, lateral ones small; upper lip obovate, white - woolly. Nutlets obovoid-oblong, dark brown or black.

PACHMARHI : Dhupgarh (1250 m), Saxena 1048 (SFR). In forest undergrowth. Rare.

Fl. & Fr. : October December.

9. MICROMERIA Benth.

Microseria biflora (Buch Ham. ex D. Don) Benth. Lab. Gen. Sp. 378. 1834; Hook. f. Fl. Brit. Ind. 4 : 650. 1885; Babu, Herb. Fl. Dehra Dun 413. 1977. *Thymus biflorus* Buch Ham. ex D. Don, Prodr. 112. 1825.

Erect ascending, aromatic, tufted, perennial herbs. Leaves subsessile, ovate-lanceolate, base rounded subcordate, subacute, glabrous. Calyx 13-ribbed; teeth subulate. Corolla pinkish. Stamens exerted. Nutlets reddish brown, glabrous.

PACHMARHI ; Vicinity (1000 m); Dhupgarh (1250 m); Mahadev hill (1200 m). In forest undergrowth. Common.

Fl. & Fr. : October March.

10. NEPETA L.

Nepeta hindostana (Roth) Haines, Bot. Bih. & Orissa, 744. 1922. Babu, Herb. Fl. Dehra Dun 414. 1977. *Glechoma hindostana* Roth, Nov. Pl. Sp. 259. 1821. *Nepeta ruderale* Buch Ham. ex Benth. in Will. Pl. As. Rar. 1 : 64. 1830; Hook. f. Fl. Brit. Ind. 4 : 661. 1885.

Erect, ascending or decumbent, annual perennial herbs, densely hairy; stems 4-gonous. Leaves ovate-rounded with a rounded base, serrate-dentate. Verticillasters combined into racemes or panicles. Bracts linear. Calyx sup 2-lipped, villous, 15-nerved. Corolla bluish or pinkish, throat purple-dotted. Nutlets brown, granulate.

PACHMARHI : Vicinity (1000 m). In moist shaded places of the forest. Common.

Fl. & Fr. : April - December.

11. ORTHOSIPHON Benth.

Orthosiphon rubicundus (D. Don) Benth. in Wall. Pl. As. Rar. 2 : 141. 1831 ; Hook. f. Fl. Brit. Ind. 4 : 614. 1885 ; Babu, Herb. Fl. Dehra Dun 416. 1977. *Plectranthus rubicunda* D. Don, Prodr. Fl. Nep. 116. 1825 (as '*Plectranthes rubicunda*').

Erect, perennial herbs, often with tuberous rootstocks. Leaves sessile, ovate or ovate-lanceolate, base cuneate, crenate-serrate. Verticillasters combined to form an interrupted raceme like inflorescence. Bracts linear. Calyx hairy ; lower lip 4-toothed. Corolla white or pink. Nutlets suborbicular, compressed, punctulate.

PACHMARHI : Vicinity (1000 m). In sal forests. Common.

Fl. & Fr. : July - December.

12. PLECTRANTHUS L' Herit.

- 1a. Calyx 2-lipped ; upper lip of fruiting calyx broad entire, reflexed ; lower lip with 4 acute, awned or subulate teeth ... *P. mollis* 1
- 1b. Calyx subequally 5-toothed, or 2-lipped, with a 3-toothed upper lip and 2-toothed lower lip. ... *P. rugosus* 2

1. ***Plectranthus mollis*** (Ait.) Spreng. Syst. 2 : 690. 1825 ; Gandhi in Sald. & Nicol. Fl. Hassan 506. 1976. *Ocimum molle* Ait. Hort. Kew. 2 : 322. 1789. *Plectranthus incanus* Link, Enum. Hort. Berol. 2 : 120. 1822 ; Hook. f. Fl. Brit. Ind. 4 : 621. 1885.

Succulent, pubescent herbs. Leaves ovate, cordate at base, membranous. Racemes sometimes with side branches at the base. Upper lip of calyx broad, entire ; lower lip 4-toothed, longer and unequal. Corolla lilac or purplish blue. Stamens included.

PACHMARHI : Vicinity (1000 m) ; Mahadev hill (1200 m).

BORI : Reserve forest (550 m). In moist places among forest under-growth. Common.

Fl. & Fr. : September December.

2. *Plectranthus rugosus* Wall. Pl. As. Rar. 2 : 17. 1831 ; Hook. f. Fl. Brit. Ind. 4 : 620. 1885 ; Mukherjee in Rec. Bot. Surv. India 14(1) : 47. 1940.

Slender, hoary, erect shrubs. Leaves ovate or elliptic, obtuse, crenate, densely white-tomentose beneath. Cymes axillary, lax-flowered, panicled in leafy racemes. Calyx subequally 5-toothed or very shortly 2-lipped. Corolla white with purple spots ; lower lip longer. Nutlets oblong.

PACHMARHI : Dhupgarh (1250 m), 28-12-62, Panigrahi 6653 (BSA). In forest undergrowth. Rare.

Fl. & Fr. : September December.

Very rare. Mainly Himalayan species.

13. POGOSTEMON Desf.

- | | |
|---|--------------------------|
| 1a. Whorls separated on the spike, semilunate in shape ... | <i>P. paniculatus</i> 2 |
| 1b. Whorls close on the spike, not semilunate | |
| 2a. Leaves membranous. Calyx just longer than the bracts. ... | <i>P. purpurascens</i> 4 |
| 2b. Leaves chartaceous. Calyx shorter than the bract.. | |
| 3a. Inflorescence densely white tomentose ... | <i>P. benghalensis</i> 1 |
| 3b. Inflorescence sparsely brown-tomentose ... | <i>P. pubescens</i> 3 |

1. *Pogostemon benghalensis* (Burm. f.) Kuntze, Rev. Gen. Pl. 2 : 529. 1891 ; Babu, Herb. Fl. Dehra Dun 418. 1977. *Origanum benghalense* Burm. f. Fl. Ind. 128. t. 38. f. 3. 1768. *Pogostemon plectranthoides* Desf. in Ann. Mus. Natt. Hist. Nat. 2 : 155. t. 6. 1803 ; Hook. f. Fl. Brit. Ind. 4 : 632. 1885.

Erect, strongly aromatic, undershrubs. Leaves ovate-lanceolate, doubly serrate, truncate at base, white-tomentose beneath. Panicles conspicuously white-tomentose. Whorls close, stalked, subtended by foliar bracts.

Calyx shorter than bracts. Corolla purple. Nutlets broadly ellipsoid, smooth brownish.

PACHMARHI : Vicinity (1000 m). BORI : Reserve forest (550 m). In forest undergrowth. Common.

Fl. & Fr. : December - April.

2. *Pogostemon paniculatus* (Willd.) Benth. in Wall. Pl. As. Rar. 1 : 30. 1830 ; Hook. f. Fl. Brit. Ind. 4 : 631. 1885 ; Gandhi in Sald. & Nicol. Fl. Hassan 507. 1976. *Elsholtzia paniculata* Willd. Sp. Pl. 3 : 59. 1800.

Erect, hairy undershrubs. Leaves usually in unequal pairs, ovate acuminate, irregularly incised, acute at both ends, appressed pubescent. Whorls on panicle generally separated, becoming semilunate with age, subtended by longer foliar bracts. Calyx longer than bracts. Corolla purple.

PACHMARHI : Mahadev hill (1250 m), Feb. 78, Part 27108 (BSA).

BORI : Reserve forest (550 m), 25-12-62, Panigrahi 6494 et 6514 (BSA). In forest undergrowth. Common.

Fl. & Fr. : November - March.

New record for the area.

3. *Pogostemon pubescens* Benth. in DC. Prodr. 12 : 152. 1848 ; Gandhi in Sald. & Nicol. Fl. Hassan 507. 1976. *Pogostemon parviflorus* Benth. in Wall. Pl. As. Rar. 1 : 31. 1830 ; Hook. f. Fl. Brit. Ind. 4 : 632. 1885. p. p.

Stout, erect, nearly glabrous undershrubs. Leaves chartaceous, ovate or ovate-lanceolate, acuminate, rounded at base, crenate-serrate. Spikes in large panicles, sparsely brown-tomentose. Bracts longer than the calyx. Corolla pink.

PACHMARHI : Vicinity (900 m). BORI : Reserve forest (550 m) In waste land and near streams. Occasional.

Fl. & Fr. : January - June.

4. *Pogostemon purpurascens* Dalz. in Hook. J. Bot. Kew Gard. Misc. 2 : 337. 1850 ; Hook. f. Fl. Brit. Ind. 4 : 632. 1885 ; Gandhi in Sald. & Nicol. Fl. Hassan 507. 1976.

Erect undershrubs, with furrowed stems, pubescent. Leaves membranous, ovate or ovate-lanceolate, irregularly serrate-crenate with appressed hairs. Whorls on panicles close, sessile. Calyx slightly longer than the bracts. Corolla white with purple upper lip.

PACHMARHI : Vicinity (900 m). BORI : Reserve forest (550 m).
In waste places and valleys. Occasional.

Fl. & Fr. : January May.

66. AMARANTHACEAE Juss.

1a. Leaves opposite :		
2a. Spikes long, narrow, lowest flowers finally remote. Flowers deflexed after anthesis :		
3a. Modified flowers with hooked spines ...	<i>Pupalia</i> 8	
3b. Modified flowers without hooked spines ...	<i>Achyranthes</i> 1	
2b. Flowers in dense globose cylindrical heads :		
4a. Staminal filaments fused below middle ...	<i>Alternanthera</i> 4	
4b. Staminal filaments completely fused forming a tube. ...	<i>Gomphrena</i> 7	
1b. Leaves alternate, sometimes in alternate fascicles :		
5a. Flowers unisexual ...	<i>Amaranthus</i> 5	
5b. Flowers bisexual :		
6a. Urticles many-seeded ...	<i>Celosia</i> 6	
6b. Urticles single-seeded :		
7a. Flowers in round or shortly ovoid heads. Plants not white pubescent ...	<i>Allmania</i> 3	
7b. Flowers in spikes. Plants white pubescent...	<i>Aerva</i> 2	

1. ACHYRANTHES L.

1a. Basal wing of the spinescent bracteole adnate throughout the length of spine. Staminodes truncate, fimbriate ...	<i>A. aspera</i> 1
1b. Basal wing of the spinescent bracteole adnate to the base of the spine, otherwise free. Staminodes truncate, toothed, not fimbriate ...	<i>A. bidentata</i>

1. *Achyranthes aspera* L. Sp. Pl. 204. 1753 ; Hook. f. Fl. Brit. Ind. 4 : 730. 1885 ; Babu, Herb. Fl. Dehra Dun 426. 1977. "Latjira".

Erect, stiff, annual-perennial herbs, branching from the base. Leaves very variable, usually orbicular-obovate, hairy or glabrous. Spikes usually more than a foot long when mature. Flowers often pink.

PACHMARHI : Vicinity (1000 m). BORI : Reserve forest (550 m). In forest undergrowth and clearings. Common.

Fl. & Fr. : April December.

2. **Achyranthes bidentata** Blume, Bijdr. 545. 1826 ; Hook. f. Fl. Brit. Ind. 4 : 730. 1885 ; Babu, Herb. Fl. Dehra Dun 426. 1977.

Erect-ascending annual-perennial herbs. Leaves elliptic-oblong or ovate-lanceolate, acuminate. Spikes axillary and terminal. Tepals subequal, lanceolate, acute. Pseudostaminodes truncate or shortly dentate at apex. Utricles 2-2.5 mm long.

PACHMARHI : Vicinity (1000 m). Roadsides and in forest undergrowth. Occasional.

Fl. & Fr. : September December.

2. AERVA Forsk.

- | | | |
|---|-----|---------------------------|
| 1a. Spikes all axillary. Leaves alternate | ... | <i>A. lanata</i> 1 |
| 1b. Spikes axillary or in terminal panicles. Leaves opposite or alternate | ... | <i>A. sanguinolenta</i> 2 |

1. **Aerva lanata** (L.) Juss. in Ann. Mus. Nat. Hist. Paris 11 : 131. 1808 ; Hook. f. Fl. Brit. Ind. 4 : 728. 1885 ; Ramam. in Sald. & Nicol. Fl. Hassan 104. 1976. *Achyranthes lanata* L. Sp. Pl. 204. 1753.

Erect, many-branched, undershrubs, tomentose. Leaves alternate, entire, obovate. Spikes axillary, usually 2-4 together. Flowers white, 5-merous.

BORI : Dhain (480 m). In forest undergrowth and clearings. Common.

Fl. & Fr. : October April.

Aerva sanguinolenta (L.) Bl. Bijdr. 547. 1825 ; Babu, Herb. Fl. Dehra Dun 427. 1977. *Achyranthes sanguinolenta* L. Sp. Pl. ed. 2. 294.

1762. *Aerua scandens* Wall. ex Moq. in DC. Prodr. 13 : 302. 1849 ; Hook. f. Fl. Brit. Ind. 4 : 727. 1885.

Erect or rambling undershrubs. Leaves opposite or alternate, elliptic-ovate to lanceolate, crenate, acute. Spikes densely tomentose, solitary or fascicled. Tepals 5, lanceolate. Stigma 1, slightly 2-lobed. Utricles 0.8-1 mm across.

BORI : Reserve forest (550 m); Dhain (462 m). Among the bushes in forest undergrowth. Common.

Fl. & Fr. : April December.

3. ALLMANIA R. Br. ex Wt.

Allmania nodiflora (L.) R. Br. ex Wt. in Hook. J. Bot. 1 : 226. 1834 ; Hook. f. Fl. Brit. Ind. 4 : 717. 1885; Ramam. in Sald. & Nicol. Fl. Hassan 105. 1976.

Diffuse, branched, annual herbs. Leaves linear or linear-oblong, shortly petioled or sessile. Flowers in sessile, leaf-opposed, yellowish-green heads. Stamens 5; anthers pink. Capsule membranous, circumsissile. Seeds solitary, arilate, black, minutely puberulous.

BORI : Dhain (413 m). Among grasses in forest undergrowth and waste places. Common.

Fl. & Fr. : July September.

4. ALTERNANTHERA Forsk.

Alternanthera sessilis (L.) R. Br. ex DC. Cat. Pl. Hort. Bot. Mons-pel. 4 : 77. 1813 ; Hook. f. Fl. Brit. Ind. 4 : 731. 1885 ; Babu, Herb. Fl. Dehra Dun 428. 1977. *Gomphrena sessilis* L. Sp. Pl. 225. 1753. *Alternanthera nodiflora* R. Br. Prodr. 417. 1810 ; Hook. f. Fl. Brit. Ind. 4 : 732. 1885.

Prostrate, branched, annual perennial herbs. Leaves elliptic, rounded at tip, cuneate at base. Flower heads globose, becoming cylindrical

later, axillary. Tepals more or less equal, glabrous, 1-nerved. Stamens 3-5, alternating with filamentous staminodes.

PACHMARHI : Mahadev hill (1200 m). In moist places on the edge of forest. Common.

Fl. & Fr. : All seasons.

5. AMARANTHUS L.

Amaranthus viridis L. Sp. Pl. ed. 2. 1405. 1763 ; Hook. f. Fl. Brit. Ind. 4 : 720. 1885 ; Babu, Herb. Fl. Dehra Dun 431. 1977. *Amaranthus gracilis* Desf. Tabl. Hort. Par. 43. 1804.

Slender, unarmed, annual herbs with slightly pinkish stems. Leaves entire, ovate, emarginate at tip. Tepals 3. Bracts shorter than tepals. Utricles corrugated, acute at apex, as long as the tepals. Seeds black.

PACHMARHI : Vicinity (1000 m). Along roadside and waste places. Common.

Fl. & Fr. : All seasons.

6. CELOSIA L.

Celosia argentea L. Sp. Pl. 205. 1753 ; Hook. f. Fl. Brit. Ind. 4 : 714. 1885 ; Babu, Herb. Fl. Dehra Dun 432. 1977. *Celosia cristata* L. Sp. Pl. 205. 1753 ; Hook. f. Fl. Brit. Ind. 4 : 715. 1885. *Celosia coccinea* L. Sp. Pl. ed. 2. 297. 1762. "Sufaid murgha".

Erect annuals ; branches grooved. Leaves variable, linear or linear-lanceolate, acute. Flowers white or pink in dense, terminal, lanceolate spikes. Capsules ellipsoid, tapering at apex into the style, circumscissile about the middle.

PACHMARHI : Jambudeep (1000 m) ; Mahadev hill (1200 m). On hill slopes. Common.

Fl. & Fr. : September - March.

7. GOMPHRENA L.

Gomphrena celosioides Mart. Beitr. Amar. 93. 1825 ; Babu, Herb. Fl. Dehra Dun 434. 1977. *Gomphrena decumbens* (auct. pl. non Jacq. 1797). Gamble, Fl. Pres. Madras 1 : 1179. 1925.

Diffused, annual-perennial herbs. Stem much-branched; branches prostrate or ascending, clothed with white hairs. Leaves oblong-elliptic or oblanceolate, sessile, narrowed at both ends. Flowers white in elongating capituliform terminal spike. Utricles indehiscent, compressed, membranous, beaked.

PACHMARHI : Mahadev hill (1200 m). On hill slopes. Common.

Fl. & Fr. : July January.

8. PUPALIA Adans. mut. Juss.

Pupalia lappacea (L.) Juss. Ann. Mus. Paris, 2 : 132. 1803 ; Hook. f. Fl. Brit. Ind. 4 : 724. 1885 ; Babu, Herb. Fl. Dehra Dun 435. 1977. *Achyranthes lappacea* L. Sp. Pl. 204. 1753.

Large scandent shrubs with terete, tomentose, striate branches. Leaves broadly ovate elliptic, acute or acuminate. Flowers in close or distant spinous clusters forming terminal spikes; rachis tomentose. Utricles membranous.

PACHMARHI : Vicinity (1000 m). In forest undergrowth. Common.

Fl. & Fr. : July - December.

77. CHENOPodiACEAE Voss.

CHENOPODIUM L.

Chenopodium album L. Sp. Pl. 219. 1753 ; Hook. f. Fl. Brit. Ind. 5 : 3. 1886 ; Babu, Herb. Fl. Dehra Dun 437. 1977. "Bethu sag".

Erect, annual herbs ; stems often striate. Leaves oblong, rhombic, deltoid or lanceolate, entire, toothed or lobulate. Flowers in clusters forming complex or lax, paniculate, often mealy spikes. Fruits depressed-globose, finely papillate. Seeds smooth.

PACHMARHI : Vicinity (1000 m). In waste lands on the edge of forest. Common.

Fl. & Fr. : November April.

78. POLYGONACEAE Juss.

- 1a. Shrubs with flattened branches. Perianth fleshy in fruit ... *Muehlenbeckia* 1
- 1b. Herbs without flattened branches. Perianth not fleshy in fruit :
 - 2a. Tepals 6, 2 - seriate ; inner 3 conspicuously enlarged in fruiting ... *Rumex* 3
 - 2b. Tepals 4 - 5 (6), 1 - seriate, inner 3 not accrescent in fruiting ... *Polygonum* 2

1. MUEHLENBECKIA Meissn.

Muehlenbeckia platyclados (F. Muell. ex Hook.) Meissn. in Bot. Zeit. 22 : 315. 1865 ; Haines, Bot. Bib. & Orissa, 783. 1924. *Coccoboba platyclada* F. Muall. ex Hook. in Curtis' Bot. Mag. t. 5382. 1863.

Shrubs. All branchlets converted into phylloclades but bearing fleshy, small, rhomboid leaves during rainy season. Flowers green and white in clusters at the nodes. Fruits with fleshy perianth.

PACHMARHI : Mahadev hill (1200 m), 27 7 64, *Panigrahi* 4544 (BSA). In the forest. Rare.

Fl. & Fr. : Collected once in July from Mahadeo hill.

New Record for the area.

2. POLYGONUM L.

1a. Flowers in spurious heads :

- 2a. Heads subtended at the base with an involucral leaf. ... *P. nepalense* 1
- 2b. Heads without involucral leaves ... *P. pedunculare* 2
- 1b. Flowers in lax pseudo - spikes or panicles ... *P. stagninum* 3

1. *Polygonum nepalense* Meissn. Monogr. Polygon. 84. t. 7. f. 2. 1826 ; Babu, Herb. Fl. Dehra Dun 444. 1977. *Polygonum alatum* Buch. Ham. ex D. Don var. *nepalense* (Meissn.) Hook. f. Fl. Brit. Ind. 5 : 41. 1886.

Erect - ascending annual herbs. Ochreae tubular, obliquely truncate, glabrous. Leaves on winged petioles with 2 rounded, amplexicaul basal auricles, ovate - triangular to rhomboid, cuneate at base, acute at apex, glabrous. Heads solitary with a sessile, semiamplexicaul based, ovate - lanceolate, involucral leaf at base. Perianth red purple, divided halfway down ; segments 4. Stamens 4 5. Nuts 3 gonoous, red brown, pitted, with a prominent rib on the lateral face.

PACHMARHI : Vicinity (1000 m). In roadside streams and moist situations. Common.

Fl. & Fr. : September November.

2. *Polygonum pedunculare* Wall. ex Wt. Ic. t. 1802 C. 1852 ; Hook. f. Fl. Brit. Ind. 5 : 43. 1886 ; Gandhi in Sald. & Nicol. Fl. Hassan 111. 1976.

Undershrubs, Stem minutely prickly. Ochreae glabrous. Leaves lanceolate, acuminate, narrowed at base into a distinct petiole, softly ciliate. Heads in slender, dichotomous cymes ; peduncles glandular ; bracts pubescent. Perianth white, sometimes tinged with pink. Styles 2. Nuts biconvex.

PACHMARHI : Vicinity (900 m). Along streams. Common.

Fl. & Fr. : All seasons.

3. *Polygonum stagninum* Buch. Ham. ex Meissner in Wall. Pl. As. Rar. 3 : 56. 1832 ; Hook. f. Fl. Brit. Ind. 5 : 37. 1886 ; Gandhi in Sald. & Nicol. Fl. Hassan 112. 1976.

Undershrubs; stem strigose, later glabrous. Ochreae strigose, ciliate. Leaves lanceolate, acuminate, shortly petiolate at base, pubescent. Inflorescence a terminal panicle, pubescent; bracts close, ciliate. Perianth white. Styles 3. Nuts trigonous.

PACHMARHI : Vicinity (900 m). Along streams. Common.

Fl. & Fr. : August November.

3. RUMEX L.

Rumex dentatus L. Mant. Pl. 2 : 226. 1771. subsp. *klotzschianus* (Meissn.) Reich. f. Beih. Bot. Centralb. 49 : 19. 1932; Babu, Herb Fl. Dehra Dun 446. 1977. *Rumex klotzschianus* Meissn. in D.C. Prodr. 14 : 57. 1856. *Rumex dentatus* (non L. 1771) *sensu* Hook. f. Fl. Brit. Ind. 5 : 59. 1890, p. p. "Ambavah".

Erect, glabrous, annual herbs. Lower leaves long-petioled, oblong, obtuse, crisped; upper ones short petioled, lanceolate-oblong, subacute; uppermost ones smaller, linear-lanceolate. Flowers in whorls combined into leafy panicles. Pedicels deflexed, jointed. Outer tepals 2-2.5 mm long; inner fruiting tepals reticulate-veined, dentate, rarely entire. Styles terminal. Nuts 3-gonous.

PACHMARHI : Vicinity (1000 m), Feb. 78, Part 27188 (BSA). Along roadside streams and moist places. Occasional.

Fl. & Fr. : February May.

New record for the area.

79. LAURACEAE Juss.

LITSEA Lamk.

Litsea glutinosa (Lour.) C. B. Rob. in Phillip J. Sci. Bot. 6 : 321. 1911; Bennet, Fl. Howrah 157. 1979. *Sebifera glutinosa* Lour. Fl. Cochinch.

638. 1790. *Litsea sebifera* Pers. Syn. 2 : 4. 1806 ; Hook. f. Fl. Brit. Ind. 5 : 157, 1886, p. p. "Maida lakri".

Medium-sized trees. Leaves glabrous above and pubescent beneath, oblong to elliptic-oblong, apex acute or acuminate, base acute to rounded. Flowers greenish-yellow, globose. Perianth-tube long, pubescent outside. Stamens about 20 ; filaments softly pubescent ; glands fleshy on villous stipes. Fruits subglobose, black or dark-brown.

PACHMARHI : Vicinity (1000 m) ; Mhahdev hill (1200 m) ; Dhupgarh (1250 m). BORI : Dhain (430 m). In the forests. Common.

Fl. & Fr. : June November.

80. LORANTHACEAE Juss.

- | | | |
|---|-----|-----------------------|
| 1a. Flowers unisexual. Leaves none, when present without midrib | ... | <i>Viscum</i> 3 |
| 1b. Flowers bisexual. Leaves well developed with midrib : | | |
| 2a. Flowers regular. Corolla tube not split on one side | ... | <i>Dendrophthoe</i> 1 |
| 2b. Flowers irregular. Corolla tube split half-way on one side | ... | <i>Scurrula</i> 2 |

1. DENDROPHTHOE Mart.

Dendrophthoe falcata (L. f.) Etting. in Denkschr. Kaiserl. Akad. Wiss. Math. Naturwiss Kl. 32 : 52-53, 58. t. 13. f. 14. 1872 ; Ramam. in Sald. & Nicol. Fl. Hassan 305. 1976. *Loranthus falcatus* L. f. Suppl. 211. 1781. *Loranthus longiflorus* Desr. in Lamk. Encycl. 3 : 598. 1792 ; Hook. f. Fl. Brit. Ind. 5 : 214. 1886. "Banda".

Semi-parasite. Leaves ovate to lanceolate, acute, cordate-amplexicaul to cuneate at base. Racemes axillary. Calyx cup-shaped. Corolla-tube curved, slightly inflated upwards, orange or pink, split at the back ; lobes 5,

linear, reflexed. Free portion of the filaments equal to the length of the linear anther. Style angular; stigma subglobose. Fruits ovoid-oblong, pinkish, with persistent calyx-limbs.

PACHMARHI : Vicinity (1000 m). On trees in the forest. Occasional.

Fl. & Fr. : January April.

2. SCURRULA L.

- | | | |
|--|-----|------------------------|
| 1a. Leaves orbicular or broadly ovate with a cordate base,
tomentose on both surfaces | ... | <i>S. cordifolia</i> 1 |
| 1b. Leaves ovate-elliptic to oblong or cordate-obovate, gla-
brous or tomentose beneath | ... | <i>S. parasitica</i> 2 |

1. *Scurrula cordifolia* (Wall.) G. Don, Gen. Syst. 3 : 423. 1834 ; Babu, Herb. Fl. Dehra Dun 450. 1977. *Loranthus cordifolius* Wall. in Roxb. Fl. Ind. 2 : 222. 1824 ; Hook. f. Fl. Brit. Ind. 5 : 209. 1886.

Bushy semiparasites. Young parts and inflorescence with rusty tomentum. Leaves subopposite, ovate or orbicular with cordate base, obtuse or subacute. Flowers in corymbose racemes. Bracts ovate, obtuse. Perianth greenish, white, mealy tomentose without, dark purple-brown and glabrous within ; segments oblanceolate-oblong, acute, reflexed. Fruits clavate, rusty mealy tomentose.

PACHMARHI : Vicinity (1000 m). On trees in and around forest. Common.

Fl. & Fr. : October March.

2. *Scurrula parasitica* L. Sp. Pl. 110. 1753 ; Babu, Herb. Fl. Dehra Dun 450. 1977. *Loranthus scurrula* L. Sp. Pl. ed. 2, 1 : 472. 1762 (*nom. illeg.*) ; Hook. f. Fl. Brit. Ind. 5 : 208. 1886, p.p.

Semiparasites ; stem terete. Young parts tomentose. Leaves opposite, ovate-elliptic to oblong, tomentose beneath. Flowers in axillary, subracemosous fascicles. Bracts minute obliquely ovate. Calyx truncate. Perianth greenish yellow, tomentose ; lobes acute. Fruits tomentose.

PACHMARHI : Vicinity (1000 m). On trees in the forest. Occasional.

Fl. & Fr. : October March.

3. VISCUM L.

Viscum nepalense Sprang. Syst. Post 47. 1827 ; Ramam. in Sald. & Nicol. Fl. Hassan 311. 1976. *Viscum articulatum* (auct non Burm. f. 1768) ; Hook. f. Fl. Brit. Ind. 5 : 226. 1886 ; Babu, Herb. Fl. Dehra Dun 451. 1977. "Badu".

Leafless, shrubby, semiparasitic. Stems jointed ; internodes flattened, green. Plants monoecious. Flowers 3 to 4-merous, subsessile in fascicles in the axils of cupular bracts. Perianth-lobes of male flowers reflexed, those of female flowers erect, triangular, 2-bracteolate. Berry subglobose, smooth, greenish-yellow.

PACHMARHI : Vicinity (1000 m) ; Mahadev hill (1200 m).

BORI : Reserve forest (550 m). On trees in the forest. Common.

Fl. & Fr. : April December.

81. SANTALACEAE Juss.

OSYRIS R. Br.

Osyris quadripartita Salz. ex Decne in Ann. Sci. Nat. Ser. 2, 6 : 65. 1836 ; Gandhi in Sald. & Nicol. Fl. Hassan 302. 1976. *Osyris wightiana* Wall. ex Wight, Ic. t. 1853. 1852 ; Babu, Herb. Fl. Dehra Dun 452. 1977. *Osyris arborea* Wall. ex A. DC. in DC. Prodr. 14 : 633. 1857 ; Hook. f. Fl. Brit. Ind. 5 : 232. 1886.

Erect, glaucous, evergreen, bushy shrubs ; branches 3-angled. Leaves elliptic-oblong, mucronate, cuneate, often glaucous. Flowers polygamous. Perianth yellow, segments 3, ovate-triangular. Stamens 3. Disk 3-lobed. Female flowers solitary, axillary, pendulous. Fruits subglobose, red.

PACHMARHI : Dhupgarh (1250 m). In the forest on hill slopes. Common.

Fl. & Fr. : July - January..

82. EUPHORBIACEAE Juss.

- | | | |
|--|-----|--------------------|
| 1a. Flowers naked, arranged in cyathia | ... | <i>Euphorbia</i> 7 |
| 1b. Flowers with perianth, not arranged in cyathia : | | |

2a. Leaves less than 3 cm long, obtuse or rounded :		
3a. Disk none. Male calyx turbinate with truncated lobes. Fruits dry. Stamens 3, united ...		<i>Breynia</i> 4
3b. Disk present. Calyx spreading ; lobes obtuse or acute :		
4a. Stamens 4 ...		<i>Securinega</i> 12
4b. Stamens 3 :		
5a. Leaves narrow. Fruits fleshy ...		<i>Emblema</i> 6
5b. Leaves ovate or obovate. Fruits dry ...		<i>Phyllanthus</i> 11
2b. Leaves more than 3 cm long, obtuse to acute, sometimes rounded :		
6a. Herbs ...		<i>Acalypha</i> 1
6b. Trees or shrubs :		
7a. Palmately veined ...		<i>Mallotus</i> 10
7b. Pinnately veined :		
8a. Petioles with 2 glands ...		<i>Baliospermum</i> 3
8b. Petioles without glands :		
9a. Leaves rounded to obtuse at tip ...		<i>Bridelia</i> 5
9b. Leaves acute to acuminate :		
10a. Flowers clustered on short, branched cymes or fasciculate ...		<i>Glossidion</i> 8
10b. Flowers spicate-racemose :		
11a. Lower leaf surface with scattered lepidote scales ...		<i>Homonoia</i> 9
11b. Lower leaf surface glabrous or with stellate pubescence ...		<i>Antidesma</i> 2

1. ACALYPHA L.

Acalypha indica L. Sp. Pl. 1003. 1753; Hook. f. Fl. Brit. Ind. 5 : 416. 1887; Naik, Fl. Osman. 316. 1979. "Kuppi".

Erect, pubescent, annual herbs. Leaves ovate or rhomboid-ovate, acute or obtuse, shortly acuminate, serrate. Flowers in axillary spikes, the males minute at the summit of the spikes, the females 3-5, surrounded by bracts. Ovary hispid. Capsules small, hispid, concealed by bracts, often only 1-seeded.

PACHMARHI : Vicinity (1000 m). In forest undergrowth and shaded waste lands. Common.

Fl. & Fr. : June November.

2. ANTIDESMA L.

Antidesma acidum Retz. Obs. Bot. 5 : 30. 1789. *Antidesma diandrum* (Roxb.) Roth. Nov. Pl. Sp. 369. 1821 ; Hook. f. Fl. Brit. Ind. 5 : 361. 1887 p. p. ; Babu, Herb. Fl. Dehra Dun. 455. 1977. *Stilago diandra* Roxb. Pl. Cor. 2 : 35. t. 166. 1798.

Erect, dioecious shrubs. Young parts rusty-pubescent. Leaves obovate-elliptic to oblong with rounded-cuneate or acute base. Petioles grooved above, rusty-tomentose. Female flowers in glabrous racemes. Bracts ovate, acute. Perianth shortly 4-lobed ; lobes ovate, obtuse. Stamens 2, in the cavities of unlobed, glabrous disk. Fruits red, ellipsoid.

PACHMARHI : Mahadev hill (1200 m). Near river bank. Common.

Fl. & Fr. : November December.

3. BALIOSPERMUM Bl.

Baliospermum montanum (Willd.) Muell.-Arg. in DC. Prodr. 15(2) : 1125. 1866 ; Babu, Herb. Fl. Dehra Dun 455. 1977. *Jatropha montana* Willd. Sp. Pl. 4 : 563. 1805. *Baliospermum axillare* Bl. Bijdr. 604. 1825 ; Hook. f. Fl. Brit. Ind. 5 : 461. 1887. "Danti".

Erect, branched, undershrubs. Leaves sinuate-toothed, the lower large, ovate, often palmately 3-5-lobed, upper small, lanceolate. Flowers in numerous axillary racemes or contracted panicles, all male or a few female below. Capsules obovoid, usually hairy, of 3 two-valved crustaceous cocci.

BORI : Reserve forest (550 & 1000 m). In the forest. Common.

Fl. & Fr. : October April.

4. BREYNIA J. & G. Forst.

Breynia retusa (Dennst.) Alston in Ann. Roy. Bot. Gard. (Peradenya) 11 : 204. 1929 *et* in Trimen, Handb. Fl. Ceyl. 6 (suppl.) : 261. 1931 ; Ramam. in Sald. & Nicol. Fl. Hassan 333. 1976. *Phyllanthus retusus* Dennst. in Schluess, Hort. Malab. 24. 1818. *Phyllanthus patens* Roxb. Fl. Ind. 3 : 667. 1832. *Breynia patens* (Roxb.) Rolfe in J. Bot. 11 : 359. 1882 ; Hook. f. Fl. Brit. Ind. 5 : 329. 1887.

Much-branched, deciduous shrubs ; branchlets 4-angular. Leaves ovate, distichous, drying black above, glaucous beneath. Flowers pendulous, brownish-yellow. Perianth turbinate ; accrescent in fruit. Disk of thick glands immediately below perianth lobes in male. Ovary depressed. Calyx red in fruit, saucer-shaped. Fruits depressed-globose, orange-red. Seeds 6.

PACHMARHI : Mahadev hill (1200 m), 26-7-64, *Panigrahi* 4541 (BSA). On hill slopes. Common.

Fl. & Fr. : April September.

New record for the area.

5. BRIDELIA Willd.

Bridelia retusa (L.) Spreng, Syst. Veg. 3 : 48. 1826 ; Hook. f. Fl. Brit. Ind. 5 : 268. 1887. *Clutia retusa* L. Sp. Pl. 1042. 1753, "Ekdania".

Moderate-sized trees with spines when young. Leaves ovate or elliptic-oblong, obtuse, rounded or acute at apex, rounded or subacute at base, coriaceous ; lateral nerves up to 30 pairs. Flowers small, greenish, in axillary clusters or in long spikes ; males and females intermixed. Fruits globose, seated on the persistent calyx and petals, purplish-black, succulent ; cocci dehiscent.

PACHMARHI : Vicinity (1000 m). BORI : Reserve forest (550 m). In the forest. Common.

Fl. & Fr. : August - January.

6. EMBLICA Gaertn.

Emblica officinalis Gaertn. Fruct. 2 : 122. t. 108. 1790 ; Ramam. in Sald. & Nicol. Fl. Hassan 336. 1976. *Phyllanthus emblica* L. Sp. Pl. 982. 1753 ; Hook. f. Fl. Brit. Ind. 5 : 289. 1887. "Amla"

Medium-sized trees ; bark greenish-grey or red ; branchlets hairy. Leaves distichous, linear, imbricate when young. Flowers densely fascicled on new shoots, males on slender pedicels, females subsessile, few. Berries globose with 6 obscure vertical furrows, pale-yellow.

PACHMARHI : Vicinity (1000 m) ; Mahadev hill (1200 m). In deciduous forest. Common.

Fl. & Fr. : March December.

7. EUPHORBIACEAE L.

1a. Trees or shrubs with succulent spiny branches. Leaves alternate, fleshy or O :

2a. Branchlets terete or angled, not winged :

3a. Stipular spines on short tubercles which are spirally disposed. Leaves rounded at apex, apiculate ...

E. nivulia 5

3b. Stipular spines on prominent tubercles which are sub-confluent in 5 lines. Leaves acute at apex ...

E. nerifolia 6

2b. Branches and branchlets 3-winged ...

E. antiquorum 1

1b. Shrubs or herbs without spines. Leaves not fleshy, alternate or opposite :

4a. Shrubs or undershrubs with leaf-like coloured bracts below the involucres ...

E. heterophylla 3

4b. Herbs, sometimes woody at base, without leaf-like coloured bracts :

5a. Leaf-bases even ; glands of involucres without a petaloid limb, often 2-horned ...

E. dracunculoides 2

5b. Leaf-bases oblique, glands of involucres often with a petaloid limb :

- 6a. Erect or procumbent, dichotomously branched herbs with medium-sized leaves ; limb of the gland large conspicuous :
 7a. Floral leaves neither distichous nor imbricate ... *E. hypericifolia* 4
 7b. Floral leaves distichous, Imbricate, enclosing the involucres which are solitary or 2 - 3 only. ... *E. pycnostegia* 8
 6b. Prostrate herbs with very small leaves ; limb of gland minute or O :
 8a. Capsules pubescent all over ... *E. thymifolia* 9
 8b. Capsules pubescent at the angles of cocci, glabrous elsewhere ... *E. prostrata* 7

1. ***Euphorbia antiquorum*** L. Sp. Pl. 450. 1753 ; Hook. f. Fl. Brit. Ind. 5 : 255. 1887 ; Ramaiah. in Sald. & Nicol. Fl. Hassan 337. 1976. "Tred-hara".

Much-branched small trees with jointed branches ; branchlets usually 3, rarely 4 - 5-winged, repand-sinuate with short stipular spines. Leaves small, fleshy, obovate-oblong or spatulate. Stamens red.

BORI : Reserve forest (550 m). On the rock crevices. Common.

Fl. & Fr. : November - January.

2. ***Euphorbia dracunculoides*** Lamk. Encycl. 2 : 428. 1788 ; Hook. f. Fl. Brit. Ind. 5 : 262. 1887 ; Babu, Herb. Fl. Dehra Dun 457. 1977. "Chagulputputi".

Erect, dichotomously much-branched herbs. Stems terete, rather glaucous. Leaves opposite ; caudine leaves sessile, linear or linear-lanceolate, subacute ; floral leaves broader at the base and shorter. Involucres broadly campanulate, subsessile, solitary. Capsules pale-yellow.

PACHMARHI : Mahadev hill (1200 m). In forest undergrowth. Occasional.

Fl. & Fr. : June - January.

3. ***Euphorbia heterophylla*** L. Sp. Pl. 453. 1753 ; Babu, Herb. Fl. Dehra Dun 458. 1977. *Poinsettia heterophylla* (L.) Klotzsch & Garcke ex Klotzsch, Nat. Pflanz. 104. 1860.

Bushy annuals. Leaves three-lobed ; lateral lobes ovate, acute ; terminal lobe again 3-lobed, acute ; floral leaves similar or entire and lanceolate, much smaller than the caudine leaves, green with a red or rosy spot at

the base. Cyathia shortly pedicellate, numerous in short terminal corymbose racemes. Capsules glabrous.

BORI : Reserve forest (550 m). Along river bank. Common.

Fl. & Fr. : October July.

4. *Euphorbia hypericifolia* L. Sp. Pl. 454. 1753 ; Hook. f. Fl. Brit. Ind. 5 : 249. 1887 ; Babu, Herb. Fl. Dehra Dun 459. 1977. *Euphorbia parviflora* L. Syst. Nat. ed. 10. 1047. 1759. "Hakshardana".

Erect or spreading, glabrous or partly pubescent annual herbs. Leaves opposite, elliptic oblong, obtuse, serrulate, often tinged with red. Involucres in axillary and terminal, usually pedunculate, many flowered cymes. Capsules pubescent.

PACHMARHI : Dhupgarh (1250 m). In forest undergrowth. Common.

Fl. & Fr. : July February.

5. *Euphorbia nivaria* Buch Ham. in Trans. Linn. Soc. London, 14 : 286. 1825 ; Hook. f. Fl. Brit. Ind. 5 : 255. 1887 ; Ramam. in Said. & Nicol. Fl. Hassan 338. 1976. "Katathohar".

Large glabrous shrubs or small trees ; branches terete, somewhat verticillate with pairs of sharp stipular spines arising from two conical, truncate, distant, spirally arranged tubercles. Leaves towards the ends of the branches, fleshy, obovate or obovate oblong, rounded at apex, apiculate, narrowly cuneate at base, sessile or nearly so.

PACHMARHI : Vicinity (1000 m). On waste land along forest margins. Common.

Fl. & Fr. : January July.

6. *Euphorbia neriiifolia* L. Sp. Pl. 451. 1753 ; Hook. f. Fl. Brit. Ind. 5 : 255. 1887 ; Naik, Fl. Osman. 300. 1979. "Pattonkisend"

Large, branched shrubs or small trees ; the young branches angled with short stipular spines arising from thick tubercles arranged in 5 irregular rows. Leaves alternate, near the ends of the branches, obovate oblong, acute, base narrowed into a very short petiole. Flower not seen.

PACHMARHI : Vicinity (1000 m) ; Dhupgarh (1250 m). On waste lands and hill slopes. Common.

Fl. & Fr. : January July.

7. *Euphorbia prostrata* Ait. Hort. Kew. 2 : 139. 1789 ; Hook. f. Fl. Brit. Ind. 5 : 266. 1887 ; Babu, Herb. Fl. Dehra Dun 460. 1977.

Prostrate, pubescent, annual herbs. Leaves elliptic obovate, rounded at apex, rounded or cordate at base. Involucres hairy outside ; lobes 5, lanceolate, ciliate. Glands red, suborbicular, with a narrow appendage. Capsule subglobose, hairy on angles. Seeds oblong, acutely quadrangular, red, transversely rugose with horizontal lines.

PACHMARHI : Vicinity (1000 m). In waste places. Common.

Fl. & Fr. : June January.

8. *Euphorbia pycnostegia* Boiss. in DC. Prodr. 15 (2) : 18. 1862 ; Hook. f. Fl. Brit. Ind. 5 : 246. 1887.

Erect, glabrous, annual herbs. Leaves opposite, oblong, obtuse ; floral leaves distichous, imbricate, enclosing the involucres which are solitary or 2-3 only. Coccii obtusely keeled, hirsute or glabrous. Seeds obtusely 4 angled, transversely furrowed or glabrous ; limbs white.

PACHMARHI : Vicinity (1000 m) ; Mahadev hill (1200 m).

BORI : Reserve forest (900 m). In forest undergrowth. Common.

Fl. & Fr. : July January.

9. *Euphorbia thymifolia* L. Sp. Pl. 454. 1753 ; Hook. f. Fl. Brit. Ind. 5 : 252. 1887 ; Ramam. in Sald. & Nicol. Fl. Hassan 339. 1976.

Prostrate, hispidly pubescent, annual herbs. Leaves elliptic - oblong. Involucres axillary, solitary or 2-5 together ; glands minute or 0 ; limb 0. Capsules obtusely keeled, pubescent all over.

PACHMARHI : Vicinity (1000 m). Along roadside and edges of forest. Common.

Fl. & Fr. : All seasons.

8. *GLOCHIDION* J. & G. Forst.

- | | | |
|---|-----|------------------------|
| 1a. Calyx of female flower 6-lobed. Style subglobose, deeply 3-lobed | ... | <i>G. johnstonae</i> 1 |
| 1b. Calyx of female flower with 6 free sepals. Style minute, 4-7 toothed. | ... | <i>G. velutinum</i> 2 |

1. *Glochidion johnstonei* Hook. f. Fl. Brit. Ind. 5 : 314. 1887 ; Ramam. in Sald. & Nicol. Fl. Hassan 341. 1976.

Small, deciduous trees ; branches pubescent. Leaves oblong - elliptic, acute, hairy on both sides. Flowers pedicelled. Perianth lobes 6, biserrate. Stamens 3. Ovary 5 - locular. Schizocarps stalked, depressed at tip, hairy.

PACHMARHI : Dhupgarh (1250 m), 26 7 64, *Panigrahi* 4521 (BSA). In the forest. Rare.

Fl. & Fr. : April - August.

2. *Glochidion velutinum* Wt. Ic. 5 (2) : 29. t. 1907. f. 2. 1852 ; Hook. f. Fl. Brit. Ind. 5 : 322. 1887. "Koria".

Small trees or large shrubs ; branches velvety - pubescent. Leaves ovate or elliptic - lanceolate, densely pubescent beneath. Flowers in few-flowered, axillary clusters. Sepals 6, free. Stamens 3. Ovary 4 - 7 lobed. Schizocarps depressed - globose, hairy. Seeds angular, bright red.

PACHMARHI : Dhupgarh (1250 m) ; Mahadev hill (1200 m). In the forests. Common.

Fl. & Fr. : December - July.

9. HOMONOIA Lour.

Homonoia riparia Lour. Fl. Cochinch. 637. 1790 ; Hook. f. Fl. Brit. Ind. 5 : 455. 1887 ; Ramam. in Sald. & Nicol. Fl. Hassan 342. 1976. "Surra".

Small trees with pubescent shoots. Leaves linear - lanceolate, acute, cuneate with many orbicular, yellowish scales beneath. Male flowers stalked, female sessile. Perianth lobes ovate, pink in male ; in female 5 - lobed, ovate, brown. Ovary tomentose.

BORI : Reserve forest (550 m). In moist situations near water courses. Common.

Fl. & Fr. : January - May.

10. MALLOTUS Lour.

Mallotus philippensis (Lamk.) Muell. in Linnaca, 34 : 196. 1855 ; Hook. f. Fl. Brit. Ind. 5 : 442. 1887. (as 'philippensis') ; Ramam. in Sald. & Nicol. Fl. Hassan 344. 1976. *Croton philippense* Lamk. Encycl. 2 : 206. 1786. "Kamala" / "Sindur".

Medium sized trees. Leaves ovate elliptic, acute acuminate, cuneate, glaucous and red - glandular beneath, sinuately toothed. Inflorescence of axillary racemes. Stamens many. Capsules globose, covered with red powder.

PACHMARHI : Vicinity (1000 m) ; Dhupgarh (1250 m). BORI : Reserve forest (450 m). In the forest, near moist situations. Common.

Fl. & Fr. : August January.

11. PHYLLANTHUS L.

1a. Stipules peltate	...	<i>P. maderaspatensis</i> 3
1b. Stipules not peltate :		
2a. Leaf - apex acute. Disc of female flowers subentire ...		<i>P. debilis</i> 2
2b. Leaf - apex obtuse or rounded. Disc of female flowers lobed	...	<i>P. amarus</i> 1

1. *Phyllanthus amarus* Schumacher, Beskriv. Guin. Pl. 421. 1827. *Phyllanthus niruri* (auct. non Linn. 1753) ; Hook. f. Fl. Brit. Ind 5 : 298. 1887. *Phyllanthus asperulatus* Hutch. in Kew Bull. 27. 1920. *Phyllanthus fraternus* Webster in Contrib. Gray Herb. No. 176, 53. 1955 ; Babu, Herb. Fl. Dehra Dun 462. 1977. "Jaramala".

Small annual herbs. Stipules lanceolate, acuminate, basally attached. Leaves oblong - elliptic, rounded, subcordate. Flowers solitary, 5 merous. Stamens fused. Seeds minutely tubercled in concentric lines.

PACHMARHI : Vicinity (1000 m). In forest undergrowth and waste places. Common.

Fl. & Fr. : April December.

2. *Phyllanthus debilis* Klein ex Willd. Sp. Pl. 4 : 582. 1805 ; Hook. f. Fl. Brit. Ind. 5 : 299. 1887 ; Babu, Herb. Fl. Dehra Dun 462. 1977.

Erect annual herbs; branchlets 3-gonous. Leaves ovate elliptic, acute, glaucous beneath. Stipules lanceolate, acuminate. Male flowers in fascicles; female solitary. Disc of female flowers subentire. Seeds brown, longitudinally ribbed with transverse striae between the ribs on the back side.

PACHMARHI : Dhupgarh (1250 m). BORI : Reserve forest (550 m); Dhain (462 m). In forest undergrowth and waste lands. Common.

Fl. & Fr. : September November.

3. *Phyllanthus maderaspatensis* L. Sp. Pl. 982. 1753; Hook. f. Fl. Brit. Ind. 5 : 292. 1887; Babu, Herb. Fl. Dehra Dun 462. 1977. "Kanocha".

Erect annual herbs. Stipules scarious, peltate. Leaves oblanceolate, sessile, rounded and mucronate at apex. Flowers whitish green, axillary; the males in subsessile clusters; the female solitary, pedicellate. Capsules 3-gonous, depressed globose, glabrous.

PACHMARHI : Vicinity (1000 m). BORI : Reserve forest (550 m). In forest undergrowth. Occasional.

Fl. & Fr. : July December.

12. SECURINEGA Comm. ex Juss.

- | | |
|------------------------------|----------------------------|
| 1a. Plants armed with thorns | ... <i>S. leucopyrus</i> 1 |
| 1b. Plants unarmed | ... <i>S. virosa</i> 2 |

1. *Securinega leucopyrus* (Willd.) Muell. Arg. in DC. Prodr. 15 (2) : 451. 1866; Sald. & Nicol. Fl. Hassan 348. 1976. *Flueggea leucopyrus* Willd. Sp. Pl. 4 : 757. 1805 (as 'Flueggea'); Hook. f. Fl. Brit. Ind. 5 : 328. 1887. "Hartho".

Shrubs with somewhat straggling branches; branchlets angular, slender, ending in sharp thorns. Leaves obovate or orbicular, round or emarginate. Flower greenish white, in axillary clusters; the males numerous; the female usually 1. Fruits globose, smooth, white, 3-celled.

PACHMARHI : Vicinity (1000 m); Dhupgarh (1250 m). BORI : Reserve forest (550 m). Among boulders. Common.

Fl. & Fr. : April July.

2. *Securinega virosa* (Roxb. ex Willd.) Pax & Hoffm. in Engl. & Prantl, Pflanzenfam. ed 2. 19. c : 60. 1931 ; Ramam. in Sald. Nicol. Fl. Hassan 348. 1976. *Phyllanthus virosus* Roxb. ex Willd. Sp. Pl. 4 : 578. 1805. *Flueggea microcarpa* Bl. Bijdr. 580. 1825 ; Hook. f. Fl. Brit. Ind. 5 : 328. 1887. "Dalme" / "Patala".

Unarmed, glabrous shrubs. Leaves elliptic to obovate, rounded, obtuse or broadly and shortly acuminate. Flowers greenish - white in axillary clusters ; the males numerous ; the females usually 1 - 5, all subtended by minute bracts. Fruits globose, fleshy, white.

PACHMARHI : Dhupgarh (1250 m). BORI : Reserve forest (550 m). In the forests. Common.

Fl. & Fr. : April July.

83. ULMACEAE Mirb.

TREMA Lour.

Trema orientalis (L.) Bl. Mus. Bot. 2 : 61. 1836 ; Hook. f. Fl. Brit. Ind. 5 : 484. 1888 ; Ramam. in Sald. & Nicol. Fl. Hassan 75. 1976. *Celtis orientalis* L. Sp. Pl. 1044. 1753. "Gia".

Unarmed, evergreen, small trees ; young parts pubescent. Leaves ovate-lanceolate, acuminate, oblique, serrate, canescent beneath, scabrid above. Flowers polygamodioecious. Tepals valvate in male, imbricate in female. Stamens 4 - 5. Drupe small, subcompressed.

PACHMARHI : Vicinity (1000 m) ; Dhupgarh (1250 m). BORI : Reserve forest (550 m). In the mixed forest. Common.

Fl. & Fr. : December - October.

84. URTICACEAE Juss.

1a. Plants with stinging hairs :

- | | |
|--|---------------------|
| 2a. Stipules large, foliaceous ; cystoliths punctiform ... | <i>Girardinia</i> 3 |
| 2b. Stipules small, scarious ; cystoliths linear ... | <i>Laportea</i> 4 |

1b. Plants without stinging hairs :

3a. Flowers in pedicelled, fleshy coenanthia	...	<i>Lecanthus</i> 3
3b. Flowers in interrupted spikes or in cymes :		
4a. Leaves sessile	...	<i>Elatostema</i> 2
4b. Leaves distinctly petioled	...	<i>Boehmeria</i> 1

1. *BOEHMERIA* Jacq.

1a. Female spikes longer than the subtending leaves	...	<i>B. platyphylla</i> 1
1b. Female spikes shorter or as long as the subtending leaves	...	<i>B. scabrella</i> 2

1. *Boehmeria platyphylla* D. Don, Prodr. Fl. Nepal 60, 1825; Hook. f. Fl. Brit. Ind. 5 : 578. 1888 (excl. var.) ; Babu, Herb. Fl. Dehra Dun 466. 1977.

Erect, perennial, pubescent, undershrubs. Leaves opposite, unequal, crenate-serrate, rounded or cordate at base. Flower-clusters in spikes. Male flowers : perianth-segments 4, ovate ; stamens 4. Female flowers : perianth tubular-lageniform, with a 2-dentate mouth. Achenes obovoid, compressed, brown, hairy at the top.

BORI : Reserve forest (550 m). In mixed forest. Common.

Fl. & Fr. : September - December.

Boehmeria scabrella Gaud. Freyc. Voy. Bot. 499. 1830 ; Babu, Herb. Fl. Dehra Dun 466. 1977. *Boehmeria platyphylla* D. Don. var. *scabrella* (Gaud.) Wedd. in Arch. Mus. Hist. Nat. Paris 9 : 365. 1856 ; Hook. f. Fl. Brit. Ind. 5 : 578. 1888.

Erect, perennial, undershrubs. Leaves nearly equal, ovate-elliptic to rounded, with rounded-subcordate base, crenate-serrate. Stipules lanceolate. Flower-clusters in spikes which are often paniculate. Female flowers : perianth hairy at the top. Achenes obovoid-ellipsoid, hairy at the top.

PACHMARHI : Mahadev hill (1200 m). BORI : Reserve forest (1000 m). In mixed forest. Common.

Fl. & Fr. : September - December.

2. ELATOSTEMA J. & G. Forst.

Elatostema surculosum Wt. Ic. t. 2091. f. 4. 1853 ; Hook. f. Fl. Brit. Ind. 5 : 572. 1888 ; Babu, Herb. Fl. Dehra Dun 468. 1977.

Erect-ascending, stoloniferous herbs. Leaves sessile, orbicular to cuneate or elliptic-oblong to ovate-lanceolate, subentire-crenate-serrate to pinnatifid, obtuse to caudate, with an acute or rounded base, glabrous, somewhat fleshy. Male flowers : receptacles long-peduncled. Involucral bracts free, rounded ; the outer ones horned. Female flowers : receptacles sessile. Achenes slender, ribbed.

PACHMARHI : Vicinity (1000 m). In the forest undergrowth. Occasional.

Fl. & Fr. : July December.

3. GIRARDINIA Gaud.

- | | | |
|---|-----|-----------------------|
| 1a. Leaves not lobed in lower portion ; upper often palmately 3 - 5-lobed. Cymes elongate | ... | <i>G. palmata</i> 1 |
| 1b. Leaves pinnately lobed. Cymes in reniform clusters | ... | <i>G. zeylanica</i> 2 |

1. *Girardinia palmata* (Forsk.) Gaud. Freyc. Voy. Bot. 498. 1830 ; Babu, Herb. Fl. Dehra Dun 469. 1977. *Urtica palmata* Forsk. Fl. Aegypt.-Arab. 159. 1775. *Urtica heterophylla* Vahl, Symb. Bot. 1 : 76. 1790. *Girardinia heterophylla* (Vahl) Decne. in Jacq. Voy. Ind. 4 : 151. t. 153. 1844 ; Hook. f. Fl. Brit. Ind. 5 : 550. 1888. "Awa".

Erect, perennial herbs with stinging hairs. Leaves broadly ovate, acuminate ; the upper ones palmately lobed. Stipules ovate. Male flowers : in panicled spikes ; perianth 4-partite ; stamens 4. Female flowers : in spikes combined into a panicle ; perianth 3-lobed ; achenes obliquely ovoid.

PACHMARHI : Vicinity (900 m). BORI : Reserve forest (550 m). On hill slopes. Occasional.

Fl. & Fr. : July December.

2. *Girardinia zeylanica* Decne. in Jacq. Voy. Bot. 152. 1844 ; Ramam. in Sald. & Nicol. Fl. Hassan 89. 1976. *Urtica heterophylla* Vahl, Symb. Bot. 1 : 76. 1790. *Girardinia heterophylla* (Vahl) Decne. var. *zeylanica* sensu. Hook. f. Fl. Brit. Ind. 5 : 551. 1888.

Erect, stinging hairy, perennial herbs. Leaves pinnately lobed; margins bluntly serrate. Stipules broadly cordate. Female inflorescence densely compacted into oblong or reniform masses in fruit.

BORI : Reserve forest (550 m) ; Dhain (462 m). In the mixed forest. Common.

Fl. & Fr. : July - December.

4. LAPORTEA Gaud.

Laportea interrupta (L.) Chew in Gard. Bull. Straits settlem. 21 : 200. 1965 ; Ramam. in Sald. & Nicol. Fl. Hassan 89. 1976. *Urtica interrupta* L. Sp. Pl. 985. 1753. *Pleurya interrupta* (L.) Gaud. in Frcyc. Voy. Bot. 497. t. 8. 1826 ; Hook. f. Fl. Brit. Ind. 5 : 548. 1888 ; Babu, Herb. Fl. Dehra Dun 468. 1977. "Lal bichua".

Diffuse, perennial herbs with stinging hairs. Stem flexuous or erect, furrowed. Leaves sparsely clothed with weak stinging hairs, ovate, acuminate, subcordate at base, crenate-dentate. Flowers in axillary spikes or panicles, dioecious. Tepals in male 4-5, free, valvate, in female 4, connate. Achenes oblique, tipped by style.

PACHMARI : Mahadev hill (1200 m) ; Dhupgarh (1250 m).

BORI : Reserve forest (550 m). On hill slopes and river bed. Common.

Fl. & Fr. : August - December.

5. LECANTHUS Wedd.

Lecanthus peduncularis (Wall. ex Royle) Wedd. in DC. Prodr. 16 : 164. 1869 ; Ramam. in Sald. & Nicol. Fl. Hassan 89. 1976. *Procris peduncularis* Wall. ex Royle, Illus. Himal. t. 53. f. 2. 1839. *Lecanthus wightii* Wedd. Ann. Sci. Nat. Bot. Ser. 4, 1 : 187. 1854 ; Hook. f. Fl. Brit. Ind. 5 : 559. 1888.

Slender annual herbs without stinging hairs. Leaves opposite with unequal petioles ; more or less pubescent below on nerves, sparsely hairy

above. Flowers dioecious in axillary coenanthiums. Tepals 4-5, free, shortly hooded, in male; in female 3-4.

PACHMARHI : Vicinity (1000 m); Dhupgarh (1250 m). On moist hill slopes and rocks. Common.

Fl. & Fr. : July - October.

85. MORACEAE Link

- | | |
|---|----------------|
| 1a. Flowers inside a closed receptacle (hypanthodium); sterile and fertile flowers together ... | <i>Ficus</i> 1 |
| 1b. Flowers in spikes or catkins; sterile and fertile flowers in separate catkins or spikes. | <i>Morus</i> 2 |

I. FICUS L.

- | | |
|--|------------------------|
| 1a. Leaves opposite ... | <i>F. hispida</i> 5 |
| 1b. Leaves alternate : | |
| 2a. Figs distinctly peduncled : | |
| 3a. Leaves scabrous above : | |
| 4a. Figs in pairs ... | <i>F. tinctoria</i> 9 |
| 4b. Figs solitary : | |
| 5a. Leaves 3-5-lobed ... | <i>F. carica</i> 3 |
| 5b. Leaves not lobed ... | <i>F. exasperata</i> 4 |
| 3b. Leaves not scabrous ... | <i>F. racemosa</i> 7 |
| 2b. Figs sessile or subsessile : | |
| 6a. Leaves caudate : | |
| 7a. Leaf base truncate or slightly attenuate; cusp 6 cm long ... | <i>F. religiosa</i> 8 |
| 7b. Leaf base cordate; cusp 3 cm long ... | <i>F. arnottiana</i> 1 |
| 6b. Leaves not caudate : | |
| 8a. Leaves obtuse or blunt at apex : | |

- 9a. Lateral nerves 6 - 9 pairs, not very distinct from smaller nerves. Figs glabrous ... *F. microcarpa* 6
- 9b. Lateral nerves less than 6 pairs, distinct from smaller nerves. Figs silky pubescent :
- 10a. Midrib with an elongated gland at the base. ... *F. tomentosa* 10
- 10b. Midrib eglandular ... *F. benghalensis* 2
- 8a. Leaves acute to acuminate at apex ... *F. virens* 11

1. *Ficus arnottiana* (Miq.) Miq. in Ann. Bot. Lugd. Bat. 3 : 287. 1867 ; Hook. f. Fl. Brit. Ind. 5 : 513. 1888 ; Ramam. & Gandhi in Sald. & Nicol. Fl. Hassan 79. 1976. *Urostigma arnottiana* Miq. Lond. J. Bot. 6 : 564. 1847.

Small trees. Leaves broadly ovate, caudate, cordato at base, glabrous, chartaceous ; base 5 - 7 nerved ; lateral nerves 8 - 12 pairs ; cusp 3 cm long. Figs clustered on tubercles on stem, usually in the axils of fallen leaves, subsessile, glabrous, globose, purple ; basal bracts distinct, caducous.

PACHMARHI : Vicinity (1000 m). In deciduous forest. Common.

Fl. & Fr. : February - April.

2. *Ficus benghalensis* L. Sp. Pl. 1059. 1753 ; Hook. f. Fl. Brit. Ind. 5 : 499. 1888 ; Ramam. & Gandhi in Sald. & Nicol. Fl. Hassan 80. 1976. "Bargad".

Large trees sending down many aerial roots from branches and thus extending the growth of the tree indefinitely ; young parts softly pubescent. Leaves coriaceous, ovate or orbicular ovate to elliptic, obtuse, entire. Receptacles sessile in pairs, axillary, globose, puberulous, red when ripe with 3 broad, rounded, nearly glabrous bracts at the base.

PACHMARHI : Vicinity (1000 m). BORI : Reserve forest (550 m). In the mixed forests. Common.

Fl. & Fr. : April - June.

3. *Ficus carica* L. Sp. Pl. 1059. 1753 ; Naik, Fl. Osman. 322. 1979. "Anjir".

Small, much branched, deciduous trees ; branches pubescent. Leaves thick, broad, ovate to nearly orbicular in outline ; usually 3 - 5 - lobed. Receptacles axillary and subterminal, stalked, solitary, pear-shaped, reddish - purple or dark - purple when ripe, slightly depressed at apex ; basal bracts 3, broadly ovate, acute, spreading.

PACHMARHI : Vicinity (1000 m). Road side. Occasional.

Fl. & Fr. : March - June.

4. *Ficus exasperata* Vahl, Enum. 2 : 197. 1886 ; Ramam. & Gandhi in Sald. & Nicol. Fl. Hassan 81. 1976. *Ficus asperrima* Roxb. Fl. Ind. 3 : 554. 1832 ; Hook. f. Fl. Brit. Ind. 5 : 522. 1888.

Shrubs or small trees ; young parts scabrid. Leaves alternate, minutely serrate, obovate - ovate or elliptic - oblong - lanceolate, abruptly acuminate, cuneate, scabrid above, hispid beneath, triplinerved ; lateral nerves 3-5 pairs. Figs axillary, solitary, distinctly peduncled, globular, pubescent, yellowish red.

BORI : Reserve forest (550 m). In mixed forest. Common.

Fl. & Fr. : February - April.

5. *Ficus hispida* L. f. Suppl. 442. 1781 ; Hook. f. Fl. Brit. Ind. 5 : 522. 1888 ; Ramam. & Gandhi in Sald. & Nicol. Fl. Hassan 81. 1976. *Ficus oppositifolia* Willd. Sp. Pl. 4 : 1151. 1804. "Daduri".

Shrubs or small trees without aerial roots ; all parts hispid pubescent. Leaves mostly opposite, oblong - lanceolate to ovate or obovate or elliptic, entire, blunt or acuminate, serrate, toothed or crenate in upper part. Receptacles paired, peduncled, globose, slightly depressed at apex, yellow when ripe, scabrous - hispid ; basal bracts 3.

PACHMARHI : Vicinity (1000 m). BORI : Reserve forest (500 m). In mixed forest. Common.

Fl. & Fr. April - October.

6. *Ficus microcarpa* L. f. Suppl. 442. 1781 ; Ramam. & Gandhi in Sald. & Nicol. Fl. Hassan 81. 1976. *Ficus retusa* (auct. non L. 1767) ; Hook. f. Fl. Brit. Ind. 5 : 511. 1888. *Ficus benjamina* Willd. Sp. Pl. 4 : 1143. 1805 (non L. 1767).

Moderate sized trees, all parts glabrous. Leaves coriaceous, elliptic, ovate or obovate, rounded or shortly bluntly acuminate at apex, polished and shining. Receptacles sessile, in pairs, axillary or from scars of fallen leaves, depressed - globose, smooth, yellow or reddish when ripe ; basal bracts 3, broadly ovate, blunt, persistent.

PACHMARHI : Vicinity (1000 m). BORI : Reserve forest (550 m). In mixed forest. Common.

Fl. & Fr. : March - June.

7. *Ficus racemosa* L. Sp. Pl. 1060. 1753 ; Ramam. & Gandhi in Sald. & Nicol. Fl. Hassan 82. 1976. *Ficus glomerata* Roxb. Pl. Cor. 2 : 13. t. 123. 1798 ; Hook. f. Fl. Brit. Ind. 5 : 535. 1888. "Gular".

Tall, evergreen trees ; young parts puberulous. Leaves ovate oblong or elliptic lanceolate, acute, glabrous. Receptacles shortly pedunculate on short, leafless, warty branches, pyriform or subturbinate, orange red when ripe ; basal bracts 3, ovate triangular.

BORI : Reserve forest (550 m). Along river side. Common.

Fl. & Fr. : December July.

8. *Ficus religiosa* L. Sp. Pl. 1059. 1753 ; Hook. f. Fl. Brit. Ind. 5 : 513. 1888 ; Ramam. & Gandhi in Sald. & Nicol. Fl. Hassan 82. 1976. "Pipal".

Large glabrous trees. Leaves coriaceous, ovate rotund, narrowed upwards and the apex produced into a linear lanceolate tail about half as long as the main portion of the blade, entire. Receptacles in pairs, axillary, sessile, smooth, depressed - globose, dark purple when ripe ; basal bracts broad, spreading.

PACHMARHI : Vicinity (1000 m). BORI : Reserve forest (550 m). In mixed forests. Occasional.

Fl. & Fr. : April August.

9. *Ficus tinctoria* Forst. f. Prodri. 76. 1786. subsp. *parasitica* (Willd.) Corner in Gard. Bull. Straits Settlem. 17 : 476. 1960 ; Ramam. & Gandhi in Sald. & Nicol. Fl. Hassan 83. 1976. *Ficus parasitica* Koen. ex Willd. Mem. Acad. Roy. Sci. Hist. (Berlin) 102. 1798. *Ficus tuberculata* Roxb. Fl. Ind. 3 : 554. 1832. *Ficus gibbosa* Bl. var. *tuberculata* (Roxb.) King in Ann. Roy. Bot. Gard. (Calcutta) 1 : 6. t. 26B. 1887 88 ; Hook. f. Fl. Brit. Ind. 5 : 497. 1888.

Small trees with aerial roots. Leaves subsessile, elliptic oblong, acute or acuminate at apex, subacute at base, inequilateral, often gibbous on one side, glabrous, scabrid, coriaceous, triplinerved ; lateral nerves 5-6 pairs. Figs in axillary pairs, peduncled, orange coloured, scabrid, sparsely pubescent ; basal bracts small.

PACHMARHI : Dhupgarh (1250 m). BORI : Reserve forest (550 m). In the mixed forests. Occasional.

Fl. & Fr. : April - December.

10. *Ficus tomentosa* Roxb. ex Willd. Sp. Pl. 4 : 1136. 1806 ; Hook. f. Fl. Brit. Ind. 5 : 501. 1888.

Large shady trees with thin aerial roots from the branches ; young parts clothed with rusty grey tomentum. Leaves coriaceous, ovate elliptic or obovate elliptic, bluntly apiculate, entire, rusty grey tomentose beneath, base rounded or cordate, 3-7 nerved, midrib with an elongated gland at the base. Receptacles sessile in pairs, axillary, pisiform, grey tomentose ; basal bracts 3, large, spreading.

PACHMARHI : Mahadev hill (1200 m) ; Dhupgarh (1250 m). In mixed forests. Common.

Fl. & Fr. : December July.

11. *Ficus vires* Ait. Hort. Kew. 3 : 451. 1789 ; Ramam. & Gandhi in Said. & Nicol. Fl. Hassan 83. 1976. *Ficus infectoria* Roxb. Fl. Ind. 3 : 551. 1832 (*non* Willd. 1806) ; Hook. f. Fl. Brit. Ind. 5 : 515. 1888. *Ficus lacor* Buch Ham. in Trans. Linn. Soc. 15 : 150. 1826.

Medium deciduous trees. Leaves ovate lanceolate, abruptly obtusely acuminate, rounded or truncate at base, slightly glossy, with 3-5 pairs of basal nerves and 6-8 pairs of lateral nerves. Figs in axillary pairs, shortly peduncled, globular, glabrous, creamy - white ; basal bracts distinct.

PACHMARHI : Vicinity (1000 m). BORI : Reserve forest (550 & 1000 m). In mixed forests. Common.

Fl. & Fr. : December April.

2. MORUS L.

Morus alba L. Sp. Pl. 986. 1753 ; Hook. f. Fl. Brit. Ind. 5 : 492. 1888 ; Ramam. & Gandhi in Said. & Nicol. Fl. Hassan 84. 1976. "Tut".

Small, deciduous, monoecious or dioecious trees. Leaves ovate, rarely large, irregularly serrate or 3 lobed, acuminate. Flowers in short, pendulous catkins, greenish. Sorosis purplish black when ripe.

BORI : Reserve forest (550 m), Feb. '78, Pant 27239 (BSA). In mixed forest. Rare.

Fl. & Fr. : January March.

New record for the area.

86. SALICACEAE Mirbel.

SALIX L.

Salix tetrasperma Roxb. Pl. Cor. t. 97. 1795 et Fl. Ind. 3 : 573. 1832; Hook. f. Fl. Brit. Ind. 5 : 626. 1888; Gandhi in Sald. & Nicol. Fl. Hassan 183. 1976. "Bod".

Moderate sized deciduous trees; branchlets and young shoots white silky hairy. Leaves lanceolate or elliptic lanceolate, glandular-serrate, glabrescent, sometimes glaucous beneath, membranous. Catkins hairy; peduncles 3-12 cm long. Stamens 4-12, free, villous at base. Ovary glabrous.

PACHMARHI : Vicinity (900 m). Along stream bank. Occasional.

Fl. & Fr. : September - December.

87. PINACEAE Lindl.

PINUS L.

Pinus longifolia Roxb. Fl. Ind. 3 : 651. 1832; Hook. f. Fl. Brit. Ind. 5 : 652. 1888. *Pinus roxburghii* Spreng. Silva N. Amer. 11 : 9. 1897. "Chir".

Large trees; bark rough, cut into polygonal plates by deep dark-coloured furrows. Leaves needle-shaped in clusters of 3. Cones on short, stiff stalks, ovoid-conical. Seeds with a thin membranous wing, obtuse, oblanceolate and unequal sided.

PACHMARHI : Vicinity (1000 m). In the forest. Planted.

Fl. & Fr. : February - May.

88. CUPRESSACEAE S. P. Gray.

CUPRESSUS L.

Cupressus sempervirens L. Sp. Pl. 1002. 1753; Hook. f. Fl. Brit. Ind. 5 : 645. 1888. "Sara"

Tall, pyramidal trees ; branches erect, often adpressed to the trunk ; branchlets 4 sided. Leaves ovate oblong. Cones few, grey when ripe, varying in shape ; scales rough, with a projecting point, convex or keeled. Seeds ovoid or oblong, angular, with a narrow wing.

PACHMARHI : Mahadev hill (1200 m). In mixed forest. Occasional.

Fl. & Fr. : February May.

89. ORCHIDACEAE Juss.

1a. Plants epiphytic :

2a. Plants with distinct pseudobulbs :

3a. Lateral sepals decurrent along the column-foot ... *Dendrobium* 2

3b. Lateral sepals not decurrent. Column-foot absent ... *Liparis* 7

2b. Plants without pseudobulbs :

4a. Spur laterally compressed ... *Rhynchostylis* 12

4b. Spur not compressed laterally :

5a. Column-foot long ... *Aerides* 1

5b. Column-foot absent ... *Vanda* 13

1b. Plants terrestrial :

6a. Lip spurred ; spur projecting beyond the lateral sepals :

7a. Anthers 2 :

8a. Stigmatic lobes flat, almost confluent ... *Platanthera* 11

8b. Stigmatic lobes not flat, distinct :

9a. Stigmatic lobes convex. Flowers erect ... *Peristylus* 10

9b. Stigmatic lobes cylindric or club-shaped. Flowers patent or erectopatent ... *Habenaria* 6

7b. Anther 1 :

10a. Inflorescence erect. Lip with a short spur, distinctly 3-lobed ... [*Eulophia*] 3

10b. Inflorescence decurved. Lip with a conical sac, faintly 3-lobed ... *Geodorum* 4

6b. Lip not spurred, often saccate with a sac not projecting beyond the sepals :		
11. Pollinia 4	...	<i>Malaxis</i> 8
11b. Pollinia 2 :		
12a. Leaves appear before the flowers. Venation divergent	...	<i>Nervilia</i> 9
12b. Leaves and flowers appear together. Venation convergent	...	<i>Goodyera</i> 5

1. AERIDES Lour.

Aerides multiflora Roxb. Pl. Cor. 3 : 63. t. 271. 1795 ; Hook. f. Fl. Brit. Ind. 6 : 44. 1890 ; Babu, Herb. Fl. Dehra Dun 479. 1977.

Epiphytic plants. Leaves crowded, obtuse. Racemes 4 to 5-flowered. Flowers white or pale violet; often darker. Sepals and petals rounded; odd sepal and petal ovate-oblong; lateral ones ovate-obovate. Lip 3-lobed; median lobe triangular-cordate, with a narrowed, rounded top, violet-red; spur straight, obtuse, upcurved.

PACHMARHI : Vicinity (1000 m), 26-12-62, *Panigrahi* 6557 (BSA). On forest trees. Rare.

Fl. & Fr. : October December.

2. DENDROBIUM Swartz.

1a. Flowers fascicled	...	<i>D. crepidatum</i> 1
1b. Flowers racemose	...	<i>D. herbaceum</i> 2

1. **Dendrobium crepidatum** Lindl. in Pax. Fl. Gard. 1 : 63. f. 45. 1850-51 ; Hook. f. Fl. Brit. Ind. 5 : 740. 1890 ; Sald. in Sald. & Nicol. Fl. Hassan 820. 1976.

Epiphytic pendulous plants, leafless when in flower. Flowers 1-few, fascicled, white. Lip rounded, yellowish, pubescent. Foot and mentum present.

PACHMARHI : Vicinity (1000 m). On trees in the forest. Common.

Fl. & Fr. : March April.

Dendrobium herbaceum Lindl. Bot. Misc. 69. 1840 ; Hook. f. Fl. Brit. Ind. 5 : 719. 1890 ; Sald. in Sald. & Nicol. Fl. Hassan 820. 1976.

Epiphytic plants with grooved stems ; leafless when in flower. Flowers shortly received, white. Lip with obscure side-lobes and a terminal triangular midlobe.

PACHMARHI : Mahadev hill (1200 m) ; Dhupgarh (1250 m). On trees in the forest. Occasional.

Fl. & Fr. : June July.

3. EULOPHIA R. Br.

- | | |
|---|-----------------------|
| 1a. Lip saccate at base. Bracts shorter than the ovary ... | <i>E. explanata</i> 1 |
| 1b. Lip with a short, bent spur. Bracts as long as or longer than the ovary ... | <i>E. herbacea</i> 2 |

1. **Eulophia explanata** Lindl. Gen. Sp. Orch. 180. 1833 ; Hook. f. Fl. Brit. Ind. 6 : 3. 1890 ; Babu, Herb. Fl. Dehra Dun 485. 1977.

Pseudobulbs ovoid, annulated. Leaves elliptic-lanceolate, acuminate. Racemes lax. Sepals and petals subequal, patent, white or yellowish streaked with reddish purple. Sepals spathulate-lanceolate, acute. Petals oblong, rounded at apex. Lip 3-lobed, subpanduriform when flattened out ; lateral lobes rounded, erect, white with reddish-purple ; median lobe yellow with purplish veins, oblong with a rounded, emarginate apex and reflexed margins.

PACHMARHI : Dhupgarh (1250 m), *Saxena* 1004 (SFRI). In shady places on hill slopes. Rare.

Fl. & Fr. : June July.

2. **Eulophia herbacea** Lindl. Gen. Sp. Orch. 182. 1833 ; Hook. f. Fl. Brit. Ind. 6 : 2. 1890 ; Babu, Herb. Fl. Dehra Dun 485. 1977.

Terrestrial herbs ; stem slender, sheathed. Leaves linear-lanceolate, many-nerved. Scape stout, sheaths large, acuminate. Inflorescence short, 8-10-flowered. Flowers white, with purple nerves. Sepals linear-lanceolate. Petals oblong-elliptic. Lip obovate, oblong.

PACHMARHI : Vicinity (1000 m), *Saxena & Pandey* 83527 (SFRI). In sal forest undergrowth. Rare.

Fl. & Fr. : June July.



4. GEODORUM Jacks.

Geodorum densiflorum (Lamk.) Schlecht. Feddes Repert. 4 : 259. 1929 ; Sald. in Sald. & Nicol. Fl. Hassan 831. 1976. *Limodorum densiflorum* Lamk. Encycl. 3 : 516. 1792. *Geodorum dilatatum* R. Br. in W. Ait. Hort. Kew. ed. 2. 5 : 207. 1813 ; Hook. f. Fl. Brit. Ind. 6 : 17. 1890.

Pseudobulbs globular. Leaves usually sessile, erect, lanceolate ; sheaths forming a false stem. Flowers arranged in corymbose racemes, whitish-fleshy coloured, almost bell-shaped. Sepals linear-oblong. Petals obovate oblong. Lip broadly cymbiform, obscurely 3-lobed ; lateral lobes subentire, median one crenulate.

PACHMARHI ; Dhupgarh (1250 m). On hill slopes. Occasional.

Fl. & Fr. : April May.

5. GOODYERA R. Br.

Goodyera procera (Ker) Hook. Exot. Fl. t. 39. 1823 ; Hook. f. Fl. Brit. Ind. 6 : 111. 1890 ; Babu, Herb. Fl. Dehra Dun 487. 1977. *Neottia procera* Ker, Bot. Reg. t. 639. 1822.

Stem greenish, streaked with light green. Leaves lanceolate, acuminate. Spikes many-flowered, dense, patently pubescent. Flowers white, fragrant. Sepals broadly ovate. Petals spatulate. Lip with 2 tubercles and bristles on the inner side with a recurved, broad, obtuse, white top.

PACHMARHI : Vicinity (1000 m) ; Mahadev hill (1200 m). On hill slopes and forest undergrowth. Common.

Fl. & Fr. ; June July.

6. HABENARIA Willd.

- | | |
|---------------------------------|-----------------------------------|
| 1a. Spur longer than the ovary | ... <i>H. grandifloriformis</i> 1 |
| 1b. Spur shorter than the ovary | ... <i>H. graveolens</i> 2 |

Habenaria grandifloriformis Blatter & Mc Cann in J. Bombay Nat. Hist. Soc. 36 : 17. 1932 *emend* Sant. & Kap. *ibid* 56 : 195. 1959 ; Sald. in

Sald. & Nicol. Fl. Hassan 832, 1976. *Habenaria grandiflora* Lindl. ex Dalz. & Gibbs. Bombay Fl. 267, 1861 (*non* Torrey ex Beck, 1833); Hook. f. Fl. Brit. Ind. 6 : 136. 1890.

Leaf near the base, solitary, radical, orbicular or ovato-cordate. Scape usually naked, 1-4-flowered. Bracts sheathing. Flowers white. Sepals ovate, lateral oblique, acute. Upper segments of the petals suborbicular. Lip 3-partite; segments subequal; lateral filiform, median linear lanceolate. Spur longer than the ovary.

PACHMARHI : Vicinity (1000 m). In forest undergrowth. Occasional.

Fl. & Fr. : June July.

Habenaria graveolens Duthie, Fl. Upper Gangetic Plain, 3 : 222. 1920; Babu, Herb. Fl. Dehra Dun 489, 1977. *Habenaria digitata* (*auct. pl.* *non* Lindl. 1835); Hook. f. Fl. Brit. Ind. 6 : 134. 1890.

Stem slender, leafy. Leaves variable, roundish to lanceolate. Scape lax, many-flowered. Flowers fragrant, pale green. Lateral sepals ovate, dorsal suborbicular. Petals 2-partite, segments unequal. Lip 3-lobed; lateral lobes a little longer than the petals; midlobe linear, straight, longer than the lateral ones. Spur shorter than the ovary.

PACHMARHI : Dhupgarh (1250 m). On hill slopes in forest undergrowth. Occasional.

Fl. & Fr. : July October.

7. **LIPARIS** Rich.

Liparis atropurpurea Lindl. Gen. Sp. Orch. 28. 1830; Hook. f. Fl. Brit. Ind. 5 : 698. 1890; Bose & Bhatt. Orch. India 339. 1980.

Plants with pseudobulbs. Leaves 3-4, petiolate, acute or acuminate. Flowers in racemes, dark purple. Sepals long, linear, obtuse. Lip orbicular-ovate, recurved, fleshy with 2 large, long, tubercles at the narrowed base.

PACHMARHI : Vicinity (1000 m). In forest undergrowth. Occasional.

Fl. & Fr. : July October.

8. *MALAXIS* Soland ex Sw.

- 1a. Leaves flat. Inflorescence lax. Side lobes of lip produced upwards into auricles :
 2a. Leaves green, often shaded purplish. Lip not constricted to the middle ... *M. acuminata*
 2b. Upper surface or leaves dark brownish - green ; the lower surface purplish. Lip constricted to the middle ... *M. mackinnonii* 2
 1b. Leaves erect. Inflorescence dense. Side lobes of lip not produced upwards into auricles ... *M. versicolor* 3

1. *Malaxis acuminata* D. Don, Prodr. Fl. Nepal. 29. 1825. *Microstylis wallichii* Lindl. Gen. et Sp. Orchid. 20. 1830 ; Hook. f. Fl. Brit. Ind. 5 : 686. 1888.

Leaves ovate - lanceolate, green, often shaded purplish. Inflorescence lax. Flowers greenish, yellow - purplish. Sepals oblong. Petals linear, blunt. Lip not constricted to form a distinct anterior lobe ; auricle of lip variable.

PACHMARHI : Vicinity (1000 m), Feb. '78, Pant 27177 (BSA). Mahadev hill (1200 m), 27 7 64. Panigrahi 4572 (BSA). on hill slopes and forest undergrowth. Common.

Fl. & Fr. : July October.

New record for the area.

2. *Malaxis mackinnonii* (Duthie) Ames, Orch. 6 : 289. 1920 ; Babu, Herb. Fl. Dehra Dun 491. 1977. *Microstylis mackinnonii* Duthie in Journ. Asiat. Soc. Beng. 71 : 37. 1902.

Leaves 1-3, clustered and spreading on the ground, subfleshy, subuplicate ; upper surface dark brownish green ; lower surface purplish. Flowers yellow. Sepals narrowly oblong, obtuse. Petals obtuse, twisted, reflexed, hardly visible. Lip constricted to the middle ; side lobes produced upwards into auricles ; the apex bilobed.

PACHMARHI : Dhupgarh (1250 m), Saxena & Pandey 83548 (SFRI). On hill slopes. Rare.

Fl. & Fr. : August - October.

3. *Malaxis versicolor* (Lindl.) Abeywickr. in Ceylon J. Sci. Biol. Sci. 2 : 147. 1959 ; Sant. & Kapadia in J. Bombay nat. Hist. Soc. 58 : 347.

1961 ; Sald. in Sald. & Nicol. Fl. Hassan 836. 1976. *Microstylis versicolor* Lindl. Gen. Sp. Orch. 21. 1830. *Microstylis rheedii* Wt. Ic. 3 (2) : 9. t. 902. 1845 ; Hook. f. Fl. Brit. Ind. 5 : 690. 1890.

Leaves erect, petiolate, ovate lanceolate, membranous, greenish purple. Bracts reflexed. Flowers very small, greenish yellow to purple. Sepals unequal, obtuse, entire. Petals slightly curved, acute. Lip superior, purple, rounded.

PACHMARHI : Vicinity (1000 m) ; Dhupgarh (1250 m). On hill slopes and forest undergrowth. Common.

Fl. & Fr. : July August.

9. NERVILIA Comm. ex Gaud.

- | | |
|---|---------------------------|
| 1a. Leaf long - petiolated, ovate. Flowers 2 - 5 | ... <i>N. aragoana</i> 1 |
| 1b. Leaf short - petiolated, orbicular. Flower solitary | ... <i>N. prainiana</i> 2 |

1. *Nervilia aragoana* Gaud. in Freycinet, Voy. Bot. 422. t. 35. 1826 ; Sald. in Sald. & Nicol. Fl. Hassan 837. 1976. *Pogonia flabelliformis* Lindl. Gen. Sp. Orch. 415. 1840 ; Hook. f. Fl. Brit. Ind. 6 : 121. 1890. "Ban batasha".

Leaf long petiolate, cordate hastate at base, acute at tip, with undulating margins. Inflorescence 5 flowered. Flowers greenish yellow. Lip shortly 3 lobed ; lateral lobes short, midlobe subacute, irregularly crenulate ; nerves fleshy, purple.

PACHMARHI : Vicinity (1000 m), Saxena & Pandey 83538 (SFRI). In forest undergrowth. Rare.

Fl. & Fr. : May June.

2. *Nervilia prainiana* (King & Pantl.) Seidenf. & Smitin. Orch. Thailand 730. 1964 ; Sald. in Sald. & Nicol. Fl. Hassan 837. 1976. *Pogonia prainiana* King & Pantl. in J. Asiat. Soc. Beng. 65 (2) : 129. 1896.

Leaf hairy, reniform cordate, flat on ground. Flower solitary. Sepals and petals yellow. Lip 3 lobed, purple ; lateral lobes as long as midlobe, rounded ; midlobe fimbriate ; nerves fleshy, hairy.

PACHMARHI : Dhupgarh (1250 m), 26 7 64, *Panigrahi* 4510 (BSA). On hill slopes. Occasional.

Fl. & Fr. : June July.

New record for the area.

10. PERISTYLSU BL.

- | | | |
|--|-----|--------------------------|
| 1a. Spur as long as or longer than sepals | ... | <i>P. stockstillii</i> 3 |
| 1b. Spur much shorter than sepals : | | |
| 2a. Inflorescence a dense, cylindric spike | ... | <i>P. constrictus</i> 1 |
| 2b. Inflorescence a lax, subsecund spike | ... | <i>P. goodyeroides</i> 2 |

1. *Peristylus constrictus* Lindl. Gen. Sp. Orch. 300. 1835 ; Babu, Herb. Fl. Dehra Dun 494. 1977. *Habenaria constricta* (Lindl.) Hook. f. Fl. Brit. Ind. 6 : 161. 1890.

Tubers oblong, hairy. Leaves 5 - 6, ovate - elliptic. Spikes cylindric, dense, many - flowered. Flowers white or pale yellow. Sepals subequal, oblong, obtuse ; lateral ones with involute edges. Petals obliquely ovate lanceolate. Lip as long as the petals, 3 lobed ; lateral lobes linear, acuminate, somewhat diverging at their tips ; median lobe oblong. Column very short, broad.

PACHMARHI : Vicinity (1000 m) ; Mahadev hill (1200 m). On hill slopes and forest undergrowth. Occasional.

Fl. & Fr. : July - August.

2. *Peristylus goodyeroides* (D. Don) Lindl. Gen. Sp. Orch. 299. 1835 ; Babu, Herb. Fl. Dehra Dun 494. 1977. *Habenaria goodyeroides* D. Don, Prodr. 25. 1825 ; Hook. f. Fl. Brit. Ind. 6 : 161. 1890.

Robust. Leaves 3 - 5, spirally arranged at about the middle of stem. Flowers small, creamy - white. Sepals unequal ; middle one ovate - oblong ; lateral ones obliquely oblong. Petals obovate - rounded. Lip 3 fid ; median oblong, shorter, obtuse ; lateral ones linear ; spur globose.

PACHMARHI : Dhupgarh (1250 m), 26 - 7 64, *Panigrahi* 4513 (BSA). On hill slopes under forest. Occasional.

Fl. & Fr. : July October.

New record for the area.

3. *Peristylus stocksii* (Hook. f.) Kranz. Orch. Gen. Sp. I : 513. 1898 ; Sant. & Kap. Orch. Bomb. 48. 1966. *Habenaria stocksii* Hook. f. Fl. Brit. Ind. 6 : 158. 1890.

Tuber ellipsoid. Stem slender, sheathed. Leaves elliptic-lanceolate. Inflorescence lax flowered. Flowers small, sessile, bracteate, yellowish green. Sepals subequal, glabrous. Petals obtuse, entire, glabrous. Lip 3 lobed, clawed, longer than the lateral sepals.

PACHMARHI : Dhungarh (1250 m). On hill slopes under forest. Occasional.

Fl. & Fr. : July September.

11. PLATANTHERA Rich.

Platanthera susannae (L.) Lindl. Gen. Sp. Orch. 295. 1835 ; Babu, Herb. Fl. Dhera Dun 495. 1977. *Orchis susannae* L. Sp. Pl. 939. 1753. *Habenaria susannae* (L.) R. Br. ex Spreng. Syst. Veg. 3 : 622. 1826 ; Hook. f. Fl. Brit. Ind. 6 : 137. 1890.

Robust ; tubers 2, ellipsoid or ovoid. Leaves ovate-oblong or oblong-lanceolate, acute. Flowers white, faintly tinged with green. Sepals unequal, white faintly suffused with green ; odd one obovate-elliptic, obtuse ; lateral ones obliquely and subquadrately oblong, acute. Petals white, narrowly linear-oblong, acute. Lip white, fimbriate ; spur pale-green, obtuse.

PACHMARHI : Vicinity (1000 m). In forest undergrowth and hill slopes. Occasional.

Fl. & Fr. : September October.

12. RHYNCHOSTYLIS Bl. *emend* Hassk.

Rhynchostylis retusa (L.) Bl. Bijdr. 286, t. 49. 1825 ; Hook. f. Fl. Brit. Ind. 6 : 32. 1890 ; Babu, Herb. Fl. Dhera Dun 496. 1977. *Epidendrum retusum* L. Sp. Pl. 953. 1753.

Epiphytic plants ; stem sheathed. Leaves coriaceous, channelled, retuse at apex. Sepals, petals white, dotted with pink. Lip pink ; spur laterally compressed, pubescent inside.

PACHMARHI : Vicinity (1000 m), Saxena 1000 (SFRI). On trees in the forest. Rare.

Fl. & Fr. : April September.

13. VANDA R. Br.

Vanda testacea (Lindl.), Reichb. f. Gard. Chron. 2 : 166. 1877 ; Babu, Herb. Fl. Dehra Dun 497. 1977. *Aerides testaceum* Lindl. Gen. Sp. Orch. 238. 1833. *Vanda parviflora* Lindl. Bot. Reg. 30 : Misc. 45. 1844 ; Hook. f. Fl. Brit. Ind. 6 : 50. 1890.

Epiphytes. Leaves leathery, unequally bilobed at the apex, linear. Flowers yellow ; midlobe of lip lilac or whitish with lilac lines. Sepals broadly obovate, spreading. Petals spatulate - oblong. Lip adnate to the foot of the column ; spur funnel shaped.

PACHMARHI : Vicinity (1000 m). On trees in the forest. Common.

Fl. & Fr. : May June.

90. ZINGIBERACEAE Lindl.

- 1a. Inflorescence on separate leafless shoots, associated with leafy stem :

 - 2a. Anther connective prolonged into a beak, enclosing style ... *Zingiber* 5
 - 2b. Anther connective truncate, crested :

 - 3a. Anther not spurred ; lateral staminodes reduced to small teeth. ... *Anomomum* 2
 - 3b. Anther base spurred ; lateral staminodes petaloid ... *Curcuma* 3

1b. Inflorescence on a leafy shoot or leaves developing after flowering :

- 4a. Inflorescence racemose, Pedicels 1 - 2 cm long ... *Alpinia* 1
- 4b. Inflorescence spicate. Pedicels 5 mm long ... *Hedychium* 4

I. ALPINIA Roxb.

Alpinia calcarata Rosc. in Trans. Linn. Soc. 8 : 347. 1807 ; Baker in Hook. f. Fl. Brit. Ind. 6 : 254. 1892.

Slender herbs. Leaves lanceolate, glabrous. Flowers showy, usually 3-4 on the lower branches of a dense pyramidal panicle. Bracts white, boat-shaped or oblong. Corolla white. Lip beautifully variegated with red and yellow, base spurred.

PACHMARHI : Vicinity (1000 m), 28-12-62, Panigrahi 6687 (BSA). In forest undergrowth. Occasional.

Fl. & Fr. : April - June.

New record for the area.

2. AMOMUM Roxb.

Amomum dealbatum Roxb. Fl. Ind. I : 43. 1832 ; Baker in Hook. f. Fl. Brit. Ind. 6 : 239. 1892.

Large herbs with tuberous rootstocks. Leaves sheathing, distichous, oblong-lanceolate. Flowers in dense spikes on short peduncles, densely covered with bracts when young. Lip with crisped margins. Crest subquadrate. Fruits oblong with 9 crenulate wings.

BORI : Reserve forest (550 m), 25-12-62, Panigrahi 6504 (BSA). In forest undergrowth. Occasional.

Fl. & Fr. : June - December.

New record for the area.

3. CURCUMA L.

1a. Rootstock small. Leaves ovate-cordate. Flower bracts purple ...

C. decipiens 1.

1b. Rootstock large. Leaves oblong. Flower bracts pale green ...

G. pseudomontana 2.

1. *Curcuma decipiens* Datz. in Hook. Kew Journ. 2 : 144. 1850 ; Baker in Hook. f. Fl. Brit. Ind. 6 : 215. 1890.

Herbs. Rootstocks small, bearing numerous small tubers. Leaves thin, ovate-cordate ; petiole as long as the blade. Spikes with short peduncles ; lower bracts ovate, many ; upper sterile, longer, oblong. Flowers shorter than the bracts ; flowers and bracts purple. Lip bifid, margin curled.

PACHMARHI : Vicinity (1000 m) ; Dhupgarh (1250 m). In forest undergrowth. Occasional.

Fl. & Fr. : July November.

Curcuma pseudomontana Graham, Cat. 210. 1839 ; Sant. Fl. Khandala 273. 1967. *Curcuma montana* Baker in Hook. f. Fl. Brit. Ind. 6 : 214. 1890, p. p. (*non* Roscoe, 1807).

Perennial herbs with large rootstocks. Rhizome large with many ellipsoid or subglobose tubers. Leaves oblong, narrowed to the base ; petioles as long as the blade. Spikes with peduncles shorter than the petioles. Flowers as long as the bracts. Flower bracts pale green. Corolla yellow.

PACHMARHI : Vicinity (1000 m). On hill slopes. Occasional.

Fl. & Fr. : July December.

4. HEDYCHIUM Koen.

Hedychium coronarium Koen. in Retz. Obs. Bot. 3 : 73. 1783 ; Baker in Hook. f. Fl. Brit. Ind. 6 : 225. 1892 ; Babu, Herb. Fl. Dehra Dun 503. 1977.

Perennial herbs with stout rhizome. Leaves oblong-lanceolate, appressed hairy beneath. Spikes cone-shaped. Bracts obtuse or acuminate, 3 - 9-flowered. Flowers white with a pale yellow blotch at mouth, fragrant. Corolla tube longer than the bract. Staminodes obliquely spatulate. Lip suborbicular, clawed, 2-fid. Capsules subglobose.

BORI : Dhain (430 m). In waste places in the forest. Common.

Fl. & Fr. : June October.

5. ZINGIBER Boehm.

Zingiber roseum (Roxb.) Rose. in Trans. Linn. Soc. 8 : 348. 1807 ; Baker in Hook. f. Fl. Brit. Ind. 6 : 244. 1892 ; Babu, Herb. Fl. Dehra Dun 504. 1977. *Amomum roseum* Roxb. Pl. Cor. t. 126. 1800.

Erect, perennial herbs with creeping rhizomes. Leaves lanceolate-oblong or elliptic. Spike ovoid-oblong. Bracts red ; lower ones ovate, upper ones lanceolate-oblong. Calyx spathaceous, purple-tinged at the top. Corolla tube pubescent ; segments red. Lip whitish, recurved and with ovate auricles. Lateral staminodes yellowish, subulate. Fruit ovoid-ellipsoid, 3-gonous, red.

PACHMARHI : Vicinity (1000 m). BORI : Reserve forest (900 m). In shaded places in forests. Common.

Fl. & Fr. : August October.

91. COSTACEAE (K. Schum.) Nak.

COSTUS L.

Costus speciosus (Koen.) Smith in Trans. Linn. Soc. Lond. 1 : 249. 1791 ; Baker in Hook. f. Fl. Brit. Ind. 6 : 249. 1892 ; Babu, Herb. Fl. Dehra Dun 500. 1977. *Banksia speciosa* Koen. in Retz. Obs. Bot. 3 : 75. 1783. "Keu".

Erect, tuberous perennial herbs. Leaves lanceolate-obovate, lower surface pubescent. Spikes terminal, compact, ovoid or ellipsoid ; bracts ovate-oblong, greenish-red, becoming bright red in age, 1-flowered. Calyx campanulate, 3-toothed, pale greenish becoming red in age. Corolla white. Staminodes absent. Lip obovate-suborbicular, white with a median yellow band towards base. Capsules globose or oblong.

PACHMARHI : Vicinity (1000 m). BORI : Dhain (430 m). In moist shady places in the forest. Common.

Fl. & Fr. : July October.

92. MUSACEAE Juss.

MUSA L.

Musa x paradisiaca L. Sp. Pl. 1043. 1753. (*Musa acuminata* x *Musa balbisiana*; '*Musa paradisiaca*'); Moore in Baileya 5 : 185. 1957; Babu, Herb. Fl. Dehra Dun 499. 1977. *Musa x sapientum* L. Syst. Nat. ed. 10. 1303. 1759 ('*Musa sapientum*'); Baker in Hook. f. Fl. Brit. Ind. 6 : 262. 1892. "Kela".

Stoloniferous, stout, tall herbs. Leaves oblong, green. Inflorescence pendulous; bracts deciduous. Fruits oblong, trigonous, yellow when ripe; the pulp sweet and edible.

PACHMARHI : Vicinity (1000 m). In deep shaded valleys. Occasional.

Fl. & Fr. : All seasons.

93. HYPOXIDACEAE R. Br.

HYPOXIS L.

Hypoxis aurea Lour. Fl. Cochinch. 200. 1790; Hook. f. Fl. Brit. Ind. 6 : 277. 1892; Gandhi in Sald. & Nicol. Fl. Hassan 797. 1976.

Slender herbs with corms crowned with remains of old leaves; the root fibres fleshy. Leaves radical, spreading, reflexed, simple, linear, acute, glabrous or hairy. Flowers in scapes. Perianth lobes sessile on the top of ovary, elliptic, lanceolate, acuminate, yellow. Capsule green.

PACHMARHI : Dhupgarh (1250 m). On hill slopes. Occasional.

Fl. & Fr. : June August.

94. DIOSCOREACEAE R. Br.

DIOSCOREA L.

- 1a. Stem twining to the right. Seeds winged all around :
- 2a. Male spikes fascicled from nodes of leafy or leafless stem :

3a. Leaves 3 - 5-nerved, variable in shape. Pistillode minute	...	<i>D. oppositifolia</i> 4
3b. Leaves 7-nerved, cordate, hastate or truncate at the base. Pistillode large, globose	...	<i>D. puber</i> 6
2b. Male spikes 1 - 3-nate on leafless stem	...	<i>D. belophylla</i> 1
1b. Stem twining to the left. Seeds winged at base only :		
4a. Leaves simple, 7 - 13-nerved :		
5a. Stem bulbiferous. Male flowers crowded or scattered	...	<i>D. bulbifera</i> 2
5b. Stem not bulbiferous. Male flowers always solitary	...	<i>D. wightii</i> 7
4b. Leaves 3 - 5-foliolate (rarely simple towards ends of branches), less than 7-nerved :		
6a. Male spike up to 1 cm. Stamens 6. Female flowers in solitary distant spikes. Capsules less than 3 cm long	...	<i>D. hispida</i> 3
6b. Male spikes 3 - 4 cm. Stamens 3 alternating with 3 staminodes. Female flowers in 2 - 3-nate racemes on the spike axis. Capsules more than 5 cm long.	...	<i>D. pentaphylla</i> 5

1. *Dioscorea belophylla* Voigt, Hort. Subur. Calc. 653. 1845; Babu, Herb. Fl. Dehra Dun 514. 1977. *Dioscorea glabra* sensu Hook. f. Fl. Brit. Ind. 6 : 294. 1892, p. p. (*non* Roxb. 1832).

Slender, glabrous, herbaceous twiners. Stem twining to right. Leaves simple, shallowly cordate, 7 - 9 ribbed. Petiole nearly as long as the blade. Male spikes 1 - 3-nate, on special leafless stems. Female spikes from nodes of leafy branches. Capsules pendulous, broader than long. Seed winged all around.

PACHMARHI : Vicinity (1000 m). In the forest. Occasional.

Fl. & Fr. : July February.

2. *Dioscorea bulbifera* L. Sp. Pl. 1033. 1753; Babu, Herb. Fl. Dehra Dun 515. 1977. *Dioscorea sativa* Thunb. Fl. Jap. 151. 1784 (*non* L. 1753); Hook. f. Fl. Brit. Ind. 6 : 295. 1892, "Ratalu".

Stem twining to left, glabrous, 4-angled, ribbed. Bulbils common in leaf axils. Leaves alternate, shallowly cordate, up to 11-ribbed. Petiole narrowly margined, with auricles at base. Male spikes in slender axillary panicles. Perianth lobes linear. Stamens 6. Female spikes 1 - 3 together; staminodes 6. Capsules quadrately oblong. Seeds winged only at the base.

PACHMARHI : Vicinity (1000 m). BORI : Dhain (413 m). On bushes in the forest. Common.

Fl. & Fr. : July December.

3. *Dioscorea hispida* Dennst. in Schluss. Hort. Ind. Malab. 15. 1818 ; Babu, Herb. Fl. Dehra Dun 515. 1977. *Dioscorea daemona* Roxb. Fl. Ind. 3 : 805. 1832 ; Hook. f. Fl. Brit. Ind. 6 : 289. 1892.

Stem twining to the left, hirsute with recurved prickles. Leaves 3 foliolate. Leaflets obovate, pubescent ; venation subpalmate. Male spikes solitary or clustered on pubescent rachis, short cylindrical. Stamens 6. Female flowers in solitary distant spikes. Capsules reflexed, oblong.

PACHMARHI : Vicinity (1000 m). BORI : Reserve forest (550 m). On bushes in the forests. Common.

Fl. & Fr. : July February.

4. *Dioscorea oppositifolia* L. Sp. Pl. 1033. 1753 ; Hook. f. Fl. Brit. Ind. 6 : 292. 1892 ; Gandhi in Sald. & Nicol. Fl. Hassan 808. 1976.

Stem twining to right. Leaves opposite and alternate, very variable in shape, acuminate, acute at base, 5 ribbed. Male spikes brownish pubescent. Stamens 6. Pistillodes often represented by glands. Female raceme solitary, from leaf axils. Pistils pubescent. Capsules stipitate, pendulous, broader than long. Seeds orbicular, winged all around.

PACHMARHI : Vicinity (1000 m) ; Mahadev hill (1200 m) ; Dhupgarh (1250 m). On bushes and trees in forests. Common.

Fl. & Fr. : July January.

5. *Dioscorea pentaphylla* L. Sp. Pl. 1032. 1753 ; Hook. f. Fl. Brit. Ind. 6 : 289. 1892 ; Babu, Herb. Fl. Dehra Dun 516. 1977. "Bhusa".

Slender, herbaceous twiners with recurved prickles twining to the left. Leaves 3-5-foliate, rarely unifoliolate at apex during flowering ; leaflets digitate, ovate elliptic, oblique at base. Bulbils sometimes present in the axils of leaves. Male spikes in axillary or terminal panicles, 2-3-nate, white tomentose. Stamens 3, alternating with 3 staminodes. Female racemes 2-3-nate. Pistil hairy outside. Capsules longer than broad. Seeds winged only at base.

PACHMARHI : Vicinity (1000 m) ; Mahadev hill (1200 m). BORI : Reserve forest (1000 m). Climber on forest trees. Common.

Fl. & Fr. : July January.

6. *Dioscorea puber* Bl. En. Pl. Jav. 1 : 21. 1827; Burkill in Fl. Males. 4 (3) : 333. 1951. *Dioscorea anguina* Roxb. Fl. Ind. 3 : 803. 1832; Hook. f. Fl. Brit. Ind. 6 : 293. 1892. "Kasaalu".

Stems right twiner, unarmed, warty. Branches densely pubescent. Leaves opposite or some alternate, pubescent, 7 nerved, very broadly ovate cordate or suborbicular or cordate hastate; upper ones ovate. Male spikes 1-2 nate, dense flowered on leafless branches. Female spikes 1-3 nate, in the axils of leaves. Capsule depressed with truncate base, winged; margins of wings thickened.

BORI : Dhain (462 m). Climber on bushes in the forest. Common.

Fl. & Fr. : September January.

7. *Dioscorea wightii* Hook. f. Fl. Brit. Ind. 6 : 291. 1892.

Stem twining to the left. Branches very slender, quite glabrous, terete, unarmed. Leaves ovate cordate, acuminate, 7 nerved, membranous, reticulate beneath. Male spikes very slender, rarely branched. Flowers always solitary, sessile by a broad base. Perianth segments erect. Filaments much longer. Pistillode minute. Capsules obtusely quadrate.

PACHMARHI : Dhupgarh (1250 m), Feb. '78, Pant 27155 (BSA).
BORI : Reserve forest (550 m), 26-12-62, Panigrahi 6543 (BSA). On bushes in the forest. Rare.

Fl. & Fr. : September February.

Collected mainly from M. P. after the type collection by Wight from Courtallam, Tamil Nadu. New record for the area.

95. LILIACEAE Juss.

- 1a. Leaves reduced to scales or spines with cladodes in their axils ... *Asparagus* 1
- 1b. Leaves well-developed, without cladodes in their axils :
 - 2a. Scrambling or climbing by means of cirrhose leaf-tips.
Flowers more than 5 cm across ... *Gloriosa* 4
 - 2b. Erect or scapigerous. Flowers less than 5 cm across :
 - 3a. Rootstock a bulb or corm :
 - 4a. Flowers on leafless scapes ... *Urginea* 6
 - 4b. Flowers in leafy racemes or solitary ... *Iphigenia* 5

3b. Rootstock a short rhizome :

- 3a. Root - fibres without tubers. Racemes branched.
Ovules 2 in each cell. Seeds wrinkled ... *Asphodelus* 2
- 3b. Root - fibres ending in ellipsoid tubers. Racemes
unbranched. Ovules 4 or more in each cell. Seeds
not wrinkled ... *Chlorophytum* 3

1. ASPARAGUS L.

Asparagus racemosus Willd. Sp. Pl. 2 : 152. 1799 ; Hook. f. Fl. Brit. Ind. 6 : 316. 1892 ; Babu, Herb. Fl. Dehra Dun 517. 1977. "Satawar".

Perennial, climbing herbs with tuberous rootstocks. Stems with patent or recurved spines. Cladodes 2-3, arranged in a tuft, falcate. Flowers in racemes, white. Pedicels jointed at the middle. Berry red, 1-3 seeded.

PACHMARHI : Dhupgarh (1250 m). BORI : Reserve forest (550 m). In forest undergrowths. Common.

Fl. & Fr. : August January.

2. ASPHODELUS L.

Asphodelus tenuifolius Cav. in Ann. Cienc. Nat. 3 : 46. t. 27. f. 2. 1801 ; Hook. f. Fl. Brit. Ind. 6 : 332. 1892 ; Babu, Herb. Fl. Dehra Dun 518. 1977.

Glaucous scapigerous herbs. Root fibres stout, numerous. Leaves tubular, radical, 20-40 cm long. Flowers white in long, branched, racemes. Capsule globose, greenish brown. Seeds wrinkled.

PACHMARHI : Vicinity (900 m), Feb. '78, Pant 27218 (BSA). Roadside among bushes. Rare.

Fl. & Fr. : November March.

New record for the area.

3. CHLOROPHYTUM Ker Gawl.

- Ia. Flowers in simple or branched racemes, remotely scattered,
solitary or in pairs ... *C. laxum* 1
- Ib. Flowers in simple or shortly branched dense-flowered
racemes ... *C. tuberosum* 2

1. ***Chlorophytum laxum*** R. Br. Prodr. 277. 1810; Hook. f. Fl. Brit. Ind. 6 : 336. 1892; Gandhi in Sald. & Nicol. Fl. Hassan 795. 1976.

Low herbs with root fibres ending in ellipsoid tubers. Leaves ensiform, linear, acute, falcate, subdistichous, glabrous. Flowers few, greenish-white, in lax, simple or forked racemes. Capsules broadly obovate, 3 winged.

PACHMARHI : Vicinity (1000 m). In rock crevices among the grasses. Common.

Fl. & Fr. : July September.

2. ***Chlorophytum tuberosum* (Roxb.) Baker** in Journ. Linn. Soc. 15 : 332. 1875; Hook. f. Fl. Brit. Ind. 6 : 334. 1892. *Anthericum tuberosum* Roxb. Pl. Cor. 2 : 20. t. 138. 1800.

Tuberous herbs. Leaves crowded at base, membranous, sessile. Flowers in simple or shortly branched, dense-flowered racemes, white. Capsules obovoid. Seeds orbicular.

BORI : Dhain (462 m). In the forest undergrowth among grasses. Common.

Fl. & Fr. : July August.

4. GLORIOSA L.

***Gloriosa superba* L.** Sp. Pl. 305. 1753; Hook. f. Fl. Brit. Ind. 6 : 358. 1892; Babu, Herb. Fl. Dehra Dun 519. 1977. "Kartihi".

Climbing herbs, glabrous. Leaves sessile, scattered, opposite or in whorls of 3 each, ovate, long-acuminate, tip ending in a tendril like spiral; base cordate. Flowers yellow, changes to orange and red on age, large showy, axillary, solitary or subcorymbose towards the end of the branches. Capsules linear-oblong.

PACHMARHI : Mahadev hill (1200 m). BORI : Dhain (430 m). On the bushes in the forest. Common.

Fl. & Fr. : August November.

5. IPHIGENIA Kunth

Iphigenia indica (L.) A. Gray, in Kunth, Enum. 4 : 215. 1843 ; Hook f. Fl. Brit. Ind. 6 : 357. 1892 ; Babu, Herb. Fl. Dehra Dun 519. 1977.

Small erect herbs with subglobose corm. Leaves sessile, grass-like, very acute or acuminate, base sheathing. Flowers purple, few or many in terminal erect racemes or more often solitary. Capsules oblong-ellipsoid, 3-grooved, obtuse.

PACHMARHI : Dhupgarh (1250 m). On hill slopes among the grasses. Common.

Fl. & Fr. : June September.

6. URGINEA Steinh.

Urginea indica (Roxb.) Kunth, Enum. 4 : 333. 1843. Hook. f. Fl. Brit. Ind. 6 : 347. 1892 ; Gandhi in Sald. & Nicol. Fl. Hassan 800. 1976. *Scilla indica* Roxb. Fl. Ind. 2 : 147. 1832. *Scilla coromandeliana* Roxb. l. c. *Urginea coromandeliana* (Roxb.) Hook. f. l. c. "Jangli Piyaz".

Scapigerous, bulbous herbs. Bulbs globose. Leaves linear-lanceolate, ensiform, acute, glaucous. Flowers on racemes often appear before the leaves. Perianth segments linear-oblong, pale-brown, white at margin. Staminal filaments white, flattened below ; anthers versatile, yellow. Capsule elliptic.

PACHMARHI : Vicinity (1000 m) ; Dhupgarh (1250 m). RORI : Reserve forest (550 m). In waste places in the forests. Common.

Fl. & Fr. : April May.

96. COMMELINACEAE R. Br.

1a. Inflorescence a cyme :

- | | |
|---|---------------------|
| 2a. Floral bracts inconspicuous. Staminodes present ... | <i>Commelinia</i> 1 |
| 2b. Floral bracts large, imbricated. Staminodes absent... | <i>Cyanotis</i> 2 |

- 1b. Inflorescence a panicle or a cluster of 1 - 5 flowers :
- 3a. Fertile stamens 6. Inflorescence dense, many-flowered ... *Flascopa* 3
 - 3b. Fertile stamens 3. Inflorescence lax or few-flowered ... *Murdania* 4

I. COMMELINA L.

- 1a. All ovary cells 1-ovuled :
 - 2a. Capsule 2-celled ... *C. suffruticosa* 3
 - 2b. Capsule 3-celled :
 - 3a. Capsule 2-valved ; posterior cell indehiscent, deciduous. Seeds adnate to the cell ... *C. undulata* 6
 - 3b. Capsule 3-valved. Seeds free in the cell ... *C. paludosa* 4
- 1b. Two anterior ovary cells 2-ovuled ; posterior one 1-ovuled :
 - 4a. Capsule 3-celled ; 2 lateral ones 2-seeded, locularily dehiscent ; median one keeled, deciduous, 1-seeded :
 - 5a. Spathes complicate ... *C. hasskarilii* 3
 - 5b. Spathes cucullate ... *C. benghalensis* 2
 - 4b. Capsule 1 celled with 2 superposed seeds ... *C. attenuata* 1

1. *Commelina attenuata* Koen. ex Vahl, Enum. 2 : 168. 1806 ; Hook. f. Fl. Brit. Ind. 6 : 372. 1892 ; Babu, Herb. Fl. Dehra Dun 526. 1977.

Much - branched herbs. Leaves linear, acute. Sheaths 1 - 1.5 cm long, ciliate. Spathes narrowly ovate lanceolate, acute or caudate acuminate. Flowers small, blue. Capsules 1 celled with 2 superposed seeds.

PACHMARHI : Vicinity (1000 m) ; Dhupgarh (1000 m). In moist sheltered places in the forest. Common.

Fl. & Fr. : August. October.

2. *Commelina benghalensis* L. Sp. Pl. 41. 1753 ; Hook. f. Fl. Brit. Ind. 6 : 270. 1892 ; Babu, Herb. Fl. Dehra Dun 526. 1977. "Kanchara".

Diffuse herbs. Stems rooting at lower nodes and bearing scale leaves and white cleistogamous flowers. Aerial leaves ovate or oblong, obtuse. Spathes 1-3 together, funnel-shaped or turbinate. Upper branch of cyme 1-flowered, blue. Ovary 3-locular. Seeds 5.

PACHMARII : Vicinity (900 m). BORI : Reserve forest (550 m). In moist places in the forests. Common.

Fl. & Fr. : August - January.

3. *Commelina hasskarlit* Clarke, Comm. Cyrt. Beng. 13, t. 5, 1874; Hook. f. Fl. Brit. Ind. 6 : 370, 1892; Babu, Herb. Fl. Dehra Dun 527, 1977.

Branched, annual perennial herbs, creeping and rooting below. Leaves subsessile, lanceolate oblong or elliptic-oblong with a rounded base, subobtuse, glabrous. Sheaths with an oblique mouth. Spathes ovate lanceolate, acute, mucronate, glabrous. Cymes with lower 1-flowered branch and 2-flowered upper one. Flowers blue. Capsules 5-celled, apiculate, glabrous. Seeds dark grey, smooth.

BORI : Reserve forest (550 m); Dhain (420 m). In moist places in the forests. Common.

Fl. & Fr. : September - December.

4. *Commelina paludosa* Bl. Enum. Pl. Jay. 1 : 2, 1817; Babu, Herb. Fl. Dehra Dun 527, 1977. *Commelina obliqua* Buch-Ham. ex D. Don, Prodr. Fl. Nepal. 45, 1825 (*non* Vahl, 1805); Hook. f. Fl. Brit. Ind. 6 : 372, 1892.

Stout, subscandent, perennial herbs. Leaves ovate to elliptic-lanceolate, acuminate, often oblique at base. Sheaths with hairs at mouth and margin. Spathes subsessile or very short peduncled. Flowers blue. Ovary 3-locular. Seeds smooth, 1 per locule, free.

PACHMARHI : Mahadev hill (1200 m); Dhupgarh (1250 m). In moist places in the forest. Common.

Fl. & Fr. : July - December.

5. *Commelina suffruticosa* Bl. Enum. Pl. Jay. 1 : 3, 1827-28; Hook. f. Fl. Brit. Ind. 6 : 374, 1892; Babu, Herb. Fl. Dehra Dun 528, 1977.

Stout, branched, nearly glabrous herbs. Leaves sessile, lanceolate, acuminate, scabridly pubescent. Sheaths auricled. Spathes short peduncled, broadly ovate-cordate. Flowers white or blue. Seeds ellipsoid, straw-coloured, puberulous.

BORI : Dhain (462 m). In moist places in the forest. Occasional.

Fl. & Fr. : July December.

6. *Commelina undulata* R. Br. Prodr. 270. 1810 ; Hook. f. Fl. Brit. Ind. 6 : 373. 1892 ; Babu, Herb. Fl. Dehra Dun 528. 1977. *Commelina kurzii* Clarke in Journ. Linn. Soc. Bot. 11 : 444. 1871 ; Hook. f. I. c.

Slender, erect or semierect, profusely branched perennial herbs. Leaves lanceolate, margins undulate. Spathes 3-5 together accompanied by 2-4 smaller leaves at the ends of the branches, triangular, closed at one end and beaked at the other, hairy. Cymes usually bifid, outer 3-5 flowered, inner often sterile. Flowers blue to violet purple. Capsules 2-3 per spathe, 3-celled, 2-valved, brown.

PACHMARHI : Vicinity (1000 m). In moist places in the forest. Common.

Fl. & Fr. : August October.

2. CYANOTIS D. Don

Cyanotis cristata (L.) D. Don, Prodr. Fl. Nopal. 46. 1825 ; Hook. f. Fl. Brit. Ind. 6 : 385. 1892 ; Gandhi in Sald. & Nicol. Fl. Hassan 646. 1976. *Commelina cristata* L. Sp. Pl. 42. 1753.

Glabrous herbs. Stem branched from the base, rather succulent, creeping and rooting below, then ascending. Leaves fleshy, sessile, ovate-oblong. Flowers blue in scorpioidly recurved cymes, longer than the bracteoles. Capsules oblong, trigonous, truncate.

PACHMARHI : Mahadev hill (1200 m). BORI : Reserve forest (550 m). In moist places in the forests.

Fl. & Fr. : July December.

3. FLOSCOPA Lour.

Floscopia scandens Lour. Fl. Cochinch. 1 : 193. 1790 ; Hook. f. Fl. Brit. Ind. 6 : 390. 1892 ; Babu, Herb. Fl. Dehra Dun 529. 1977.

Subscandent herbs. Leaves alternate, elliptic lanceolate, acuminate with 1 cm long sheath. Panicles clustered, terminal and subterminal. Flowers small, purple crowded. Capsules ellipsoid. Seeds rugose.

PACHMARHI : Jambudweep (1000 m) ; Dhuvgarh (1200 m). In moist places in the forests. Common.

Fl. & Fr. : October February.

4. MURDANIA Royle

Murdania spirata (L.) Brueckn. in Engl. & Prantl, Pflanzenfam. ed. 2, 15a : 173. 1930 (as 'spiratum') ; Babu, Herb. Fl. Dehra Dun 531. 1977. *Commelina spirata* L. Mant. Alt. 176. 1771. *Anilemma spiratum* (L.) R. Br. Prodr. 271. 1810 ; Hook. f. Fl. Brit. Ind. 6 : 377. 1892.

Dwarf annual herbs with fibrous roots. Stem with a single line of hairs. Leaves ovate oblong, cordate and semialexicaul at base. Panicles short, slender, lax or few flowered. Flowers blue. Staminal filaments bearded. Capsules acutely 3 angled, 9-10 seeded. Seeds pale brown, 3-gonous, tuberculate.

BORI : Dhain (430 m). In moist places. Occasional.

Fl. & Fr. : August November.

97. ARECACEAE Schultz Schutzenst.

PHOENIX L.

1a. Stem 5-16 m high	...	<i>P. sylvestris</i> 3
1b. Stem very short or often absent :		
2a. Stem short, bulbiform	...	<i>P. aculeata</i> 1
2b. Stem 1-5 m high	...	<i>P. humilis</i> 2

1. *Phoenix canariensis* Roxb. ex Buch - Ham. in Trans. Linn. Soc. Lond. 15 : 87. 1826 ; Beccari & Hook. f. in Hook. f. Fl. Brit. Ind. 6 : 426. 1892 ; Babu, Herb. Fl. Dehra Dun 533. 1977. "Khajur".

Stem very short, sometimes bulb like. Leaves up to 2 m long; leaflets stiff, with acicular tips, 20–50 cm long. Petiole up to 30 cm long, spiny at base. Male spadix up to 60 cm long, with a 30–40 cm long, scurfy spathe which splits into boat-shaped valves. Fruiting spadix up to 100 cm long. Fruits ellipsoid.

PACHMARHI : Vicinity (1000 m) ; Dhupgarh (1230 m). In forest undergrowth. Occasional.

Fl. & Fr. : November – July.

2. *Phoenix humilis* Royle, Illustr. Himal. 394, 397, 399. 1840 ; Beccari & Hook. f. in Hook. f. Fl. Brit. Ind. 6 : 426. 1892 ; Babu, Herb. Fl. Dehra Dun 533. 1977. "Khajur".

Stem up to 5 m tall, with a spreading crown. Leaves up to 2 m long; leaflets opposite, folded, faintly nerved, with acicular tips. Male spadix up to 30 cm long. Female spadix up to 20 cm long. Fruit up to 1 cm long.

PACHMARHI : Vicinity (1000 m). BORI : Reserve forest (550 m). In forest undergrowth. Common.

Fl. & Fr. : March – June.

3. *Phoenix sylvestris* (L.) Roxb. Fl. Ind. 3 : 787. 1832 ; Beccari & Hook. f. in Hook. f. Fl. Brit. Ind 6 : 425. 1892 ; Babu, Herb. Fl. Dehra Dun 534. 1977. *Elate sylvestris* L. Sp. Pl. 1189. 1753. "Khajur".

Stem 10–20 m tall. Leaves pinnate, 2–4 m long; leaflets rigid, folded, with acicular tips. Male flowers white; spadix up to 1 m long; spathes scurfy, split into 2 boat-shaped valves. Female flowers similar to male flowers. Fruit oblong-ellipsoid, orange-yellow to reddish brown when ripe. Seeds rounded at ends, grooved to the centre on one face, pale brown.

PACHMARHI : Vicinity (1000 m). On the edge of forests. Occasional.

Fl. & Fr. : November – May.

98. ARACEAE Juss.

1a. Leaves peltate, entire	...	<i>Remusatia</i> 4
1b. Leaves not peltate, variously dissected, not entire :		
2a. Spadix without an apical, barren appendage :		
3a. Neutral flowers present	...	<i>Plesmonium</i> 3

3b. Neutral flowers absent	... <i>Amorphophallus</i> 1
2b. Spadix with an apical, barren appendage :	
4a. Male flowers shortly pedicelled. Plants usually dioecious	... <i>Arisaema</i> 2
4b. Male flowers sessile. Plants monoecious	... <i>Sauvormatum</i> 3

1. AMORPHOPHALLUS Bl. ex Decine.

Amorphophallus bulbifer (Roxb.) Bl. *Rumphia* 1 : 148. 1837 : Hook. f. *Fl. Brit. Ind.* 6 : 515. 1893 ; Nicol. in Sald. & Nicol. *Fl. Hassan* 783. 1976. *Arum bulbiferum* Roxb. *Fl. Ind.* 3 : 510. 1832.

Deciduous, cormous herbs flowering before leaves. Petioles smooth. Leaves bulbiferous. Peduncle at least 50 cm long. Stigma essentially sessile. Appendix elongate, pale.

PACHMARHI : Vicinity (1000 m). In shady dark places in the forest. Occasional.

Fl. & Fr. : June July.

2. ARISAPMA Mart.

Arisaema tortuosum (Wall.) Schott in Schott & Endl. *Molet. Bot.* 17. 1832 ; Hook. f. *Fl. Brit. Ind.* 6 : 502. 1893 ; Babu, *Herb. Fl. Dehra Dun* 537. 1977. *Arum tortuosum* Wall. *Pl. As. Rat.* 2 : 10. t. 111. 1830.

Spathes greenish to purplish, fading white, overlapping for 4 - 5 cm ; blade 7 - 10 cm long. Spadix sigmoid, 20 - 25 cm long, fertile at lower 2.5 - 6.5 cm long portion ; lowest 1 - 2 cm pistillate and staminate portion 2 - 5 cm long, more or less separated from pistillate portion ; appendix often purple.

PACHMARHI : Vicinity (1000 m). In shaded places in the forest. Occasional.

Fl. & Fr. : June - November.

3. PLESMONIUM Schott

Plesmonium margaritiferum (Roxb.) Schott, Aroid, 1 : 34. 1856 ; Hook. f. Fl. Brit. Ind. 6 : 518. 1893 ; Babu, Herb. Fl. Dehra Dun 538. 1977. *Arum margaritiferum* Roxb. Fl. Ind. 3 : 512. 1832. "Jahulija".

Perennial herbs with tubers. Leaf one, 3-partite ; segments pinnatisect. Peduncle up to 50 cm long. Spatha erect, pale yellowish green, suffused with pink on the inner surface, ovate, obtuse, convolute below the middle. Spadix stipitate as long as the spathe, with female flowers below, neutral middle and male above.

PACHMARHI : Mahadev hill (1200 m) ; Dhupgash (1250 m). In shaded places in the forests. Common.

Fl. & Fr. : July November.

4. REMUSATIA Schott

Remusatia vivipara (Roxb.) Schott in Schott & Endl. Melet. Bot. 18. 1832 ; Hook. f. Fl. Brit. Ind. 6 : 521. 1893 ; Babu, Herb. Fl. Dehra Dun 538. 1977. *Arum viviparum* Roxb. Hort. Beng. 65. 1874 (as 'viviparium'), nom. valid.

Perennial herb with tubers. Leaves peltate, ovate triangular, abruptly acute. Bulbils produced on erect, or suberect, 1 to many shoots. Bulbils in clusters, ovoid-globose. Peduncle up to 20 cm long. Spathes 10-12 cm long ; ovoid-oblong, green ; limb golden yellow, ovate cordate. Spadix 2-3 cm long.

PACHMARHI : Vicinity (1000 m) ; Dhupgash (1250 m). On moist shady hill slopes. Common.

Fl. & Fr. : July December.

5. SAUROMATUM Schott

Sauromatum venosum (W. Ait.) Kunth, Enum. Pl. 3 : 28. 1841 ; Babu, Herb. Fl. Dehra Dun 539. 1977. *Arum venosum* W. Ait. Hort. Kew. ed. 1. 3 : 315. 1789. *Arum guttatum* Wall. Pl. As. Rar. 2 : 10. t. 115. 1831.

Sauromatum guttatum (Wall.) Schott, Melet. ot. I. 17. 1832; Hook. f. Fl. Brit. Ind. 6 : 508. 1893. "Bhasmakand".

Perennial tuberous herbs. Leaves 1 or 2, appear after flowering. Petiole 50-100 cm long, pedately pinnate; segments 3-10, elliptic-obovate or oblong. Peduncle 10-15 cm long. Spathe lanceolate oblong, purple on the outside, dark purple on the inner side. Spadix as long as the spathe with a terminal appendage. Fruit ovoid, black.

PACHMARHI : Vicinity (1000 m). On damp shady hill slopes. Occasional.

Fl. & Fr. : April - August.

99. ERIOCAULACEAE Desv.

ERIOCAULON L.

1a. Leaves red or pinkish	...	<i>E. quinquangulare</i> 4
1b. Leaves green :		
2a. Plants more than 2 cm long. Involucral bracts hairy	...	<i>E. polycephalum</i> 2
2b. Plants less than 25 cm long. Involucral bracts glabrous :		
3a. Anthers black :		
4a. Involucral bracts about twice as long as the floral heads.	...	<i>E. xeranthemum</i> §
4b. Involucral bracts shorter than or as long as the floral heads	...	<i>E. oryzetorum</i> 3
3b. Anthers not black	...	<i>E. cinereum</i> 1

1. *Eriocaulon cinereum* R. Br. Prodr. 254. 1810; Babu, Herb. Fl. Dehra Dun 547. 1977. *Eriocaulon sieboldianum* Sieb. & Zucc. ex Steud. Syn. Pl. Glum. 2 : 272. 1855; Hook. f. Fl. Brit. Ind. 6 : 577. 1893.

Plants glabrous. Leaves capillary, up to 5 cm long. Peduncles many, up to 6 cm long. Heads up to 3 mm across; bracts pale. Male florets : corolla lobes with an apical gland; anthers white or yellow; Female florets : sepals hyaline; petals strikingly linear, eglandular.

BORI : Reserve forest (550 m). In damp shaded forest undergrowth.

Fl. & Fr. : October - January.

2. *Eriocaulon polycephalum* Hook. f. Fl. Brit. Ind. 6 : 573. 1893 ; Gandhi in Sald. & Nicol. Fl. Hassan 653. 1976. *Eriocaulon longicuspis* Hook. f. var. *polycephalum* (Hook. f.) Fyson in J. Indian Bot. 2 : 309. 1921.

Leaves linear ensiform, up to 20 cm long. Peduncles 1 many, up to 50 cm, glabrous or pubescent ; heads up to 8 mm across ; receptacle villous. Involucral bracts obovate, sparsely hairy. Floral bracts obovate, caudate. Male florets : sepals 3, free, ciliate at apex ; corolla lobes hairy, with apical gland ; one lobe longer than floral bract. Female florets : sepals 3, oblong, ciliate at apex ; petals ciliate, cuneate, with apical gland.

PACHMARHI : Vicinity (1000 m). In damp shaded places in forests. Common.

Fl. & Fr. : July December.

3. *Eriocaulon oryzetorum* Mart. in Wall. Pl. As. Rar. 3 : 28. 1832 ; Hook. f. Fl. Brit. Ind. 6 : 579. 1893.

Leaves up to 8 cm long, linear, obtuse. Heads globose to oblong ovoid, black. Receptacle conical or columnar, villous. Involucral bracts glabrous, obtuse. Male florets : sepals 2, fimbriate or glabrous. Female florets : sepals 3, slender, caducous ; petals filiform to oblanceolate, glabrous or ciliolate.

PACHMARHI : Vicinity (1000 m). In damp shaded places in the forest. Occasional.

Fl. & Fr. : September November.

4. *Eriocaulon quinquangulare* L. Sp. Pl. 87. 1753 ; Hook. f. Fl. Brit. Ind. 6 : 582. 1893 ; Babu, Herb. Fl. Dehra Dun 548. 1977.

Leaves linear, up to 6 cm long, red to pink. Peduncles many, up to 14 cm long ; head 4 mm across ; receptacle with short hairs. Involucral bracts oblong, glabrous. Floral bracts obovate, acuminate, glabrous. Male floret : calyx spathaceous, hairy at apex ; corolla lobes hairy at apex, with minute apical gland. Female floret : sepals 3, hairy at apex ; petals oblanceolate, ciliate, with apical gland.

BORI : Reserve forest (900 m). In wet places in the forest. Common.

Fl. & Fr. : November - January.

5. *Eriocaulon xanthemum* Mart. in Wall. Pl. As. Rar. 3 : 29. 1832 ; Hook. f. Fl. Brit. Ind. 6 : 584. 1893 ; Rao & Verma in Bull. Bot. Surv. India. 18 : 48. 1979.

Leaves spreading, linear lanceolate, up to 4 cm long. Peduncles usually 2-3, almost twice as long as the leaves, 5-ribbed. Heads 4-6 mm across. Receptacles globose, glabrous; involucral bracts stellately spreading. Male floret: sepals 3, free or partially connate, obovate, hairy; petals minute, anthers black. Female floret: sepals 3 or 2, free, oblanceolate, glabrous; petals 3, oblanceolate, ciliate, glandular.

PACHMARHI : Vicinity (1000 m). In marshy places. Occasional.

Fl. & Fr. : July August.

100 CYPERACEAE Juss.

- 1a. Ovaries or nuts enclosed within a sac-like organ (utricle) ... *Carex* 2
- 1b. Ovaries or nuts not enclosed within a sac-like organ :
 - 2a. Nuts borne on a 3-lobed or band-like disk ... *Scleria* 8
 - 2b. Nuts not borne on a disk :
 - 3a. Flowers with perianth consisting of one to several hypogynous bristles and/or scales :
 - 4a. Perianth scales alternating with bristles ... *Lipocarpha* 6
 - 4b. Perianth of bristles only :
 - 5a. Nuts beaked by the persistent style-base ... *Rhynchospora* 6
 - 5b. Nuts not beaked by the persistent style-base ... *Scirpus* 7
 - 3b. Flowers naked. Perianth absent :
 - 6a. Nuts crowded by the persistent style-base which is articulated with the nut proper :
 - 7a. Style 3-fid, base persisting like a minute button ... *Bulbostylis* 1
 - 7b. Style 2-fid, base persisting like a conspicuous beak ... *Rhynchospora* 6
 - 6b. Nuts not crowded by the persistent style-base; style-base continuous or articulated :
 - 8a. Style articulated with the ovary, usually swollen at the base, and usually fimbriate ... *Fimbristylis* 4

8b. Style continuous with the ovary, neither swollen nor fibrous:

- | | | |
|----------------------|-----|------------------|
| 9a. Glume distichous | ... | <i>Cyperus</i> 3 |
| 9b. Glume spiral | ... | <i>Scirpus</i> 7 |

1. BULBOSTYLLIS Kunth

Bulbostylis barbata (Rottb.) Clarke in Hook. f. Fl. Brit. Ind. 6 : 651. 1893 ; Babu, Herb. Fl. Dehra Dun 549. 1976. *Scirpus barbatus* Rottb. Descr. Pl. Rar. Progr. 27. 1772 et Descr. Ic. 52. t. 17. f. 4. 1773.

Tufted annuals, up to 20 cm. Leaves glabrous, except at the sheath mouth. Inflorescence hemispherical, about 1 cm across ; bracts filiform. Spikelets linear oblong, acute. Glumes red brown with strong green, curved, excurrent keel. Nut obovoid, trigonous, finely reticulate by isodiametric surface cells.

PACHMARHI : Vicinity (1000 m). In moist places. Common.

Fl. & Fr. : July November.

2. CAREX L.

Carex cruciata Wahlenb. Vet. Akad. Handl. Stockh. 24. 149. 1803 ; Babu, Herb. Fl. Dehra Dun 550. 1977 ; Clarke in Hook. f. Fl. Brit. Ind. 6 : 715. 1894. *Carex condensata* Nees in Wt. Contrib. 125. 1834 ; Clarke in Hook. f. Fl. Brit. Ind. 6 : 716. 1894.

Perennials with woody rhizomes. Stem 3-gonous, glabrous. Leaves as long as or longer than stem, glabrous. Sheathes trigonous. Panicle slender, compound. Bracts foliaceous. Spikelets cylindrical, linear-oblong. Utricle inflated, ellipsoid, narrowed into a 2-fid beak.

PACHMARHI : Mahadev hill (1200 m) ; 27 - 12 62, *Panigrahi* 66 04 (BSA). On shady hill slopes. Common.

Fl. & Fr. : August December.

New record for the area.

3. CYPERUS L.

- 1a. Nuts lenticular ; style 2 - fid :
- 2a. Inflorescence capitate of sessile glomerules, each spikelet maturing into a solitary nut :
- 3a. Keel of the glume distinctly winged ... *C. kyllingia* 13
- 3b. Keel of the glume wingless :
- 4a. Rhizome densely caespitose. Heads (-1) 3 (-5), cylindric, ovoid ... *C. triceps* 25
- 4b. Rhizome horizontally creeping. Head solitary, subglobose or ovoid ... *C. brevifolius* 2
- 2b. Inflorescence anthelate or capitulate ; each spikelet maturing into several nuts :
- 5a. Nuts with transverse wavy lines ... *C. diaphanus* 6
- 5b. Nuts punciculate or finely reticulate :
- 6a. Nuts linear - oblong with almost parallel sides. Leaves 2 - 4 mm broad ... *C. polystachyos* 19
- 6b. Nuts lobovoid or oblong. Leaves 1 - 2 mm broad :
- 7a. Inflorescence contracted into a head ; spikelet 10 - 20 - flowered, 3 - 5 mm long ... *C. pygmaeus* 21
- 7b. Inflorescence simple or subcompound ; spikelet 20 - 40 (-60) - flowered, 10 - 30 mm long ... *C. flavidus* 10
- 1b. Nuts trigonous. Style 3 - fid :
- 8a. Rachilla of the spikelets caducous ; [the spikelets thus fall off as a whole along with the persistent glumes] :
- 9a. Inflorescence a lobed head ... *C. dubius* 8
- 9b. Inflorescence anthelate :
- 10a. Anthelae compound or decompound, spikes globose ... *C. compactus* 3
- 10b. Anthelae simple. Spikes cylindric :
- 11a. Rhizome emitting slender stolons covered with lanceolate, reddish brown striate sheaths. Spikelets bearing 1 nut... *C. panicans* 17

- 11b. Rhizome not stoloniferous. Spikelets bearing 1 - 4 nuts ... *C. cyperinus* 3
- 8b. Rachilla of the spikelets persistent ; the glumes acropetally caducous :
- 12a. Inflorescence capitate :
- 13a. Annual herbs. Glumes long aristate, the awns about half as long as to equaling the main body ... *C. cuspidatus* 4
- 13b. Annual or perennial herbs. Glumes muticous or shortly mucronate :
- 14a. Spikelets oblong-lanceolate, 1 - 2.5 cm long, 14 - 40-flowered ... *C. nivens* 14
- 14b. Spikelets ovate, 2.4 mm long, 8 - 12-flowered ... *C. pulchellus* 20
- 12b. Inflorescence panicle-like with distinct rays :
- 15a. Spikelets spicate, the rachis several times longer than the spikelets :
- 16a. Glumes orbicular to broadly ovate, about as broad as long :
- 17a. Rachis of the spikes smooth ; keel 3 - 5-nerved, smooth, not winged ... *C. Iria* 12
- 17b. Rachis of the spike scabrid on the angles ; keel 7-nerved, winged with serrate margin at the top ... *C. alatatus* 1
- 16b. Glumes linear-lanceolate or ovate-oblong, about half or less as broad as long :
- 18a. Rachis hispidulous ... *C. pilosus* 18
- 18b. Rachis glabrous :
- 19a. Spikes penicillate, 2.5 mm broad ... *C. nutans* 15
- 19b. Spikes cylindric, 10 - 20 mm broad ... *C. imbricatus* 11
- 15b. Spikelets digitate or very shortly spicate, the rachis obscure or much shorter than to about as long as the spikelets :

- 20a. Spikelets digitate, 3-13 mm long.
Rachilla visible between the widely
spreading glumes ... *C. tenuispica* 24
- 20b. Spikelets shortly spicate, 6-63 mm
long. Rachilla not as above :
- 21a. Anthela simple ; glumes dis-
tinctly mucronate, mucro 0.5-
1.2 mm long. ... *C. squarrosus* 23
- 21b. Anthela simple or compound.
Glumes muticous or mucronate :
- 22a. Stems 4-8 mm thick in
the middle. Leaves absent
or solitary ... *C. pangorei* 16
- 22b. Stems 1-5 mm thick in
the middle. Leaves 2 to
several :
- 23a. Spikelets acicular,
ca 1 mm broad ;
glumes 1.5-2.0 mm
long ... *C. distans* 7
- 23b. Spikelets compres-
sed, 1.4-3.6 mm
broad ; glumes 3.0-
4.5 mm long :
- 24a. Spikelets 5-18
mm long, 8-
10-flowered ;
glumes 7-9-
nerved ... *C. esculentus* 9
- 24b. Spikelets 10-
35 mm long,
10-40 (-100)
flowered ; glu-
mes 5-7-
nerved ... *C. rotundus* 22

1. *Cyperus alutatus* Kern in Reinwardtia 1 : 463-466, f. 1, 1952 ;
Babu, Herb. Fl. Dehra Dun 553, 1977. *Cyperus iria* L. var. *rectangularis*
Kuk. in Engler, pfrich. 101 : 152, 1935.

Annuals. Stem triquetrous. Leaves as long as or longer than the stem. Spikes up to 3 cm long, in umbellate inflorescence. Bracts 6-8, unequal, one up to 30 cm long. Rays 4-8, unequal, up to 15 cm long. Spikelets greenish yellow. Glumes ovate, imbricate, 7-nerved, winged, serrulate in the upper margin. Stamens 2. Style 2-partite near the base. Nut ovoid, reddish brown, apiculate.

BORI : Reserve forest (550 m), 22° 12' 62, *Panigrahi* 6297 (BSA). In moist places in the forest. Occasional.

Fl. & Fr. : August December.

New record for the area.

2. *Cyperus brevifolius* (Rottb.) Hassk. Cat. Hort. Beg. 24. 1844 ; Babu, Herb. Fl. Dehra Dun 554. 1977. *Kyllinga brevifolia* Rottb. Descr. et. Ic. 13. t. 4. f. 3. 1773 ; Clarke in Hook. f. Fl. Brit. Ind. 6 : 588. 1893 : Hopper in Sald. & Nicol. Fl. Hassan 686. 1976.

Perennials, stolons creeping, rhizomatous, covered with brown scale leaves. Stems slender. Leaves subbasal, shorter or as long as the stem. Spikes solitary, greenish, globose. Spikelets ovate lanceolate. Lowest 2 glumes unequal ; fertile glumes concave, ovate, keeled. Stamens 2. Nut obovoid ellipsoid, compressed.

PACHMARHI : Vicinity (1000 m). In moist places in and around forest. Common.

Fl. & Fr. : August December.

3. *Cyperus compactus* Retz. Obs. Bot. 5 : 10. 1789 ; Babu, Fl. Dehra Dun 554. 1977. *Mariscus microcephalus* Pers. Rel. Haenck. 1 : 182. 1828 ; Clarke in Hook. f. Fl. Brit. Ind. 6 : 624. 1893.

Erect perennials. Stems obscurely trigonous, smooth, longitudinally striated. Leaves linear, acuminate. Spikelets narrowly linear, terete, red brown ; rachilla winged. Glume oblong, lanceolate or elliptic, obtuse ; keel rounded. Stamens 3. Nut trigonous.

BORI : Dhain (460 m). In moist places in the forest. Common.

Fl. & Fr. : August November.

4. *Cyperus cuspidatus* Kunth in H. B. K. Nov. Gen. Sp. 1 : 204. 1816 ; Clarke in Hook. f. Fl. Brit. Ind. 6 : 598. 1893 ; Babu, Herb. Fl. Dehra Dun 555. 1977.

Tufted annuals. Leaves linear, acute or acuminate. Bracts spreading, longer than rays. Rays few, short. Spikelets 5-23 in a globose head. Glumes ovate, chestnut-brown, with a 3-nerved keel. Stamens 3. Nut obovoid, dark brown.

PACHMARHI : Vicinity (1000 m) ; Mahadev hill (1200 m). In moist places and hill slopes. Common.

Fl. & Fr. : July October.

5. *Cyperus cyperinus* (Retz.) Valck. Sur. Geal. Cyp. Mal. Arch. 154. t. 6. f. 10. 1898; Kern in Fl. Males 7 (3) : 641. 1974. *Kyllingia cyperina* Retz. Obs. 6 : 21. 1791. *Mariscus cyperinus* (Retz.) Vahl, Enum. 2 : 377. 1806; Clarke in Hook. f. Fl. Brit. Ind. 6 : 621. 1893; Hooper in Sald. & Nicol. Fl. Hassan 689. 1976.

Perennials, shortly rhizomatous. Stems rigid, triquetrous, smooth, covered with dark fibers. Leaves shining greyish green, rigid, flat. Rays none to short. Spikes obovoid, dense, many-flowered. Spikelets obliquely erect, 2-3 flowered; rachilla broadly winged. Glumes with green, 3-nerved keel. Stamens 3. Stigmas 3, longer than the style. Nut trigonous, ellipsoid, brown.

PACHMARHI: Vicinity (1000 m). In moist places and around forests. Occasional.

Fl. & Fr. : September November.

6. *Cyperus diaphanus* Schrad. ex Roem. & Schult. Mant. 2 : 477. 1824. var. *latespicatus* (Boeck.) Kern in Fl. Males. 7 (3) : 653. 1974. *Cyperus latespicatus* Boeck. in flora 42 : 441 ('433'). 1859. *Pycreus latespicatus* Clarke in Hook. f. Fl. Brit. Ind. 6 : 590. 1893.

Annuals. Stems tufted, rigid, trigonous, smooth. Leaves flat. Inflorescence simple. Spikes broadly ovate; rachis short. Spikelets horizontally spreading, strongly compressed; rachilla wingless, persistent. Glumes obliquely patent, keeled. Stamens 2. Stigmas 2. Nut biconvex, laterally compressed, rugulose with transverse wavy lines, black on maturity.

PACHMARHI: Vicinity (1000 m), *Saxena & Pandey* 81302 (SFRI). In marshy places. Rare

Fl. & Fr. : August October.

7. *Cyperus distans* L. f. Suppl. 103. 1781; Clarke in Hook. f. Fl. Brit. Ind. 6 : 606. 1893; Babu, Herb. Fl. Dehra Dun 556. 1977.

Tufted perennials. Stems up to 50 cm, trigonous, smooth. Leaves few; membranous side of sheath enlarged at mouth. Inflorescence twice unbellate; bracts spreading. Spikes branched, with few, distant spikelets. Spikelets spreading, linear with sharp tips and zig-zag rachilla. Glumes elliptical obtuse, dark red brown with a membranous margin. Nut ellipsoid, trigonous.

PACHMARHI: Vicinity (1000 m). In shady places. Occasional.

Fl. & Fr. : October November.

8. *Cyperus dubius* Retz. Descr. et. Ic. Pl. 20. t. 4. f. 5. 1773 : Kern in Fl. Males 7 (3) : 643. 1974. *Mariscus dregeanus* Kunth, Enum. 2 : 120. 1837 ; Clarke in Hook. f. Fl. Brit. Ind. 6 : 620. 1893.

Tufted perennials. Stems bulbous at the base ; sheaths brown, papery. Inflorescence, lobed with long spreading or reflexed bracts. Spikelets congested, ovate to lanceolate, acute, 3 - 6 flowered. Glumes broadly ovate, obtuse and apiculate, with several raised nerves. Nut trigonous, ellipsoid.

PACHMARHI : Madadev hill (1200 m). On moist hill slopes. Occasional.

Fl. & Fr. : July October.

9. *Cyperus esculentus* L. Sp. 67. 1753 ; Clarke in Hook. f. Fl. Brit. Ind. 6 : 616. 1893 ; Babu, Herb. Fl. Dehra Dun 556. 1977. "Chichoda".

Erect, glabrous perennials with subterranean stolons ending in ovoid tubers. Stems triquetrous, smooth, finely striated. Leaves linear, acuminate, shorter than the stems. Spikes short. Spikelets linear. Rachilla winged. Glumes boat shaped, rounded. Stamens 3. Nut obovoid, ellipsoid.

PACHMARHI : Chauragarh (1200 m). In open grasslands. Occasional.

Fl. & Fr. : August. November.

10. *Cyperus flavidus* Retz. Obs. 5 : 13. 1789 ; Kern in Fl. Males. 17(3) : 648. 1974 ; *Pycreus capillaris* Nees in Linnaea 9 : 283. 1834 ; Clarke in Hook. f. Fl. Brit. Ind. 6 : 591. 1893.

Annuals with yellowish, fibrous roots and without stolens. Stems rigid, trigonous, smooth. Leaves rigid, narrow, gradually acuminate ; lower sheath reddish brown. Inflorescence simple or subcompound. Involucral bracts 2 - 4, obliquely erect. Spikes ovoid to broadly ovoid, with 5 - 20 spikelets. Spikelets spreading, linear, parallel-sided, compressed, 20 - 40-flowered. Rachilla wingless persistent. Glumes sharply keeled, oblong-ovate, obtuse ; keels 3-nerved. Stamens 2. Nut biconvex, laterally compressed, oblong-obovate, apiculate.

PACHMARHI : Vicinity (1000 m), 28-7-64, Panigrahi 4619 (BSA). On moist hill slopes. Occasional.

Fl. & Fr. : July October.

New record for the area.

11. *Cyperus imbricatus* Retz. Obs. 5 : 12. 1789 ; Kern in Fl. Males 7(3) : 603. 1974. *Cyperus rediatus* Vahl, Enum. 2 : 369. 1806 ; Clarke in Hook. f. Fl. Brit. Ind. 6 : 617. 1893.

Perennials with short rhizomes. Stem trigonous, smooth, 50–100 cm long. Leaves coriaceous; lower sheaths somewhat spongy, purplish black. Inflorescence compound, up to 20 cm long. Spikes digitately arranged. Spikelets spicately arranged, compressed, 6–20-flowered. Glumes membranous, ovate, obtuse; keel green, faintly 3-nerved. Stamens 3. Nuts trigonous, compressed dorsiventrally, ovoid to ellipsoid, yellowish brown.

PACHMARHI : Vicinity (1000 m). On grassy hill slopes. Occasional.

Fl. & Fr. : August - November.

12. *Cyperus iria* L. Sp. Pl. 45. 1753; Clarke in Hook. f. Fl. Brit. Ind. 6 : 606. 1893; Babu, Herb. Fl. Dehra Dun 557. 1977.

Tufted annuals. Stems triquetrous. Leaves few, scarred towards apex, with papery sheaths. Bracts leaf-like, exceeding rays. Spikes cylindrical, lax. Spikelets compressed, golden-yellow. Glumes obovate, obtuse, keeled, spreading, with membranous upper edge. Style hardly any. Nut obovate-elliptic with convex, smooth sides.

PACHMARHI : Vicinity (1000 m). On wet soil amongst the grasses. Common.

Fl. & Fr. : July - November.

13. *Cyperus kyllinga* (Rottb.) Endl. Cat. Hort. Ac. Vindob. 1 : 94. 1842; Babu, Herb. Fl. Dehra Dun 557. 1977. *Kyllinga monocephala* Rottb. Descr. et Ic. 13. t. 4. f. 4. 1773; Clarke in Hook. f. Fl. Brit. Ind. 6 : 588. 1893. "Nirbishi".

Perennials with stoloniferous rhizomes. Stems triquetrous. Leaves basal, as long as or longer than stem. Spikes white, globose. Bracts 3, foliaceous. Spikelets compressed, obliquely ellipsoid-obovoid. Glumes ovate, acuminate, with a serrate-winged keel; lowest 2 empty. Stamens 2. Nut reddish-brown, oblong-obovoid, apiculate.

PACHMARHI : Vicinity (1000 m). In moist places amongst the grasses. Common.

Fl. & Fr. : July - November.

14. *Cyperus niveus* Retz. Obs. Bot. 5 : 12. 1791; Clarke in Hook. f. Fl. Brit. Ind. 6 : 601. 1893; Babu, Herb. Fl. Dehra Dun 557. 1977.

Perennials with woody rhizomes. Stems trigonous, nodose, clothed with leaf-sheaths up to 10–30 cm high. Leaves basal, linear. Bracts 2–3,

leafy, unequal. Spikelets white or straw-coloured, lanceolate. Glumes ovate, acute, 5-6-nerved on either side of the keel. Stamens 3. Nut obovoid-ellipsoid.

PACHMARHI : Vicinity (1000 m). In moist places in the forest. Common.

Fl. & Fr. : May - July.

15. *Cyperus nutans* Vahl, Enum. 2 : 363. 1806 ; Clarke in Hook. f. Fl. Brit. Ind. 6 : 607. 1893 ; Kern in Fl. Males. 7(3) : 609. 1974 ; Babu, Herb. Fl. Dehra Dun 558. 1977.

Perennials with woody rhizomes. Stems trigonous, up to 100 - 150 cm tall. Leaves basal. Inflorescence a decompound umbel of spikes. Primary bracts leafy ; secondary ones linear-filiform, shorter than the rays. Spikelets reddish-brown. Glumes slightly imbricate, mucronate, 2-3-nerved on either side of the keel. Stamens 3 ; anthers bearded at the apex. Nut pale white or straw-coloured, oblong.

BORI : Reserve forest (550 m), 22-12-62, *Panigrahi* 6316 (BSA). In swampy places in the forest. Common.

Fl. & Fr. : July - December.

New record for the area.

16. *Cyperus pangorei* Rottb. Descr. Pl. Rar. 18. 1772 ; Babu, Herb. Fl. Dehra Dun 558. 1977. *Cyperus tegetum* Roxb. Fl. Ind. 1 : 208. 1832 ; Clarke in Hook. f. Fl. Brit. Ind. 6 : 613. 1893.

Glaucous perennials with stout, creeping rhizomes clothed with dark, fibrous scales. Stems up to 100 cm. Leaves few, shorter than stems with long, papery, brown sheaths. Inflorescence loose ; secondary bracts inconspicuous. Bracts leafy. Spikes broadly ovate with few, distant spikelets. Spikelets linear, acute, red-brown, lax-flowered with winged rachilla. Glumes elliptic with narrow keel and nerveless sides. Anther red-crested. Nut oblong, brown.

PACHMARHI : Vicinity (1000 m). In marshy places. Common.

Fl. & Fr. : August - December.

17. *Cyperus paniceus* (Rottb.) Boeck. in Linnaea 36 : 381. 1870 ; Babu, Herb. Fl. Dehra Dun 558. 1977. *Kyllinga panicea* Rottb. Descr. et Ic. 15. t. 4. f. 1. 1773. *Mariscus paniceus* (Rottb.) Vahl, Enum. 2 : 373. 1806 ; Clarke in Hook. f. Fl. Brit. Ind. 6 : 620. 1893.

Perennials with stoloniferous rhizomes. Stem trigonous. Leaves sub-basal. Inflorescence a simple umbel of spikes with 6–8 rays. Bracts unequal, leafy. Spikelets greenish, 1-flowered. Lowest 2 glumes empty. Stamens 3; anthers spiculate. Nut oblong, pale brown, slightly curved.

PACHMARHI : Vicinity (1000 m). In moist waste lands. Common.

Fl. & Fr. : July November.

18. *Cyperus pilosus* Vahl, Enam. Pl. 2 : 354. 1805 ; Clarke in Hook. f. Fl. Brit. Ind. 6 : 609. 1893 ; Babu, Herb. Fl. Dehra Dun 559. 1977.

Perennials with several slender rhizomes. Stems acutely triquetrous, leafy below. Leaves acuminate, with long, papery, golden sheaths. Inflorescence with a few rays. Bracts leafy, much exceeding rays. Spikes clustered, cylindrical. Spikelets distant, spreading, oblong, flat. Glumes distant, ovate, obtuse, apiculate with sharp keel having 2–3-nerves, red-brown sides. Nuts obovate-elliptic.

PACHMARHI : Vicinity (900 m). Along the streams. Common.

Fl. & Fr. : June November.

19. *Cyperus polystachyos* Rottb. Deser. Pl. Rar. Progr. 21. 1772 ; Kern in Fl. Males. 7(3) : 649. 1974. *Pycreus polystachyos* (Rottb.) Beauv. Pl. Oware Benin 2 : 48. t. 86. f. 2. 1807 ; Clarke in Hook. f. Fl. Brit. Ind. 6 : 592. 1893 ; Hooper in Sald. & Nicol. Fl. Hassan 693. 1976.

Tufted annuals or perennials with short rhizomes. Stem slender, trigonous, triquetrous just below the inflorescence, smooth. Leaves 2–4 mm wide. Spikelets linear-lanceolate, acute. Glumes regularly half-imbricate, elliptic, acute, mucronulate with nerveless, membranous straw-coloured to golden-brown sides and narrow green keel. Nut 2-sided, laterally compressed, with flat to slightly convex sides, oblong, black.

PACHMARHI : Jambudeep (1000 m). Feb. 78, Pant 27206 (BSA). In marshy places. Occasional.

Fl. & Fr. : November February.

New record for the area.

20. *Cyperus pulchellus* R. Br. Prodri. 213. 1810 ; Hooper in Sald. & Nicol. Fl. Hassan 669. 1976. *Cyperus leucocephalus* (acut. non Retz. 1789) ; Clarke in Hook. f. Fl. Brit. Ind. 6 : 602. 1893.

Small tufted perennials. Stems bulbously thickened at the base. Leaves linear, sometimes exceeding stems ; sheaths becoming fibrous. Inflorescence capitate, spherical, white with 3 slender reflexed bracts. Spikelets

numerous, sessile, confluent. Glumes lanceolate, obtuse or subacute with an indistinct rounded keel. Nut narrowly elliptic.

PACHMARHI : Vicinity (1000 m). In forest undergrowth. Common.

Fl. & Fr. : September November.

21. *Cyperus pygmaeus* Rottb. Descr. et le. 20. t. 14. f. 5. 1773 ; Babu, Herb. Fl. Dehra Dun 560. 1977. *Juncellus pygmaeus* (Rottb.) Clarke in Hook. f. Fl. Brit. Ind. 6 : 596. 1893.

Tufted annuals. Leaves linear, acuminate. Inflorescence a solitary terminal head of numerous spikelets. Glumes narrowly boat-shaped, with rounded keels, acute or with a thickened, slightly acuminate apex. Stamens 1-2. Nut ellipsoid.

BORI : Reserve forest (550 m). In swampy places in the forest. Common.

Fl. & Fr. : September December.

22. *Cyperus rotundus* L. Sp. Pl. 45. 1753 ; Clarke in Hook. f. Fl. Brit. Ind. 6 : 614. 1893 ; Babu, Herb. Fl. Dehra Dun 560. 1977. "Mutha".

Perennials with woody, stoloniferous rhizomes. Stems leafy at base, from a tuber. Leaves dark green above, paler beneath, gradually acuminate with reddish brown sheaths. Inflorescence a compound umbel of short spikes, white with 3 slender bracts. Spikelets many, sessile, confluent. Glumes lanceolate, obtuse or subacute with an indistinct rounded keel. Nut narrowly elliptic.

PACHMARI : Vicinity (1000 m). In moist waste lands. Common.

Fl. & Fr. : July November.

23. *Cyperus squarrosus* L. Cent. Pl. 2 : 6. 1756 ; Kern in Fl. Males. 7 (3) : 631. 1974. *Cyperus aristatus* Rottb. Descr. Pl. Kar. Progr. 22. 1772 Descr. et le. 23. t. 6. f. 1. 1773 ; Clarke in Hook. f. Fl. Brit. Ind. 6 : 606. 1893. *Mariscus squarrosus* (L.) Clarke in Hook. f. Fl. Brit. Ind. 6 : 623. 1893 quad synon ; Hooper in Sald. & Nicol. Fl. Hassan 690. 1976.

Small annuals with fibrous roots. Stems tufted, triquetrous to almost 3 winged, smooth. Leaves few, weak ; sheaths inflated, purple. Inflorescence once anthelate ; bracts exceeding rays. Spikelets congested in hemispherical or oblong spikes. Glumes elliptic, reddish brown with clear raised nerves and recurved arista. Nut obovate, puncticulate.

PACHMARHI : Vicinity (1000 m). ; Dhupgarh (1250 m). In moist places and hill slopes. Common.

Fl. & Fr. : July November.

24. *Cyperus tenuispica* Steud. Syn. Pl. Glum. 2 : 11. 1855 ; Babu, Herb. Fl. Dehra Dun 560. 1977. *Cyperus flavidus* (auct. pl. non Retz. 1789) ; Clarke in Hook. f. Fl. Brit. Ind. 6 : 600. 1893.

Tufted annuals with purple fibrous roots. Stems weak, triquetrous. Leaves all bladeless or one with trigonous blade. Bracts 1-3, the longest exceeding the rays. Spikelets in dense clusters. Glumes oblong, purple-brown, incurved below, excurved above, spreading at maturity with a green midrib, keeled above and with obtuse membranous tip. Stamens 2; anthers obtuse. Nut obtusely trigonous to rounded, stipitate, warty.

BORI : Reserve forest (500 m), Feb. '78, Pant 27260 (BSA). In moist places in the forest. Occasional.

Fl. & Fr. : September - February.

New record for the area.

25. *Cyperus triceps* Endl. Cat. Hort. Ac. Vindob. 1 : 94. 1842 ; Kern in Fl. Males. 7 (3) : 659. 1974 ; Babu, Herb. Fl. Dehra Dun 561. 1977. *Kyllinga triceps* Retz. Descr. et Ic. 14. t. 4. f. 6. 1773 ; Clarke in Hook. f. Fl. Brit. Ind. 6 : 587. 1893.

Perennials with short rhizome. Stems nodose, trigonous. Leaves basal, as long as or longer than the stem. Spikelets compressed, obliquely lanceolate, straw-coloured in 3-6 dense, ovoid cylindric spikes, combined into a compact head. Bracts 3-6, leafy, unequal. Lowest 2 glumes empty ; 3rd one fertile, lanceolate, mucronate, 3-4 nerved on either side of the keel ; 4th one empty. Stamens 2. Nut grey, oblong, apiculate.

PACHMARHI : Vicinity (1000 m). In moist places, Common.

Fl. & Fr. : July - February.

4. FIMBRISTYLIS Vahl

- | | | |
|--|-----|--------------------------|
| 1a. Nuts linear with almost parallel sides | ... | <i>F. tetragona</i> 6 |
| 1b. Nuts obovoid or scorbiculae : | | |
| 2a. Stigmas 2. Nuts lenticular : | | |
| 3a. Spikelets angular, 1.0 - 1.5 mm. broad | ... | <i>F. bisumbellata</i> 1 |
| 3b. Spikelets terete, 2.5 - 3.0 mm. broad | ... | <i>F. dichotoma</i> 2 |
| 2b. Stigmas 3. Nuts trigonal : | | |

- 4a. Glumes distichous. Spikelets strongly compressed ... *F. ovata* 5
- 4b. Glumes spiral. Spikelets terete or angular:
- 5a. Spikelets in clusters of 2 - 5, or a few, sometimes solitary; stamens 3 ... *F. falcata* 3
- 5b. Spikelets all solitary. Stamen 1 (rarely 2) ... *F. miliacea* 4

1. *Fimbristylis bisumbellata* (Forsk.) Bab. Dodec. 30. 1850; Babu, Herb. Fl. Dehra Dun 564. 1977. *Scirpus bisumbellata* Forsk. Fl. Aegypt Arab. I : 15. 1775. *Fimbristylis dichotoma* [auct. pl. non (L.) Vahl, 1805]; Clarke in Hook. f. Fl. Brit. Ind. 6 : 635. 1893.

Tufted annuals. Stems flattened. Leaves flat with several equal nerves; ligule a fringe of short hairs; sheath membranous, hairy. Inflorescence of numerous oblong spikelets. Rachilla much elongating. Bracts hairy at base. Glumes ovate oblong, membranous, red-brown, with green, sharp, apiculate keel. Style fimbriate; outer layer transparent. Nut short stipitate, white or straw coloured, obovoid with 5-7 longitudinal striae.

PACHMARHI: Vicinity (1000 m). In waste places in forest. Common.

Fl. & Fr.: July December.

2. *Fimbristylis dichotoma* (L.) Vahl, Enum. Pl. 2 : 287. 1805; Babu, Herb. Fl. Dehra Dun 565. 1977. *Scirpus dichotoma* L. Sp. Pl. 1 : 50. 1753. *Scirpus diphyllos* Retz. Obs. Bot. 5 : 15. 1789. *Fimbristylis diphylla* (Retz.) Vahl, Enum. Pl. 2 : 289. 1805; Clarke in Hook. f. Fl. Brit. Ind. 6 : 636. 1893.

Shortly rhizomatous, tufted perennials. Stems compressed, glabrous. Leaves flat with rounded spinulose tips; sheaths hairy, brown-spotted. Ligule hairy. Spikelets solitary, few, ovate, acute, red-brown. Glumes broadly ovate, brown, minutely apiculate. Style bearded at the base of the 2 stigmas. Nut obovate or broadly elliptic, ridged by 7-10 rows of concave thick-walled cells.

PACHMARHI: Vicinity (1000 m); Mahadev hill (1200 m). In waste places and hill slopes. Common.

Fl. & Fr.: July December.

3. *Fimbristylis falcata* (Vahl) Kunth, Enum. Pl. 2 : 239. 1837; Babu, Herb. Fl. Dehra Dun 565. 1977. *Scirpus fulacter* Vahl, Enum. Pl. 2 : 275. 1806. *Trichostylis junciformis* Nees in Wt. Contrib. Bot. Ind. 106. 1834. *Fimbristylis junciformis* (Nees) Kunth, Enum. Pl. 2 : 239. 1837; Clarke in Hook. f. Fl. Brit. Ind. 6 : 647. 1893.

Perennials with fiber covered short rhizome. Leaves spreading, eligulate, abruptly triangular tipped. Inflorescence sessile or once umbellate with a few rays. Spikelets elliptic. Glumes obtuse, red brown with a white margin. Nut trigonous, pale; surface cells quadrate, nearly isodiametric, some convex, producing an irregularly papillate verruculose surface.

PACHMARHI ; Mahadev hill (1200 m), 27 4 64, Panigrahi 4562 (BSA). In waste places and hill slopes. Common.

Fl. & Fr. : July November.

New record for the area.

4. *Fimbristylis miliacea* (L.) Vahl, Enum. Pl. 2 : 287. 1805 ; Clarke in Hook. f. Fl. Brit. Ind. 6 : 644. 1893 ; Babu, Herb. Fl. Dehra Dun 565. 1977. *Scirpus miliaceus* L. Syst. Nat. ed. 10. 868. 1759. *Fimbristylis littoralis* Gaud. in Freyc. Voy. Bot. 413. 1836.

Tufted annuals. Stem quadrangular, bearing bladeless, papery sheathes. Leaves on terminal sterile shoot, equitant, eligulate. Inflorescence umbellate. Spikelets subglobose, dark, reddish-brown. Glumes ovate, obtuse, rounded on back. Stigmas 3. Nut narrowly obovate, verruculose.

PACHMARHI : Vicinity (100 m). In moist places in the forests. Common.

Fl. & Fr. : July November.

5. *Fimbristylis ovata* (Burm. f.) Kern. in Blumea 15 : 126. 1967 ; Hooper in Sald. & Nicol. Fl. Hassan 679. 1976. *Carex ovata* Burm. f. Fl. Ind. 194. 1768. *Cyperus monostachyos* L. Mant. Alt. 180. 1771. *Fimbristylis monostachyos* (L.) Hook. Pl. Jav. Rar. 61. 1848 ; Clarke in Hook. f. Fl. Brit. Ind. 6 : 649. 1893.

Perennials with short rhizomes. Stems thickened at the base. Leaves linear, shorter than stems. Inflorescence of 1-2 solitary spikelets : bracts very short. Spikelets narrowly ovate, acute. Glumes triangular ovate, acute with pale scarious sides and curved green, shortly excurrent keel. Style smooth. Nut stipitate orbicular, terete or somewhat ridged, covered by large warts except on the ridges.

PACHMARHI : Vicinity (1000 m). In forest clearings and moist places. Common.

Fl. & Fr. : September October.

6. *Fimbristylis tetragona* R. Br. Prodr. 226. 1810 ; Clarke in Hook. f. Fl. Brit. Ind. 6 : 631. 1893 ; Hooper in Sald. & Nicol. Fl. Hassan 681. 1976.

Glabrous, glaucous perennials with short rhizomes. Stems tufted, erect, rigid, quadrangular, strongly ribbed. Leaves bladeless; sheaths with oblique inflated mouths. Inflorescence consisting of a single terminal spikelet. Spikelet ebracteate, globose, many-flowered. Glumes oblong-ovate, obtuse, rounded on the back, several-nerved. Style base hairy. Stigmas 2-3. Nut pale, narrowly obovate or cylindric with a conspicuous gynophore.

PACHMARHI: Vicinity (1000 m). In open marshy places in sal forests. Occasional.

Fl. & Fr. : October November.

5. LIPOCARPHA R. Br.

Lipocarpha chinensis (Osbeck) Kern in Blumea, Suppl. 4 : 167. 1958. Babu, Herb. Fl. Dehra Dun 567. 1977. *Scirpus chinensis* Osbeck, Dagb. Ostind. Resa 220. 1757. *Hypaelyptrum argenteum* Vahl, Enum. Pl. 2 : 283. 1805. *Lipocarpha argentea* (Vahl) R. Br. in Tuckey, Narr. Exp. Congo, 477. 1819; Clarke in Hook. f. Fl. Brit. Ind. 6 : 667. 1893.

Annuals or perennials. Stem tufted, obtusely trigonous. Leaves stiff, spreading. Involucral bracts finally deflexed. Inflorescence lobes 5-6, rounded obtuse. Glumes rounded on the back, deciduous, enclosing 1-2 stamens and a nut wrapped round by 2 membranous scales, much exceeding the nut. Nut oblong, compressed.

PACHMARHI: Vicinity (1000 m). In marshy places in and around the forest. Common.

Fl. & Fr. : July December.

6. RHYNCHOSPORA Vahl

Rhynchospora rugosa (Vahl) Gale in Rhodora 46 : 275, t. 835, f. 1 A. B. 1944; Kern in Fl. Males 7 (3) : 720. 1974. *Schoenus rugosus* Vahl, Eclog. Am. 5. 1798. *Rhynchospora glauca* Vahl, Enum. 2 : 233. 1806, nom. illegit.; Clarke in Hook. f. Fl. Brit. Ind. 6 : 671. 1893.

Perennials with short rhizome. Stem tufted, trigonous, many leaved at the base and with some distant caudine leaves. Leaves shorter than the stems, with strong midrib; basal sheaths brown. Inflorescence paniculate, consisting of 3-4 distant umbels. Spikelets solitary or in small clusters, 2-4 flowered. Glumes 5-8, spiral. Style halfway bifid; base conical, glabrous. Nut obovate, biconvex, finely transversely wrinkled.

PACHMARHI : Vicinity (1000 m). In moist places in the forest. Occasional.

Fl. & Fr. : July - December.

7. SCIRPUS L.

Scirpus squarrosum L. Mant. 2 : 181. 1771 ; Clarke in Hook. f. Fl. Brit. Ind. 6 : 663. 1893 ; Babu, Herb. Fl. Dehra Dun 569. 1977.

Annuals with filiform, striate, glabrous stems. Sheaths glabrous, membranous. Spikelets 1-3, ovoid-globose, brown. Bracts 1-3, filiform, erect. Glumes obovate, narrowed abruptly into a recurved awn. Stamens 1-2. Bristles absent. Nut obovoid, trigonous, brown, smooth.

BORI : Reserve forest (550 m). In moist places in the forest. Common.

Fl. & Fr. : July - December.

8. SCLERIA Berg.

1a. Hypogynous - disc obsolete, reduced to a narrow band ... *S. lithosperma* 2

1b. Hypogynous - disc well - developed, 3 - lobed :

2a. Annual herbs. Terminal partial panicles 2-4 cm long.
Nuts cancellate ... *S. parvula* 3

2b. Perennial herbs. Terminal partial panicles 4-10 cm
long. Nuts smooth or faintly reticulate ... *S. levis* 1

1. *Scleria levis* Retz. Obs. Bot. 4 : 13. 1786 ; Babu, Herb. Fl. Dehra Dun 571. 1977. *Scleria hebecarpa* Nees in Wt. Contrib. Bot. Ind. 117. 1834 ; Clarke in Hook. f. Fl. Brit. Ind. 6 : 689. 1894.

Tufted perennials. Stems scabrid on the angles. Leaves equally distributed along the stem, scabrid on the margins in the upper part; sheaths narrow, winged. Inflorescence narrow, terminal and 1-2 smaller lateral ones; primary bracts overtopping the inflorescence. Spikelets unisexual. Male spikelets oblong-lanceolate. Stamens 3; anthers linear. Female spikelets ovate, or sterile glume usually present; glumes ovate, acute or mucronulate. Disc deeply 3-lobed. Nut globose, not exserted from the glumes, pubescent, ultimately glabrescent, white.

PACHMARHI : Vicinity (1000 m). Along streams and marshy places. Common.

Fl. & Fr. : July November.

2. *Scleria lithosperma* (L.) Sw. Prodr. Veg. Ind. Occ. 18. 1788; Clarke in Hook. f. Fl. Brit. Ind. 6 : 685. 1894; Hooper in Sald. & Nicol. Fl. Hassan 700. 1976. *Scirpus lithosperma* L. Sp. Pl. 51. 1753.

Perennials with nodulose rhizomes. Stems slender, triquetrous. Leaves rigid, linear; contraligule convex or triangular, brown hairy. Inflorescence slender with 2-3 distant, axillary, almost spicate panicles. Spikelets ferruginous. Nut ovoid, obtusely trigonous, with a ferruginous glandular patch at the base of each face and dark ring at the base of the stipe.

PACHMARHI : Vicinity (1000 m). In moist places in the forest. Occasional.

Fl. & Fr. : July September.

3. *Scleria parvula* Steud. Syn. 2 : 174. 1855; Babu, Herb. Fl. Dehra Dun 572. 1977. *Scleria lessellata* Clarke in Hook. f. Fl. Brit. Ind. 6 : 686. 1894 (*non* Willd. 1805), p. p.

Annuals. Stem slender, triquetrous. Leaves linear, glabrous except scabrid margins; contraligule rounded, ciliate. Sheaths triquetrous, glabrous. Inflorescence terminal and lateral panicles. Female spikelets with a male flower at the base. Glumes ovate, brown, mucronate. Nut white, ellipsoid-subglobose, apiculate, pubescent on the striations. Disk 3-lobed, brown, with ovate, acuminate lobes. Male spikelets: glumes lanceolate. Hermaphrodite spikelets often present, with female florets below and male florets above.

PACHMARHI : Vicinity (900 m). In moist places. Occasional.

Fl. & Fr. : August December.

101. POACEAE Barnhart

- 1a. Spikelets 1 to many-flowered, breaking up at maturity above the more or less persistent glumes or if falling entire then not 2-flowered with the lower floret male or barren and the upper hermaphrodite :
- 2a. Arborescent. Leaves articulate with sheaths ... *Dendrocalamus* 16
- 2b. Otherwise. Leaves not articulate with sheaths :
- 3a. Spikelets in open or contracted spike-like panicles, less often racemes or spikes :
- 4a. Spikelets with one fertile floret, with or without 1 or 2 male or barren florets below it :
- 5a. Spikelets with 2-florets :
- 6a. Lower floret empty, epaleate. Glumes half the length of the spikelets ... *Thysanolaena* 54
- 6b. Lower floret male or empty, usually paleate. Glumes as long as the spikelets :
- 7a. Glumes unequal; lower one acute, upper one acuminate. Upper lemma awned ... *Arundinella* 5
- 7b. Glumes equal, obtuse or mucronate. Upper lemma awnless ... *Isachne* 30
- 5b. Spikelets with 1-floret :
- 8a. Lemma awned ... *Aristida* 3
- 8b. Lemma awnless :
- 9a. Inflorescence a long curved secund spike ... *Microchloa* 35
- 9b. Inflorescence an open or contracted panicle ... *Sporobolus* 52
- 4b. Spikelets with 2 or more fertile florets, if one, then with sterile florets above :
- 10a. Clump 1.5 meter or more high. Racemes hairy ... *Phragmites* 43

- 10b. Culms less than 1 meter. Rachilla glabrous :
- 11a. Lemma 2-lobed or toothed or notched at apex, glabrous at base ... *Tripsacum* 55
- 11b. Lemma tip entire, acute or shortly awned, bearded at base :
- 12a. Inflorescence a solitary spike ... *Oropetium* 38
- 12b. Inflorescence digitate :
- 13a. Spikelets with a fertile floret with or without reduced florets above :
14a. Spikelets without reduced florets, awnless ... *Cynodon* 13
- 14b. Spikelets with 1 or more reduced florets, awned ... *Chloris* 10
- 13b. Spikelets with 2 or more fertile florets :
- 15a. Glume awned, margin densely ciliate ... *Melanocenchrus* 34
- 15b. Glume not as above :
- 16a. Spikelets in open contracted, spike-like racemes or panicles :
17a. Spikelets in panicles ... *Eragrostis* 24
- 17b. Spikelets in solitary, secund, raceme or spike... *Eragrostiella* 23

- 16b. Spikelets in digitate or racemosely arranged spikes or spike-like racemes :
- 18a. Rachis projected beyond terminal spikelet, 2nd glume short, awned or mucronate ... *Dactyloctenium* 15
- 18b. Rachis not projected beyond terminal spikelets, 2nd glume not awned or mucronate ... *Eleusine* 22
- 3b. Spikelets on opposite sides of the rachis of a solitary spike or spike-like racemes ... *Triticum* 56
- 1b. Spikelets 2-flowered, falling entire at maturity ; usually with female upper floret and male or barren lower one : frequently dorsally compressed :
- 19a. Spikelets bisexual or male or barren, and bisexual spikelets on the same inflorescence, if unisexual, then lemmas of the fertile one indurated :
- 20a. Spikelets paired, with 1 sessile and 1 pedicelled similar or dissimilar. Glumes as long as the spikelet and enclosing the florets, rigid. Lemmas hyaline or membranous ; upper ones usually awned :

- 21a. Spikelets in similar pairs. Female joints thin, linear or slightly dilated at the top :
 22a. Spikelets solitary, laterally compressed. Rachis continuous. Inflorescence of a single raceme or of several one-sided racemes ... *Dimeria* 20
- 22b. Spikelets in pairs or in threes, mostly dorsally compressed or cylindrical. Rachis articulating :
 23a. Spikelets in panicles or in compound racemes :
 24a. Lemmas awned, toothed or clefted :
 25a. Rachis of racemes tough or tardily breaking up. Upper lemma less clefted... *Narenga* 36
 25b. Rachis of racemes breaking up. Upper lemma clefted ... *Spodiopogon* 31
- 24b. Lemmas awnless, neither clefted nor toothed :
 26a. Stamens 1 or 2. Inflorescence a contracted, cylindrical panicle, small. Rachis tough ... *Imperata* 29
 26b. Stamens 3. Inflorescence large, open panicle. Rachis fragile ... *Saccharum* 47
- 23b. Spikelets in racemes, 2 to few, digitate :
 27a. Spikelets with 2-florets. Upper lemma 2-toothed ... *Eulaliopsis* 26
 27b. Spikelets with 1 floret. Upper lemma deeply clefted, awned in the sinus ... *Eulalia* 25
- 21b. Spikelets in dissimilar pairs ; sessile one bisexual ; pedicelled one male or sterile or absent, if similar then the joints and pedicels thick and swollen :

- 28a. Joints of rachis and pedicels swollen,
3-angled, rounded or flattened :
 29a. Upper lemma awned ; sessile
spikelets with male and bisex-
ual florets :
 30a. Racemes 1-noded, re-
duced to 3 heteromor-
phous spikelets, enclosed
in a boat shaped spa-
the ... *Apluda* 2
- 30b. Racemes many-noded, es-
pathate ... *Ischaemum* 31
- 29b. Upper lemma unawned ; ses-
sile spikelets with bisexual
floret only or rarely with male
floret below :
 31a. Raceme fragile ; pedi-
celled and sessile spike-
lets different :
 32a. Lower glume of ses-
sile spikelets with a
broad wing on each
keel ... *Manisuris* 33
- 32b. Lower glume of ses-
sile spikelets not
winged at the
keel ... *Rottboellia* 46
- 31b. Raceme tough, its flat-
tened rachis formed from
the fused pedicels and
internodes ; spikelets al-
most alike ... *Hemarthria* 27
- 28b. Joints and pedicels narrow, neither
thickened nor flattened often with a
translucent longitudinal groove :
 33a. Spikelets in racemes which are
neither interrupted by spathes
nor solitary at the ends of
branches, usually in whorled
panicles :
 34a. Spikelets dorsally com-
pressed. Lower glume
smooth ... *Sorghum* 50
- 34b. Spikelets laterally com-
pressed or terete. Lower
glume tuberculate ... *Pennisetum* 57

- 33b. Spikelets in panicles or racemes interrupted by spathes, if not, then the racemes solitary or digitate :
- 35a. Upper lemma of the sessile spikelets awned from the back ... *Arthroxon* 4
- 35b. Upper lemma awned from the tip or sinus, often reduced to the hyaline base of an awn :
- 36a. Lower glume of the sessile spikelets with infolded margins, 2-keeled ; awn glabrous :
- 37a. Upper lemma of the sessile spikelets awned from the entire tip, often stipitate and passing into an awn :
- 38a. Racemes in panicles ... *Capillipedium* 8
- 38b. Racemes digitate or in short spikeiform panicles :
- 39a. Joints and pedicels with a translucent longitudinal furrow. Pairs of spikelets heterogamous ... *Bathriochloa* 6
- 39b. Joints and pedicels without a translucent furrow :
- 40a. Pairs of spikelets heterogamous. Upper lemma of the sessile spikelets 2 - lfd ... *Pseudosorghum* 44
- 40b. Lowest 1 - 3 pairs of spikelets homogamous. Upper lemma of the sessile spikelets reduced to the translucent base of an awn ... *Dichanthium* 17
- 37b. Upper lemma of sessile spikelets 2 - cleft or lobed, awned from the sinus :

- 41a. Racemes 2 - nate, combined into large spathate panicle. Plants aromatic ... *Cymbopogon* 12
- 41b. Racemes solitary at the ends of culms and their branches. Plants not aromatic :
- 42a. Pedicelled spikelets very much larger than the sessile. Upper glume awned. Joints and pedicels buccini-form ... *Dactyloctenium* 18
- 42b. Pedicelled spikelets not conspicuously larger, often small to very small. Upper glume awnless. Joints and pedicels clavate, 2 - toothed ... *Schizachyrium* 48
- 36b. Lower glume of the sessile spikelets without inflexed sides, inturned and rounded, not keeled as above, if keeled then mostly at the top :
- 43a. Racemes without an involucre of homogamous spikelets ... *Heteropogon* 28
- 43b. Racemes surrounded at base by an involucre of homogamous spikelets :
- 44a. Involucral spikelets pedicelled, deciduous. Callus of the fertile spikelets short, truncate or obtuse ... *Iseilema* 32
- 44b. Involucral spikelets sessile, persistent. Callus of the fertile spikelets pointed ... *Themeda* 33
- 20b. Spikelets solitary or paired, usually similar. Glumes shorter or as long as the spikelets, membranous. Lemmas especially upper one papery to very tough, rigid, awnless :
- 45a. Spikelets with an involucre of bristles or subtended by a solitary bristle, falling with or without bristles at maturity :
- 46a. Upper lemma transversely rugose. Bristles persistent ... *Setaria* 49
- 46b. Upper lemma smooth. Bristles caducous ... *Pennisetum* 42
- 45b. Spikelets not subtended by an involucre of bristles or a solitary bristle, falling singly :
- 47a. Spikelets in contracted or open panicles :
- 48a. Spikelets gibbous, laterally much compressed :
- 49a. Upper glume and lower lemma beaked, long ciliate ... *Rhynchelytrum* 43

- 49b. Upper glume and lower lemma entire at apex ... *Cyrtococcum* 14
- 48b. Spikelets not gibbosus ... *Panicum* 39
- 47b. Spikelets in secund (1-sided) spikes or spike like racemes which are either digitate or scattered, rarely solitary :
- 50a. Lemma of the upper floret thinly cartilaginous, usually with flat, hyaline margins :
- 51a. Upper lemmas awnless ... *Digitaria* 19
- 51b. Upper lemmas awned ... *Alloteropsis* 1.
- 50b. Lemma of the upper floret more or less crustaceous or coriaceous, usually with in - rolled margin exposing much of the palea :
- 52a. Lower glume turned towards the rachis, with the back of the upper lemma turned away from it (spikelets adaxial) ... *Brachiaria* 7
- 52b. Lower glume turned away from the rachis, with back of the upper lemma facing it (spikelets abaxial) :
- 53a. Lower glume usually absent ... *Paspalum* 41
- 53b. Lower glume usually present, often much reduced :
- 54a. Upper lemma acute, not mucronate; upper florets transversely rugose ... *Paspalidium* 40
- 54b. Upper lemma mucronate or awned; upper florets smooth :

- 55a. Leaves linear. Culms erect.
Leaf base not oblique ... *Echinochloa* 21
- 55b. Leaves ovate-lanceolate.
Culms creeping below. Leaf
base oblique ... *Oplismenus* 37
- 19b. Spikelets unisexual, male and female in separate in -
florescence or in different parts of the same inflores -
cence and of different appearance. Lemma hyaline or
membranous, thinner than the glumes :
- 56a. Female spikelets enclosed in a metamorphosed
leaf sheath which forms a spherical or cylindri -
cal ivory + bead - like structure ... *Coxix* 11
- 56b. Female spikelets not enclosed in a false invo -
lure as above ... *Chionachne* 9

1. ALLOTEROPSIS C. Presl.

Alloteropsis cimicina (L.) Stapf in Prain, Fl. Trop. Afr. 9 : 487.
1919 ; Babu, Herb. Fl. Dehra Dun 580. 1977. *Milium cimicinum* L. Mant.
Pl. 184. 1771. *Axonopus cimicinus* (L.) P. Beauv. Ess. Agrost. 12. 1812 ;
Hook. f. Fl. Brit. Ind. 7 : 64. 1896.

Annuals with culms hairy. Leaves ovate lanceolate, subacute,
ciliate on the margins with bulbous based hairs ; sheath and ligule hairy.
Spikelets ovoid-ellipsoid. Lower glume ovate lanceolate, acuminate,
3-5 nerved. Upper glume ovate elliptic, mucronate, 5 nerved. Lower
palea divided into 2 linear lobes.

PACHMARHI : Vicinity (1000 m). In waste lands and along water
course. Common.

Fl. & Fr. : July October.

2. APLUDA L.

Apluda mutica L. Sp. Pl. 82. 1753. *Apluda aristata* L. Amoen. Acad.
4 : 303. 1756. *Apluda varia* Hack. subsp. *aristata* (L.) Hack. in DC.
Monogr. Phan. 6 : 196. 1889 ; Hook. f. Fl. Brit. Ind. 7 : 150. 1896.

Perennial grass. Culms tufted, geniculately ascending, erect or the branches rambling among the bushes. Leaves linear-lanceolate, narrowed from the middle to filiform tip and below into a slender petiole; ligule chartaceous, oblong, lacerate. Spikelets clustered on short peduncles; the clusters solitary or few and arranged in an elongate bracteate interrupted leafy panicle. Sessile spikelets 3-5 mm long.

PACHMARHI : Vicinity (1000 m); Dhupgarh (1250 m).

BORI : Reserve forest (500 m). On moist hill slopes and way sides of the forests. Common.

Fl. & Fr. : October - January.

3. ARISTIDA L.

Aristida setacea Retz. Obs. Bot. 4 : 22. 1786; Hook. f. Fl. Brit. Ind. 7 : 225. 1896; Ramam. in Sald. & Nicol. Fl. Hassan 709. 1976.

Perennial grass. Culms stout, erect. Leaf blade involute, narrow; ligule a fringe of hairs. Inflorescence a contracted or effuse panicle. Spikelets 1-flowered, rachilla not produced beyond the floret. Glumes long-awned; G1 1.3 cm long; G2 with awn up to 1-4 cm.

PACHMARHI : Vicinity (1000 m); Jambudeep (1000 m). BORI : Reserve forest (550 m). In rock crevices and waste places. Common.

Fl. & Fr. : All seasons.

4. ARTHRAXON Beauv.

- | | | |
|--|-----|--------------------------|
| 1a. Pedicel glabrous or 0 | ... | <i>A. quadrinarius</i> 3 |
| 1b. Pedicel hairy : | | |
| 2a. Lower glume keeled; keels tuberculate | ... | <i>A. meboldii</i> 2 |
| 2b. Lower glume rounded on the back, not keeled, | ... | <i>A. lancifolius</i> 1 |

1. *Arthraxon lancifolius* (Trin.) Hochst. in Flora 39 : 188. 1856 ; Babu, Herb. Fl. Dehra Dun 583. 1977. *Andropogon lancifolius* Trin. in Mem. Acad. Sci. Petersb. Ser. 6, 2 : 271. 1832. *Andropogon microphyllus* Trin. in Mem. Acad. Sci. Petersb. Ser. 6, 2 : 275. 1832. *Arthraxon macrophyllus* (Trin.) Hochst. in Flora 39 : 188. 1856 ; Hook. f. Fl. Brit. Ind. 7 : 147. 1896.

Slender annual herbs. Leaves hairy. Pedicels hairy. Glume 1 rounded on the back with hispid nerves. G2 ciliate on keel towards apex.

PACHMARHI : Vicinity (1000 m). On hill slopes. Common.

Fl. & Fr. : September - December.

2. *Arthraxon meeboldii* Stapf in Bull. Misc. Inform. 449. 1908 ; Bot. Grasses India 101. 1960 ; Ramam. in Sald. & Nicol. Fl. Hassan 710. 1976.

Annual herbs. Leaves ovate lanceolate ; blade up to 2 × 0.5 cm. G1 2 keeled ; keels with two rows of marginal tubercles which become spinulose and ciliate upwards.

PACHMARHI : Vicinity (1000 m). On hill slopes. Occasional.

Fl. & Fr. : August - October.

3. *Arthraxon quartianum* (A. Rich.) Nash in N. Amer. Flora 17 : 99. 1912 ; Babu, Herb. Fl. Dehra Dun 584. 1977. *Alectordia quartiana* A. Rich. Tent. Fl. Abyss. 2 : 488. t. 99. 1851. *Arthraxon ciliaris* P. Beauv. Ess. Agrost. Ill : 152. t. II. f. 6. 1812 ; Hook. f. Fl. Brit. Ind. 7 : 145. 1896, p. p.

Annuals. Leaves lanceolate, cordate at base, hairy. Sessile spikelets 3-3.2 mm long with a minute callus. Pedicelled spikelets reduced to subulate points.

PACHMARHI : Vicinity (1000 m). In swampy places. Common.

Fl. & Fr. : September - November.

5. ARUNDINELLA Raddi

- | | |
|--|------------------------|
| 1a. Tip of pedicel with 2 bristles | ... <i>A. setosa</i> 2 |
| 1b. Tip of pedicel without any bristle | ... <i>A. pumila</i> 1 |

1. *Arundinella pumila* (Hochst. ex A. Rich.) Steud. Syn. Pl. Glum. 1 : 114. 1854 ; Babu, herb. Pl. Dehra Dun 586. 1977. *Acruntherum pumilum* Hochst. ex A. Rich. Tent. Fl. Abyss. 2 : 414. t. 100. 1851. *Arundinella tenella* Nees ex Steud. Syn. 1 : 114. 1854 ; Hook. f. Fl. Brit. Ind. 7 : 71. 1896.

Delicate annual herbs. Blades 20 × 2.6 cm, hairy. Panicle fan shaped. Spikelets less than 2 mm long. G2 often with few hairs on back.

BORI : Reserve forest (550 m). In shady places in the forest. Common.

Fl. & Fr. : September December.

2. *Arundinella setosa* Trin. Gram. Panic. 63. 1826 ; Hook. f. Fl. Brit. Ind. 7 : 70. 1896 ; Ramam. in Sald. & Nicol. Fl. Hassan 711. 1976.

Tufted perennial herbs. Leaf blade flat ; sheath strongly compressed and keeled on the back ; ligule very narrow. Inflorescence of digitate, spiciform, alternate racemes. Spikelets sessile, solitary, alternate; dorsally compressed, acute, 2 flowered, falling entire. G1 absent, G2 as long as the spikelet, membranous, with involute margin. L1 membranous, faintly nerved, epaleate. L2 herbeaceous, involute at margin, hardening in fruit, enclosing a basally auricled, bisexual palea. Lodicules 2 ; stamens 3 ; styles 2, free ; stigmas plumose.

PACHMARHI : Vicinity (1000 m) ; Dhupgarh (1250 m). On hill slopes and waste places. Common.

Fl. & Fr. : August October.

6. BOTHRIOCHLOA O. Kuntze

- | | |
|--|------------------------|
| 1a. Lower racemes longer than the rachis. Racemes 2 - 8, overtopping the axis ... | <i>B. kuntzeana</i> 3 |
| 1b. Lower racemes shorter than the rachis. Racemes 8 - many, not overtopping the axis : | |
| 2a. Primary axis of the panicle 3 - 7 cm long. Racemes simple, often the lower ones branched ... | <i>B. intermedia</i> 2 |
| 2b. Primary axis of the panicle 5 - 10 cm long. Racemes usually branched ... | <i>B. glabra</i> 1 |

1. **Bothriochloa glabra** (Roxb.) A. Camus in Ann. Soc. Linn. Lyon, N. S. 76 : 164. 1931 ; Babu, Herb. Fl. Dehra Dun 589. 1977. *Andropogon glaber* Roxb. Fl. Ind. 1 : 271. 1820. *Andropogon intermedius* sensus Hook. f. Fl. Brit. Ind. 7 : 175. 1896, p. p. (non R. Br. 1810).

Perennials. Leaves ciliate, hairy. Racemes 5-10 cm long, combined into a 12-30 cm long spiciform panicle. Sessile spikelets : L. glume truncate or 2-toothed, 2-keeled. U. glume ciliate, scarbird on the keel. L. floret barren. L. lemma epaleate. U. floret bisexual. U. lemma replaced by scabrid, brown awn, epaleate. Lodicules ciliolate. Pedicelled spikelets reduced to empty glumes.

BORI : Reserve forest (550 m) ; Dhain (460 m). On hill slopes. Common.

Fl. & Fr. : September - December.

2. **Bothriochloa intermedia** (R. Br.) A. Camus in Ann. Soc. Linn. Lyon, N. S. 76 : 164. 1931. *Andropogon intermedius* R. Br. Prodri. 202. 1810. var. *punctatus* (Roxb.) Hook. f. Fl. Brit. Ind. 7 : 176. 1896. *Andropogon punctatus* Roxb. Fl. Ind. 1 : 268. 1820. 'Khar' / "Jhara".

Perennials. Leaves glabrous, ciliate. Ligule reduced to a ciliate rim. Racemes 8-15. Sessile spikelets : callus bearded. L. glume usually pitted. U. glume ciliate. L. floret : empty, epaleate. L. lemma acute, ciliate. U. lemma reduced to the hyaline base of an awn, epaleate. Pedicelled spikelets reduced to empty glumes.

BORI : Dhain (460 m). In shaded places in the forest. Common.

Fl. & Fr. : August - December.

3. **Bothriochloa kuntzeana** (Hack.) Henr. in Blumea 3 : 456. 1940. *Andropogon kuntzeana* Hack. in DC. Monogr. Phan. 6 : 478. 1889 ; Hook. f. Fl. Brit. Ind. 7 : 175. 1896.

Tall perennials with thickly bearded nodes. Leaves narrowly linear, smooth, glabrous, glaucous. Spike corymbose. Sessile spikelets narrow : G1 glabrous, thin ; G2 lanceolate, acuminate, margins ciliolate ; G3 lanceolate, glabrous ; G4 awned, base dilated. Pedicelled spikelets narrower ; male ; G1 keeled ; keels ciliate at the entire tip ; G2 5-nerved ; G3 nerveless ; G4 small or O.

BORI : Reserve forest (550 m). In shady places in the forest. Occasional.

Fl. & Fr. : October December.

7. BRACHIARIA Griseb.

- | | | |
|---|-----|---------------------|
| 1a. Spikelets 1.2 - 2 mm long. Pedicels bristly | ... | <i>B. reptans</i> 3 |
| 1b. Spikelets 2.5 - 3 mm long. Pedicels and rachis hairy or glabrous : | | |
| 2a. Spikelets distant by less than 3 mm. Primary pedicels not more than 2 mm long. Pedicels and rachis with long colourless hairs | ... | <i>B. ramosa</i> 2 |
| 2b. Spikelets distant by 10 - 16 mm. Primary pedicels 6 - 10 mm or more long. Pedicels and rachis without long colourless hairs. | ... | <i>B. deflexa</i> 1 |

1. *Brachiaria deflexa* (Schum.) C. E. Hubb. ex Robyns in Bull. Jard. Brux. 9 : 181. 1932 ; Bor. Grasses India 281. 1960. *Panicum deflexum* Schum. Beskr. Guin Pl. 63. 1827.

Annuals. Culms decumbent ascending, nodes pubescent. Leaves lanceolate. Ligule long - ciliate. Spikelets or pairs of spikelets or secondary racemes loosely scattered, distant by 10 - 16 mm. Primary pedicels 6 - 10 mm or more long. L. glume 5 nerved. U. glume 7 nerved. Pedicel and rachis devoid of long colourless hairs.

BORI : Reserve forest (550 m), 22 12 62, Panigrahi 6296A (BSA). In shaded places and waysides. Rare.

Fl. & Fr. : August November.

2. *Brachiaria ramosa* (L.) Stapf in Prain, Fl. Trop Afr. 9 : 542. 1919 ; Babu, Herb. Fl. Dehra Dun 591. 1977. *panicum ramosum* L. Mant. Pl. 1 : 29. 1767 ; Hook. f. Fl. Brit. Ind. 7 : 36. 1896, p. p.

Annuals. Culms decumbent ascending, rooting from the lower nodes. Leaves lanceolate, cordate, ciliate. Racemes 5 many. Rachis scabrid, often with long hairs. Spikelets spiculate. Pedicels with 1 - 3 needle like hairs at the top. L. glume ovate rounded, glabrous, 5 - nerved. U. glume 7 nerved, pubescent. L. lemma 5 - nerved, glabrous,

epaleate, empty. U. lemma bisexual, transversely rugose, apiculate. Palea similar to U. lemma.

BORI : Reserve forest on way sides. Common.

Fl. & Fr. August November.

Brachiaria reptans (L.) Gardn. & Hubb. in Hook. Ic. Pl. t. 3363. 1938 ; Babu, Herb. Fl. Dehra Dun 591. 1977. *Panicum reptans* L. Syst. Nat. ed. 10. 870. 1759.

Annuals or perennials. Culms erect-ascending from the creeping base, hollow, glabrous. Leaves ovato-lanceolate, with an amplexicaul base. Ligule long-ciliate. Spikelets : L. glume ovate, with a rounded or triangular tip, 0 to 3-nerved. U. glume as long as the spikelet, 7-nerved. L. lemma 5-nerved. U. lemma mucronate, tuberculate, rugulose, glabrous.

BORI : Reserve forest (550 m). In the forest undergrowth. Common.

Fl. & Fr. : August December.

8. CAPILLIPEDIUM Stapf

Capillipedium assimile (Stend.) A. Camus in Lecomte, Fl. Gen. de l' Indo-Chine 7 : 314. 1922 ; Babu, Herb. Fl. Dehra Dun 592. 1977. *Andropogon assimilis* Stend. in Zoll. Syst. Verz. 58. 1854 et Syn. 1 : 397. 1854 ; Hook. f. Fl. Brit. Ind. 7 : 179. 1896, p.p.

Perennials. Culms decumbent with scandent branches. Leaves linear. Ligule ciliate. Panicles decomound. Racemes glabrous. Sessile spikelets : callus bearded ; L. glume ciliate on the keels, with 3 intracarinal nerves ; U. glume lanceolate, 3-nerved. L. floret : empty ; L. lemma epaleate ; U. lemma replaced by scabrid awn. Palea absent. Pedicelled spikelets male or barren. L. glume 7-nerved. L. floret : male. L. lemma epaleate ; U. lemma absent.

PACHMARHI : Vicinity (1000 m). BORI : Reserve forest (550 m). In forest undergrowth. Common.

Fl. & Fr. : September April.

9. CHIONACHNE R. Br.

Chionachne koenigii (Spreng.) Thw. Enum. Pl. Zeyl. 357. 1864 ; Babu, Herb. Fl. Dehra Dun 593. 1977. *Coxia koenigii* Spreng. Syst. 1 : 239.

1825. *Coix barbata* Roxb. Fl. Ind. 3 : 569. 1832. *Polytoca barbata* (Roxb.) Stapf in Hook. f. Fl. Brit. Ind. 7 : 102. 1896.

Tufted grass, perennial. Leaves linear-lanceolate, clasping, acuminate; ligule membranous, ciliate. Racemes paniculate on slender peduncles. Female spikelets enclosed by a sheath of the spike. Male spikelets distichous on the rachis.

BORI : Dhain (462 m). In moist places in the forest. Common.

Fl. & Fr. : September - December.

10. CHLORIS Sw.

Chloris dolichostachya Lagasca, Gen. et Sp. Pl. 5. 1816 ; Babu, Herb. Fl. Dehra Dun 593. 1977. *Melica digitata* Roxb. Fl. Ind. 1 : 328. 1820. *Chloris incompleta* Roth, Nov. Pl. Sp. 60. 1821 ; Hook. f. Fl. Brit. Ind. 7 : 290. 1896. "Bamna"/"mathaniya".

Annual or perennials with nodes glabrous. Leaves tapering towards the base. Spikes 4 - 6, digitate, patent ; rachis trigonous, scabrid. Spikelets : imbricate; L. glume acuminate, 1-nerved. Lemmas 3-nerved, 2-toothed with a scabrid, long awn. Paleas 2-toothed, 2-keeled. Stamens 3. U. floret reduced to a minute, short-awned lemma.

BORI : Reserve forest (900 m). In the forest undergrowth. Common.

Fl. & Fr. : October - December.

11. COIX L.

- | | |
|---|----------------------|
| 1a. Floating and creeping plants. Upper surface of the leaves densely covered with conspicuous glands ... | <i>C. aquatica</i> 1 |
| 1b. Erect plants. Upper surface of the leaves without numerous conspicuous glands ... | <i>C. gigantea</i> 2 |

1. *Coix aquatica* Roxb. Fl. Ind. 3 : 571. 1832 ; Hook. f. Fl. Brit. Ind. 7 : 100. 1896 ; Bor, Grasses Ind. 264. 1960.

Floating aqua ic and creeping plants with succulent stems and floating roots at the nodes. Leaves linear-lanceolate, long acuminate; upper surface densely covered with conspicuous glands which bear bristle-like hairs. Ripe involucre abruptly constricted at the neck into a beak.

BORI : Reserve forest (550 m). In swamps of forests. Occasional.

Fl. & Fr. : October - February.

2. *Coix gigantea* Koenig ex Roxb. Fl. Ind. 3 : 570. 1832 ; Bor, Grasses Ind. 264. 1960. *Coix lachryma-jobi* L. Sp. Pl. 972. 1753. var. *gigantea* (Koen. ex Roxb.) Stapf in Hook. f. Fl. Brit. Ind. 7 : 100. 1896.

Erect aquatic grass, never floating. Leaves linear-lanceolate, long acuminate; upper surface eglandular, glabrous. Ripe involucre gradually constricted at the neck.

BORI : Dhain (462 m). Marashy places near river sides. Common.

Fl. & Fr. : October - February.

12. CYMBOPOGON Spreng.

Cymbopogon martinii (Roxb.) Wats. in Atkins. Gaz. N. W. Prov. Ind. 382. 1882 ; Babu, Herb. Fl. Dehra Dun 597. 1977. *Andropogon martinii* Roxb. Fl. Ind. 1 : 280. 1820. *Andropogon schoenanthus* L. var. *martini* (Roxb.) Hook. f. Fl. Brit. Ind. 7 : 204. 1896. "Gandh bel".

Sweet-scented grass. Leaves linear, acuminate. Panicles long, decom-pound, contracted, subtended by a spatheate bract 1.5 - 2 cm long. Sessile spikelets 3 - 5 mm long.

PACHMARHI : Vicinity (1000 m) ; Dhupgarh (1250 m). On hill slopes and along river banks. Common.

Fl. & Fr. : October - February.

Contains sweet-scented essential oil.

13. CYNODON Rich.

Cynodon dactylon (L.) Pers. Syn. Pl. 1 : 85. 1805 ; Hook. f. Fl. Brit. Ind. 7 : 288. 1896 ; Babu, Herb. Fl. Dehra Dun 598. 1977. *Panicum dactylon* L. Sp. Pl. 58. 1753. "Dhub" "hariyal".

Culms slender, prostrate, widely creeping, forming matted tufts, with slender or ascending flowering branches. Leaves narrowly linear or lanceolate, finely acute to pungent; ligule a very fine ciliate rim. Spikes digitate on a slender peduncle. Spikelets 1.5–2.5 cm.

PACHMARHI : Vicinity (1000 m). In waste lands and roadsides. Common.

Fl. & Fr. : June–October.

14. CYRTOCOCCUM Staff

Cyrtococcum oxyphyllum (Hochst. ex Steud.) Stapf in Hook. Ic. Pl. t. 3096. 1922; Ramam. in Sald. & Nicol. Fl. Hassan 720. 1976. *Panicum oxyphyllum* Hochst. ex Steud. Syn. Pl. Glum. 1 : 65. 1854. *Panicum pilipes* Nees & Arn. ex Buese in Miq. Pl. Jungh. 3 : 376. 1854; Hook. f. Fl. Brit. Ind. 7 : 57. 1896.

Perennial grasses. Leaves linear, lanceolate; ligules membranous. Panicle contracted. Spikelets short-pedicelled, obliquely ovate, gibbous, laterally compressed, 2-flowered, deciduous. Pedicels shorter than the spikelets.

PACHMARHI : Vicinity (1000 m). BORI : Reserve forest (900 m). In forest undergrowth under moist conditions. Common.

Fl. & Fr. : September–December.

15. DACTYLOCTENIUM Willd.

Dactyloctenium aegypticum (L.) P. Beauv. Ess. Agrost. 15. 1812; Babu, Herb. Fl. Dehra Dun 599. 1977. *Cynosurus aegypticus* L. Sp. Pl. 72. 1753. *Eleusine aegyptiaca* (L.) Desf. Fl. Atlant. 1 : 65. 1798; Hook. f. Fl. Brit. Ind. 7 : 295. 1896. "Makra"/"makri".

Annuals of variable habit. Culms sometimes prostrate, rooting from the nodes, branched, glabrous. Leaves linear, tapering to a fine point. Ligule a slightly ciliolate line. Spikes 2–6, digitately radiating. Spikelets numerous, 3–5-flowered, spreading at right angles to the rachis.

PACHMARHI : Vicinity (1000 m). On hill slopes and waste places. Common.

Fl. & Fr. : June–December.

16. DENDROCALAMUS Nees

Dendrocalamus strictus (Roxb.) Nees in Linnaea 9 : 476. 1834; Gamble in Ann. Roy Bot. Gard. Calcutta 7 : 78. t. 68-69. 1896 et in Hook. f. Fl. Brit. Ind. 7 : 404. 1896; Babu, Herb. Fl. Dehra Dun 600. 1977. *Bambos stricta* Roxb. Pl. Cor. 1 : 58. t. 80. 1798. "Bans"/"kaban".

Deciduous densely tufted bamboo with strong culms, solid or with a small cavity. Culm-sheaths covered on the back with golden brown stiff hairs. Leaves linear, gradually narrowed upwards into an acuminate twisted point.

PACHMARHI : Mahadev hill (1200 m). BORI : Reserve forest (550 m) ; Dhain (462 m). In the forests, gregarious in Bori forest. Common.

Fl. & Fr. : Not recorded.

17. DICHTANTHUM Willem.

1a. Peduncle below inflorescence hairy	...	<i>D. aristatum</i> 2
1b. Peduncle below inflorescence glabrous :		
2a. Lower glume of the sessile spikelet without a median nerve. Sheaths compressed	...	<i>D. caricosum</i> 3
2b. Lower glume of the sessile spikelet with a median nerve. Sheaths terete	...	<i>D. annulatum</i> 1

1. **Dichanthium annulatum** (Forsk.) Stapf in Prain, Fl. Trop. Afr. 9 : 178. 1917 ; Babu, Herb. Fl. Dehra Dun 601. 1977. *Andropogon annulatus* Forsk. Fl. Aegypt Arab. 173. 1775 ; Hook. f. Fl. Brit. Ind. 7 : 196. 1896. "Jaunera"/"palmaha".

Sarmentose grass. Culm nodes usually patently hairy. Leaves linear, acuminate ; sheaths terete ; ligule membranous. Recemes 2-9. Gl of pedicellate spikelet glabrous, of sessile spikelet without wings or keels.

BORI : Reserve forest (550 m). In forest undergrowth. Common.

Fl. & Fr. : September December.

2. **Dichanthium aristatum** (Poir.) C. E. Hubb. in Kew Bull. 1939 : 654. 1939 ; Raman. in Sald. & Nicol. Fl. Hassan 722. 1976. *Andropogon*

aristatus Poir. in Lamk. Encycl. Suppl. 1 : 585. 1810. *Andropogon caricosus* L. ssp. *mollicomus* Hack. var. *mollicomus* (Kunth) Hack. in DC. Monogr. Phan. 6 : 569. 1889 ; Hook. f. Fl. Brit. Ind. 7 : 196. 1896.

Perennial herbs ; nodes of culms usually patently hairy, sometimes glabrous. Leaves linear, acuminate ; ligule a rim of hairs. Racemes 1 - 6 ; peduncle hairy.

BORI : Reserve forest (550 m). Along river banks and waste land in the forest. Common.

Fl. & Fr. : October January.

3. *Dichanthium caricosum* (L.) A. Camus in Bull. Mus. Hist. Nat. Paris 27 : 549. 1921. *Andropogon caricosus* L. Sp. Pl. ed. 2. 1480. 1765 Hook. f. Fl. Brit. Ind. 7 : 196. 1896 [excl. var. *mollicomus* (Kunth) Hack.] ; "Kartah"/"Khel".

Perennial grass. Culm nodes rarely hairy. Leaves narrowly linear, finely acuminate ; ligule very short, membranous. Racemes 1 - 4. G1 of pedicellate spikelet laxly hairy, of sessile spikelet often winged and keeled.

PACHMARHI : Vicinity (1000 m). In forest undergrowth and roadside. Occasional.

Fl. & Fr. : September December.

18. DIECTOMIS Kunth

Diectomis fastigiata (Sw.) Kunth in Humb. & Bonpl. Nov. Gen. et. Sp. 1 : 193. t. 64. 1816. *Andropogon fastigiatus* Sw. Prodr. Veg. Ind. Oce. 26. 1788 ; Hook. f. Fl. Brit. Ind. 7 : 167. 1896.

Much fastigately branched grass, becomes red on drying. Leaves narrowly linear, acuminate ; ligule elongate, acute. Sessile spikelets laterally compressed. Pedicellate spikelet with a large G1 which with its flattened villous pedicel conceals the inner sessile spikelet.

PACHMARHI : Vicinity (1000 m). On hill slopes. Common.

Fl. & Fr. : September December.

19. DIGITARIA Heist. Ex Fabric.

1a. Hairs on the spikelet not clavate :

- 2a. U. glume less than one third of the length of the spikelet or often reduced to a minute, triangular scale ... *D. setigera* 3
- 2b. U. glume usually more than one - third of the length of the spikelet, well developed ... *D. ciliaris* 1

1b. Hairs on the spikelet clavate - tipped :

- 3a. Upper glume absent ... *D. stricta* 4
- 3b. Upper glume present ... *D. ternata* 2

1. *Digitaria ciliaris* (Retz.) Koel. Descr. Gram. 27. 1802 ; Veldk. in Blumea 21 : 32. 1973. *Panicum ciliare* Retz. Obs. Bot. 4 : 16. 1786. *Paspalum sanguinale* Lamk. var. *ciliare* Hook. f. Fl. Brit. Ind. 7 : 15. 1896. p. p. *Panicum adscendens* H. B. K. Nov. Gen. Sp. 1 : 97. 1816. *Digitaria adscendens* (H. B. K.) Henr. in Blumea 1 : 92. 1934. "Takri" / „Takria".

Annual grass, glabrous. Leaves linear, acute ; ligule membranous. Racemes 2 - 8, subdigitate, alternate, subwhorled ; peduncle hairy at joints. Spikelets oblong, hairy, pedicels winged, scabrid.

PACHMARHI : Vicinity (1000 m). BORI : Reserve forest 1000 m). Near water courses and waste places. Common.

Fl. & Fr. : August December.

2. *Digitaria ternata* (A. Rich.) Stapf ex Dyer. Fl. Cap. 7 : 376. 1898 ; Bor, Grass. Ind. 306. 1960. *Cynodon ternatus* A. Rich. Tent. Fl. Abyss. 2 : 405. 1851. *Paspalum ternatum* (A. Rich.) Hook. f. Fl. Brit. Ind. 7 : 17. 1896.

Erect annuals ; culms wiry, rarely branched. Leaves linear, acuminate ; ligule short, membranous. Racemes usually 2 - 3 or up to 7, subdigitate, short peduncled. Spikelets elliptic oblong, obtuse, hairy ; hairs clavate tipped. U. glume present.

PACHMARHI : Vicinity (1000 m). In waste places. Occasional.

Fl. & Fr. : July October.

3. *Digitaria setigera* Roth ex Roem. & Schult. Syst. Veg. 2 : 474. 1817. Veldk. in Blumea 21 : 37. 1973 ; Babu, Herb. Fl. Dehra Dun 606. 1877. *Paspalum sanguinale* Lank. Var. *pruriens* (Buse) Hook. f. Fl. Brit. Ind. 7 : 15. 1896. *Digitaria pruriens* Buse in Mig. Pl. Jungh. 379. 1854.

Slender grass. Leaves linear. Spikelets elliptic, acute, glabrous or shortly pubescent on the margin and lateral intercepts. U. glume 1/3 of spikelets or reduced to scale.

PACHMARHI : Mahadev hill (1200 m). Dhupgarh (1250 m).

BORI : Reserve forest (550 m). On hill slopes and forest clearings. Common.

Fl. & Fr. : July November.

4. *Digitaria stricta* Roth ex Roem. & Schult. Syst. Veg. 2 : 474. 1817 ; *Paspalum royleanum* Nees ex Thw. Enum. Fl. Zeyl. 358. 1864 *nomen. et. in* Hook. f. Fl. Brit. Ind. 7 : 18. 1896, descr. *Digitaria royleanum* (Nees) Prain. Bang. Pl. 1182. 1903.

Annual grass. Leaves erect, linear, acuminate ; ligule short, rounded, membranous. Racemes 3-15, erect, subdigitate or alternate. Spikelets broadly elliptic, tomentose with minute clavellate hairs.

PACHMARHI : Vicinity (1000 m). On hill slopes. Occasional.

Fl. & Fr. : October December.

20. DIMERIA R. Br.

Dimeria connivens Hack. in DC. Mongr. Phan. 6 : 689. 1889 ; Hook. f. Fl. Brit. Ind. 7 : 104. 1896 ; Bor. Grass. Ind. 140. 1960.

Much tufted grass with leaves mainly near the base of the culm. Leaves linear, hairy on the margins, acuminate. Racemes more than one. U. glume narrowly winged all along the keel ; rachis narrow, 0.75 cm wide. Racemes rarely divergent. Spikelets 3.5-4 mm long.

BORI : Reserve forest (550 m). Feb. '78, Pant 27285 (BSA). In forest undergrowth. Rare.

Fl. & Fr. : October - February.

21. ECHINOCHLOA Beauv.

Echinochloa coloenum (L.) Link. Hort. Berol. 2 : 209. 1833 ; Babu, Herb. Fl. Dehra Dun 607. 1977. *Panicum coloenum* L. Syst. Nat. ed. 10. 2 : 870. 1759 ; Hook. f. Fl. Brit. Ind. 7 : 32. 1896. "Sawank"

Annuals; culms slender, decumbent or shortly creeping below; nodes glabrous. Leaves narrowly lanceolate or linear, acuminate; ligule absent. Spikes rather distant, 1–2 cm long. Spikelets 2.5–5 mm long.

PACHMARHI: Vicinity (1000 m). In moist places in the forest and roadsides. Common.

Fl. & Fr.: June–November.

22. ELEUSINE Gaertn.

Eleusine indica (L.) Gaertn. *Fruct. Sem.* 1: 8. 1789; Hook. f. *Fl. Brit. Ind.* 7: 293. 1896; Babu, *Herb. Fl. Dehra Dun* 609. 1977. *Cynosurus indicus* L. *Sp. Pl.* 72. 1753. "Mandla".

Erect annuals. Culms tufted, slightly compressed, glabrous. Leaves as long as culm, linear; ligule membranous, slightly hairy. Spikes usually 2–7, digitate. Spikelets 2.5–3 mm long, 3–6-flowered, glabrous.

PACHMARHI: Dhupgarh (1300 m). BORI: Dham (462 m). On moist hill slopes. Common.

Fl. & Fr.: July–October.

23. ERAGROSTIELLA Bor

Eragrostiella bifaria (Vahl) Bor in *Indian. For.* 66: 270. 1940; Ramam. in Sald. & Nicol. *Fl. Hassan* 728. 1976. *Poa bifaria* Vahl, *Symb. Bot.* 2: 19. 1791. *Eragrostis bifaria* (Vahl) Wt. ex Steud. *Syn. Pl. Glum.* 1: 264. 1854; Hook. f. *Fl. Brit. Ind.* 7: 325. 1896. *Poa coromandeliana* Koen. ex Rottl. in *Ges. Natur. Freunde Berlin, Neue Schrift*, 4: 191. 1803. *Eragrostis coromandeliana* (Koen. ex Rottl.) Trin. in *Mem. Acad. Sci. Petersb. Ser. 6.* 1: 415. 1830; Hook. f. *Fl. Brit. Ind.* 7: 326. 1896.

Tufted perennials. Leaves mostly basal, very short, narrow, rolled inwards, sparsely hairy. Spikelet laterally compressed, linear to ovate-oblong. Keels of the palea broadly winged, ciliate.

PACHMARHI: Vicinity (1000 m). In waste places and forest clearings. Common.

Fl. & Fr.: July–January.

24. ERAGROSTIS P. Beauv.

Ia. Lemmas falling from below upward :

- 2a. Spikelets 2 mm or more wide ... *E. unioloides* 5
- 2b. Spikelets 1 - 1.5 mm wide, rarely up to 1.7 mm wide :
- 3a. Pedicel with white bands ... *E. tenuifolia* 4
- 3b. Pedicel without white bands :
- 4a. Annuals ... *E. gangetica* 3
- 4b. Perennials ... *E. atrovirens* 1

1b. Lemmas falling from above downward :

- 5a. Panicle effuse. Plants viscous ... *E. viscosa* 6
- 5b. Panicle contracted. Plants not viscous ... *E. diarrhena* 2

1. *Eragrostis atrovirens* (Desf.) Trin. ex Steud. Nom. Bot. ed. 2. I : 562. 1840 ; Babu, Herb. Fl. Dehra Dun 610. 1977. *Poa atrovirens* Desf. Fl. Atlant. I : 73. t. 14. 1798.

Perennial grasses, sometimes glaucous. Panicle more or less effuse. Spikelets shortly pedicelled, oblong acute in outline. Lemmas elliptic-oblong, acute ; lateral nerves strong.

PACHMARHI : Vicinity (1000 m) ; Mahadev hill (1200 m). In moist places in and around forests. Common.

Fl. & Fr. : July December.

2. *Eragrostis diarrhena* (Schult.) Steud. Syn. Pl. Glum. I : 266. 1854 ; Babu, Herb. Fl. Dhera Dun 611. 1977. *Poa diarrhena* Schult. Mant. 2 : 616. 1827. *Eragrostis interrupta* sensu Hook. f. Fl. Ind. 7 : 316. 1896.

Tufted perennials with stout, erect culms. Panicle contracted ; branches mostly solitary. Spikelets densely clustered, 6-14-flowered. Keels of palea non ciliate, Lemma about 1 mm long.

BORI : Reserve forest (550 m). Along river bank. Occasional.

Fl. & Fr. : August-December.

3. *Eragrostis gangetica* (Roxb.) Steud. Syn. Pl. Glum. 1 : 226. 1854 ; Babu, Herb. Fl. Dehra Dun 611. 1977. *Poa gangetica* Roxb. Fl. Ind. 1 : 341. 1820. *Eragrostis stenophylla* Hochst. ex Miq. Verh. Konink. Nederl. Inst. 3 (4) : 39. 1851, p. p. ; Hook. f. Fl. Brit. Ind. 7 : 318. 1896, p. p. "Jenkua" / "Khar".

Annuals. Culms erect. Leaves linear, glabrous, acuminate. Panicle oblong, erect or nodding with age. Spikelets linear to linear oblong, longer than the pedicels, 8–24 flowered, slaty grey.

BORI : Reserve forest (550 m) ; Dhain (462 m). Along river bank and streams. Common.

Fl. & Fr. : September January.

4. *Eragrostis tenuifolia* (A. Rich.) Hochst. ex Steud. Syn. Pl. Glum. 1 : 268. 1854 ; Hook. f. Fl. Brit. Ind. 7 : 322. 1896 ; Ramam. in Sald. & Nicol. Fl. Hassan 730. 1976. *Poa tenuifolia* A. Rich. Tent. Fl. Abyss. 2 : 425. 1851.

Perennial grass. Culms tufted, terete, and branching from near the base ; nodes glabrous. Leaves complicate or convolute ; glabrous, acuminate ; ligule a short hairy rim ; sheaths compressed. Panicles lax ; branches slender, alternate. Spikelets linear, 9–13 flowered, breaking up from below upwards, olive-green to slaty black.

PACHMARHI : Vicinity (1000 m). On hill slopes and clearings. Occasional.

Fl. & Fr. : August November.

5. *Eragrostis unioloides* (Retz.) Nees ex Steud. Syn. Pl. Glum. 1 : 264. 1854 ; Babu, Herb. Fl. Dehra Dun 614. 1977. *Poa unioloides* Retz. Obs. Bot. 5 : 19. 1789. *Eragrostis amabilis* sensu Hook. f. Fl. Brit. Ind. 7 : 317. 1896 [*non* (L.) Wt. & Arn. 1838].

Tufted annual grass. Leaves convolute, acuminate. Panicles spreading, alternate, branched from near the base. Spikelets ovate to ovate-lanceolate, 10–30-flowered, white to pink or reddish-purple, breaking up from below upwards.

PACHMARHI : Vicinity (1000 m) ; Mahadev hill (1200 m). BORI : Reserve forest (550 m). On moist hill slopes ; forest edges and waste lands. Common.

Fl. & Fr. : July December.

6. **Eragrostis viscosa** (Retz.) Trin. Med. Acad. Imp. Sci. St. Petersb. Ser. 6, 1 : 397. 1830 ; Ramam. in Sald. & Nicol. Fl. Hassan 730. 1976. *Poa viscosa* Retz. Obs. Bot. 4 : 20. 1768. *Eragrostis tenella* Roem. & Schult. var. *viscosa* (Retz.) Stapf in Hook. f. Fl. Brit. Ind. 7 : 315. 1896. *Eragrostis glutinosa* Roxb. ex Stapf, I. c.

Perennial tufted grass. Culms and leaves viscous. Panicles green to purplish, spreading. Keels of panicle more or less ciliate. Lemmas not ciliate on the margins.

PACHMARHI : Vicinity (1000 m). BORI : Reserve forest (1000 m). On moist hill slopes, waste lands and near streams. Common.

Fl. & Fr. : October January.

25. EULALIA Kunth

Eulalia trispicata (Schult.) Hent. in Blumea 3 : 453. 1940 ; Babu, Herb. Fl. Dehra Dun 616. 1977. *Andropogon trispicatus* Schult. Syst. Veg. 2 : 452. 1824. *Pollinia argentea* Trin. Bull. Acad. Sci. St. Petersb. 1 : 7. 1836 ; Hook. f. Fl. Brit. Ind. 7 : 193. 1896.

Tufted perennial grass. Leaves flat or convolute, linear lanceolate, finely acuminate. Racemes little spreading, 3-7, digitate, sub-digitate or fascicled, silky, easily breaking up at maturity ; rachis and pedicels white-hairy. G1 white hairy on keels ; G2 with golden brown hairs on the keel.

PACHMARHI : Vicinity (1000 m). On Hill slopes. Occasional.

Fl. & Fr. : September December.

26. EULALIOPSIS Honda

Eulaliopsis binata (Retz.) C. E. Hubb. in Hook. Ic. Pl. 1. 3262. 1935 ; Babu, Herb. Fl. Dehra Dun 617. 1977. *Andropogon binatus* Retz. Obs. Bot. 5 : 21. 1789. *Spodiopogon angustifolius* Trin. Mem. Acad. Sci.

St. - Petersb. Ser. 6. 2 : 300. 1832. *Ischaemum angustifolium* (Trin.) Hack in DC. Monogr. Phan. 6 : 241. 1889 ; Hook. f. Fl. Brit. Ind. 7 : 129. 1896. "Bhabar"/ "Sabai".

Perennial grass. Culms woolly at base. Leaves with a rounded base and tubercle based hairs on the lower surface. Racemes 2 - 4, whitish-brown. G1 3 - 4 toothed, ciliate in the upper half with a tuft of hairs at the margin. G2 ciliate in the upper half, with a tuft of hairs on the keel. Upper lemma bidentate, ciliate in the upper portion with an awn.

PACHMARHI : Vicinity (1000 m). On hill slopes and forest under-growth. Common.

Fl. & Fr. : July - November.

27. HEMARTHRIA R. Br.

Hemarthria compressa (L. f.) R. Br. Prodr. 207. 1810 ; Babu, Herb. Fl. Dehra Dun 618. 1977. *Rottboellia compressa* L. f. Suppl. 114. 1781 ; Hook. f. Fl. Brit. Ind. 7 : 153. 1896. "Biksa".

Perennial grass. Culms rooting at nodes, glabrous. Leaves linear, acute ; ligule a narrow fimbriate membrane. Racemes solitary or 2 - 5 from leaf-sheath, narrow, internodes as long as the spikelets. Sessile spikelets 3 - 4 mm long. Pedicellate spikelets rather longer and narrower than the sessile ones, otherwise similar.

PACHMARHI : Jambudeep (900 m). In marshy places and near streams. Common.

Fl. & Fr. : September - November.

28. HETEROPOGON Pers.

Heteropogon contortus (L.) P. Beauv. ex Roem. & Schult. Syst. Veg. 2 : 836. 1817 ; Babu, Herb. Fl. Dehra Dun 618. 1977. *Andropogon contortus* L. Sp. Pl. 1045. 1753 ; Hook. f. Fl. Brit. Ind. 7 : 199. 1896. "Kher"/ "Kumeria".

Perennial grass with densely tufted culms. Leaves mainly at the base of culm, linear, obtuse or abruptly short acuminate; ligule short ciliolate. Racemes with the lower 2 - 6 spikelets sessile, awnless, male or neuter; the upper sessile spikelets narrow, long - awned, female. Pedicellate spikelets much longer than the sessile ones.

PACHMARHI : Vicinity (1000 m). BORI : Reserve forest (550 m). On hill slopes and in forest undergrowth. Common.

Fl. & Fr. : July December.

26. IMPERATA Cyrill.

Imperata cylindrica (L.) P. Beauv. Ess. Agrost. 165, 1812; Babu, Herb. Fl. Dehra Dun 619, 1977. *Lagurus cylindricus* L. Syst. Nat. ed. 10. 878, 1759. *Imperata arundinacea* Cyrill. Pl. Rar. Neap. 2 : 26, 1792; Hook f. Fl. Brit. Ind. 7 : 106, 1896. "Dabh"/"Siru"/"Ula".

Perennial grass with stoloniferous rootstocks, often creeping. Culms tall, slender; nodes hairy or not. Leaves linear, erect or flat, acuminate. Panicles not more than 20 cm long, dense or loose, spikelike, subcylindrical, silvery white. Spikelets 4 - 5.5 mm long.

PACHMARHI : Vicinity (1000 m), 25 7 64, *Pant* 4486 (BSA)

BORI : Reserve forest (550 m), Feb. '78, *Pant* 27263 (BSA). On exposed areas having full sunlight. Common.

Fl. & Fr. : July - February.

New record for the area.

30. ISACHNE R. Br.

- | | |
|--|----------------------|
| 3a. Spikelets 1.2 - 1.5 mm long. Pedicels with white - banded glands ... | <i>I. globosa</i> 1 |
| 1b. Spikelets about 1 mm long. Pedicels without glands ... | <i>I. gracilis</i> 2 |

1. *Isachne globosa* (Thunb.) Kuntze, Rev. Gen. Pl. 2 : 776. 1891 ; Ramam. in Sald. & Nicol. Fl. Hassan 736. 1976. *Milium globosum* Thunb. Fl. Jap. 49. 1784. *Isachne australis* R. Br. Prod. 196. 1810 ; Hook. f. Fl. Brit. Ind. 7 : 24. 1896.

Tufted grass. Leaves lanceolate, acute, sheaths smooth. Pedicels white, gland banded. Glumes shorter than the spikelets. Lemmas dissimilar. L₁ elliptic, rounded, membranous, L₂ ovate, acute, chartaceous, tubercled.

PACHMARHI : Vicinity (1000 m). On moist hill slopes. Occasional.

Fl. & Fr. : August September.

2. *Isachne gracilis* C.E. Hubb. in Kew Bull. 1927, 77. 1927 ; Bor, Grass. Ind. 581. 1960.

A very delicate grass. Leaves elliptic - acute, very thin. Pedicels white. Spikelets about 1 mm long. Florets unequal in size and different in texture.

PACHMARHI : Vicinity (1000 m), Saxena 7909 (SFRI)

On shaded hill slopes. Rare.

Fl. & Fr. : August. September.

32. ISCHAEMUM L.

- | | |
|---|----------------------------|
| 1a. Margins of the lower glume of the sessile spikelet expanded below and top above the middle : | |
| 2a. Keel of the upper glume of the sessile spikelet winged above the middle ... | <i>I. indicum</i> 2 |
| 2b. Keel of the upper glume of the sessile spikelet not winged above the middle ... | <i>I. duthiei</i> 1 |
| 1b. Margins of the lower glume of the sessile spikelet narrowly and evenly inturned from base to apex ... | <i>I. semisagittatum</i> 3 |

1. *Ischaemum duthiei* Stapf ex Bor in Kew Bull. 1950 : 188. 1950 et Grass. Ind. 178. 1960.

Perennial grass. Leaves linear, flat, acuminate ; ligule membranous. Racemes 3-5, digitate. Keel of upper glume of the sessile spikelet not

winged above the middle. Lower lemma of the pedicelled spikelet acuminate or aristate.

PACHMARHI : Vicinity (1000 m), *Saxena* 7845 (SFRI). On moist hill slopes. Rare.

Fl. & Fr. : October - February.

2. *Ischaemum indicum* (Houtt.) Merill in Journ. Arn. Arbor. 19 : 320. 1938 ; Ramam. in Sald. & Nicol. Fl. Hassan 737. 1976. *Phleum indicum* Houtt. Nat. Hist. 2, 13 : 198. t. 90. f. 2. 1782. *Ischaemum aristatum* (*auct. non* Linn. 1753) ; Hook. f. Fl. Brit. Ind. 7 : 126. 1896. *Ischaemum ciliare* Retz. Obs. Bot. 6 : 36. 1791 ; Hook. f. Fl. Brit. Ind. 7 : 133. 1896. "Kander" "Bara toriya gadi".

Annual grass. Leaves flat, linear-lanceolate, acute, hirsute on both the surfaces. Racemes 2-3. G1 of sessile spikelet chartaceous, broader and involute at base, broadly winged on either side above. G2 winged near tip on the median keel.

PACHMARHI : Vicinity (1000 m). BORI : Reserve forest. Near streams and marshy places. Common.

Fl. & Fr. : August - January.

3. *Ischaemum semisagittatum* Roxb. Fl. Ind. 1 : 322. 1820 ; Hook. f. Fl. Brit. Ind. 7 : 130. 1896 ; Bor, Grasses Ind. 185. 1960.

Slender annual grass. Leaves linear-lanceolate, base cordate or sagittate, lower leaves long petioled. Margins of the lower glume of the sessile spikelet narrowly and evenly inturned from base to apex.

PACHMARHI : Vicinity (1000 m), 28 12 62, *Panigrahi* 6661 (BSA). Near water sources. Rare.

Fl. & Fr. : October - January.

32. ISELEEMA Anders

Iseleema prostratum (L.) Anders. in Nov. Act. Soc. Sci. Upsal. Ser. 3, 2 : 251. 1856 ; Bor, Grass. Ind. 188. 1960. *Andropogon prostratus* L. Mant. Alt. 304. 1771. *Isetleema wightii* Anders. l.c. ; Hook. f. Fl. Brit. Ind. 7 : 218. 1896. "Buri"/"chholi garpa".

Annual or perennial grass. Culms tufted, compressed, branched; nodes hairy. Leaves flat, linear-lanceolate, acute; ligule a dense hairy ring. Tubercles present on the proper spathe. Racemes on a slender peduncle exserted from the spathe.

BORI : Reserve forest (500 m). On hill slopes. Occasional.

Fl. & Fr. : September. January.

33. MANISURIS L.

- | | | |
|--|-----|-------------------------|
| 1a. Lower glume of sessile spikelets not awned | ... | <i>M. clarkei</i> 1 |
| 1b. Lower glume of sessile spikelets with two divercate awns | ... | <i>M. forficulata</i> 2 |

1. *Manisuris clarkei* (Hack.) Bor, *apud* Sant. in Rec. Bot. Surv. Ind. 16(1) : 357. 1953 ; Bor, Grass. Ind. 191. 1960. *Rottboellia clarkei* Hack. in Ost. Bot. Z. 41 : 8. 1891 ; Hook. f. Fl. Brit. Ind. 7 : 156. 1896.

Annual grass. Leaves lanceolate with cordate base. Lower glume of the sessile spikelets umbonate, ovate-obtuse, winged on both sides above the middle. Pedicelled spikelets like the sessile but smaller and less gibbous.

PACHMARHI : Vicinity (1000 m), *Saxena* 8209 (SFRI). On hill slopes Rare.

Fl. & Fr. : September. December.

2. *Manisuris forficulata* C.E.C. Fischer in Kew Bull. 1933. 355. 1933 ; Ramam. in Sald. Nicol. Fl. Hassan 740. 1976. *Rottboellia divergens* Lisboa in Journ. Bomb. Nat. Hist. Soc. 6 : 195. 1891 (*non* Hack. 1889) ; Hook. f. Fl. Brit. Ind. 7 : 155. 1896.

Tufted annual grass. Leaves flat, hairy. Gl of sessile spikelets chartaceous, lanceolate, terminated by a pair of unequal divercate awns, margins with basally acute wing that tapers on to the base of awns; base of glume on the back and margin with 4-5 rows of hooked, apically minutely bearded tubercles.

PACHMARHI : Vicinity (1000 m), 8-10-60, Joseph 11336 (BSA).

In forest clearings and waste places. Rare.

Fl. & Fr. : September. December.

34. MELANOCENCHRIS Nees.

Melanocenchris jacquemontii Jaub. & Spach. Ill. Pl. Or. 4 : 36. 1851 ; Ramam. in Sald. & Nicol. Fl. Hassan 740. 1976. *Melanocenchris royleana* Nees ex Steud. Syn. Pl. Glum. 1 : 218. 1854. *Gracillea royleana* (Nees ex Steud.) Hook. f. Fl. Brit. Ind. 7 : 284. 1896. "Phulsi".

Annual, slender, densely tufted grass. Leaves flat or convolute, linear-lanceolate, acute ; ligule a hairy ridge. Spikes filiform. Clusters of spikelets purplish green.

BORI : Dhain (462 m). On rocky hill slopes. Common.

Fl. & Fr. : July September.

35. MICROCHLOA R. Br.

Microchloa indica (L. f.) P. Beauv. Ess. Agrost. 82. 1820 ; Ramam. in Sald. & Nicol. Fl. Hassan 741. 1976. *Nardus indica* L. f. Suppl. 105. 1781. *Microchloa setacea* R. Br. Prodr. 208. 1810 ; Hook. f. Fl. Brit. Ind. 7 : 283. 1896.

Annual grass. Culms terete ; nodes glabrous. Leaves narrowly linear, convolute, glabrous ; ligule short, ciliate. Spike solitary, terminal, curved. Spikelets sessile, oblong-lanceolate, green tinged with purple, 1 flowered. Glumes subequal, lanceolate-oblong, 1 nerved, keeled, acute.

PACHMARHI : Vicinity (1000 m). On rocky hill slopes. Occasional.

Fl. & Fr. : August - November.

36. NARENGA Bor

Narenga prophyrocoma (Hance ex Trim.) Bor in Ind. For 66 : 267. 1940 ; Babu, Herb Fl. Dehra Dun 624. 1977. *Eriochrysis porphyrocoma* Hance ex Trim. J. Bot. 14 : 294. 1876. *Saccharum narenga* Wall. ex Hack. in DC. Monogr. Phan. 6 : 120. 1889 ; Hook. f. Fl. Brit. Ind. 7 : 120. 1896. "Ronsa".

Perennial grass. Leaves glabrous above, hairy beneath; ligule ciliate. Panicle woolly, dense. Racemes whorled. Sessile spikelets golden brown, lanceolate oblong, obtuse. Pedicelled spikelets: pedicels slightly dilated at the tips.

PACHMARHI : Vicinity (1000 m). In swampy places and near nala. Common.

Fl. & Fr. : September. December.

37. OPLISMEUS P. Beauv

- | | |
|----------------------------------|----------------------------|
| 1a. Awn capillary, barbellate | ... <i>O. burmanii</i> 1 |
| 1b. Awn stiff, smooth but viscid | ... <i>O. compositus</i> 2 |

1. ***Oplismenus burmanii* (Retz.) P. Beauv.** Ess. Agrost. 54 : 168 - 169. 1812 ; Hook. f. Fl. Brit. Ind. 7 : 68. 1896 ; Ramam. in Sald. & Nicol. Fl. Hassan 742. 1976. *Panicum burmanii* Retz. Obe. Bot. 3 : 10. 1783. "Nini".

Slender annual grass. Leaves ovate or ovate lanceolate, acuminate; ligule a rim of hairs. Spikelets solitary or 2 nate; pedicels short, hairy. Awns longer than glumes, pale.

PACHMARHI : Vicinity (1000 m). On shady hill slopes. Common.

Fl. & Fr. : September. November.

2. ***Oplismenus compositus* (L.) P. Beauv.** Ess. Agrost. 54 : 168. 1812 ; Hook. f. Fl. Brit. Ind. 7 : 66. 1896 ; Ramam. in Sald. & Nicol. Fl. Hassan 742. 1976. *Panicum compositum* L. Sp. Pl. 57. 1753.

Perennial grass. Leaves ovate, acute or acuminate, hairy. Spikelets 2 to 3 nate. Awns longer than glumes, often reddish.

PACHMARHI : Dhaupgarh (1250 m). BORI : Reserve forest (900 m). Under shade along river banks and in forest undergrowth. Common.

Fl. & Fr. : September. December.

38. OROPETIUM Trin.

***Oropetium roxburghianum* (Steud.) S.M. Phillips** in Kew Bull. 30(3) : 496. 1975 ; Patunkar, Grass. Marath. 225. 1980. *Lepturus roxburghianus*

Steud. Syn. Pl. Glum. I : 357. 1854 ; Hook. f. Fl. Brit. Ind. 7 : 365. 1896.
Tripogon roxburghianus (Steud.) Bhide in J. Proc. Asiat. Soc. Beng. II
 7 : 515. 1912 ; Bor, Grass. Ind. 524. 1960.

Perennial tufted grass. Leaves filiform, convolute; margins with distant white hairs; apex acute. Spikes straight or curved, often purple. Spikelets deeply sunk into the hollow of the rachis, 1-2 flowered. Lower glume asymmetrical, 1-nerved, acute. Lemmas bearded at the base, 3-nerved, truncate or minutely 2-3-toothed at apex. Palea subequal, 2-keeled.

PACHMARHI : Vicinity (1000 m), July 64, *Panigrahi* 4491 (BSA).
 On hill slopes. Rare.

Fl. & Fr. : July December.

New record for the area

39. PANICUM L.

1a. Leaf blade ovate, oblong-lanceolate, asymmetrical at the base	...	<i>P. brevifolium</i> 1
1b. Leaf blade linear-lanceolate, symmetrical at the base:	...	
2a. L. glume cuspidate-acuminate. Spikelets wide-open during anthesis	...	<i>P. trypheron</i> 5
2b. L. glume not cuspidate-acuminate. Spikelets not wide open:		
3a. Spikelets lanceolate, acute. Plants aquatic or marshy	...	<i>P. paludosum</i> 3
3b. Spikelets ovate-oblong to elliptic. Plants terrestrial:		
4a. Spikelets obtuse. L. glume half or three-fourth of the length of the spikelet. Perennials	...	<i>P. notatum</i> 2
4b. Spikelets acute. L. glume half to one-fourth of the length of the spikelet. Annuals	...	<i>P. Sumatrense</i> 4

1. *Panicum brevifolium* L. Sp. Pl. 59. 1753 ; Ramam. in Said. & Nicoll. Fl. Hassan 744. 1976. *Panicum ovalifolium* Poir. in Lamk. Encycl. Meth. Bot. Suppl. 4 : 279. 1816 ; Hook. f. Fl. Brit. Ind. 7 : 44. 1896.

Weak perennial grass. Leaves ovate, oblong lanceolate, acute-acuminate, amplexicaul, asymmetrical at the base. Panicle effuse. Spikelets sparsely hairy.

PACHMARHI : Vicinity (1000 m). In moist shady places in forest. Occasional.

Fl. & Fr. : September December.

2. **Panicum rotatum** Retz. Obs. Bot. 4 : 18. 1786 ; Bor, Grass. Ind. 701. 1960. **Panicum montanum** Roxb. Fl. Ind. 1 : 315. 1820 ; Hook. f. Fl. Brit. Ind. 7 : 53. 1896 ; Babu, Herb. Fl. Dehra Dun 629. 1977.

Perennial grass. Leaves lanceolate, acute acuminate, with a semi-amplexicaul, cordate base decorated with tubercle based hairs. Panicle effuse. Spikelets elliptic oblong.

BORI : Reserve forest (550 m). In forest undergrowth. Common.

Fl. & Fr. : August December.

3. **Panicum paludosum** Roxb. Fl. Ind. 1 : 310. 1820 ; Babu, Herb. Fl. Dehra Dun 629. 1977. **Panicum proliferum** (auct. non Lamk. 1797) ; Hook. f. Fl. Brit. Ind. 7 : 50. 1896.

Free floating, perennial grass with spongy culms. Leaves linear-lanceolate. Panicles more or less contracted. Spikelets lanceolate, glabrous.

PACHMHRHI : Vicinity (1000 m). In marshy places. Common.

Fl. & Fr. : August - November.

4. **Panicum sumatrense** Roth ex Roem. & Schult. Syst. Veg. 2 : 434. 1817 ; Bor, Grass. Ind. 701. 1960. **Panicum millare** Lamk. Tab. Encycl. Meth. Bot 1 : 173. 1791 ; Hook. f. Fl. Brit. Ind. 7 : 46. 1896. **Panicum psilopodium** Trin. Gram. Panic. 217. 1826 ; Hook. f. l.c. "Shavan"/"Kungu".

Annual grass. Culms erect, tufted ; nodes glabrous. Leaves linear, acute ; ligule short, membranous, fimbriate. Panicle effuse, narrow ; branches capillary. Spikelets ovate, acute, turgid, solitary.

PACHMARHI, Vicinity (1000 m) ; Mahadev hill (1200 m).

BORI : Reserve forest (1000 m). On hill slopes and forest under-growth. Common.

Fl. & Fr. : July December

5. *Panicum tryphonum* Schult. Mant. 244. 1824 ; Hook. f. Fl. Brit. Ind. 7 : 47. 1896 ; Babu, Herb. Fl. Dehra Dun 630. 1977. "Mijhrī".

Annual grass. Culms slender ; nodes glabrous, often purple-tinged. Leaves thin linear, acute, hairy on both surfaces ; margin ciliate ; ligule short, membranous, fimbriate. Panicles distant, ovoid, acuminate, sometimes with purple tinge, glabrous.

PACHMARHI : Vicinity (1000 m). In forest undergrowth. Occassional.

Fl. & Fr. : August November.

40. PASPALIDIUM Stapf

Paspalidium flavidum (Retz.) A. Camus in Lecomte, Fl. Gen. Indo-China 7 : 419. 1922 ; Babu, Herb. Fl. Dehra Dun 630. 1977. *Panicum flavidum* Retz. Obs. Bot. 4 : 15. 1786 ; Hook. f. Fl. Brit. Ind. 7 : 28. 1896. "Muramer"/"Chapri".

Annual grass. Leaves sub bifarious, narrowly linear, acuminate or obtuse ; ligule a ridge of long hairs. Spikes distant, sessile. Spikelets globose, sessile or nearly so, 2 - seriate, glabrous.

PACHMARHI : Vicinity (1000 m). BORI : Dhain (462 m). In shaded moist places. Common.

Fl. & Fr. : July - October.

41. PASPALUM L.

- 1a. Spikelets broadly elliptic, acute. Aquatic grass ... *P. distichum* 2
- 1b. Spikelets rotundate - elliptic, broadly obovate - elliptic to almost orbicular, obtuse. Land grass :
 - 2a. Annuals. Lower lemma 5 - 7 - nerved ... *P. scrobiculatum* 4
 - 2b. Perennials. Lower lemma 3 - 5 nerved :

- 3a. Spikelets 2 - ranked. Lower lemma 3 - 5 -
nerved ... *P. commersonii* 1
- 3b. Spikelets in two rows. Lower lemma
3 nerved, but side nerves often double ... *P. orbiculare* 3

1. *Paspalum commersonii* Lamk. Encycl. 1 : 175. t. 43. f. 1. 1791 ; Babu, Herb. Fl. Dehra Dun 631. 1977. *Paspalum scrobiculatum* sensu Hook. f. Fl. Brit. Ind. 7 : 10 11. 1896 (*non* Linn. 1767), p.p. "Kodo"/"Kodra".

Perennial grass. Leaves mostly basal, hairy above, glabrous beneath. Racemes 2-3, subdigitate. Spikelets dark brown, elliptic rounded. Lower glume absent. Lower lemma empty, subcoriaceous, 3-5 nerved.

PACHMARHI : Vicinity (1000 m). In wet places under sal forest. Common.

Fl. & Fr. : July November

2. *Paspalum distichum* L. Syst. Nat. ed. 10. 2 : 855. 1759 ; Hook. f. Fl. Brit. Ind. 7 : 12. 1896 ; Bor, Grass. Ind. 338. 1960.

Perennial, aquatic grasses with rhizomes and long creeping stolons. Leaves flat or involute. Racemes up to 9 cm long. Spikelets elliptic, twice as long as broad. Upper glume covered with a very short pubescence. Lower lemma with a prominent middle nerve.

PACHMARHI : Vicinity (1000 m), Hiratal 33334 (SFRI).

In swamps and stagnant water. Rare.

Fl. & Fr. : January December.

3. *Paspalum orbiculare* G. Forst. Fl. Insul. Austr. Prodri. 7. 1786 ; Ramam. in Sald. & Nicol. Fl. Hassan 747. 1976. *Paspalum scrobiculatum* sensu Hook. f. Fl. Brit. Ind. 7 : 10 11. 1896 (*non* Linn. 1767), p.p.

Perennial grass. Racemes often more than 2. Spikelets short, ovate-elliptic or orbicular, in two rows. Lower lemma 3 nerved but the lateral nerves double.

PACHMARHI : Vicinity (1000 m). Saxena 7889 (SFRI). On hill slopes. Rare.

Fl. & Fr. : July - December.

4. *Paspalum scrobiculatum* L. Mant. Pl. 1 : 29. 1767 ; Hook. f. Fl. Brit. Ind. 7 : 10. 1896, p.p. ; Bor, Grass. Ind. 340. 1960 ; Babu, Herb. Fl. Dehra Dun 632. 1977 "Kodo"/"Kodra".

Annual grass. Leaves linear lanceolate white margined. Sheaths compressed, keeled. Racemes 2-3, sessile. Spikelets 2 seriate, rounded-ovate. Lower glume absent. Upper glume 5-7 nerved. Lower lemma 5-7 nerved, epaleate.

PACHMARHI : Vicinity (1000 m) ; Mahadev hill (1200 m). On hill slopes and waste places. Common.

Fl. Fr. : July November

42. PENNISETUM Rich.

1a. Lemmas homomorphous ; lower not 3-lobed. Upper floret not deciduous. Rachis ribs not winged :

2a. Rachis of the spikes villous ... *P. orientale* 3

2b. Rachis of the spikes glabrous ... *P. hohenackeri* 1

1b. Lemmas heteromorphous ; lower often 3-lobed. Upper floret deciduous. Rachis ribs winged below the pedicels :

3a. Spikelete solitary and pedicelled or in groups of 2-5, with one sessile and the others pedicelled ... *P. pedicellatum* 4

3b. Spikelets sessile, solitary :

4a. Bristles densely plumose or at least the inner plumose ... *P. setosum* 5

4b. Bristles glabrous, scaberulous ... *P. hordeoides* 2

I. **Pennisetum hohenackeri** Hochst. ex Steud. Syn. Pl. Glum 1 : 103. 1854 ; Ratnam. in Sald. & Nicol. Fl. Hassan 747. 1976. *Pennisetum alopecuroides* Steud. 1. c. 102 (*non* Jacq. 1844) ; Hook. f. Fl. Brit. Ind. 7 : 84. 1896.

Densely tufted perennial grass. Leaves narrowly linear, convolute. Spikelets solitary, 2 flowered, sessile. Lower glume very small, scaly. Upper glume 1-3 nerved. Lower lemma empty, 8-11-nerved. Upper lemma 5 nerved.

PACHMARHI : Vicinity (1000 m). BORI : Reserve forest (550 m). In forest undergrowth and along river bank. Common.

Fl. & Fr. : July - January.

2. *Pennisetum hordeoides* (Lamk.) Steud. Syn. Pl. Glum. 1 : 103. 1854 ; Bor, Grass. Ind. 345. 1960. *Panicum hordeoides* Lamk. Encycl. 1: 170. 1791. *Pennisetum parviflorum* Trin. Gram. Panic. 65. 1826 : Hook. f. Fl. Brit. Ind. 7 : 86. 1896.

Slender grass. Leaves suberect. Spikes narrow, tapering, purple. Spikelets close, but not clustered. Bristles free, unbranched, glabrous, scabrous. Lower glume minute. Upper glume 5 nerved. Lower lemma 5 - nerved.

BORI : Reserve forest (550 m). In forest undergrowth. Occasional.

Fl. & Fr. : October - February.

3. *Pennisetum orientale* L. C. Rich. in Pers. Syn. Pl. 1 : 72. 1805 ; Hook. f. Fl. Brit. Ind. 7 : 86. 1896 ; Bor, Grass. Ind. 345. 1960.

Perennial grass. Leaves narrowly linear, flat or involute. Spikes pinkish. Rachis flexuous, angular, hispid. Spikelets 2 - 3, oblong-lanceolate.

PACHMARHI : Vicinity (900 m). On hill slopes. Occasional.

Fl. & Fr. : August - December.

4. *Pennisetum pedicellatum* Trin. in Mem. Acad. Sci. Petersb. Ser. 6, 3 : 184. 1834 ; Hook. f. Fl. Brit. Ind. 7 : 86. 1896 ; Bor, Grass. Ind. 346. 1960.

Annual grass. Leaves flat, linear-lanceolate. Spikes reddish-purple ; rachis angular. Spikelets solitary, pedicelled or 2 - 3 together, oblong-lanceolate, acute with one sessile and other pedicelled. Lower glume hyaline, lanceolate with silky hairs on the back, nerveless or 1 - nerved which ends below the acute apex.

PACHMARHI : Vicinity (1000 m). BORI : Reserve forest [(550 m)]. On hill slopes and near marshy places. Common.

Fl. & Fr. : July - December.

5. *Pennisetum setosum* (Sw.) L.C. Rich. in Pers. Syn. Pl. 1 : 72. 1805 ; Hook. f. Fl. Brit. Ind. 7 : 87. 1896 ; Bor, Grass. Ind. 348. 1960. *Cenchrus setosus* Sw. Prodr. Veg. Ind. Occ. 26. 1788.

Annual grass. Leaves flat, linear-lanceolate. Peduncle and rachis of spikes glabrous. Spikelets sessile, solitary. The bristles are densely plumose or at least the inner plumose.

BORI : Dhain (462 m), 24 12 62, Panigrahi 6437 (BSA). On edge of forest. Rare.

Fl. & Fr. : October December.

43. PHRAGMITES Trin.

Phragmites karka (Retz.) Trin. ex. Steud. Nom. Bot. ed. 2, 2 : 324. 1841 ; Hook. f. Fl. Brit. Ind. 7 : 304. 1196, p.p. ; Babu, Herb. Fl. Dehra Dun 634. 1977. *Arundo karka* Retz. Obs. Bot. 4 : 21. 1786. "Karkul".

Perennial reeds. Rhizomes creeping, woody. Culms erect, woody at base, branched. Leaves linear - lanceolate, acuminate with a rounded base. Panicle compound, effuse, plumose. Spikelets 3 - 5 - flowered, linear, not jointed on the pedicels. Rachilla with long silky hairs above the lowest lemma and not exceeding it, jointed between the lemma and produced beyond the uppermost.

PACHMARHI : Vicinity (1000 m). BORI : Reserve forest (550 m). Along river banks, nala and water falls. Common.

Fl. & Fr. : October January.

44. PSEUDOSORGHUM A. Camus

Pseudosorghum fasciculare (Roxb.) A. Camus in Bull. Mus. Hist. Nat. Paris 26 : 662. 1920 ; Babu, Herb. Fl. Dehra Dun 637. 1977. *Andropogon fascicularis* Roxb. Fl. Ind. 1 : 269. 1820 ; Hook. f. Fl. Brit. Ind. 7 : 177. 1896.

Annual grass. Leaves flat, lanceolate with a strong mid vein, apex acuminate or caudate. Panicle ovate oblong. Racemes slender, 3 - 4, mostly appressed to one another, the lower branched, upper simple, alternate. Sessile spikelets elliptic lanceolate, awned. Upper lemma hyaline, cleft at apex into two linear - acute lobes, awn from the sinus.

BORI : Reserve forest (550 m). On moist undergrowth of teak forest. Occasional.

Fl. & Fr. : September December.

45. RHYNCHELYTRUM Nees

- 1a. Pedicels of the spikelets with a few long hairs. Lower glume 0.6 mm below the upper, bearded at the base, pilose elsewhere ... *R. repens* 1
- 1b. Pedicels of the spikelets without long hairs. Lower glume 0.8 mm below the upper, bearded at the base, glabrescent upwards ... *R. villosum* 2

1. *Rhynchelytrum repens* (Willd.) C. E. Hubb. in Kew Bull. 1934. 110. 1934; Bor, Grass. Ind. 355. 1960; Patunkar, Grass. Marath. 178. 1980. *Saccharum repens* Willd. Sp. Pl. 1 : 322. 1798.

Annual or perennial grass. Leaves flat, linear, glabrous or pubescent, acute. Panicles ovate to pyramidal, lax, silvery white to purple. Spikelets solitary or paired, ovate to broadly oblong, densely silky with greyish-brown hairs; pedicels with a few long hairs. Lower glume densely villous at the base, pilose above.

PACHMARHI : Mahadev hill (1100 m). On hill slopes. Occasional.

Fl. & Fr. : July - December.

2. *Rhynchelytrum villosum* (Parl.) Chiov. in Ann. Inst. Bot. Roma 8 : 310. 1908; Bor, Grass. Ind. 355. 1960. *Monachyron villosum* Parl. in Hook. Niger. Fl. 191. 1849. *Tricholaena tuberculosa* Hack. ex Hook. f. Fl. Brit. Ind. 7 : 65. 1896. *Tricholaena wightii* Arn. & Nees ex Hook. f. 1. c.

Annual or perennial grass. Leaves linear, flat, acuminate. Panicles pyramidal, lax, white to purple. Spikelets solitary or paired, densely silky; pedicels without long hairs. Lower glume bearded at the base, glabrescent upwards.

PACHMARHI : Vicinity (1000 m), August '49, Narayanaswami s.n. (CAL). On hill slopes. Rare.

Fl. & Fr. : July - December

46. ROTTBOELLIA L.f.

Rottboellia exaltata L. f. Nov. Gram. Gen. 40. t. 1. 1779. *et in Suppl. Pl. 114. 1781*; Hook. f. Fl. Brit. Ind. 7 : 156. 1896, p. p.; Babu. Herb. Fl. Dehra Dun 638. 1977. "Bhursali"/"barsali".

Annual grass. Culms grooved to trigonous upwards, branched. Leaves linear, flat, tapering to the base, acuminate. Spikes thick peduncled, exserted from a spathe. Sessile spikelets linear-lanceolate, glabrous, awnless. Pedicellate spikelets imperfect.

BORI : Reserve forest (550 m) ; Dhain (430 m). In moist places in the forest. Common.

Fl. & Fr. : October December.

47. SACCHARUM L.

Saccharum spontaneum L. Mant. Alt. 183. 1771 ; Hook. f. Fl. Birt. Ind. 7 : 118. 1896 ; Babu, Herb. Fl. Dehra Dun 639. 1977. "Kans"/"Kas".

Perennial, erect grass. Culms 1-2 m tall. Leaves linear, coriaceous, inrolled, finely acuminate ; ligule ovate, membranous. Panicles oblong lanceolate, 20-50 cm long, reddish or purple with age, primary branches verticillate or alternate. Sessile spikelets linear-lanceolate, awnless. Pedicels of pedicellate spikelets finely ciliate.

PACHMARHI : Vicinity (1000 m). **BORI** : Reserve forest (900 m). Along river banks, swampy places and forest clearings. Common.

Fl. & Fr. : October February.

48. SCHIZACHYRIUM Nees

Schizachyrium exile (Hochst.) Pilger in Engl. Bot. Jahr. 54 : 284. 1917 ; Bor, Grass. Ind. 1 : 216. 1960. *Andropogon exilis* Hochst. in Flora 27 : 241. 1844.

Annual grass. Leaves flat or involute, linear, glabrous or sparsely pilose. Racemes slender, concealed in a narrow spathe. Sessile spikelets linear-lanceolate, compressed, awned. Pedicelled spikelets reduced to aristate glumes.

PACHMARHI : Vicinity (1000 m), 27 12 62, *Pantgrahi* 6626 (BSA). On hill slopes. Rare.

Fl. & Fr. : August December.

49. SETARIA P. Beauv.

1a. Panicle cylindrical, dense or often lobulate.		
Leaves not plicate :		
2a. Involucro-bristles retrorsely barbed	...	<i>S. verticillata</i> 5
2b. Involucro-bristles introrsely barbed :		
3a. Upper lemma as long as the upper glume nearly smooth or faintly rugose	...	<i>S. Italica</i> 3
3b. Upper lemma shorter than the upper glume, rugose :		
4a. Panicle spiciform, lobulate	...	<i>S. Intermedia</i> 2
4b. Panicle cylindric, dense	...	<i>S. pallide-fusca</i> 4
1b. Panicle lax, diffuse. Leaves plicate	...	<i>S. homonyma</i> 1

1. *Setaria homonyma* (Steud.) Choiv. in Muov. Giorn. Bot. Ital. N. S. 26 : 78. 1919 ; Babu, Herb. Fl. Dehra Dun 642. 1977. *Panicum homonymum* Steud. Synt. Pl. Glum. I : 48. 1854. *Panicum rhachitrichum* sensu Hook. f. Fl. Brit. Ind. 7 : 56. 1896 (*non* Hochst. 1844).

Annual grass. Leaves elliptic-lanceolate to oblong, plicate, acuminate, contracted at base. Rachis patently long hairy. Involucro-bristles flexuous, usually one. Spikelets elliptic-lanceolate, obtuse, glabrous.

PACHMARHI : Vicinity (1000 m) ; Mahadev hill (1200 m.) In waste places and on hill slopes. Occasional.

Fl. & Fr. : September - December.

2. *Setaria intermedia* Roem. & Schult. Syst. Veg. 2 : 489. 1817 ; Hook. f. Fl. Brit. Ind. 7 : 79. 1896 ; *Panicum tomentosum* Roxb. Fl. Ind. 1 : 303. 1820. *Panicum intermedium* (Roem. & Schult.) Roth, Nov. Pl. Sp. 47. 1821 (*non* Vahl ex Hormen. 1813). *Setaria tomentosa* (Roxb.) Kanth, Rev. Gram. I : 47. 1829 ; Babu, Herb. Fl. Dehra Dun 643. 1977.

Annual grass. Leaves flat, linear-lanceolate, thin, acuminate, anicles narrowly oblong - acuminate, spiciform or lobed, erect ; rachis slender, angular, scabrid; branches very short, with sessile, solitary

spikelet : involucral bristles 1-7, unequal. Spikelets ovate-oblong, glabrous.

PACHMARHI : Vicinity (1000 m). In waste places and roadside. Common.

Fl. & Fr. : July January.

3. *Setaria italica* (L.) P. Beauv. Ess. Agrost. 51 : 170, 178. 1812; Hook. f. Fl. Brit. Ind. 7 : 78. 1896; Babu, Herb. Fl. Dehra Dun 642. 1977. *Panicum italicum* L. Sp. Pl. 56. 1753. "Kala kangni"/"Kangni".

Annual grass. Leaves scabrid, with a contracted base, white-margined, up to 2 cm broad. Rachis densely hairy. Spikelets solitary, ovate-elliptic, obtuse.

BORI : Reserve forest (1000 m). On hill slopes and waste land. Common.

Fl. & Fr. : August November.

4. *Setaria pallide-fusca* (Schum.) Stapf & C. E. Hubb. in Kew Bull. 1930 : 259. 1930; Babu, Herb. Fl. Dehra Dun 643. 1977. *Panicum pallide-fuscum* Schum. Beskr. Guin. Pl. 58. 1827. *Setaria glauca* Hook. f. Fl. Brit. Ind. 7 : 78. 1896 (*non* P. Beauv. 1812), p.p.

Annual grass. Leaves with a slightly contracted base, glabrous. Panicles cylindric, dense, green, yellow or sometimes purplish; rachis pubescent; branches reduced to subsessile involucres each supporting a solitary perfect spikelet, frequently with another spikelet. Spikelets broadly oblong to elliptic, pale-green, glabrous, acute.

PACHMARHI : Vicinity (1300 m). BORI : Reserve forest (550 m). On hill slopes and along streams. Common.

Fl. & Fr. : July - January.

5. *Setaria verticillata* (L.) P. Beauv. Ess. Agrost. 51 : 178. 1812; Hook. f. Fl. Brit. Ind. 7 : 80. 1896; Babu, Herb. Fl. Dehra Dun 644. 1977. *Panicum verticillatum* L. Sp. Pl. ed. 2. 82. 1762

Annual grass. Leaves linear-lanceolate, base subcordate, pilose or hispid, finely acuminate. Panicles narrowly oblong, dense, rachis angular, scabrid; branches short, very close, terminating into a bristle; involucral bristles retroflexely barbed. Spikelets elliptic, pale-green, glabrous, obtuse.

PACHMARHI : Vicinity (1000 m). On moist shady hill slopes.
Common.

Fl. & Fr. : July December.

50. SORGHUM Moench

- 1a. Nodes bearded. Primary branches of the panicle simple ... *S. nitidum* 2
- 1b. Nodes glabrous. Primary branches of the panicle branched... *S. miliaceum* 1

1. *Sorghum miliaceum* (Roxb.) Showden in Journ. Linn. Soc. Bot. 55 : 205. 207. 1955; Babu, Herb. Fl. Dehra Dun 646. 1977. *Andropogon miliaceus* Roxb. Fl. Ind. 1 : 276. 1820.

Perennial grass with creeping rootstock. Culms erect; nodes glabrous. Leaves up to 3 cm broad. Panicle effuse, with patent branches, up to 60 cm long; lower primary branches up to 30 cm long. Sessile spikelets elliptic-lanceolate, acute. Pedicelled spikelets lanceolate, acute.

BORI : Reserve forest (500 m). In forest undergrowth and forest clearings. Common.

Fl. & Fr. : September - December.

2. *Sorghum nitidum* (Vahl) Pers. Syn. Pl. 1 : 101. 1805 ; Babu, Herb. Fl. Dehra Dun 646. 1977. *Holcus nitidus* Vahl, Symb. Bot. 2 : 102. 1791. *Andropogon serratus* Thunb. Fl. Jap. 41. 1784. Hook. f. Fl. Brit. Ind. 7 : 185. 1896. *Sorghum serratum* (Thunb.) O. Kuntze, Rev. Gen. Pl. 2 : 792. 1891 (*non* Roem. & Schult. 1817).

Perennial grass. Culms decumbent-ascending, rooting below; nodes bearded. Leaves linear-setaceous, glabrous or thinly hirsute, white margined. Panicles up to 30 cm long; lower branches whorled. Sessile spikelets elliptic-lanceolate, changing to dark brown on maturity. Pedicelled spikelets reduced to glumes.

BORI : Reserve forest (550 m); Dhain (430 m). Near streams and along wayside. Common.

Fl. & Fr. : September - November.

51. SPODIOPOGON Trin.

Sporopogon rhizophorus (Steud.) Pilger in Engl. & Prantl, Pflanzenf. 14e : 119. 1940 ; Ramam. in Sald. & Nicol. Fl. Hassan 753. 1976. *Andropogon rhizophorus* Steud. Syn. Pl. Glum. 1 : 381. 1854. *Sporopogon albidus* Benth. in Journ. Linn. Soc. Bot. 19 : 66. 1881 ; Hook. f. Fl. Brit. Ind. 7 : 108. 1896.

Very leafy grass. Leaves broad, flaccid, elliptic, tapering to the long petiole. Panicles of racemes narrow; rachis silky villous. Spikelets densely covered with white hairs.

BORI : Reserve forest (1000 m). On hill slopes. Common.

Fl. & Fr. : September - December.

52. SPOROBOLOUS R. Br.

1a. Stamens 3 :

2a. Panicle effuse	... <i>S. retusissimus</i> 3
2b. Panicle contracted	... <i>S. indicus</i> var. <i>fertilis</i> 2
1b. Stamens 2	... <i>S. indicus</i> var. <i>diander</i> 1

1. *Sporobolus indicus* (L.) R. Br. var. *diander* (Retz.) Jov. & Goed. in Bull. Centre Et. Rech. Sc. Biarritz, 7 : 65. 1968 et Taxon 22 : 163. 1973. *Agrostis diander* Retz. Obs. Bot. 19. 1789. *Sporobolus diander* (Retz.) P. Beauv. Ess. Agrost. 26 : 147. 178. 1812 ; Hook. f. Fl. Brit. Ind. 7 : 247. 1896 ; Babu, Herb. Fl. Dehra Dun 647. 1977. "Ciriya-ka-dana".

Tufted perennial grass. Leaves often convolute, rounded at base, glabrous, acuminate. Panicle contracted, gradually becoming effuse at maturity. Lemma longer than glumes. Stamens 2. Grain truncate above.

PACHMARHI : Vicinity (1000 m). In waste places and hill slopes. Common.

Fl. & Fr. : July September.

2. *Sporobolus indicus* (L.) R. Br. var. *fertilis* (Steud.) Jov. & Goed. in Bull. Centre Et. Rich. Sc. Biarritz 7 : 50. 1968 et in Taxon 22 : 163.

1973. *Agrostis fertilis* Steud. Syn. Pl. Gram. 170. 1855. *Sporobolus fertilis* (Steud.) Clayton in Kew Bull. 19 : 29. 1965. *Sporobolus indicus* sensu Hook. f. Fl. Brit. Ind. 7 : 247. 1896 [non (L.) R. Br. 1810], p.p.; Ramam. in Sald. & Nicol. Fl. Hassan 754. 1976.

Perennial grass. Leaves with slightly infolding margins, rounded at base, glabrous, acuminate. Panicle contracted. Upper glume shorter than lemma; lemma 1-3-nerved. Stamens 3. Grain truncate above.

PACHMARHI : Vicinity (1000 m). In moist places and hill slopes. Common.

Fl. & Fr. : July August.

3. *Sporobolus tenuissimus* (Schrank) O. Ktze. Rev. Gen. Pl. 3 : 369. 1893 ; Patunkar, Grasses Marath. 276. 1980. *Panicum tenuissimum* Schrank in Denkschr. Bot. Ges. Regensh. 2 : 26. 1822. *Vilfa multiflora* Trin. Diss. Bot. 158. 1824. *Sporobolus multiflorus* (Trin.) Link, Hort. Berol. 1 : 88. 1827 ; Hook. f. Fl. Brit. Ind. 7 : 248. 1896.

Delicate annual grass. Leaves flat or convolute, glabrous, finely acuminate. Panicle effuse. Upper glume shorter than lemma, 1-nerved, acute. Stamens 3. Grain elliptic oblong.

PACHMARHI : Dhupgarh (1300 m). On hill slopes and waste lands. Occasional

Fl. & Fr. : July September.

53. THEMEDA Forsk.

- 1a. Involucral spikelets less than 6 mm long.
Awn up to 3.5 cm long. Hermaphrodite spikelet solitary or geminate ... *T. quadrivalvis* 1
- 1b. Involucral spikelets over 6 mm long.
Awn over 5.5 cm long. Hermaphrodite spikelet always solitary ... *T. triandra* 2

Themeda quadrivalvis (L.) O. Ktze. Rev. Gen. Pl. 794. 1891 ; Babu, Herb. Fl. Dehra Dun 649. 1977. *Andropogon quadrivalvis* L. in Murt. Syst. Veg. ed. 13. 758. 1774. *Anthistiria ciliata* L. f. Suppl. 113. 1781 ; Hook. f. Fl. Brit. Ind. 7 : 213. 1896. "Bharwan".

Annual grass. Leaves flat, linear-lanceolate, margin scabrid ; acute.

Spathe boat-shaped, margins hairy. Involucral spikelets subsessile, linear-lanceolate. Lower glume many-nerved; keels 2, winged. Hermaphrodite spikelets one or two on a short stipe.

BORI : Reserve forest (550 m). In forest undergrowth and clearings. Common.

Fl. & Fr. : August - January.

2. *Themeda triandra* Forsk. Fl. Aegypt. Arab. 178. 1755 ; Ramam. n Sald. & Nicol. Fl. Hassan 756. 1976. *Anthistiria imberbis* Retz. Obs. Bot. 3 : 11. 1783 ; Hook. f. Fl. Brit. Ind. 7 : 211. 1896.

Robust annual grass. Leaves flat, linear, glabrous; margin scabrid; acute. Spathe boat-shaped, margins with a few bristles. Involucral spikelets subsessile, oblong-lanceolate. Lower glume many-nerved; keels 2, winged with stiff bristles; margins narrowly inflexed. Hermaphrodite spikelets solitary on short stipe.

PACHMARHI : Vicinity (1000 m); Dhupgarh (1250 m). BORI : Reserve forest (550 m). On hill slopes and along waysides. Common.

Fl. & Fr. : September - January.

54. THYSANOLAENA Nees

Thysanolaena maxima (Roxb.) O. Kuntze, Rev. Gen. Pl. 2 : 794. 1891; Babu, Herb. Fl. Dehra Dun 650. 1977. *Agrostis maxima* Roxb. Fl. Ind. 1 : 319. 1820. *Thysanolaena agrostis* Nees in Edinb. New. Phil. Journ. 18 : 180. 1835; Hook. f. Fl. Brit. Ind. 7 : 61. 1896. "Chir".

Reed-like perennial grass. Leaves lanceolate, with a cordate, semi-amplexicaul base and acuminate apex. Panicle effuse, decomound, with filiform branches. Spikelets 1 to 2-nate, minute, greenish or purplish, 2-flowered, elliptic-lanceolate, acuminate, ciliate.

PACHMARHI : Vicinity (1000 m). BORI : Reserve forest (550 m). On hill slopes and dried streams. Common.

Fl. & Fr. : November - April.

55. TRIPOGON Roem. & Schult.

Ia. Lemma 2 - lobed :

2a. Median awn longer than the lemma ... *T. capillatus* 2

2b. Median awn shorter than the lemma ... *T. lisbeae* 3

1b. Lemma 4 - lobed ... *T. bromoides* 1

1. *Tripogon bromoides* Roem. & Schult. Syst. Veg. 2 : 600. 1817; Hook. f. Fl. Brit. Ind. 7 : 287. 1896; Ramam. in Sald. & Nicol. Fl. Hassan 757. 1976. *Trianthera bromoides* Roth ex Roem. & Schult. loc. cit.

Tufted perennial grass. Leaves convolute. Racemes spiciform; rachis stiff, flattened. Spikelets sessile, 1 cm long; upper glume 2-lobed at the tip; lobes acute, with a short awl from the center.

PACHMARHI : Vicinity (1000 m). BORI : Reserve forest (900 m) On hill slopes. Common.

Fl. & Fr. : July September.

2. *Tripogon capillatus* Jaub. & Spach, Ill. Fl. Oc. 4 : 47. t. 332. 1851; Hook. f. Fl. Brit. Ind. 7 : 285. 1896; Ramam. in Sald. & Nicol. Fl. Hassan 757. 1976.

Tufted perennial grass. Leaves convolute. Spikelets alternate, few-flowered. Upper glume aristate. Lemma bilobed with a long central awn.

PACHMARHI : Vicinity (1000 m). On hill slopes. Occasional.

Fl. & Fr. : July October.

3. *Tripogon lisboae* Stapf in Kew Bull. 1892 : 84. 1892; Hook. f. Fl. Brit. Ind. 7 : 286. 1896; Bor, Grass. Ind. 1 : 522. 1960.

Tufted perennial grass with wiry roots. Leaves usually flat, sometimes rolled, green, not glaucous; ligule obsolete. Median awn shorter than the lemma; lemma 2-lobed.

BORI : Reserve forest (550 m), 26 12 62, Panigrahi 6570 (BSA). On hill slopes. Rare.

Fl. & Fr. : August December.

56. TRITICUM L.

Triticum aestivum L. Sp. Pl. 85. 1753; Babu, Herb. Fl. Dehra Dun 652. 1977. *Triticum vulgare* Vill. Hist. Pl. Dauph. 2 : 153. 1787; Hook. f. Fl. Brit. Ind. 7 : 367. 1896. "Gehuri".

Annual cultivated grass. Culms hollow. Leaves flat, linear-lanceolate, scaberulous; margins scabrid; apex acute. Spikes erect, curved with age, irregularly 4-sided. Rachis zig-zag, tip flattened. Spikelets distichous, solitary, imbricate, laterally compressed, 3-flowered, the upper most sterile. Grains oblong, ventrally grooved, free within lemma and palea.

BORI : Reserve forest (550 m). Cultivated and as escape on hill slopes.

Fl. & Fr. : December - March.

57. VETIVERIA Lem. Lisanc.

Vetiveria zizanioides (L.) Nash in Small, Fl. South East U. S. 67. 1903 ; Babu, Herb. Fl. Dehra Dun 653. 1977. *Phalaris zizanioides* L. Mant. Pl. 2 : 183. 1771. *Andropogon squarrosus* sensu Hook. f. Fl. Brit. Ind. 7 : 186. 1896 (*non* L. f. 1781) "Khas-khas".

Perennial grass with a rhizomatous rootstock and aromatic stout root system. Leaves linear-lanceolate. Panicle contracted. Sessile spikelets lanceolate, acute, yellowish, turning to darkish on maturity. Pedicelled spikelets linear-lanceolate.

PACHMARHI : Vicinity (10000 m). In moist places along waysides. Common.

Fl. & Fr. : July November.

1. JASMINUM L.

2. *Jasminum officinale* L. Sp. Pl. 7. 1753 ; Clarke in Hook. f. Fl. Brit. Ind. 3 : 603. 1882 ; Naik, Fl. Osman, 196. 1979. "*Chameli Jati*". Var. *officinale*.

Scandent or twining shrubs. Leaves opposite, pinnately 5 - 7 foliolate, elliptic or ovate, acute or acuminate, 0.8 - 5 cm long. Flowers white, fragrant, in lax, terminal dichotomous cymes.

PACHMARHI : Vicinity (1000 m).

In forest undergrowth. Occasional.

Fl. & Fr. : June October.

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