

FLORA
OF INDIA
SERIES-3

Flora of Chamoli

Volume 1

B.D. NAITHANI

BOTANICAL SURVEY OF INDIA

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Series 3

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BOTANICAL SURVEY OF INDIA

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FOREWORD

The Botanical Survey of India has started publishing the new flora of India under four series.

Series 1 is the national flora of India, which is being brought out in the form of fascicles dealing with various families, tribes or large genera for the whole country. Sixteen fascicles have been already brought out. The work is being intensified and many manuscripts are in press and under editing or preparation.

Series 2 deals with the inventory of plants of different states or large regions. The states of Karnataka, Himachal Pradesh and Tamilnadu were taken up in first phase, and the former two have been completed.

Series 3 deals with detailed floras of districts or such smaller regions. Four such floras have been published.

Series 4 has special publications, monographs on cryptogams, or such works which can not be covered under 1-3.

The flora of Chamoli in series 3 is being published in two volumes. The district of Chamoli is situated in north-western part of Uttar Pradesh in northern India.

The floristic elements from the neighbouring or sometimes distant regions such as of Europe, Siberia, Malaya, Africa, Australia, China Japan and America are also met in the district.

The work of Shri Naithani will provide interested visitors, to the Himalayas a manual for identifying the trees, shrubs and herbs which they will meet during their trails in the region, including the famous spots of Valley of flowers, Kedarnath, Badrinath, Nandadevi, etc.

The Botanical Survey has intensified its work on the district floras and in addition to the scientists of the Survey, a number of botanists in educational institutions of the country have been involved.

It is hoped that a number of district floras will appear during the current year and the coming years. They should be useful to teachers and students of botany, officials of the forest and agriculture departments and also for persons concerned with utilization and conservation of plant resources.

Shri Naithani will welcome useful suggestions on this flora and will try to incorporate in future editions.

Botanical Survey of India,
Howrah—3
15-5-84

S. K. Jain

P R E F A C E

Apart from the religious significance, the district Chamoli of Garhwal Himalaya is famous for its high snowclad mountain peaks and enchanting verdant valleys. The rich and varied flora has been of great attraction for the professional collectors as well as amateur enthusiasts. The impetus for plant collection increased with the visit of Thomas Hardwick on a political mission to the ruler of Garhwal in Srinagar along the Alaknanda valley in 1796. Since then the practice of collecting plants from this area has been continuing and a large collection of plants were made by several visitors in whatever capacities they travelled in the district. The most comprehensive collections from the area however, have been those of two European Surveyors, Strachey and Winterbottom which were made between 1846-1849 within the province of Kumaon and adjoining portions of Garhwal and Tibet.

Duthie among one of the pioneer collectors in the area finally incorporated the results of all subsequent visitors to the form of a catalogue and published it in 1906 and provided a good source of information about plants of the area. Since then, the knowledge about the plant wealth of the district has been increased and accounts are found scattered in several published works. To overcome this difficulty it is proposed to incorporate all such informations about the plants of the area and to produce a book which shall supply more materials to the visitors in the district interested in botany and acquainted with the rudiment of that science. This will also help indentifying the trees, shrubs and herbs they see while on travels along the routes in the neighbouring valleys or on excursions to Valley of Flowers, Badrinath, Kedarnath, Tungnath, Niti, Mana; Nandadevi and so many other important places in the district.

It has also been endeavoured to incorporate the requisite informations about the district pertaining to its topography, history, ecology and soil, climate, rainfall and vegetation, etc. available in authentic records and on own and several observations by other workers during expeditions and botanical tours in the district.

Efforts have been made to incorporate all the species preserved in the BSD herbarium as well as those recorded in published works. Apart from this, accounts on floristic, phytogeographic analysis and general statistics are provided in this flora.

The occurrence of large number of species in the area and richness of the flora has rendered the district a botanical paradise. After the ana-

lysis of the flora, the total number of flowering plants recorded in the present work is 2022, including 88 cultigens. These are distributed over 892 genera belonging to 163 families. Among 1921 species of angiosperms 1513 are dicots with over 73 cultigens and remaining 408 constitute monocots with 15 cultigens. The species of dicots are distributed in 690 genera belonging to 135 families ; 408 monocots are distributed under 194 genera belonging to 24 families.

In view of large number of species included in the flora, it is proposed to produce the whole text in two volumes. The first volume contains introduction and a part of systematics dealing with about 967 species belonging to families Ranunculaceae to Asteraceae while the second volume will include 1055 species under families Campanulaceae to Pinaceae including cultigens.

I express my deep gratitude to Dr. S. K. Jain, Director, Botanical Survey of India, Dr. M. A. Rau and Dr. A. S. Rao, former Deputy Directors, Northern Circle, Botanical Survey of India for their valuable suggestions and encouragements during the preparation of this book. I am very grateful to Dr. U. C. Bhattacharya, Dr. R. R. Rao, Deputy Directors for guidance and suggestion and kindly going through the Introductory portion of the manuscript. Thanks are also due to the authorities of the Forest Research Institute and Colleges for according permission to consult the library and the herbarium.

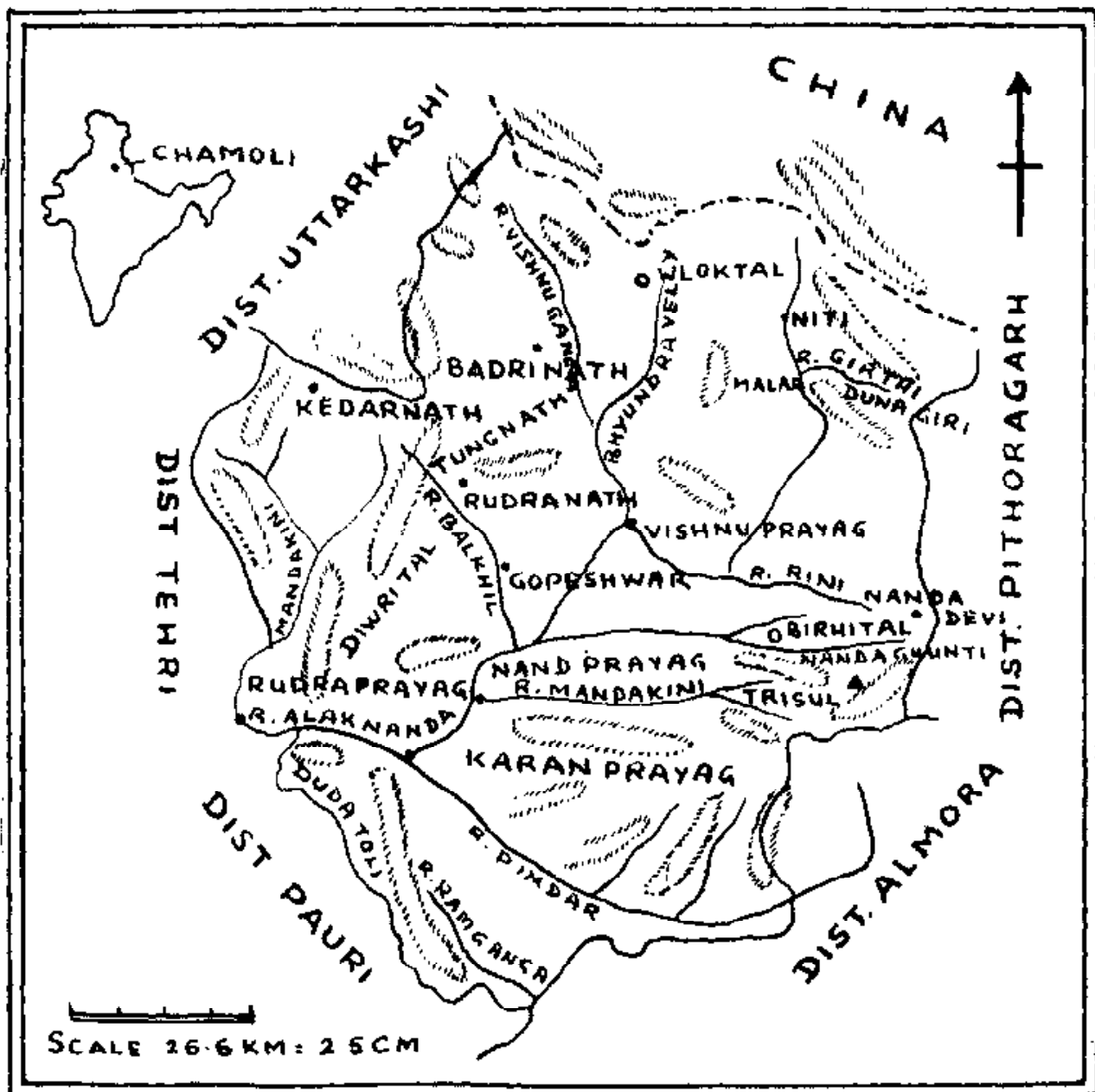
In spite of all possible care and attention, there is always a possibility of creeping omissions, errors and discrepancies. It will be greatly appreciated if the users of this flora very kindly bring such instances to the notice of the author.

Botanical Survey of India
Northern Circle

Dated : August, 1984.

B. D. NAITHANI

CHAMOLI DISTRICT





Morus serrata (The Sacred Mulberry Tree) - Joshimath



Saussurea simsoniana Garhwal, Lake Hemkund



Lake Dewariya Garhwal - Ukhimath



Confluence of Pinder & Alaknanda Rivers at Karanprayag - Garhwal Chamoli



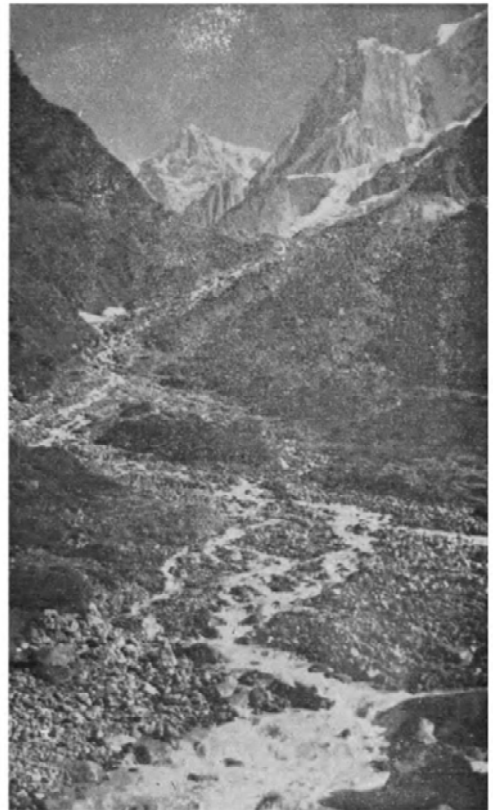
Hill Slopes With *Nardostachya* On Rocks - Garhwal



Oak - Forest (*Quercus dilatata*) Near Gurikund - Kedarnath



Calanthe tricarinata - Garhwal - Ramni



Moraine at Mandakini River Kedarnath



Lichen On A Birch Stem. Garhwal - On Way To Hemkund



Alkapuri Moraine Garhwal Vasudhara

INTRODUCTION

Uttar Pradesh, one of the largest States of the Indian Union occupies an area of about 29.443 km². It forms the major bulk of the Gangetic Plains and the famous Kumaon and Garhwal sectors with magnificent snow-capped mountains of the Himalaya, make the north-western part of the State, where the district Chamoli is located. The Garhwal Himalaya is having some of the noblest and most beautiful mountain peaks of the world like Nilkantha, Kamet, Nandadevi etc. The sector of the Himalaya lying between 30°-31° N and 79°-80° E forms Chamoli district of Garhwal Division and occupies an area of about 7098 km². It is bounded and butted towards north by Tibet, east by Pithoragarh and Almora, South by Pauri and West by Uttarkashi and Tehri districts. The famous Dudatoli range demarcates the district towards south from Pauri district (MAP). Alaknanda with its tributaries is the principal river which contributes bulk of the perennial water to the Ganges.

The mighty Himalayan sector which cover Chamoli district has been of great interest to the people of various professions. The whole district is spotted with many centres of great religious significance and streams of pilgrims pay visit to the holy shrines of Badrinath and Kedarnath every year during summer and after monsoon. There are also a number of landmarks of great importance from the point of their scenic grandeur.

Amongst them the famous 'Valley of Flowers' and the Nanda Devi National Park have great attraction. Some beautiful natural lakes like Vasukital, Deurital, Devtal, Loktal and Roop Kund etc. are famous for tourism. Gopeshwar is the Headquarter of the district on the bank of Alaknanda.

The history of botany of this region dates back from 1796 when T. Hardwick entered the Alaknada Valley on a political mission. However, the major interest on the plant collection started with Strachey and Winterbottom, the two surveyors who passed through these hills to Tibet in 1844-49. These two surveyors have made best collections in the Himalayan region of the State as well as in Tibet and adjoining parts of Garhwal. Since then frequent visits were made by others and resulted in publication of the important Catalogue of Duthie in 1906. This valuable publication also influenced other workers to write accounts of the plant wealth of other regions of the State. Amongst the important works on the botany of this region, the Forest Flora of Kumaon (Osmaston, 1922) and the Flora of Upper Gangetic Plains (Duthie, 1921-39) are significant, several others also

did work on the botany of other parts of the State like Forest Flora of Pilibhit, Oudh, Gorakhpur and Bundelkhand (Kanjilal, 1933), Flora of Upper Gangetic plains and Adjacent Siwaliks and sub-Himalayan Tract Check list (Rau, 1969), Flora Gorakhpurensis (Srivastava, 1976), Flora Nainitalensis (Gupta, 1968), Herbaceous Flore of Dehra Dun (Babu, 1977) and High Altitude Flowering plants of West Himalaya (Rau, 1975), etc.

With the present day urge for gathering knowledge about our wildlife, the urgency for assessing botanical information at microlevel has received special attention. Moreover, the plant life is threatened with extinction either due to their over exploitation or due to destruction for developmental activities.

Keeping this in view, an account of flowering plants of Chamoli district is presented here and is based on extensive field surveys and studies of herbarium material during 1976-83.

MATERIAL AND METHODS

Routine procedures were followed for collecting and preserving the specimens in the Herbarium (Jain & Rao, 1976).

All the specimens were compared with the earlier authentic specimens, preserved in the herbaria (DD, BSD) and carefully studied and identified with the available standard floras and monographs.

Efforts have been made to bring the nomenclature upto date in accordance with International Code of Botanical Nomenclature 1978.

TOPOGRAPHY AND GENERAL FEATURES

Chamoli contains inner Himalayan massive mountains in its major part associated with a number of rivers and mountain torrents. Some of the highest peaks in India namely Nanda Devi, Kamet along with a number of other well-known peaks of more than 6000 metres like Trisul, Dunagiri, Mana, Badrinath, Kedarnath and Nilkanta are also famous peaks of this district. Rivers like Alakanda, Mandakini, Nandakini, Dhaul, Pinder and Bhyundar originating far in the glacial beds and down to their south and eastward courses are joined by a number of tributaries to form a major source of drainage. The run of water from all these valleys ultimately confluent with a southerly course with Alaknanda and join the long drainage of the Bhagirathi at Devprayag whenceforth it is called the Ganga. The forests of varied composition flourish in the valleys

up to an altitude of 3000—3500 metres, above which extensive meadows occur in places, which are covered in summer and autumn months by profusion of flowers of alpine and alpine species.

GEOLOGY AND SOILS

1. **Geology :** As per the records of the Geological Survey of India only a part of the area has been studied in detail, the rest is yet to be surveyed. On the basis of the latest information the various rock formations have been classified into four kinds viz. (i) the Central crystalline, (ii) the Dudatoli (Almora crystalline) (iii) the Baijnath crystalline, (iv) the Garhwal group with intrusive granite and dolomite (or metadolorite). In general, geological composition of the area is of tertiary origin along with older sedimentary and granite rocks. The tertiary fresh water deposits are 1-40 million years old, containing mammalian fossils. The mountain ranges are composed of highly folded marine sedimentary rocks and metamorphosed granite. The Central crystallines are generally found exposed in high altitudinal areas of the district. Terraces along the river valleys generally consist of sandy alluvium bouldered beds and sand as well as plains or slopes have developed on different levels on either banks of Alaknanda, Pindar, Mandakini and Nandakini, etc.

2. **Soil :** The composition of soil in the district varies from place to place and is directly related with the factors prevalent in the particular locality such as in damp evergreen forests, the litters play an important role in generation and conservation of soil caps. The rock type also plays an important role on the quality of soil. For example, gneiss schist and granite yielding high sandy and micaceous soil may be very rich with considerable depth and is excellent for the tree growth under favourable conditions. The type and structure of the rock is also responsible for the quantum growth of the plant in many localities. The soil texture ranges from sandy loam to clayey loam.

CLIMATE

The mountainous tracts of the whole district have varying altitude and relief which contribute to a great extent for the variations of the climatic conditions. Owing to orientation or steepness of slopes, there are marked local effects due to differences in the insolation. Deep river valleys are generally dry but when wind blows through valleys, rainfall is greater. The flow of wind in the upper reaches and slopes have a considerable local influence on the temperature and plays an important role in the distribu-

tion of the vegetation. Winters are very severe at higher elevations and snow-fall occurs even down to 1500 m. Severe frost is observed from December to February. In May and June lower valleys are very hot up to the onset of monsoon, except the higher reaches where it is considerably cool in the hottest period. The most pleasant climate is witnessed during October to November.

Temperature : The lower valleys of Alaknanda, Pindar, Nandakini, Mandakini and Birhi have typical north Indian sub-tropical climate with a hot and more or less dry season from April to June. The rainy season extends from July to September. The temperature in summer reaches maximum up to 45°C in valleys below 1600 m and on ridge around 1600m it is up to 35°C and those at 2000 m is $\pm 30-32^{\circ}\text{C}$. The mean temperature in winter at 3000 m is around 0°C.

Rainfall : The rainfall in the district varies during summer and winter between 1500 mm 2000 mm and 500 mm 750 mm. respectively. But it is considerably regulated over the division due to variation in altitude and aspects. In the extreme north however, the precipitation rapidly decreases and practically ceases beyond the first snow range. Monsoon though uncertain generally breaks in June. July and August are the wettest months receiving upto 90% of total precipitation, November is the driest month. Winter rains, though erratic, seldom fail altogether. During April-May thunder storms are often accompanied by hailstorms which are fairly frequent. As the monsoon advances in the region of Joshimath, it is considerably reduced in Dhauli valley. consequently Niti and Mana regions receive very low percentage of precipitation and almost remain dry and dusty.

PREVIOUS WORK AND PRESENT STUDY

European botanists, army officers, surveyors and surgeons were the pioneers to botanise in the Indian sub-continent including the North-western Himalaya. Botanical history since 1840 includes the visit of T. Hardwick (1796), the first european who collected plants in this division of Kumaon Himalaya including Alaknanda valley. During the early years of nineteenth century William Moorcroft crossed over Niti Pass, reached Mansarover and brought a large bulk of collection of plants from the places as far as in the interior of the Himalaya. The restoration of the botanical Garden by Hastings (1820) in Saharanpur further accelerated the impetus of botanical explorations in the Garhwal region.

The most comprehensive collections from the area, however, have been those of two European surveyors, Strachey and Winter-bottom, who made collections during 1846-49 within the province of Kumaon and

adjoining portions of Garhwal and Tibet. The original herbarium of Strachey and Winterbottom included nearly 2000 species and distributed in sets to various museums in 1852-53 along with catalogue mentioned earlier. The original catalogue was first published by Duthie in 1882 and revised in 1906 incorporating the results of subsequent explores in the area from time to time. Among them the notable collectors are Wallich, Royle, Falconer, Blinkworth, T. Thomson and Duthie himself.

Apart from these botanists, O. E. Osmaston also extensively surveyed the Kumaon including the adjoining portions of Garhwal and made a valuable contribution on the ecology of North Garhwal (1922), and also made an excellent account of the flora of this region by writing the *Forest Flora of Kumaon* 1927. Holdsworth and Smythe who were members of the British Kamet Expedition in 1931, on their return journey also collected plants in the Bhyundar valley and included the list of plants in their work "Kamet Conquered" (1932). Smythe again visited the valley in 1937 and collected more than 250 species and included all plants in his delightful book "Valley of Flowers".

Ghildiyal (1957) made two visits to various parts of Garhwal including the Valley of Flowers and listed 289 species. Since the inception of Northern Circle, Botanical Survey of India, most significant collections of plants in the district have been made by M. A. Rau (1957-1959) and listed approximately 738 species of flowering plants and ferns from North Garhwal. Subsequent botanists from the BSI like U. C. Bhattacharyya, N. C. Nair, B. D. Naithani, B. M. Wadhwa, G. Panigrahi, P. K. Hajra, D. Basu and others also collected large number of plants from remote areas of district and enriched the herbarium and published their valuable information pertaining to the plant wealth of the district. Recently workers from the Garhwal University have also engaged in explorations and have made some contributions to the botany of the district.

The present flora is based on the works of the past more than one hundred fifty years of explorations of the selected valleys, followed by five years of general survey and study of the specimens and literatures.

GENERAL ASPECTS OF VEGETATION

Zonation of vegetation from sub-tropical areas to alpine heights is the characteristic feature of the district. This varies due to different physiognomic conditions and altitudinal range associated with various climatic and biotic factors. Winter follows the defoliation of most of the trees and as the days warm up in spring, new foliage appear and is followed by flowering and fruiting. The alpine zones of the district are

ablazed with a variety of colourful flowers and onset of the monsoon spells a greenery throughout the district. The ephemeral vegetation generally comprised of annuals and biennials is markedly affected by the seasonal changes. In the following pages, forest biodata are discussed in details. Vegetation pertaining to waste-lands, grass-lands, weeds and allies, aquatic and marshland habitats and exotic flora are discussed in brief.

Forests :

Chamoli district abounds in forests and meadows with their characteristic plant composition. For the sake of administrative convenience, the forests in the district are divided into Badrinath and Kedarnath forest divisions lying in the eastern and western parts of the district respectively and preserve a rich flora and fauna of the area. The names of these forest divisions are after the shrines of great religious significance.

Since the forest types in both the divisions extend over a wide altitudinal range above 550 m to perpetual snow in the north, the conifers contribute a major component of the forest communities.

Information on various forest vegetation in the present work is derived mainly from the botanical explorations undertaken during the past more than one hundred fifty years in the area. Several pioneer workers in their expeditions also contributed valuable informations in evaluating the types of vegetation. In order to outline the salient features of the main forest vegetation Champion and Seth's classification (1968) has been followed.

In several localities up to an altitude of 1400m below the zone of Chir Pine, northern mixed dry deciduous type of forest is found to occur common species here are *Albizia procera*, *Cassia fistula*, *Cinnamomum tamala*, *Toona ciliata*, *Callicarpa macrophylla*, *Coelebrookia oppositifolia*, *Euphorbia royleana*, *Abrus precatorius*, *Bauhinia vahlii*, *Clematis gouriana*, *Arundinella nepalensis*, *Apluda mutica* and *Arundo donax* etc. Representative of species in such type of forests varies with the local factor. But where excessive grazing, lopping and burning have taken place, the degraded type, i. e. northern tropical dry deciduous scrub with dominant species like *Euphorbia royleana*, *Engelhardtia spicata*, *Dioscorea belophylla*, *Parthenocissus semicordata*, *Smilax aspera*, *Cymbopogon martinii*, *Digitaria granularis* etc. are found to occur. Whereas in both the divisions between 650 m - 2300 m outer himalayan chir forest with the main components of *Pinus roxburghii* along with the other species of plants like *Lyonia ovalifolia*, *Quercus leucotrichophora*, *Rhododendron arboreum*, *Aechmenanthera tomentosa*, *Indigofera dosua*, *Inula cappa*, *Galium asperifolium*, *Micromeria biflora*, *Rosa brunonii*, *Arundinella pumila*, *Capillipedium assimile* and *Eulalia hirtifolia* etc. are found. Quality and distribution of such type of forests varies with other factors like depth and moisture content of the soil. Places where

excessive destruction of natural vegetation has taken place are generally substituted by poor vegetation, mainly scrub is found to prevail with elements like *Carissa opaca*, *Rhus parviflora*, *Woodfordia fruticosa*, *Ziziphus mauritiana* etc. In some localities on the dry exposed southern face of the hill in the Chir belt *Euphorbia royleana* takes its course due to severe biotic factors but completely disappears above 1500 m in both the southern and northern faces. Such scrubs are well represented by the species like *Rhus parvifolia*, *Woodfordia fruticosa* and *Heteropogon contortus*. In the main himalayan range between 1800-2300 m on the southern face and below 1500 - 1800 m on the northern face banz-oak (*Quercus leucotrichophora*) type of forest is extensively found, except in the areas of poor rainfall. Such type of forests are found to be composed of species like *Betula alnoides*, *Carpinus viminea*, *Lindera pulcherrima*, *Lyonia ovalifolia*, *Rhododendron arboreum*, *Cotoneaster obtusus*, *Myrsine africana*, *Hedera nepalensis*, *Vitis lanata*, *Taxillus vestitus* etc., whereas in the moist zone of the main himalayan axis between 2000 m - 2750 m, luxuriant type of moru-oak forest (*Quercus floribunda*) type is found sandwiched between *Quercus semicarpifolia* with the admixture of mainly deciduous and evergreen species. Among the principal elements, which are associated in the formation of such type of forests are *Betula alnoides*, *Acer caesium*, *Eurya acuminata*, *Thamnocalamus falconeri*, *Salix denticulata*, *Viburnum cotoni-folium*, *Ulmus wallichiana*, *Aesculus indica* and *Prunus cornuta* etc. Places where undue destruction of *Quercus leucotrichophora* has taken place, species unpalatable to cattle such as *Rhododendron arboreum*, *Lyonia ovalifolia*, *Berberis lycium*, *Prinsepia utilis*, etc. are generally seen growing.

The most beautiful type of western mixed conifer forests with mixtures of trees like *Abies*, *Picea*, some *Pinus wallichiana*, occasionally *Deodar*, associated with the deciduous broad leaved trees are found to occur between 2400 - 3000 m and in individual patches down to 2100 m and are more common in the areas of poor rainfall. In places of requisite rainfall such forests are composed of trees like *Quercus floribunda* and *Quercus semicarpifolia* and vary in association in different phases, for example oak are replaced by broad-leaved species like *Acer caesium*, *Aesculus indica*, *Juglans regia*, etc. The forest undergrowth is well represented with the herbs and shrubs with the abundance of *Cimnobambusa jaunsarensis* and *Thamnocalamus spathiflora* in patches. In places of moist and deep soil, except in the lowest parts below 1800 m - 2700 m, moist temperate type of forests is common throughout the district and is frequently common along the streams, hollow depressions and bottoms of sheltered valleys. Among the elements associated in the formation of such type of forests are *Aesculus indica*, *Acer caesium*, *Carpinus viminea*, *Ulmus wallichiana*, *Thamnocalamus spathiflora*, *Viburnum* spp., *Berberis chitria*, *Strobilanthes wallichii*, *Paeonia emodi*, *Impatiens scabrida*, *Clematis connata*, etc. In north of the

main himalayan range, in dry tracts with moderate rainfall, extensive forests of *Pinus wallichiana* intermixed with *Cedrus deodara* are found to occur. The undergrowth of the forests are well represented mainly with the elements of grasses.

One of the characteristic features of the higher hills of the district is the growth of the Kharsu-oak (*Quercus semecarpifolia*) type of forests in unglaciated maraine tract between 2400 m - 3000 m and are composed of elements like *Quercus floribunda*, *Betula alnoides*, *Pyrus lanata*, *Abies pindrow*, *Rhododendron barbatum*, *Rosa sericea*, *Cotoneaster acuminatus*, *Salix denticulata*, *Clematis montana* and *Thamnocalamus* species. The undergrowth of forest is well represented with the herbs and shrubs. Close to the mixed coniferous forests between 2600 m - 3400 m on sheltered sites, west himalayan upper oak/abies type of forests are found to occur and are associated with the elements like *Abies pindrow*, *Quercus semecarpifolia*, *Aesculus indica*, *Taxus baccata*, *Syringa emodi*, *Viburnum cotinifolium*, *Schisandra grandiflora* and *Hedera depalensia* etc. The cleared places in such forests are well represented with *Thamnocalamus spathiflora*, *Chimnobambusa jaunsariensis* in luxuriant growth, where the shady and protected places are sheltered with ferns and mosses.

The undergrowth of Oak-Rhododendron and conifers in cleared places at 2400 m, maintain bamboo forests with species like *Chimnobambusa jaunsariensis*, *Arundinaria falcata*, *Thamnocalamus falconeri* and *T. spathiflora*. In forests of *Quercus semecarpifolia*, *Quercus leucotrichophora* and *Abies pindrow* above 2100 m around Kharaks, himalayan temperate park land type of forests are seen well represented with the elements like *Prunus cornuta*, *Berberis*, *Arundinaria* and *Cotoneaster* etc. whereas the areas between 1800 m - 3000 m. where the biotic factors have exercised their influence, grasslands and himalayan temperate pasture type of vegetation, associated with elements like *Agrostis pilosula*, *Dactylis glomerata*, *Bromus ramosus*, *Themeda anathera* and *Chrysopogon gryllus* etc. is found.

Areas of permanent water supply throughout the district are well represented with the forests of *Alnus nepalensis*. Such alder type of forests are seen intermixed with the elements like *Populus ciliata*, *Aesculus indica*, *Celtis australis*, etc. The undergrowth of the forests is well represented with the species like *Ainslaea latifolia*, *Sarcococca saligna* and *Rubus foliolosus* etc.

The natural dry deodar forest type is only represented in south of himalayan axis of Badrinath forest division, whereas plantation of deodar with *Pinus wallichiana* are represented in Kedarnath forest division. Apart from this, such forests are also found to occur in the inner dry valleys beyond the main range between 2400 m - 3000 m, whereas towards upper limits, these forests pass into *Betula utilis*, *Abies pindrow* or *Juniperus*

forests. The undergrowth is well represented with the elements like *Abelia triflora*, *Prunus jacquemontii*, *Juniperus* spp. and *Artemisia maritima* and *Ribes alpestre*, etc. In areas of moderate rainfall behind the main himalayan axis and moist localities in northern face between 2400-2700 m, in Dhauli valley, west himalayan temperate deciduous type of forests are found to occur with the elements like *Corylus jacquemontii*, *Aesculus indica*, *Acer caesium* and *Populus ciliata*, etc. Dry tracts of Dhauli valley in Malari and Dunagiri in the north of himalayan axis between 3000-4000 m, west himalayan high level blue pine (*Pinus wallichiana*) type is found to occur. Exceptionally over a small area such forests pass into *Betula* and *Abies* forests in the upper limits. Undergrowth of such forests is generally comprised of elements like *Lonicera hopoleuca*, *Rosa sericea*, *Juniperus* sp. and *Salix denticulatus* etc.

The valleys of himalayas streams between 2300-3200 m, are well represented with the type of forests of *Hippophae-Myricaria* scrub and gradually pass into *Juniperus* forests in high altitudes. Such type of forests are also present in transition zones of temperate and alpine forests. Above 3000 m particularly on northern sides, west himalayan sub-alpine-birch/fir type of forests generally consisting of *Betula* and *Rhododendron* elements in irregular forms are found to occur. Favourable areas in the sub-alpine zones between 3000-3500 m, are subjected to heavy biotic interferences and therefore, sub-alpine pastures or bugyal type of vegetation is found to occur with the species like *Brachypodium sylvaticum*, *Bromus japonica*, *Poa annua* and *Stipa roylei* etc.

High level grasslands generally found above the tree line between 3300-4500 m and present a picturesque look in summer and rainy seasons on account of luxuriant growth of herbaceous plants, flushed with beautiful flowers. Such alpine pasture type of vegetation is generally composed of the members of *Primula*, *Anemone*, *Potentilla*, *Iris*, *Gentians*, *Ranunculus* and several members of *Cruciferae* and *Caryophyllaceae* etc. Among the elements which constitute the main bulk of the vegetation are *Euratia ceratoides*, *Juniperus* sp., *Caragana* sp. and *Artemisia* sp. Further higher up areas with the stony desert look is composed of Species belonging to *Sedum*, *Androsace*, *Primula*, *Saxifraga* and *Potentilla*.

Hilly wasteland vegetation :

In the present work the hilly wasteland has been considered to be the areas lying outside the forest and cultivated lands between 1000-2000 m of altitude. The terrain of the whole district is hilly and a major portion is occupied by the forest. Lower valleys along the river banks are generally thickly populated. During the settlement of people, such areas were cleared and the deforested products continued to meet up their usual demands for fuel, fodder and wood for the construction of their houses. Subsequently

considerable portions of the cleared areas remained unused. In course of time certain species of trees began to appear in such areas. Among the principal tree species found to occur in those tracts are *Acacia pennata*, *Butea monosperma*, *Bauhinia variegata*, *Cassia fistula*, *Casearia graveolens*, *Dalbergia sissoo*, *Flacourtia indica*, *Ficus hispida*, *Glochidion velutinum*, *Mallotus philippensis*, *Myrsine serrata*, *Lannea coromandelica*, *Prunus cerasoides*, *Pyrus pashia*, *Xeromphis spinosa*, *Sapium insigne* etc. Such wastelands are also prone to shelter number of shrubs and undershrubs and among the common species which are found to occur are *Carissa opaca*, *Cotoneaster* sp., *Adhatoda zeylanica*, *Colebrookia oppositifolia*, *Cocculus laurifolius*, *Colquhounia coccinea*, *Elsholtzia flava*, *E. polystachya*, *Scutellaria repens*, *Plectranthus coetsa*, *Achyranthes bidentata*, *Cyathula tomentosa*, *Vitex negundo* and *Ziziphus mauritiana* etc. Whereas climbers like *Cryptolepis buchananii*, *Clematis gouriana*, *C. grata*, *Rubia cordifolia*, *Cissampelos pareira*, *Ipomoea purpurea* are commonly seen on trees and shrubs found to occur there.

In some places within the wastelands parasites like *Texillus vestitus*, *Scurulla* sp., *Viscum album* etc. are frequently seen on trees. The ground floor is well represented with the annuals and perennials. Among the commoners are *Ajuga bracteosa*, *Amaranthus spinosus*, *Antirrhinum orontium*, *Berberis aristata*, *B. asiatica*, *Capsella bursa-pastoris*, *Campylotropis ertocarpa*, *Cleome viscosa*, *Crotalaria prostrata*, *Datura stramonium*, *Euphorbia hirta*, *Martynea annua*, *Nicotiana rustica*, *Solanum nigrum*, *S. surratense*, *Verbascum thapsus*, etc. and *Asclepias curassavica* occasionally along course of streams.

Grass lands

Generally the people of the area take their cattle wealth to wastelands and forests which are principal source of fodder grass. Among the dominant species of grasses which are found to occur are *Apluda mutica*, *Arundinella nepalensis*, *Eulaliopsis binnata*, *Cymbopogon martinii*, *Heteropogon melanocenchrus* and *Themeda arundinacea* encountered with these are the species like *Aechmanthera tomentosa*, *Berberis lycium* and *Moghania fruticosa*, etc.

Some beautiful natural grass lands are generally found to occur in higher altitudes which are locally known as Bugyals. These are principal source of fodder for the cattle of the neighbouring areas. Generally people take their cattle wealth to such pasture lands before the onset of rains and remain there till the winter approaches. Among the important species which are generally found to occur are *Agrostis pilosula*, *Bromus ramosus*, *Dactylis glomerata*, *Deschampsia caespitosa*, *Eremopoa persica*, *Festuca polycolea*, *Stipa roylei* and *Themeda anathera* etc. Such pasture lands are

well represented also by species of economic importance such as *Aconitum*, *Anemone*, *Corydalis*, *Delphinium*, *Nardostachys*, *Nomocharis*, *Picrorhiza* and *Potentilla* etc. On account of rich fodder value of grass, such area are being largely exploited. As a result of which luxuriant growth of those valued species adapted under such environmental conditions are generally under depletion. In view of such threats some areas of the district have been protected by declaring them biosphere reserves and sanctuaries.

Cultivated Plants :

Because of the mountainous topography, the agricultural fields are often terraced in the district. The crops are totally dependent on the seasonal rains. In some places however, irrigation is practiced but does not suffice the need of the people. Amongst the main Rabi crops generally cultivated during winter are *Brassica oleracea*, *Hordeum vulgare*, *Lens culinaris*, *Pisum sativum* and *Triticum aestivum* upto 1600 m along river valleys and other places. The Kharif crop during rainy season generally grown are *Dolichos biflorus*, *Echinochloa colonum*, *Eleusine coracana*, *Glycine max*, *Nicotiana tabacum*, *Oryza sativa*, *Paspalum indicum*, *Sesamum orientale* and *Vigna radiata* etc. up to 2000 m. Whereas in remote areas within 3000-4000 m crops like *Amaranthus caudatus*, *A. viridis*, *Fagopyrum esculentum*, *F. tataricum*, *Panicum miliaceum* etc. are cultivated. The summer season crop Jayad includes *Allium cepa*, *A. sativum*, *Solanum tuberosum* etc. which are cultivated in suitable places. The vegetables are commonly grown during the Kharif season. Among the chief vegetables those get preference are *Abelmoschus esculentus*, *Cucurbita maxima*, *Dolichos* sp., *Lagenaria siceraria*, *Lycopersicon asculentum*, *Phaseolus* sp., *Solanum tuberosum* and *Solanum melongena* etc.

Cultivated Trees :

In and around the villages certain species of plants are grown for fodder and wood for the construction of houses. Amongst the principal species of trees which are used for fodder are *Ficus subincisa*, *F. neriifolia* var. *nemoralis*, *F. auriculata*, *Grewia asiatica*, *G. optiva*, *Melia azeadirach* and *Trema orientalis* and the leaves are frequently lopped from these trees whereas *Tonna serrata*, *Celtis australis* and *Pinus roxburghii* are among the wood yielding trees for construction purposes.

Orchard and Garden :

Improved varieties of *Pyrus malus* are cultivated in higher ridges of the district and earn a good revenue. Apart from this, *Aegle marmelos*, *Citrus aurantium*, *C. medica*, *Juglans regia*, *Mangifera indica*, *Prunus armeniaca*, *P. persica*, *Psidium guajava* etc. are seen planted in many places.

Among the beautiful flowering plants generally found in the gardens are *Antirrhinum majus*, *Dahlia* sp., *Delphinium ajacis*, *Helianthus annuus*, *Hibiscus rosa-sinensis*, *Impatiens balsamina*, *Petunia* sp., and *Tagetes erecta* etc.

Weeds and Aliens :

Generally in many places the cultivated fields and gardens are well represented with the weeds. Among the common weeds which are generally found to occur are : *Anagallis arvensis*, *Asclepias curassavica*, *Caesulia axillaris*, *Capsella bursa-pastoris*, *Cannabis sativa*, *Chenopodium album*, *C. ambrosioides*, *Cleome viscosa*, *Commelina benghalensis*, *Cyperus aristatus*, *C. compressus*, *C. iria*, *C. paniceus*, *Euphorbia hirta*, *Fimbristylis dichotoma*, *Fumaria parviflora*, *Lathyrus aphaca*, *Oxalis dehradunensis*, *Panicum psilopodium*, *Ranunculus sceleratus*, *Silene conoidea*, *Stellaria media*, *Tagetes minuta*, *Triumfetta annua*, *Vicia hirsuta* etc.

PLANTS OF MEDICINAL, ECONOMIC AND HORTICULTURAL IMPORTANCE :

Botanical wealth of the area is very rich in medicinal, economic and horticultural plants and are listed below groupwise with their few representative species :

1. Medicinal plants :

Abies pindrow, *Aconitum atrox*, *Aesculus indica*, *Berberis aristata*, *Clissampelos pareira*, *Cuscuta reflexa*, *Dioscorea deltoidea*, *Doronicum roylei*, *Ephedra gerardiana*, *Hyoscyamus niger*, *Dactylorhiza hatagirea*, *Picrorhiza scrophulariflora*, *Rheum tibeticum*, *Viola pilosa* etc.

2. Plants of economic importance :

1. Essential oil yielding : *Abies pindrow*, *Centella asiatica*, *Juniperus communis*, *Micromeria biflora*, *Skimmia laureola* etc.

2. Gum yielding : *Lannea coromandelica*, *Prunus cornuta*, *Rhus walli-chii* etc.

3. Resin yielding : *Cupressus torulosa*, *Hedera nepalensis*, *Juniperus communis*, *Pistacia khinjuk*.

4. Tannin yielding : *Coriaria nepalensis*, *Dalbergia lanceolaria*, *Myrica esculenta* etc.

5. Oil yielding : *Actaea acuminata*, *Prinsepia utilis*, *Sorbus aucuparia* etc.

6. **Timber yielding** : *Buxus wallichiana*, *Cedrus deodara*, *Pinus roxburghii*, *P. wallichiana*, *Toona serrata* etc.

7. **Fibre yielding** : *Boehmeria platyphylla*, *Crotalaria sessiliflora*, *Grewia optiva*, *Urtica dioica* etc.

8. **Ordinary ropes** : *Erianthus ravennae*, *Eriophorum comosum* etc.

9. **Dye yielding** : *Alnus nepalensis*, *Berberis aristata*, *Myrica esculenta*, *Potentilla nepalensis* etc.

3. Plants of horticultural importance :

Anemone vitifolia, *Campanula latifolia*, *Benthamedia capitata*, *Corylus jacquemontii*, *Cymbidium iridioides*, *Delphinium brunonianum*, *Ficus palmata*, *F. auriculata*, *Inula grandiflora*, *Iris kumaonensis*, *Meconopsis aculeata*, *Miscanthus nepalensis*, *Trillidium govanianum*, *Myrica esculenta*, etc.

4. Interesting plants of botanical importance :

Arceuthobium minutissimum, *Circaeaster agrestis*, *Didicea cunninghamii*, *Hydrobryum griffithii*, *Listera pinetorum*, *Stellera chamaejasme*, *Viscum loranthe* etc.

5. Endangered plants :

Balanophora involucrata, *Carduus edelbergii*, *Ceropegia longifolia*, *Cypripedium himalaicum*, *C. cordigerum*, *Didicea cunninghamii*, *Dioscorea deltoidea*, *Falconeria himalaica*, *Holboelia latifolia*, *Listera longifolia*, *Michelia kisopa*, *Podophyllum hexandrum*, *Triosteum hirsutum*, etc.

6. **Germ-plasm material** : *Avena fatua*, *Abelmoschus manihot*, *Cicer microphyllum*, *Duchesnea indica*, *Eleusine indica*, *Echinochloa crus-galli*, *Ficus palmata*, *Malus baccata*, *Lathyrus aphaca*, *Leymus secalinus*, *Moghania vestita*, *Miscanthus nepalensis* etc.

GAME SANCTUARIES/NATIONAL PARKS :

Topography and the natural condition set up of certain areas of the district Chamoli, have offered congenial environment to flourish a large number of species of great economic, Medicinal and horticultural importance and are best suited for the preservation of germ plasm of many domesticated species. Among those reserves added to the flora are :

1. **The Valley of Flowers** (ii) **Nanda Devi Sanctuary** (iii) **Musk Deer National Park**.

1. The Valley of Flowers :

The fame of this Valley of Flowers was brought to light with the enduring efforts of Smythe and Holdsworth in 1931, who were the mem-

bers of the British Kamet Expedition and collected beautiful specimens of flowering plants during their return journey along Bhyundar valley and were so impressed with the scenic grandeur and the wealth of the flora that they named it "Valley of Flowers" and the list of the plants collected during the expedition has been included in *Kamet Conquered* (1932). Smythe again returned to the Valley for collection of the seeds and bulbs for the Royle Botanic Garden Edinburgh and collected nearly 250 species, a list of which is given in his delightful book "Valley of Flowers" (1938). This enchanting valley with its considerable area preserves several most interesting species of himalayan flowers.

2. Nanda Devi Sanctuary: Nanda Devi with its area and altitude 799 km². and 7820 m respectively, is a twin peaked mountain, highest in the district defended by a ring of impassible mountain enclosing an undulated table and the name "Sanctuary" has been given by Mr. Hume Rutledge to the unique Nanda Devi basin. It remained unexplored till 1934, when Shipton and Tillman made their successful attempt for getting entry right up the base of the mountain.

Due to its perilous and difficult configuration it remained unexplored for many years. But the endless efforts of Gurdial Singh and Capt. K. Kumar prized them with success in getting entry right to the basin in 1960 and 1961 respectively. Such expeditions revealed many interesting things of the sanctuary and encouraged later workers for organising expeditions for scientific studies of the area. Subsequently Sri Anup Shah for the first time organised such expedition in 1974. Thereafter the members who visited the sanctuary for scientific studies of the flora and fauna were Lav Kumar, Jayant Society Rajkot (1977) and Dr. P.K. Hajra (POSSCEF) Botanical Survey of India (Northern Circle) 1981 and gathered a number of interesting botanical species and also described few new taxa from the area. Notwithstanding it still stands a challenge for the visitors.

3. Musk Deer National Park : There are reports of suitable habitats for the Musk deer in Kedarnath Division around Madmaheswar and Tungnath and a sanctuary has been recently created for the conservation of this animal of great economic importance.

ANALYSIS OF THE FLORA

In the present work, flora of Chamoli is mainly concerned with the flowering plants of 1934 species distributed in 892 genera and 163 families. The table below shows the break with respect to the monocots and dicots. The proportion of species belonging to monocots to dicots is 1: 3.7, of genera 1 : 3.5 and of families is 1 : 5.6. If such ratios are compared taking into account the entire, Indian subcontinent including Malaya (Hooker

1904), species ratio of monocots to dicots comes out to be 1 : 2.3 and genera to species is 1 : 7. This satisfies the general rule that within the same floral region, the smaller the flora, the smaller is the ratio for species to genera.

TABLE 1: GENERAL SURVEY

	Genera	%	Species	%
Monocots	194	21.9	408	21.2
Dicots	690	78.4	1513	78.8
Total	884		1921	

The ten dominant families in the flora of Chamoli with their respective genera and species are listed below in table 2. The comparison of sequence with that of Hooker (1904) for Flora British India, given in table 3, shows that the family Asteraceae takes the highest position in the Flora of Chamoli district and not the family Orchidaceae occupying the top position in Hooker's flora (l.c.). It is interesting to note that the families like Rubiaceae, Euphorbiaceae and Acanthaceae occupying the higher position in dominance according to Hooker, are coming in the last in the flora of Chamoli. Whereas families like Ranunculaceae, Rosaceae and Scrophulariaceae having their suitable dominance in the flora of Chamoli are not at all occupying among the dominant families listed by Hooker. This is perhaps due to the prevalence of the members of these families only in this part of Indian sub-continent.

TABLE 2: THE 10 LARGEST FAMILIES IN CHAMOLI

Family	Genera	Species
Asteraceae	67	157
Poaceae	85	151
Leguminosae		
(Sensu lato)	56	132
Orchidaceae	43	95
Rosaceae	22	81
Lamiaceae	32	63
Ranunculaceae	14	57
Scrophulariaceae	21	56
Cyperaceae	7	54
Urticaceae		
(sensu lato)	20	49

TABLE 3 : THE 10 LARGEST FAMILIES IN CHAMOLI

Flora of Chamoli	Flora of British India
Asteraceae	Orchidaceae
Poaceae	Leguminosae
Leguminosae	Poaceae
Orchidaceae	Rubiaceae
Lamiaceae	Euphorbiaceae
Cyperaceae	Acanthaceae
Urticaceae	Asteraceae
Rubiaceae	Cyperaceae
Euphorbiaceae	Lamiaceae
Acanthaceae	Urticaceae

Flora of Chamoli when compared with the available Himalayan flora pertaining to the Western Himalaya such as Flora Simlensis (Collett 1921) and Flora Nainitalensis (Gupta 1968) together with the revised check list of Duthie (1906) wherein the early collections from North Garhwal and Kumaon are enumerated, valuable similar and contrasting results have been obtained.

The proportion of dicots and monocots in the flora of Chamoli is 78.1 : 21.9 and 78.8 : 21.2 in respect of genera and species respectively. The corresponding figures in respect of species for Simla, Nainital and the entire country being respectively 75.8 : 23.2, 80.43 : 19.57 and 76.57 : 23.43 (Gupta 1968). Table 4 contains the number of families, genera and species collected from Kumaon and Garhwal (Duthie 1906) and their percentages in the flora of Chamoli.

TABLE 4 : COMPARATIVE STATEMENT BETWEEN KUMAON & GARHWAL AND CHAMOLI

	Families	(Sensu	%	Genera	%	Species	%
	Kumaon	lato)		Kumaon	Chamoli	Kumaon	Chamoli
	Garhwal	Chamoli		&		&	
				Garhwal		Garhwal	
Monocots	20	18	90	201	194	96.5	752
Dicots	115	109	95	773	690	89.2	1906
							1513
							54.1
							79.3

The comparative statement as shown in Table 4 justifies that from the total number of species reported in respect of monocots and dicots from Kumaon and Garhwal in Duthie's Catalogue (1906) more than 50%

and 79% of species belonging to monocots and dicots have been collected from the Chamoli district. The ratio of collections of monocots and dicots when compared with the flora of Nainital with 22% and 36.67% of plants belonging to monocots and dicots respectively, indicates that the percentage of species collected in the Chamoli district is much higher. This is perhaps due to the wider coverage of the area in Chamoli district.

A comparison with the flora of Chamoli, Nainital and Simla shows that there are 23 families with 20 or more species in Chamoli as compared to 12 and 19 for Nainital and Simla respectively. Apart from this there are 37 families with one genus and single species as compared to 22 and 23 families in Nainital and Simla respectively. There are 17 Families represented with one genus but more than one species in the flora of Chamoli district while there are similarly 16 and 12 families represented in Nainital and Simla respectively.

Comparative studies revealed that flora of Chamoli has closer affinity with the flora of Simla for having the elements of arid climatic zone like *Caragana brevispina*, *Carduus edelbergii*, *Cedrus deodara*, *Herniaria hirsuta*, *Hippophae tibetana*, *Hyoscyamus niger*, *Morina coulteriana*, *Oxybaphus himalaicus*, *Parietaria micrantha*, *Ribes grossularia* and *Thesium himalense*. etc. whereas on the other hand, it has also the resemblances with the flora of Nainital in having species like *Aristolochia dilatata*, *Callicarpa arborea*, *Colquhounia coccinea*, *Pentapanax parasitichum* and *Porana racemosa* etc. which have their distribution in Kumaon eastwards.

PHYTOGEOGRAPHICAL ANALYSIS

While analysing the floristic composition in the flora of Chamoli district it has been observed that the species of west and middle Asian mountains suited to comparatively dry conditions, are found to occur in the areas adjoining Tibet. Species originating from the moist areas of high mountain are also represented in the flora of the Chamoli district. Among the species belonging to western, middle and northern Asia are the members of *Artemisia* and *Chenopodiaceae*, *Lamium rhomboideum* and *Physochlaina praealta* etc., which are found to occur in the north west of Chamoli district. Apart from this, elements of other distributional pattern such as *Cedrus deodara* along with other several elements like *Paeonia emodi* and many species of *Epilobium* and *Primula* are represented in the flora of Chamoli. The influx of Western Chinese elements like *Aletris pauciflora*, *Anemone rupicola* and *A. vitifolia* etc. are represented here. The most interesting distributional pattern can be well cited in respect of the influx of extraneous elements from north west China to the northern part of the district by the occurrence of *Circaeaster agrestis*. Apart from this, elements

from the neighbouring region are also associated in the formation of the flora of Chamoli. Among the Malayan elements the genera like *Engelhardtia*, *Daphniphyllum*, *Balanophora*, *Gaultheria* and numbers of Zingiberaceae, etc. The African elements like *Flacourtia*, *Dipsacus*, *Grewia*, *Phoenix*, *Gerbera*, *Striga* and species like *Albizia lebbeck*, *Atylosia scrabaeoides* and *Elatostemma sessile* etc. are worth mentioning. Apart from this Australian type elements like *Pittosporum* ; typical sino-japanese elements like *Bischofia javanica*, *Cornus macrophylla* ; American elements like *Podophyllum*, *Meconopsis*, *Rhododendron* etc. are well represented in the flora of Chamoli.

The occurrence of *Hydrobryum griffithii* in Nigol valley of the district further confirms the view of a common flora existing in the past and must have covered the whole of east of Asia including Himalaya, China and Japan during Tertiary period. The Chinese mountains being older in age have had considerable influence over the Himalayan flora and allowed migration of many species of plants westward to this younger Himalaya.

The present status of flora is, therefore, very different in their floristic composition than what it was at the beginning. The reason behind this change must have been due to great changes those had taken place in the topography and climate of the region.

Due to the recession of ice sheet, several elements from the north migrated in the district from many directions and constituted the high altitude flora. Such successive changes in the topography and the climate during pleistocene not only brought many new elements but also disturbed the existing elements driving out of the old habitants. Such periodic disturbance resulted the disjunct distribution of many genera and species. In support of the view the occurrence of *Cedrus deodara* forest in patches particularly in the Badrinath division of the district can very well be cited, which probably had existed in a continuous belt rather than what we find today. Flora of Chamoli is further enriched with the species like *Didicella cunninghamii*, *Lestera longi caulis*, *L. pinetorum* *Triosteum* and *Falconeria himalaica* etc. which are not reported to have been occurring in any part beyond their natural habitats. Such new reports in the flora of Chamoli has thrown light in understanding the phytogeographical significance. Taking into account all these facts it strongly confirms the view of Hooker (1904) that the Flora of India is a mixture of floras from the surrounding areas, enriched by migration of the plants from China, Tibet and Siberia in the north, Malaysia in the south and Africa and Europe in the west.

PLAN OF THE FLORA

In the present work vascular plants like Angiosperms and Gymnosperms of Chamoli district having been included. The families are

arranged according to Bentham and Hooker's classification (1862-83) except in few cases in which Hutchinson's (1959) concept regarding splitting of families is followed. The names of the families are without the name of the author and description. In case of genera, the names are followed by the name of the author, but without description.

Keys: Dichotomous keys, based mostly on macroscopic characters, for the identification of taxa from the rank of family to infra-specific level are given.

Nomenclature : Attempts have been made to adopt the latest correct names according to ICBN (ed. 1978). The references to the latest monograph and taxonomic revision if available follow the adopted name. The basionym is given to indicate the source of valid combination as an indirect source. The important synonyms are given to connect the valid names with the names accepted in the flora of British India. The conserved names have been marked as 'nom' cons.',

Local names : The local names in, Garhwali, a dialect of Uttar Pradesh, have been given in inverted commas after citation.

Description : Brief descriptions of the species and infra-specific taxa based on the species studied have been given. Efforts have been made to avoid the characters in the descriptions reflecting in the keys. For plants recorded in the literature but could not be collected or seen in any herbaria by the author, the descriptions are based on authentic literature.

Flowering and fruiting time : Flowering and Fruiting time for the plants growing in the district has been indicated as per the records available in the herbarium. In case of the plants recorded from literature the timings have been given as noted by the author.

Illustrations : A district map showing forest ranges and other important localities surveyed has been included. As there are quite a number of good illustrations of the species in some of the standard floras, it has not been felt essential to depict them in the flora of Chamoli.

Measurements : Conventional abbreviations to metric measurements have been used. m : meter cm. : centimetre, $\pm$: more or less, var. is variety.

Distribution : The data about the locality and the altitude have been given at the end of the text of each species except where the plants are either planted or in cultivation. One representative field number for each species has been given within bracket. In cases where the plants are referred from some literature or authentic work the number mentioned by the author has been given and only the author's name has been indicated within the brackets when no collection number was recorded. Such references are

followed by the word 'Lit.' at the end. Where a particular species seems to be very uncommon or rare only in such cases the frequencies have been given at the end.

Notes : In certain cases where it was not possible to use the latest name by the author but such names have been indicated in the flora are marked by an asterisk.(*)

Cultigens : Cultigens with their valid names, important synonyms and brief descriptions have been given at the end either of genera or of families. Efforts have been made to include the cultigens in the keys but have not been taken into account for the purpose of floristic analysis of the Flora.

Abbreviations : Efforts have been made to use the abbreviations of serials and floras in conformity with the common usage in the botanical taxonomy and are cited in accordance with the recommendations made by the International Code of Botanical Nomenclature (ed. 1978). The abbreviations of various herbaria have not been given in the present work except where the field numbers are represented in BSD.

CONCLUDING REMARKS

On account of its famous old temples, high snowclad peaks, beautiful lakes, picnic spots and wild life sanctuaries and National Parks, the Chamoli district is of great religious and aesthetic importance for the devotees, mountaineers and naturalists. Apart from this, the rich flora and fauna play an important role in the field of development of the area. The fauna with the beautiful birds and animals such as snow Leopard (*Panthera unica*), Goral Himalayan goat (*Nemorhaedus goral*), Sambhar (*Cervus unicolor*), Kakar-Barking deer (*Muntiacus muntjak*), the Himalayan Thar (*Hemitragus jemlahicus*), Musk deer (*Moschus moschiferus*), Monal (*Lophophorus impejanus*), and Asela-Hill Troat (*Schizothorax reichardsoni*), etc. deserve special attention for their conservation on account of their rarity and to preserve the national heritage.

At the same time the flora of the district presents a very rich and varied assemblage of species due to topography and climatic conditions which offer most congenial environment for the growth of plants of great economic and medicinal importance. The occurrence of large number of species in the area and richness of the flora has rendered the district a botanical treasure.

The presence of wide range of species in the district provides a great source of natural resources potential for the development of forest based industries like 1 - resin and its distillation products, 2 - on medicinal herbs,

3 on wood suitable for making sport articles, furniture and decorative pieces etc. 4 on packing cases, 5 on ringals (*Arundinaria*), 6 on paper pulp etc.

It is obvious from the account of the flora that district Chamoli has a good prospect in its plant resources where suitable projects can be carried out in planned manner and implemented under scientific expertise.

CLASSIFICATION OF THE NATURAL ORDERS OF FLOWERING PLANTS REPRESENTED IN THE FLORA OF CHAMOLI

The sequence of Natural Orders in this work is adopted from Ben-
tham and Hooker's 'Genera Plantarum' (1862-1883) with some modi-
fications by Airy Shaw (1973) and Hutchinson (1959).

KEY TO THE FAMILIES

- 1a. Ovules in closed ovary, fertilized through stigma
 - 2a. Leaves reticulately veined ; perianth 4 - 5
merous, embryo with two Cotyledon
 - 3a. Plants insectivorous or parasite
 - 4a. Plants insectivorous.
 - 5a. Leaves with glandular tenta-
cles ... DROSERACEAE 56
 - 5b. Leaves with bladder and glands ;
without tentacles ... LENTIBULARIACEAE 97
 - 4b. Plants parasitic.
 - 6a. Parasite leafless ; climbers or
erect herbs.
 - 7a. Climbers ... CONVOLVULACEAE 93
(*Cuscuta*)
 - 7b. Erect herbs.
 - 8a. Root parasites ; stems
small brown or yellow.
 - 9a. Flowers minute,
uni-sexual crowded
in ovoid globose
heads ... BALANOFORACEAE 124
 - 9b. Flower small, bi -
sexual.
 - 10a. Flowers irre-
gular ; ovary
1 - celled.
 - 11a. Brown
annuals;
corolla -
tube
curved... OROBANCHACEAE 96

- 11b. White
or red-
dish
peren-
nials ;
corol -
la-tube
not
cur -
ved ... SCROPHULARIACEAE 95
(*Lathraea*)
10. Flowers regu-
lar ; ovary 4 - 5
celled ... MONOTROPACEAE 80
- 8b. Stem parasites ; stems
very minute ... LORANTHACEAE 122
(*Arceuthobium*)
- 6b. Parasites leafy ; shrubs or herbs.
- 12a. Shrubs ; fruit drupe or
berry.
- 13a. Stem parasites ... LORANTHACEAE 122
- 13b. Root parasites ... SANTALACEAE 123
(*Osyris*)
- 12b. Herbs ; fruit a nut ... SANTALACEAE 123
(*Thesium*)
- 3b. Plants not insectivorous or parasite.
- 14a. Climbers and twiners
or with trailing stems.
- 15a. Tendrils present.
- 16a. Flowers regular.
- 17a. Ovary superior ... VITACEAE 39
- 17b. Ovary inferior ... CUCURBITACEAE 64
- 16b. Flowers irregular.
- 18a. Flowers papilion-
aceous ; ovary 1 -
celled ; fruit a
pod ... PAPILIONACEAE 49
- 18b. Flower not papi-
lionaceous ; ovary
3 - celled ; fruits
globose membran-
ous capsules ... SAPINDACEAE 42
(*Cardiospermum*)
- 15b. Tendrils absent.
- 19a. Armed with spines or
prickles.

- 20a. Leaves simple.
- 21a. Ovary apo -
carpus ... ROSACEAE 52
(*R. paniculata*)
- 21b. Ovary syn
carpus.
- 22a. Leaves
alter
nate ;
fruit a
berry ... CAPPARACEAE 12
- 22b. Leaves
oppo -
site,
fruit a
drupe ... RHAMNACEAE 38
(*Sageretia*)
- 20b. Leaves compound.
- 23a. Leaves 3 -
foliolate ... ROSACEAE 52
- 23b. Leaves pin -
nate ... CAESALPINACEAE 50
- 19b. Unarmed.
- 24a. Leaves simple.
- 25a. Perianth diffe-
rentiated into
calyx and
corolla.
- 26a. Flowers polypetalous.
- 27a. Flowers uni-sexual.
- 28a. Flowers showy ; ovary many ;
ovules 2 ... SCHISANDRACEAE 4
- 28b. Flowers minute ; ovaries 3 ; ovule
solitary ... MENISPERMACEAE 5
- 27b. Flowers bi-sexual or polygamous.
- 29a. Flowers usually with a few large con -
spicuous sterile outer flowers in
corymb ... HYDRANGEACEAE 54
- 29b. Flowers without conspicuous outer
sterile flowers ; inflorescence various.
- 30a. Flowers solitary axillary ... SABIACEAE 45
(*S. campanulata*)

- 30b. Flowers in umbels or panicles.
- 31a. Flowers in umbels ; calyx-tube adnate to the ovary... ARALIACEAE 70
- 31b. Flowers in panicles.
- 32a. Leaves entire ; stamens 10 ... MALPIGHIACEAE 28
- 32b. Leaves serrate ; stamens 5 ... RHAMNACEAE 38
- 26b. Flowers gamopetalous.
- 33a. Leaves alternate ... CONVOLVULACEAE 93
- 33b. Leaves opposite.
- 34a. Filaments united into a tube ; anthers adnate to the stigma ... ASCLEPIADACEAE 87
- 34b. Filaments free ; anthers not adnate to the stigma APOCYNACEAE 86
- 25b. Perianth not differentiated.
- 35a. Perianth often dilated ... ARISTOLOCHIACEAE 114
- 35b. Perianth not dilated.
- 36a. Flowers on the inner surface of the fleshy hollow receptacle ... MORACEAE 129
- 36b. Flowers in spikes or panicles.
- 37a. Leaf base cordate ... POLYGONACEAE 113
- 37b. Leaf base acute ... AMARANTHACEAE 110
- 24a. Leaves compound.
- 38a. Flowers polypetalous.
- 39a. Flowers zygomorphic ... PAPILIONACEAE 49
- 39b. Flowers actinomorphic.
- 40a. Flowers in umbels ... ARALIACEAE 70
- 40b. Flowers in axillary fascicles or in racemes or panicles.
- 41a. Leaves alternate.
- 42a. Leaflets toothed ... VITACEAE 39
- 42b. Leaflets entire ... LARDIZABALACEAE 7
- 41b. Leaves opposite ... RHAMNACEAE 38
- 38b. Flowers gamopetalous.
- 43a. Leaves opposite, stipulate ; stipules inter or intrapetiolar ; ovary inferior ... RUBIACEAE 74

- 43b. Leaves opposite or alternate ; exstipulate ;
ovary superior ... BIGNONIACEAE 99
- 14b. Trees, shrubs and herbs.
- 44a. Trees and shrubs,
- 45a. Armed with spines or prickles,
- 46a. Succulent shrubs with minute
or 0 leaves ... CACTACEAE 67
- 46b. Non succulent.
- 47a. Perianth differentiated
into calyx and corolla.
- 48a. Flowers polypetalous.
- 49a. Stamens indefinite.
- 50a. Calyx poly -
sepalous. ... FLACOURTIACEAE 14
- 50b. Calyx gamos -
epalous.
- 51a. Leaves alternate,
stipulate ... ROSACEAE 52
- 51b. Leaves opposite, ex -
stipulate ... PUNICACEAE 62
- 49b. Stamens up to 10.
- 52a. Flowers irregular ... PAPILIONACEAE 49
- 52b. Flowers regular.
- 53a. Flowers in umbels ... ARALIACEAE 70
- 53b. Flowers not in umbels.
- 54a. Flowers 3 - merous ... BERBERIDACEAE 6
- 54b. Flowers 5 - merous.
- 55a. Calyx imbricate ; leaves
dotted, aromatic ... RUTACEAE 32
- 55b. Calyx velvate ; leaves
not dotted ... RHAMNACEAE 38
- 48b. Flowers gamopetalous.
- 56a. Leaves opposite.
- 57a. Stipules present ; ovary inferior, 2 or 5
celled ... RUBIACEAE 74
- 57b. Stipules none ; ovary superior, 2 - celled... APOCYNACEAE 86
- 56b. Leaves alternate ; ovary superior ... SOLANACEAE 94

- 47b. Perianth not differentiated or apetalous.
- 58a. Plants covered with dense silvery scales ; flowers in axillary fascicles... ELAEAGNACEAE 121
- 58b. Plants not covered with silvery - scales ... MORACEAE 129
- 46b. Unarmed shrubs or trees.
- 59a. Leaves simple.
- 60a. Leaves opposite (or rarely in whorls of three).
- 61a. Perianth differentiated into calyx and corolla.
- 62a. Flowers polypetalous.
- 63a. Stamens indefinite.
- 64a. Calyx polysepalous not adnate to ovary ... HYPERICACEAE 20
- 64b. Calyx gamosepalous and adnate to ovary ... MYRTACEAE 59
- 63b. Stamens upto 12.
- 65a. Petals hypogynous, stamens inserted on the hypogynous disc formed by expansion of the torus.
- 66a. Stems 4 - angled ; ovary 1 - celled ... CORIARIACEAE 47
- 66b. Stems cylindric ; ovary 1 - celled.
- 67a. Stamens 4 - 5 ; fruit not a samara.
- 68a. Calyx imbricate, stamens alternating with petals ... CELASTRACEAE 31
- 68b. Calyx valvate ; stamens opposite the petals ... RHAMNACEAE 38

- 67b. Stamens generally more than 5 ;
fruit a double samara with mem-
branous wings ... ACHACEAE 43
- 65b. Petals perigynous ; stamens inserted on the calyx or
ovary or epigynous or perigynous disk.
 - 69a. Style simple.
 - 70a. Trees ; flowers upto 1 cm across ... CORNACEAE 72
 - 70b. Shrubs ; flowers more than 5 cm across ... MELASTOMATACEAE 60
 - 70b. Styles 2 or more ... HYDRANGEACEAE 54
 - 62b. Flowers gamopetalous.
 - 71a. Ovary inferior.
 - 72a. Leaves usually exstipulate ... CAPRIFOLIACEAE 73
 - 72b. Leaves always stipulate ... RUBIACEAE 74
 - 71b. Ovary superior.
 - 73a. Flowers regular ; ovary of two carpels.
 - 74a. Stamens 2 ... OLEACEAE 85
 - 74b. Stamens 4 - 5.
 - 75a. Juice generally milky ;
stamens 5 ... APOCYNACEAE 86
 - 75b. Juice not milky ; stamens 4 ... RUDDLEACEAE 88
 - 73b. Flowers zygomorphic ; ovary of 2 - 4
carpels.
 - 76a. Bracts conspicuous ; stem with
swollen joints ; ovary 2 - celled ... ACANTHACEAE 102
 - 76b. Bracts minute or absent ; joints of
stem not swollen ; ovary 4 - celled.
 - 77a. Ovary entire ; style terminal ... VERBENACEAE 105
 - 77b. Ovary 4 - celled ; style gyno-
basic ... LAMIACEAE 106
 - 61b. Perianth not differentiated or apetalous.
 - 78a. Flowers on inner surface of a fleshy hollow
receptacle ... MORACEAE 129
 - 78b. Flowers not in receptacles.
 - 79a. Flowers bi-sexual ... THYMELAEACEAE 120
 - 79b. Flowers uni-sexual.
 - 80a. Ovary 1 - celled ... URTICACEAE 130
 - 80b. Ovary 3 - celled ... EUPHORBACEAE 125

60b. Leaves alternate or fascicled.

81a. Perianth differentiated into calyx and corolla.

82a. Flowers polypetalous.

83a. Calyx polysepalous.

84a. Torus small or elongated ; not expanded.

85a. Stamens many.

86a. Ovary apocarpus ... MAGNOLIACEAE 3

86b. Ovary syncarpus.

87a. Placentation
parietal ... FLACOURTIACEAE 14

87b. Placentation
axile.

88a. Flowers
on sim -
ple pedi-
celes ... THEACEAE 21

88b. Flowers
in pani -
cles ... ACTINIDIACEAE 22

85b. Stamens not more than 10.

89a. Leaves scale like ... TAMARICACEAE 19

89b. Leaves broad not
scale like ... PITTOSPORACEAE 15

84b. Torus thickened or exapnded into a fleshy disc.

90a. Leaves crenate or serrate.

91a. Stamens alternate
with petals ... CELASTRACEAE 37

91b. Stamens opposite
with petals ... SABIACEAE 45

90b. Leaves entire ... ANACARDIACEAE 46

83b. Calyx more or less connate.

92a. Flowers irregular ... CAESALPINIACEAE 50

92b. Flowers regular.

93a. Stamens indefinite.

94a. Anthers 2 - locular.

- | | | |
|--|-----|------------------|
| 95a. Filaments united into a tube | ... | STERCULIACEAE 25 |
| 95b. Filaments free. | | |
| 96a. Receptacle elevated bearing the
sepals and petals at the base | ... | TILIACEAE 26 |
| 96b. Receptacle not elevated ; calyx tube
inserted with the stamens and
petals | ... | ROSACEAE 52 |
| 94b. Anthers 1 - locular | ... | BOMBACACEAE 24 |
| 93b. Stamens upto 10. | | |
| 97a. Calyx adnate to the ovary. | | |
| 98a. Stamens 4 - 5 | ... | SAXIFRAGACEAE 53 |
| 98b. Stamens 6 - 10. | | |
| 99a. Fruit a berry ; seeds 2 | ... | ALANGIACEAE 71 |
| 99b. Fruit usually a capsule ; seed 1 | ... | COMBRETACEAE 58 |
| 97b. Calyx free from the ovary. | | |
| 100a. Calyx valvate | ... | RHAMNACEAE 38 |
| 100b. Calyx imbricate | ... | AQUIFOLIACEAE 36 |
| 82b. Flowers gamopetalous. | | |
| 101a. Ovary inferior. | | |
| 102a. Flowers in heads | ... | ASTERACEAE 77 |
| 102b. Flowers in cymose corymbs forming
panicles | ... | SYMPLOCACEAE 84 |
| 101b. Ovary superior. | | |
| 103a. Stamens inserted on the receptacle ;
flowers bi-sexual | ... | ERICACEAE 79 |
| 103b. Stamens inserted on the corolla. | | |
| 104a. Ovules indefinite | ... | SOLANACEAE 94 |
| 104b. Ovules definite. | | |
| 105a. Leaves gland-dotted | ... | MYRSINACEAE 83 |
| 105b. Leaves not gland-dotted ;
ovary 2 - 4 celled | ... | EHRETIACEAE 92 |
| 81b. Perianth not differentiated or apetalous. | | |
| 106a. Flowers bi-sexual. | | |
| 107a. Ovary inferior | ... | SANTALACEAE 123 |
| 107b. Ovary superior. | | |

- 108a. Anthers 4 - celled, opening by
4 - valves ... LAURACEAE 119
- 108b. Anthers 2 - celled, opening by
slits.
- 109a. Plants covered with silvery
scales ... ELAEAGNACEAE 121
- 109b. Plants not covered with
silvery scales.
- 110a. Stamens twice the
perianth lobes ... THYMELAEACEAE 120
- 110b. Stamens as many or
fewer than perianth
lobes ... AMARANTHACEAE 110
- 106b. Flowers uni-sexual.
- 111a. Male flowers (sometimes also female) in
catkins or spikes.
- 112a. Leaves exstipulate ... MYRICACEAE 132
- 112b. Leaves stipulate (except in
Morus) not palmately nerved or
lobed.
- 113a. Ovary superior ; ovules
few or many ... SALICACEAE 135
- 113b. Ovary inferior or sub
inferior.
- 114a. Female flowers many
in dense spikes ;
female perianth 0 ... BETULACEAE 133
- 114b. Female flowers in
slender terminal
spikes in pairs at the
base of a foliaceous
bract or solitary or
in cluster or short
spiked, each enclosed in an involucre ;
female perianth ad -
nate to the ovary ... FAGACEAE 134
- 111b. Flowers not in catkins or spiked
(flower clusters sometimes arranged in
interrupted spikes).
- 115a. Ovary 3 - celled with 1 or 2
ovules in each locule.
- 116a. Leaves mostly stipulate ... EUPHORBIACEAE 125
- 116b. Leaves exstipulate ... BUXACEAE 126

- 115b. Ovary 1 - celled, 1 - ovuled.
- 117a. Flowers crowded inside a fleshy receptacle ... MORACEAE 129
- 117b. Flowers not in a fleshy receptacle.
- 118a. Leaves entire ... LAURACEAE 119
- 118b. Leaves serrate, dentate or crenate.
- 119a. Anthers usually influxed in end ; style simple ; fruit an achene ... URTICACEAE 130
- 119b. Anthers erect in end.
- 120a. Trees ; fruit a samara or a drupe ... ULMACEAE 127
- 120b. Erect shrubs ; fruit an achene ... CANNABACEAE 128
- 59b. Leaves compound.
- 121a. Leaves pinnate.
- 122a. Perianth differentiated into calyx and corolla.
- 123a. Flowers polypetalous.
- 124a. Flowers irregular.
- 125a. Anthers 1 - celled... MORINGACEAE 48
- 125b. Anthers 2 - celled... PAPILIONACEAE 49
- 124b. Flowers regular.
- 126a. Stamens indefinite
- 127a. Leaves tripinnate ... MIMOSACEAE 51
- 127b. Leaves bipinnate ... ROSACEAE 52
- 126b. Stamens not more than 12.
- 128a. Leaves 1 - 3 pinnate.
- 129a. Leaves 2 - 3 pin - nate ... MELIACEAE 35
- 129b. Leaves 1 - pin - nate.
- 130a. Leaves gland-dotted.. RUTACEAE 32
- 130b. Leaves not gland - dotted.

- 131a. Leaflets entire.
- 132a. Ovary 1 - celled.
- 133a. Fruit a pod. ... CAESALPINIACEAE 50
- 133b. Fruit a drupe ... ANACARDIACEAE 46
- 132b. Ovary more than 1 - celled.
- 134a. Stamens 5 ; fruit a capsule, septifragally 5 - valved. ... MELIACEAE 35
- 134b. Stamens 8 10, fruit a fleshy coriaceous 1 - 2 coccous, indehiscent ... SAPINDACEAE 42
- 131b. Leaflets serrate or crenate.
- 135a. Petiole dilated at the base into sheathing stipule ... LEEACEAE 40
- 135b. Petiole not dilated at the base ; stipule 0.
- 136a. Stamens united into a tube ; ovules more than 2 in each cell... MELIACEAE 35
- 136b. Stamens free ; ovule 1 in each cell.
- 137a. Plants resinous ; drupes fleshy, globose 1.75 - 3 cm in diam ... BURSERACEAE 34
- 137b. Plants not resinous .5 .75 cm in diam ... SIMARUBACEAE 33
- 128b. Leaves 3 - foliolate ; fruit an inflated membranous capsule ... STAPHYLEACEAE 44
- 123b. Flowers gamopetalous.
- 138a. Ovary inferior ; flowers in heads ... ASTERACEAE 77
- 138b. Ovary superior ; flowers not in heads.
- 139a. ovary 2 - celled.
- 140a. Stamens 2 .. OLEACEAE 85
- 140b. Stamens 4 ... BIGNONIACEAE 99
- 139b. Ovary 1 - celled ... MYRSINACEAE 83

- 122b. Perianth not differentiated or apetalous.
- 141a. Perianth adnate to ovary ; leaves exstipulate ; fruit drupe or nut. ... JUGLANDACEAE 131
- 141b. Perianth 0 ; leaves stipulate ; fruit a berry ... PIPERACEAE 117
- 121b. Leaves digitate.
- 142a. Flowers polypetalous.
- 143a. Flowers irregular ... PAPILIONACEAE 49
- 143b. Flowers regular.
- 144a. Leaflets 5-9 ... HIPPOCASTANACEAE 41
- 144b. Leaflets 3. ... ANACARDIACEAE 46
- 142b. Flowers gamopetalous. ... VERBENACEAE 105
- 44b. Herbs.
- 145a. Terrestrial or rarely amphibious herbs.
- 14a6. Leaves simple.
- 147a. Calyx and corolla present.
- 148a. Flowers with both calyx and corolla.
- 149a. Flowers polypetalous.
- 150a. Flowers not regular.
- 151a. Stamens more than 10 ... RANUNCULACEAE 1
- 151b. Stamens less than 10.
- 152a. Flowers spurred ... BALSAMINACEAE 31
- 152b. Flowers not spurred.
- 153a. Stamens 8 - 10.
- 15a4. Stamens 8 ; ovary 2 - celled ... POLYGALACEAE 16
- 154b. Stamens 10 ; Ovary 1 - celled ... PAPILIONACEAE 49

| | | |
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| 153b. Stamens 5 ; ovary 1 - celled | ... | VIOLACEAE 13 |
| 150b. Flowers regular. | | |
| 155a. Ovary inferior or subinferior. | | |
| 156a. Ovary inferior ; plants erect, ascending. | | |
| 157a. Flowers not in umbels. | | |
| 158a. Flowers uni-sexual | ... | BEGONIACEAE 63 |
| 158b. Flowers bi-sexual. | | |
| 159a. Leaves entire | ... | MELASTOMATACEAE 63 |
| 159b. Leaves toothed | ... | ONAGRACEAE 63 |
| 156b. Ovary sub inferior ; plants. prostrate, succulent ; seeds tubercled, pitted | ... | PORTULACACEAE 18 |
| 155b. Ovary superior. | | |
| 160a. Flowers uni-sexual | ... | EUPHORBIACEAE 125 |
| 160b. Flowers bi-sexual. | | |
| 161a. Floral parts other than ovary in series of three ; scapigerous herbs ; leaves 2 | ... | PODOPHYLLIACEAE 8 |
| 161b. Floral parts other than ovary in series of four to five. | | |
| 162a. Stamens more than 10. | | |
| 163a. Carpels apocarpus. | | |
| 164a. Carpels not seated on a fleshy disc.... | | RANUNCULACEAE 1 |
| 164b. Carpels seated on a fleshy disc | ... | PABONIACEAE 2 |
| 163b. Carpels syncarpus. | | |
| 165a. Leaves opposite | ... | HYPERICACEAE 20 |
| 165b. Leaves alternate. | | |
| 166a. Sepals 2 or 3 | ... | PAPAVERACEAE 9 |
| 166b. Sepals 4 or 5 | ... | MALVACEAE 23 |
| 162b. Stamens not more than 10. | | |
| 167a. Leaves opposite. | | |
| 168a. Ovary of distinct carpels | ... | CRASSULACEAE 55 |

- 168b. Ovary of combined car -
pels.
- 169a. Leaves entire.
- 170a. Styles
2 - 5 ... CARYOPHYLLACEAE 17
- 170b. Style sim -
ple ... LYTHRACEAE 61
- 171b. Leaves lobed or
toothed ... GERANIACEAE 29
- 167b. Leaves alternate.
- 171a. Ovary of distinct car -
pels ... CRASSULACEAE 55
- 171b. Ovary of combined car -
pels.
- 172a. Petals 4 ... BRASSICACEAE 11
- 172b. Petals 5.
- 173a. Sepals con -
nate below... SAXIFRAGACEAE 53
- 173b. Sepals free... LINACEAE 27
- 149b. Flowers gamopetalous.
- 174a. Ovary inferior.
- 175a. Stamens 3 ... VALERIANACEAE 75
- 175b. Stamens 2, 4 or 5.
- 176a. Ovary 1 - celled.
- 177a. Anthers united ... ASTERACEAE 77
- 177b. Anthers free ... DIPSACACEAE 76
- 176b. Ovary more than 1 - celled.
- 178a. Leaves stipulate ;
whorled ... RUBIACEAE 74
- 178b. Leaves exstipulate, never
whorled ... CAMPANULACEAE 90

174b. Ovary superior,

179a. Flowers regular,

180a. Free central placentation.

| | | |
|----------------------|-----|----------------|
| 181a. Style solitary | ... | PRIMULACEAE 82 |
|----------------------|-----|----------------|

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|--------------------------|-----|-------------------|
| 181b. Styles 5, distinct | ... | PLUMBAGINACEAE 81 |
|--------------------------|-----|-------------------|

180b. Parietal placentation.

| | | |
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| 182a. Leaves all radical | ... | PLANTAGINACEAE 107 |
|--------------------------|-----|--------------------|

182b. Leaves opposite or alternate.

183a. Leaves opposite.

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| 184a. Filaments united ;
gynostegium present. | ... | ASCLEPIADACEAE 87 |
|--|-----|-------------------|

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|---|--|--|
| 184b. Filaments free ;
gynostegium absent. | | |
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| 185a. Ovary 1 -
called | ... | GENTIANACEAE 89 |
|---------------------------|-----|-----------------|

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|----------------------------|-----|----------------|
| 185b. Ovary 2 -
celled. | ... | APOCYNACEAE 86 |
|----------------------------|-----|----------------|

183b. Leaves alternate.

186a. Seeds indefinite.

| | | |
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| 187a. Ovary 3-cell-
ed ; fruit, a
loculicidal
capsule. | ... | POLYMONIACEAE 90 |
|---|-----|------------------|

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|----------------------------|--|--|
| 187b. Ovary 2 -
called. | | |
|----------------------------|--|--|

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|--|-----|---------------|
| 188a. Fruit a
berry,
if cap-
sule
then
spinis-
cent. | ... | SOLANACEAE 94 |
|--|-----|---------------|

| | | |
|---------------------------------------|-----|---------------------|
| 188b. Fruit a
capsule not
spiny | ... | SCROPHULARIACEAE 95 |
|---------------------------------------|-----|---------------------|

- 186b. Seeds 4 or less in number.
- 189a. Ovary deeply 4 - lobed ; style simple ... BORAGINACEAE 91
- 189b. Ovary entire ; styles 2, terminal. ... CONVOLVULACEAE 93
- 179b. Flowers irregular.
- 190a. Ovary 1 - celled.
- 191a. Ovules many or two ; placentation parietal. ... GESNERIACEAE 98
- 191b. Ovule solitary ... PHRYMACAE 104
- 190b. Ovary 2 - 4 - celled.
- 192a. Style gynobasic ... LAMIACEAE 106
- 192b. Style terminal.
- 193a. Bracts 0 or minute.
- 194a. Capsule beaked by strong curved spine. ... MARTYNIACEAE 101
- 194b. Capsule unarmed... PEDALIACEAE 100
- 193b. Bracts present.
- 195a. Ovules 2 - many in each locule.
- 196a. Nodes usually not tumid ; seeds without jaculators. ... SCROPHULARIACEAE 95
- 196b. Nodes usually tumid ; seeds with jaculators. ... ACANTHACEAE 102
- 195b. Ovule one in each locule.
- 197a. Plants fleshy ; stamens 2. ... SELAGINACEAE 103
- 197b. Plants not fleshy ; stamens 4. ... VERBENACEAE 105

- 198a. Ovary 2 - 4 - celled ;
4 - ovuled. ... VERBENACEAE 105
- 198b. Ovary 1 - celled ;
1 - ovuled. ... PHRYMACEAE 104
- 148b. Flowers with either calyx or corolla.
- 199a. Flowers female, male or polygamous.
- 200a. Ovary 2 - 3 - celled. ... EUPHORBIACEAE 125
- 200b. Ovary 1 - celled.
- 201a. Leaves stipulate. ... URTICACEAE 130
- 201b. Leaves exstipulate.
- 202a. Stamens 1 - 5 ... AMARANTHACEAE 110
- 202b. Stamens 9 - 25. ... DATISCEAE 66
- 199b. Flowers bi-sexual.
- 203a. Flowers highly reduced, fascicled
amidst a rosette of leaves ; herbs very
small. ... CIRCAETERACEAE 118
- 203b. Flowers not as above.
- 204a. Stamens indefinite. ... RANUNCULACEAE 1
- 204b. Stamens 2 - 8.
- 205a. Leaves opposite or
whorled.
- 206a. Perianth tubular,
5 - lobed. ... NYCTAGINACEAE 108
- 206b. Perianth segments
free.
- 207a. Ovary 3 -
celled. ... MOLLUGINACEAE 68
- 207b. Ovary 1 - cel-
led.
- 208a. Stipu-
les
scari-
ous ;
style
bifid... ILLECEBRACEAE 109

- 208b. Stipules
O ;
style
sim-
ple ... AMARANTHACEAE 110
- 205b. Leaves alternate.
- 209a. Petals present.
- 210a. Petals 4 ;
stamens 6,
didymous ... BRASSICACEAE 11
- 210b. Petals 5 ;
stamens 5.
- 211a. Flo-
wers
brac-
teate ;
bracts
scarious ... AMARANTHACEAE 110
- 211b. Flo-
wers
ebrac-
teate ... CHENOPODIACEAE 111
- 209b. Petals absent ;
stamens 5 - 30, in-
serted on a fleshy
disc ; fruit drupe
like. ... PHYTOLACACEAE 112
- 147b. Calyx and corolla absent.
- 212a. Leaves alternate ; spikes with an involucre of
large bract. ... SAURURACEAE 116
- 212b. Leaves whorled ; spikes without an invo-
lucre. ... PIPERACEAE 117
- 146b. Leaves compound.
- 213a. Flowers regular.
- 214a. Perianth differentiated into calyx and
corolla.
- 215a. Flowers polypetalous.
- 216a. Stamens indefinite, more
than 15.

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| 217a. Sepals distinct. ... | RANUNCULACEAE 1 |
| 217b. Sepals combined... | ROSACEAE 52 |
| 216b. Stamens 5 - 10. | |
| 218a. Flowers in umbels. ... | APIACEAE 69 |
| 218b. Flowers not in umbels. | |
| 219a. Petals 4. | |
| 220a. Leaves 2-pin-nate ; fruit of 3 - 5 separate car-pels. ... | RUTACEAE 32 |
| 220b. Leaves 1-pin-nate ; fruit a 2 - valved pod ... | BRASSICACEAE 11 |
| 219b. Petals 5 ; styles 5. ... | OXALIDACEAE 30 |
| 215b. Flowers gamopetalous ... | ASTERACEAE 77 |
| 214b. Perianth not differentiated or apetalous. | |
| 221a. Leaves palmate. ... | CANNABACEAE 128 |
| 221b. Leaves pinnate. | |
| 222a. Delicate herbs ; stamens 8 ; styles 2. ... | SAXIFRAGACEAE 53 |
| 222b. Stout herbs ; stamens 9 - 25 ; styles 3 ... | DATISCAEAE 66 |
| 213b. Flowers irregular. | |
| 223a. Flowers spurred. | |
| 224a. Stamens more than 10. ... | RANUNCULACEAE 1 |
| 224b. Stamens 6. ... | FUMARIACEAE 10 |

- 223b. Flowers not spurred.
- 225a. Sepals 2, soon falling off ; stamens 6 in two
sets of three each. ... FUMARIACEAE 10
- 225b. Calyx 5 - toothed ; stamens 10. ... PAPILIONACEAE 49
- 145b. Aquatic plants.
- 226a. Plants growing on stones in streams ; perianth
O ; stamens 2. ... PODOSTEMONACEAE 115
- 226b. Plants not growing on stones.
- 227a. Stems floating.
- 229a. Leaves opposite or whorled ; flowers regular,
1-sexual. ... HALORRHAGIDACEAE 57
- 229b. Leaves rosulate or alternate ; flowers irregu-
lar 2 - sexual ... LENTIBULARIACEAE 97
- 228b. Stems not floating. ... POLYGONACEAE 113
- 2b. Leaves parallel veined ; perianth 3 - merous ; embryo
with one cotyledon.
- 229a. Plants terrestrial or epiphytic.
- 230a. Flowers arranged in spadix.
- 231a. Perennial tuberous herbs ; perianth
none, or rudimentary ; leaves 3
sect ... ARACEAE 152
- 231b. Shrubs or trees ; petiole beset with
spines ; perianth of 6 - segments ;
leaves pinnate ... PALMAE (ARECACEAE) 151
- 230b. Flowers not arranged in spadix.
- 232a. Leaves grass - like.
- 233a. Perianth absent or reduced ;
ovary 1 - celled.
- 234a. Leaf - sheath split to the
base on one side ; stems
cylindric ... POACEAE 159
- 234b. Leaf sheath tubular, not
split ; stems often triquet -
rous ... CYPERACEAE 158
- 233b. Perianth 2 - seriate chaffy, not
coloured ; ovary 3 - celled.

- 235a. Flowers in heads ; terminal on scape ... ERIOCAULACEAE 157
- 235b. Flowers in axillary or terminal cymes ... JUNCACEAE 150
- 231b. Leaves not grass-like (Except in *Hypoxis*) ; perianth coloured.
- 236a. Flowers regular.
- 237a. Ovary superior.
- 238a. Perianth of 2-series, clearly distinguished as calyx and corolla ... COMMELINACEAE 149
- 238b. Perianth of 2-series of 3-segments each, indifferentiated into calyx and corolla.
- 239a. Anthers 1 locular by confluence of the loculi ; stem often prickly ; leaves 3-5 nerved with reticulate venation ... SMILACEAE 147
- 239b. Anthers usually 2-locular ; leaves mostly with parallel nerves and veins ... LILIACEAE 146
- 237b. Ovary inferior or half-inferior.
- 240a. Flowers uni-sexual ... DIOSCORIACEAE 145
- 240b. Flowers hermaphrodite.

- 241a. Stamens 3 ;
flowers large
about 5 cm
across ;
bluish ... IRIDACEAE 142
- 241b. Stamens 6 ;
flowers
small, yellow,
white
or pinkish.
- 242a. Flowers in
racemes ;
style
tubular ... HAEMODORACEAE 141
- 242b. Flowers in axillary scapes, solitary or
in pairs or panicles.
- 243a. Flowers in axillary scapes or in
pairs ; perianth segments free to
the base ; inflorescence radical... HYPOXYDACEAE 143
- 243b. Flowers in panicles ; perianth,
segments connate to the middle
or more ; inflorescence terminal ... AGAVACEAE 144
- 236b. Flowers irregular.
- 244. Ovary inferior.
- 245a. Ovary 1-celled ; stamens usually confluent
with the style in a column ... ORCHIDACEAE 137
- 245b. Ovary 3-celled.
- 246a. Stamen 1.
- 247a. Calyx tubular or spatheous ; anthers 2-
celled ; style slender ... ZINGIBERACEAE 138
- 247b. Sepals free ; anthers
1-celled ; style flattened ... CANNACEAE 139
- 246b. Stamens 5 ; sepals free or
connate ; anthers 2-celled ... MUSACEAE 140
- 244b. Ovary superior, 3-celled ... COMMELINACEAE 149

229b. Aquatic or marshy plants.

248a. Herbs stemless.

- 249a. Free floating minute herbs with leaf-like fronds ; stamens 1 - 2 ... LEMNACEAE 153

- 249b. Submerged tufted stoloniferous or scapigerous herbs ; leaves sessile long and narrow ; stamens 3 - 9 ... HYDROCHARITACEAE 136

248b. Herbs with well developed stems.

250a. Marshy herbs ; stamens 6.

- 251a. Leaves long-petioled, sagittate, hastate or cordate ; anthers basifixed ; fruit a capsule ... PONTEDERIACEAE 148

- 251b. Leaves rush-like, flat or terete, anthers didymous ; fruit 1-seeded utricled achenes ... JUNCAGINACEAE 154

250b. Aquatic, herbs ; stamens 1 - 4 ;

- 252a. Flowers bi-sexual ; stamens 4 ... POTAMOGETONACEAE 155

- 222b. Flowers uni-sexual ; stamens 1 or 2 ... ZANNICHELLIACEAE 156

1b. Ovules exposed, fertilized by direct contact with pollen-tube.

- 253a. Leaves reduced to sheaths ; male flowers in small bracteate spikes ; perianth 2-lobed ... EPHEDRACEAE 160

253b. Leaves not reduced to sheaths ; male flowers in catkins ; perianth 0.

- 254b. Leaves without resin canals, bifarious, linear, flattened ; fruit drupaceous ... TAXACEAE 161

- 254b. Leaves with resin canals, acicular, scale-like or linear and flattened ; fruit a woody cone.

- 255a. Leaves opposite or whorled, small, usually scale-like ; cone scales few, ovules erect ... CUPRESSACEAE 162

- 255b. Leaves spirally arranged, sometimes fascicled, usually linear or needle shaped ; ovules inverted ... PINACEAE 163

1. RANUNCULACEAE

- | | | |
|--|-----|------------------------|
| 1a. Climbing shrubs ; leaves opposite | ... | <i>Clematis</i> 8 |
| 1b. Erect herbs or undershrubs ; leaves alternate. | | |
| 2a. Carpels one ovuled ; flowers regular. | | |
| 3a. Petals none ; sepals 4-8, petal like. | | |
| 4a. Flowers in an umbelliform cyme with ear like involucre | ... | <i>Anemone</i> 4 |
| 4b. Flowers in panicles ; involucre none | ... | <i>Thalictrum</i> 13 |
| 3b. Petals 3-15, more conspicuous than the sepals. | | |
| 5a. Sepals, petal like | | |
| 6a. Flowers scarlet ; petals with a basal gland. | ... | <i>Callianthemum</i> 6 |
| 6b. Flowers white ; petals without the basal gland | ... | <i>Adonis</i> 3 |
| 5b. Sepals herbaceous. | | |
| 7a. Sepals 3-5 ; deciduous ; petals usually 5 | ... | <i>Ranunculus</i> 12 |
| 7b. Sepals 5 ; persistent ; petals 10-15 | ... | <i>Oxygraphis</i> 10 |
| 2b. Carpels many ovuled | | |
| 8a. Flowers very irregular | | |
| 9a. Sepals flat, regular ; petals spurred | ... | <i>Aquilegia</i> 5 |
| 9b. Sepals irregular. | | |
| 10a. Upper sepal spurred | ... | <i>Delphinium</i> 9 |
| 10b. Upper sepal helmet shaped | ... | <i>Aconitum</i> 1 |
| 8b. Flowers regular or nearly regular | | |
| 11a. Flowers solitary ; fruit, a follicle | | |
| 12a. Petals none ; leaves undivided | ... | <i>Caltha</i> 7 |
| 12b. Petals present ; leaves divided. | | |
| 13a. Flowers yellow | ... | <i>Trollius</i> 14 |
| 13b. Flowers white | ... | <i>Paraquilegia</i> 11 |
| 11b. Flowers racemed ; fruit, a berry | ... | <i>Actaea</i> 2 |

1. ACONITUM L.

- 1a. Plants slender, hardly exceeding 25 cm ; leaves distinctly orbicular, finely dissected ... *A. violaceum* 5
- 1b. Plants stout far exceeding 25 cm ; leaves ovate-orbicular in outline, lobed at least in the lower ones.
- 2a. Cauline leaves ovate-lanceolate, acute, amplexicaule ... *A. heterophyllum* 3
- 2b. Cauline leaves ovate-orbicular lobed to the base, petioled.
- 3a. Stems much branched; leaves long petioled ; racemes branched ; carpels 3 ... *A. laeve* 4
- 3b. Stems simple ; leaves short petioled ; racemes simple or very rarely branched ; carpels 5.
- 4a. Cambium of tuber discontinuous, horse - shoe shaped ; carpels yellow tomentose. ... *A. atrox* 1
- 4b. Cambium of tuber continuous ; sinus ring in cross-section ; carpels glabrous ... *A. falconeri* 2

1. *Aconitum atrox* (Bruhl) Mukerjee in Bull. Bot. Surv. Ind. 3 : 101. 1961. *A. ferox* var. *atrox* Bruhl in Ann. Royl. Bot. Gdn. Cal. 5 : 110. 1895. *A. balfourii* Holmes, Mus. Ref. Pharm. Soc, Great Brit. 2 et. 28. 1895 1902. 'Bis'

Herbs, tubers fusiform ; flowers bluish violet.

Fl. & Fr. : September October.

Bhyunder valley, Dunagiri, Gothing. 3500 4000 m. (56176).

2. *A. falconeri* Stapf in Ann. Royle. Bot. Gdn. 10 : 160. 1905 ; Rau, High Alt. Flow. Plants 55. 1975.

Tuberous herbs ; leaves 5 partite ; flowers blue large.

Fl. & Fr. :

Badrinath. 3800 m (Falconer). Lit.

3. *A. heterophyllum* Wall. ex Royle, Ill. Bot. Himal. 56. t. 13. 1834 ; Hook. f. Fl. Brit. Ind. 1 : 29. 1872. '*Atis, Methu*'.

Herbs ; leaves toothed, clasping stem ; flowers dull green.

Fl. & Fr. : September October.

Amritganga, Kedarnath glacial & Rishiganga valleys, 3500-4200 m. (44134).

4. *A. aene* Royle, Ill. Bot. Himal. 1 : 56. 1834. *A. lycoctonum* non L. ; sensu Hook. f. & Thoms. Fl. Ind. 55. 1855 ; Hook. f. Fl. Brit. Ind. 1 : 28. 1872.

Branching herbs ; roots thick fibrous ; flowers pale yellow.

Fl. & Fr. : May-June.

Amritganga valley, 3000 m (44055).

5. *A. violaceum* Jacq. ex Stapf in Ann. Royl. Bot. Gdn. Cal. 10 : 144. 1905 ; Hook. f. Fl. Brit. Ind. 1 : 29. 1872. *A. napellus* var. *multifidum* (Royle) Hook. f. & Thoms. in Fl. Brit. Ind. 1 : 29. 1872.

Herbs with fusiform tubers ; flowers bluish-violet.

Fl. & Fr. : September-October.

Gothing, Hemkund, 4200-4700 m (35956).

2. ACTAEA L.

Actaea acuminata Wall. ex Royle, Ill. Bot. Himal. 57. 1834. *A. spicata* non L. sensu Hook. f. Fl. Brit. Ind. 1 : 29. 1872.

Pubescent herbs ; berries many-seeded shining black.

Fl. & Fr. : June-October.

Bhuna-Bistola, Ghangaria, Gohna-Ramni, 2400-3000 m (39011).

3. ADONIS L.

Adonis chrysocyathus Hook. f. & Thoms. in Hook. f. Fl. Brit. Ind. 1 : 15. 1872.

Herbs ; stems several from the base ; flowers golden-yellow.

Fl. & Fr. : July-August.

Rajhoti. (Duthie). Lit.

4. ANEMONE L.

- 1a. Radical leaves deeply lobed to the base.
- 2a. Petiole glabrous ; lobes markedly dentate ; achenes embedded in wool ; beak straight ... *A. rupicola* 5
- 2b. Petiole with spreading hairs ; lobes coarsely dentate ; achenes not embedded in white wool ; beak curved ... *A. rivularis* 4
- 1b. Radical leaves not deeply lobed to the base.
- 3a. Leaves broadly ovate, cordate, cotony white beneath ; achenes embedded in white wool ... *A. vitifolia* 6
- 3b. Leaves orbicular, densely hairy on both surfaces ; achenes not embedded in white wool.
- 4a. Scape short ; achenes hairy. ... *A. obtusiloba* 2
- 4b. Scape long ; achenes glabrous.
- 5a. Densely silky herbs ; leaves 5-7 lobed ; umbels many flowerd. ... *A. polyanthes* 3
- 5b. Pubescent herbs ; leaves 3-partite ; umbels few flowered ... [*A. elongata* 1

1. *Anemone elongata* D. Don, Prodr. Fl. Nep. 194. 1825 ; Hook. f. Fl. Brit. Ind. 1 : 10. 1872.

Pubescent herbs ; scape elongate ; flowers white.

Fl. & Fr. : May June.

Mongu, 2800 m (48021). Not Common.

2. *A. obtusiloba* D. Don, Prod. Fl. Nep. 194. 1825 ; Hook. f. Fl. Brit. Ind. 1 : 8. 1872.

Tufted hairy herbs ; root stock thick ; flowers white.

Fl. & Fr. : May June.

Amritganga valley, Bistola, Tunganath area. 2000 4000 m, (10229).

3. *A. polyanthes* D. Don, Prodr. Fl. Nep. 194. 1825 ; Hook. f. Fl. Brit. Ind. 1 : 9. 1872.

White hairy herbs. flowers white ; styles straight or hooked.

Fl. & Fr. : May August.

Bhuna Bistola, Hemkund, Khankhelia. 3000 - 4000 m (39053).

4. **Anemone rivularis** Buch. Ham. ex DC. Syst. 1 : 211. 1817 ; Hook. f. Fl. Brit. Ind. 1 : 9. 1872.

Silky pubescent herbs ; flowers violet with white tinge.

Fl. & Fr. : May - August.

Amritganga valley, Ghangaria, Pandukeswar. 2000 - 3000 m (39346).

5. **A. rupicola** Camb. in Jacq. Voy. 4 (Bot.) : 5, t. 5. 1835 ; Hook. f. Fl. Brit. Ind. 1 : 8. 1872.

Scapigerous herbs ; rootstock woody ; flowers large showy white.

Fl. & Fr. : May - June.

Badrinath, Kanol, Khankhelia. 2600 - 3600 m (48061).

6. **A. vitifolia** Buch. - Ham. ex DC. Syst. 1 : 211. 1817 ; Hook. f. Fl. Brit. Ind. 1 : 8. 1872.

Glabrous to silky tomentose herbs ; rootstock woody ; flowers white.

Fl. & Fr. : August - October.

Bhyundar valley, Phata, Rambara Gaurikund. 2000 - 2600 m (8719).

5. AQUILEGIA L.

Aquilegia pubiflora Wall. ex Royle, Ill. Bot. Himal. 55. 1834 ; *Aquilegia vulgaris* subsp. *pubiflora* (Wall.) Hook. f. & Thoms. in Fl. Brit. Ind. 1 : 24. 1872.

Slender herbs ; flowers purplish - yellow.

Fl. & Fr. : May - August.

Bajmara, Bhyundar valley, Trijuginarayan on way. 2000 - 3000 m (47843).

6. **CALLIANTHEMUM** C. A. Mey

Callianthemum pimpinelloides (D. Don). Hook. f. & Thoms. Fl. Ind. 26. 1855. *C. cachemirianum* Camb. in Jacq. Voy. 4 (Bot.) : 5, t. 3. 1835. *Ranunculus pimpinelloides* Don ex Royle, Ill. Bot. Himal. 52. 1834 ; Hook. f. Fl. Brit. Ind. 1 : 15. 1872.

Densely tufted glabrous herbs ; flowers white.

Fl. & Fr. : May Juuc.

Bhyunder Valley. 3000 3500 m (Smythe) Lit.

7. **CALTHA** L.

1a. Stems branched ; radical leaves reniform ... *C. palustris* 1

1b. Scapes many ; radical leaves oval, entire or crenate ... *C. scaposa* 2

1. **Caltha palustris** L. Sp. Pl. 558. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 21. 1872.

Glabrous herbs, roots thick, fibrous ; flowers yellow.

Fl. & Fr. : May June.

Amritganga, Hemkund. 2800 m (39026).

2. **C. scaposa** Hook. f. & Thoms. Fl. Ind. 1 : 40. 1855 ; Hook. f. Fl. Brit. Ind. 1 : 21. 1872.

Scapigerous herbs ; leaves radical ; flowers solitary, yellow.

Fl. & Fr. : May June.

Bhyundar valley. (Smythe). Lit.

8. **CLEMATIS** L.

1a. Flowers in axillary fascicles ; pedicels 1-flowered.

2a. Pedicels with 2-connate bracts at or near the middle, ... *C. nepaulensis* 8

2b. Pedicels without connate bracts.

- 3a. Flowerse white or tinged with pink ; filaments glabrous. ... *C. montana* 7
- 3b. Flowers greenish-brown ; filaments usually fringed with long hairs ... *C. barbellata* 2
- 1b. Flowers in axillary panicles
- 4a. Sepals spreading from the base.
- 5a. Filaments glabrous ; connective of anthers not produced ; flowers small.
- 6a. Stems pubescent or hoary pubescent ; flowers 1.2-2.5 cm in diam. ; leaves simple pinnate ; anthers short.
- 7a. Leaflets ovate lanceolate ; panicles shorter than the leaves. ... *C. puberula* 10
- 7b. Leaflets broadly ovate, cordate ; panicles exceeding the leaves. ... *C. grata* 6
- 6b. Stems usually glabrous ; flowers upto 1.5 cm in diam. ... *C. gouriana* 5
- 5b. Filaments hairy ; connective of anthers produced ; flowers large, 3.8 cm in diam. ... *C. orientalis* 9
var. *longicaudata*
- 4b. Sepals erect with recurved tips ; connective not produced.
- 8a. Filaments hairy throughout
- 9a. Leaves glabrescent.
- 10a. Leaflets 3-7 ; leaves connate at the base ... *C. connata* 4
- 10b. Leaflets 3 ; leaves not connate ... *C. acuminata* 1
- 9b. Leaves and inflorescence tomentose ... *C. buchananiana* 3
- 8b. Filaments hairy only in the lower half. ... *C. roylei* 11

1. *Clematis acuminata* DC. Syst. 1 : 148. 1817. *C. acuminata* var. *wallichii* Hook. f. Fl. Brit. Ind. 1 : 5. 1872.

Slender glabrous climbers ; flowers cream - white with recurved sepals.

Fl. & Fr. : August - October.

Dudatoli, (Osmaston). Lit.

2. **Clematis barbellata** Edgew. in Trans. Linn. Soc. 20 : 25. 1846 ; Hook. f. Fl. Brit. Ind. 1 : 3. 1872.

Purplish glabrous climbers ; flowers pale purplish.

Fl. & Fr. : May August.

Ghangria, Mangu, Tungnath area. 2800 3100 m (29418).

3. **C. buchananiana** DC. Syst. 1 : 140. 1817 ; Hook. f. Fl. Brit. Ind. 1 : 6. 1872. '*Ghatiyali*'.

Tomentose climbers ; flowers white tomentose.

Fl. & Fr. : August October.

Bhyundar valley, Mondal, Pandukeswar; 1650 2300 m (35927).

4. **C. connata** DC. Prodr. 1 : 4. 1824 ; Hook. f. Fl. Brit. Ind. 1 : 6. 1872. '*Ghatiyali*'.

Stout climbers with leaves connate at the base ; flowers cream white.

Fl. & Fr. : August October.

Bhyundar valley, Rambara, Wan. 2400 3000 m (37985).

5. **C. gauriana** Roxb. ex DC. Syst. Nat. 138. 1817 ; Hook. f. Fl. Brit. Ind. 1 : 4. 1872. '*Kanguli*'.

Evergreen extensive climbers ; achenes hairy.

Fl. & Fr. : June July.

Dewali, Lobha. (Duthie). Lit.

6. **C. grata** Wall. Pl. As. Rar. 1 : 83, t. 98. 1830 ; Hook. f. Fl. Brit. Ind. 1 : 3. 1872. '*Ghantiyali*'.

Slender climbers ; achenes densely pubescent.

Fl. & Fr. : August October.

Bhyundar valley, Mondal, Ukhimath. 1300 2300 m (10423).

7. **C. montana** Buch. Ham. ex DC. Syst. 1 : 164. 1817 ; Hook. f. Fl. Brit. Ind. 1 : 2. 1872.

Glabrous purplish climbers ; flowers in axillary fascicles, white.

Fl. & Fr. : April June.

Amritganga valley, Hemkund, Tungnath. 2100 3500 m (44088).

8. *Clematis napaulensis* DC. Syst. 1 : 164. 1817 ; Hook. f. Fl. Brit. Ind. 1 : 2. 1872.

Spreading glabrous climbers ; flowers with a cup like connate bract below.

Fl. & Fr. : December - May.

Gwaldam, Munli. (Osmaston). Lit. Not Common.

9. *C. orientalis* L. var. *longicaudata* (Ledeb.) Mukerjee. Bull. Bot. Surv. Ind. 1 (1) : 139. 1959 ; Hook. f. Fl. Brit. Ind. 1 : 1872.

Slender, purplish climbers ; flowers pale yellow, long peduncled.

Fl. & Fr. : July August.

Geoldong, Gothing, Malari. 3500 4500 m (56938).

10. *C. puberula* Hook. f. & Thoms. in Fl. Brit. Ind. 1 : 4. 1872.

Slender pubescent climbers ; flowers pale yellow of ± 2.5 cm diam.

Fl. & Fr. : August October.

Okhimath. (Duthie). Lit.

11. *C. roylei* Rehder in Journ. Arn. Arb. 22 : 574. 1941. *C. nutans* Royle, Ill. Bot. Himal. 51. 1834, non Crantz, 1763 ; Hook. f. Fl. Brit. Ind. 1 : 18. 1872: '*Kangu*'.

Slender climbers ; leaves opposite ; flowers small ; sepals reflexed ; filaments glabrous.

Fl. & Fr. : October March.

Tangsa Forest. 1050 m (614, Kala & Gaur). Lit.

9. DELPHINIUM L.

- 1a. Strigose pubescent herbs, leaves thinly parted ... *D. caeruleum* 2
- 1b. Herbs with spreading hairs ; leaves thickly parted.
 - 2a. Spur is longer than the upper sepal.
 - 3a. Herbs hardly exceeding 40 cm, glabrous ; leaves parted almost to the base glabrous ; spur straight and slender ... *D. denudatum* 5
 - 3b. Herbs far exceeding 60 cm ; 1 cm. thick ; leaves with sparse-dense spreading white hairs ; spur bluntly curved to the apex ... *D. pyramidale* 6
 - 2b. Spur is shorter than the upper sepal.
 - 4a. Herbs thick, woolly ; racemes dense. ... *D. densiflorum* 4
 - 4b. Herbs slender with spreading hairs ; racemes lax.
 - 5a. Herbs exceeding beyond 30 cm ; flowers in elongated raceme ; spur bluntly curved to the apex. ... *D. vestitum* 7
 - 5b. Herbs, rarely exceeding 30 cm ; flowers in corymb of few flowers ; spur straight.
 - 6a. Inflorescence glandular pubescent ; flowers blue ... *D. brunonianum* 1
 - 6b. Inflorescence with white spreading hairs ; flowers violet. ... *D. cashmerianum* 3

1. *Delphinium brunonianum* Royle, Ill. Bot. Himal. 56. 1834 ; Hook. f. Fl. Brit. Ind. 1 : 27. 1872.

Musky herbs, glabrous or downy below, glandular pubescent above ; flowers pale blue to dirty brown.

Fl. & Fr. : August September.

Way to Geoldong, Gothing. 4500 4800 m, (56242).

2. *D. caeruleum* Jacq. ex Camb. in Jacq. Voy 4 (Bot.) 7, t. 6 1835 ; Hook. f. Fl. Brit. Ind. 1 : 25. 1872.

Strigose branching herbs, $\pm$ 40 cm. tall, flowers pale blue.

Fl. & Fr. : August.

Geoldong, Gothing, Laptal. 4000-4400 m (56152). Not Common.

3. *Delphinium cashmerianum* Royle, Ill. Bot. Himal. 55. 1834 ; Hook. f. Fl. Brit. Ind. 1 : 26. 1872.

Herbs with white spreading hairs ; flowers dull violet.

Fl. & Fr. : August,

South-east of Malari. 3000 m (55949).

4. *D. densiflorum* Duthie ex Huth in Jahrb. 20 : 393. 1895.

Stout woolly herbs, $\pm$ 27 cm tall ; flowers pale-blue hairy.

Fl. & Fr. : October.

Roopkund. 4500 m, (30956).

5. *D. denudatum* Wall. ex Hook. f. & Thoms. Fl. Ind. 49. 1855 ; Hook. f. Fl. Brit. Ind. 1 : 25. 1872. 'Jem'.

Glabrous herbs, $\pm$ 40 cm tall ; flowers sky-blue.

Fl. & Fr. : April-July.

Hanumanchatti, Nagnath-Pokhri. 2000-3500 m (2953).

6. *D. pyramidale* Royle, Ill. Bot. Himal. 56. 1834. *D. elatum* L. var. *ranunculaeforme* (Wall.) Hook. f. Fl. Brit. Ind. 1 : 26. 1872.

Herbs with spreading hairs ; flowers violet.

Fl. & Fr. : August.

Way to Kedarnath. 3000 m (38633). Not Common.

7. *D. vestitum* Wall. ex Royle, Ill. Bot. Himal. 55. 1839 ; Hook. f. Fl. Brit. Ind. 1 : 26. 1872.

Slender branching herbs with spreading hairs ; flowers violet.

Fl. & Fr. : September-October.

Amritganga valley, Kedarnath, Vedni Bugyal. 3000-3500 m (8650).

10. *OXYGRAPHIS* Bunge.

Oxygraphis polypetala (Royle) Hook. f. & Thoms. Fl. Ind. 1 : 27. 1855. *Ranunculus polypetalus* Royle ex D. Don in Royle Ill. Bot. Himal. t. 11, f. 2. 1833 ; 54. 1834 ; Hook. f. Fl. Brit. Ind. 1 : 21. 1872.

Tender glabrous herbs. flowers yellow.

Fl. & Fr. : May August.

Amritganga valley, Hemkund, Tungnath. 3000 4200 m (29510).

11. PARAQUILEGIA Drumn. et. Huth.

Paraquilegia anemonoides (Willd.) Ulbr. in Notizb. Bot. Gart. Mus. Berl. Dahl. 9 : 209. 1925. *Aquilegia anemonoides* Willd. in Mag. Ges. Naturf. freud. S. Jahr. 401. 1811. *Paraquilegia grandiflora* (Fisch.) Drum. et Huth. in Kew Bull. 156. 1920. *Isopyrum grandiflorum* Fisch. ex DC. in Hook. f. Fl. Brit. Ind. 1 : 23. 1872.

Rigid, bristly herbs ; flowers white, solitary.

Fl. & Fr. : August September.

Niti. (Duthie), Dharansi. 3500 m (Hazra) Lit.

12. RANUNCULUS L.

1a. Annual, pale-green, glabrous herbs.

2a. Radical leaves deeply 3-lobed ; achenes glabrous in oblong heads. ... *R. sceleratus* 9

2b. Radical leaves spatulate or wedge-shaped ; achenes in globose heads, spinous. ... *R. arvensis* 1

1b. Perennial brown - green, glabrous or hairy herbs.

3a. Radical leaves or all the leaves undivided (sometimes in *R. pulchellus*).

4a. Erect herbs : leaves elliptic - oblong ; sepals elliptic often black-tipped ... *R. pulchellus* 7

4b. Decumbent herbs : leaves orbicular ; sepals oval ... *R. lobatus* 5

3b. Leaves much branched or lobed.

5a. Achenes turgid not margined.

6a. Small glabrous herbs ; flowers solitary.

7a. Floating herbs ; leaves 5-7 lobed ... *R. natans* 6

7b. Creeping in moist soil ; leaves 5-7 partite ... *R. radicans* 8

6b. Tall hairy herbs ; flowers many ... *R. hirtellus* 3

5b. Achenes flattened with an intramarginal rib.

8a. Diffuse or prostrate herbs with spreading hairs ;
achenes dotted ... *R. diffusus* 2

8b. Erect herbs with appressed hairs ; achenes not
dotted. ... *R. laetus* 4

1. *Ranunculus arvensis* L. Sp. Pl. 780. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 20. 1872.

Glabrous herbs ; roots fibrous ; flowers yellow.

Fl. & Fr. : April.

Chaurangi Pindari valley, Rudraprayag environs. 1200 m (35146).

2. *R. diffusus* DC. Prodr. 1 : 31. 1824 ; Hook. f. Fl. Brit. Ind. 1 : 19. 1772, p. p.

Perennial hairy herbs ; hairs spreading ; flowers yellow ; achenes compressed and glabrous.

Fl. & Fr. : June July.

Masoli. 1700 m (44191).

3. *R. hirtellus* Royle ex D. Don in Royle, Ill. Bot. Himal. 53. 1834 ; Hook. f. Fl. Brit. Ind. 1 : 18. 1872.

Perennial hairy herbs ; hairs adpressed ; achenes slightly gibbous.

Fl. & Fr. : May October.

Amritganga, Bhyundar valleys, Tungnath. 2000 4000 m (44004).

4. *R. laetus* Wall. ex D. Don in Royle, Ill. Bot. Himal. 53. 1834 ; Hook. f. Fl. Brit. Ind. 1 : 19. 1872. '*Dainya*'.

Hairy herbs ; rootstock woody ; flowers white.

Fl. & Fr. : April October.

Gupta Kashi ; Trijuginarayan, Trisula. 1200 2000 m (48003).

5. *Ranunculus lobatus* Jacq. ex Camb. in Jacq. Voy. Bot. 5. t. 1. 1B. 1844 ; Hook. f. Fl. Brit. Ind. 1. 17. 1872.

Weak decumbent herbs ; flowers yellow.

Fl. & Fr. : September.

Niti. (Duthie). Lit.

6. *R. natans* C. A. Mey. in Ledeb. Fl. Ait. 2 : 315. 1830. *R. hyperboreus* var. *natans* ((C. A. Mey.) Regel in Bull. Soc. Nat. Mosc. 34 (2) : 43. 1861 ; Hook. f. Fl. Brit. Ind. 1 : 18. 1872.

Floating herbs with lobed leaves ; flowers yellow.

Fl. & Fr. : June.

Kulhar (Kuwari on way), Vasudhara. 3520 m (2886).

7. *R. pulchellus* C. A. Mey. in Ledeb. Fl. Ait. 2 : 333. 1830 ; Hook. f. Fl. Brit. Ind. 1 : 17. 1872.

Glabrous herbs, $\pm$ 36 cm tall ; flowers yellow.

Fl. & Fr. : October.

Arwa - Sarswati basin, Gastoli, Niti Pass. 4000 m (10566).

8. *R. radicans* C. A. Mey. in Ledeb. Fl. Ait. 2 : 316. 1830. *R. hyperboreus* Rottb. var. *radicans* Hook. f. Fl. Brit. Ind. 1 : 18. 1872.

Creepers in moist soil ; leaves 5 - 7 - partite ; heads of achenes large.

Fl. & Fr. : June.

Laptel. (Duthie). Lit.

9. *R. sceleratus* L. Sp. Pl. ed. 1, 551. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 19. 1872. '*Shim*'.

Stout glabrous herbs ; leaves cuneately segmented ; achenes many in oblong head.

Fl. & Fr. : April.

Rudaraprayag area. 700 m (26748).

13. THALICTRUM L.

- 1 a. Leaves all radical ; stems simple ; flowers racemed ... *T. alpinum* 1
- 1 b. Leaves all cauline except (*saniculaeforme*, radical leaves also present) ; stems branched ; flowers paniced.
- 2 a. Achenes stalked.
- 3 a. Leaf axils with bulbils. ... *T. chelidonii* 2
- 3 b. Leaf axils without bulbils.
- 4 a. Leaflets glabrous.
- 5 a. Stems 12-30 cm tall ; achenes 6-12, long stalked, ventral suture winged ; stigma incurved ... *T. elegans* 5
- 5 b. Stems 30-60 cm 11 ; achenes 3-5, short stalked, 3-nerved on each side ; style straight ... *T. pauciflorum* 8
- 4 b. Leaflets glandular pubescent.
- 6 a. Achenes glandular pubescent ... *T. reniforme* 9
- 6 b. Achenes glabrous.
- 7 a. Leaf - sheaths with small auricles ; pinnules not exceeding beyond 1.2 cm, membranous ; flowers greenish - yellow ; anthers long pointed ... *T. cultratum* 3
- 7 b. Leaf - sheaths without auricles ; pinnules upto .5 cm thick, wrinkled ; flowers green ; anthers blunt ... *T. cultratum* 4
subsp. *platycarpum*
- 2 b. Achenes sessile.
- 8 a. Persistent style oblong - oblique ; leaves glandular pubescent beneath ... *T. foetidum*
- 8 b. Persistent style curved ; leaves glabrous beneath.
- 10 a. Sepals white ; stamens included ; anthers 1.2 cm long. ... *T. saniculaeforme* 10
- 10 b. Sepals green ; stamens exerted ; anthers .5 cm long ... *T. foliolosum* 7

1. *Thalictrum alpinum* L. Sp. Pl. 545. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 12. 1872.

Tufted slender glabrous perennials, $\pm$ 7 - 16 cm tall ; leaves all radical. flowers purple.

Fl. & Fr. : June - August.

Hemkund. 4200 - 4500 m (39019).

2 *T. chelidonii* DC. Prodr. 1 : 11. 1824 ; Hook. f. Fl. Brit. Ind. 1 : 11. 1872.

Much branched glabrous herbs ; leaf axils with bulbils ; flowers large lilac.

Fl. & Fr. : August.

Bhyundar valley. 2900 m (29666).

3. *T. cultratum* Wall. Pl. As. Rar. 2 : 26. 1831 ; Hook. f. Fl. Brit. Ind. 1 : 11. 1872.

Leaf - sheaths with small auricles ; flowers greenish - yellow.

Fl. & Fr. : June - October.

Bhuna, Ghangaria, Rambara - Kedarnath. 3000 - 3500 m (1856).

4. *T. cultratum* Wall. subsp. *platycarpum* (Hook. f. et Thoms.) Bruhl in Ann. Royl. Bot. Gdn. Cal. 5 : 72. 1896. *T. platycarpum* Hook. f. & Thoms. Fl. Ind. 13. 1855 ; Hook. f. Fl. Brit. Ind. 1 : 11. 1872.

Leaf - sheath not auricled ; flowers green ; anthers blunt.

Fl. & Fr. : October.

Hemkund, Rishiganga valley. 3500 - 3800 m (24302).

5. *T. elegans* Wall. ex Royle, Ill. Bot. Himal. 51. 1834. Hook. f. Fl. Brit. Ind. 1 : 10. 1872.

Pale - brown herbs ; flowers small green ; stamens far projecting.

Fl. & Fr. : June - October.

Bhyundar valley, Ghangaria, Tanakia - Woodier. 3200 - 3600 m (30965).

6. **Thalictrum foetidum** L. Sp. Pl. 545. 1753. *T. minus* L. var. *foetidum* (L.) Hook. f. et Thoms. in Hook. f. Fl. Brit. Ind. 1 : 14. 1872.

Herbs ; Stems dull purple ; achenes glandular pubescent, stalked.

Fl. & Fr. : August.

Malari. 2600 m (53837).

7. **T. foliolosum** DC. Syst. Nat. 1 : 175. 1817 ; Hook. f. Fl. Brit. Ind. 1 : 14. 1872. '*Makori, Panglajari*'.

Herbs ; Stems pale green ; flowers pale purple ; anthers filaments filiform.

Fl. & Fr. : September.

Phata. 1400 - 2100 m (6496).

8. **T. pauciflorum** Royle. Ill. Bot. Himal. 52. 1834 ; Hook. f. Fl. Brit. Ind. 1 : 11. 1872.

Pale brown herbs ; roots fibrous ; flowers purple ; achenes strongly ribbed.

Fl. & Fr. : August - October.

Bhuna, Bhyundar valley, Hemkund on the way. 3000 - 3500 m (29438).

9. **T. reniforme** Wall. Pl. As. Rar. 2 : 26. 1831 ; Hook. f. Fl. Brit. Ind. 1 : 11. 1872.

Herbs ; leaflets reniform cordate ; flowers green.

Fl. & Fr. : August - October.

Bhuna, Bhyundar valley. 3000 - 3500 m (42143).

10. **T. saniculaeforme** DC. Prodr. 1 : 12. 1824 ; Hook. f. Brit. Ind. 1 : 13. 1872.

Radical leaves as long as the stem ; flowers mostly solitary, white.

Fl. & Fr. : July - August.

Bhyundar valley. 2500 m (29331).

14. TROLLIUS L.

Trollius acaulis Lindl. in Bot. Reg. 28 ; Misc, 56. 1842 ; Hook. f. Fl. Brit. Ind. 1 : 22. 1872.

Herbs, leafy above the middle ; flowers yellow.

Fl. & Fr. : June July.

Bhyundar valley. (*Smythe*). L

2. PAEONIACEAE

PAEONIA L.

Paeonia emodi Wall. ex Royle, Ill. Bot. Himal. 57. 1834 ; Hook. f. Fl. Brit. Ind. 1 : 30. 1872. '*chandrain*'.

Large spreading glabrous herbs ; flowers white ; follicles ovoid, 2.5 cm.

Fl. & Fr. : April - June.

Gohna Ramni, Sitapur, 1600 - 2000 m (47920).

3. MAGNOLIACEAE

MICHELIA L.

Michelia kisopa Buch. Ham. ex DC. Syst. Nat. 1 : 448. 1817 ; Hook. f. Fl. Brit. Ind. 1 : 43. 1872. '*Garuri*'.

Trees ; flowers fragrant, white ; fruiting spike 5 - 7 cm long.

Fl. & Fr. : September - October.

Bhyundar valley, Govindghat. 1800 - 2000 m (24204). Not Common.

4. SCHISANDRACEAE

SCHISANDRA Michx.

- 1a. Deciduous climbers ; petiole pinkish ; flowers white ... *S. grandiflora* 1
 1b. Evergreen climbers ; petiole not pink ; flowers pink. ... *S. propinqua* 2

1. *Schisandra grandiflora* (Wall.) Hook. f. in Fl. Brit. Ind. 1 : 44. 1162. *Kadsura grandiflora* Wall. Tent. Fl. Nap. 10, t. 14. 1824. 'Agali, chimgadi'.

Leaves elliptic ovate to oblong - lanceolate, acuminate ; flowers 2.5 - 4.5 cm in diam.

Fl. & Fr. : April - September.

Amritganga valley, Mongu, Rambara. 1600 - 3500 m (44080).

2. *S. propinqua* (Wall.) Baill. Hist. Pl. 1 : 148, f. 183, 184. 1868. *Kadsura propinqua* Wall. Tent. Fl. Nap. 11, t. 15. 1824 ; Hook. f. Fl. Brit. Ind. 1 : 45. 1882. 'Agali'.

Leaves lanceolate or sometimes oblong or elliptic ; flowers 1.2 - 2.5 cm in diam.

Fl. & Fr. : May - November.

Occurs throughout. 1500 - 2000 m (Osmaston). Lit.

5. MENISPERMACEAE

1a. Leaves not peltate :

- 2a. Leaf base not or slightly cordate ; main basal nerves 3 or 5 ... *Cocculus* 2
 2b. Leaf base deeply cordate ; main basal nerves 5-9 ... *Tinospora* 4

1b. Leaves peltate.

- 3a. Whole plant glabrous ... *Stephania* 3
 3 b. Whole plant tomentose ... *Cissampelos* 1

1. CISSAMPELOS L.

Cissampelos pariera L. Sp. Pl. ed. 1 : 1031. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 103. 1872. '*Pari*'.

Deciduous tomentose climbers ; flowers minute greenish-yellow.

Fl. & Fr. : June - November.

Common throughout upto 2000 m (*Osmaston*). Lit.

2. COCCULUS DC. nom. cons.

Cocculus laurifolius DC. Syst. Nat. 1 : 530. 1817 ; Hook. f. Fl. Brit. Ind. 1 : 101. 1872. '*Tilpata*'.

Large shrubs or small trees. flowers minute yellow ; drupes black.

Fl. & Fr. : April - January.

Agastamuni, Mondal, Nandprayag. 900-1500 m (26839).

3. STEPHANIA Lour.

1a. Flowers greenish - yellow ; leaves orbicular ... *S. glabra* 2

1b. Flowers purplish ; leaves triangular

2a. Leaves orbicular - deltoid, obtuse ... *S. gracilentia* 3

2b. Leaves triangular - ovate, acuminate ... *S. elegans* 1

1. **Stephania elegans** Hook. f. & Thoms. Fl. Ind. 195 1855 ; Hook. f. Fl. Brit. Ind. 1 : 103. 1872.

Glabrous climbers ; Leaves 5 - 11 cm, entire, thin, pale beneath ; flowers .25 cm diam.

Fl. & Fr. : August - December.

Guptakashi, Okhimath, 1400-1800 m (35818).

2. *Stephania glabra* (Roxb.) Miers in Ann. Mag. Nat. Hist. Ser. 3. 18 : 14. 1866. *Cissampelos glabra* Roxb. Fl. Ind. ed. 2. 3 : 840. 1832 ; Hook. f. Fl. Brit. Ind. 1 : 103. 1872. 'Ghindharu'.

Leaves 11 - 23 cm with 9 - 12 main nerves ; flowers .5 - .6 cm diam.

Mondal, Nandprayag, 800-2300 m (43973).

3. *S. gracilentia* Miers (in Ann. & Mag. Nat. Hist. Ser. 3. 18. 15. 1866. nom nud.) in Contr. Bot. 3 : 219. 1871.

Climbers ; Leaves .5 - .8 cm with 8 - 9 main nerves ; flowers .25 cm diam.

Fl. & Fr. : July - October.

Bhyundar valley, Pandukeswar, Wan - Vedeni, 2200-2600 m (29355).

4. TINOSPORA Miers

Tinospora Cordifolia (Willd.) Miers ex Hook. f. & Thoms in Fl. Ind. 184. 1855 & Hook. f. Fl. Brit. Ind. 1 : 97. 1872. *Menispermum Cordifolium* Willd. Sp. Pl. 4, 826. 1806. 'Gileh'.

Large twiners ; leaves deeply cordate ; flowers greenish - yellow.

Fl. & Fr. : March - May.

Near Langasu, across Alaknanda. 1200 m (s. n.).

6. BERBERIDACEAE Sensus BH.

| | | |
|--------------------|-----|-------------------|
| 1a. Leaves simple | ... | <i>Berberis</i> 1 |
| 1b. Leaves pinnate | ... | <i>Mahonia</i> 2 |

1. BERBERIS L.

1a. Dwarf shrubs, hardly exceeding 40 cm ; flowers solitary.

2a. Leaves linear - oblong ; fruits blue - black ; style distinct

...

B. osmastonii 7

- 2b. Leaves obovate orbicular ; fruits red ; style O ... *B. kumaonensis* 5
- 1b. Large shrubs, exceeding more than 60 cm ; flowers not solitary.
- 3a. Inflorescence in branched raceme.
- 4a. Large shrubs ; twigs and panicles red ... *B. chitria* 3
- 4b. Low shrubs ; twigs and panicles not red ... *B. edgeworthiana* 4
- Inflorescence in simple raceme.
- 5a. Ripe fruits red.
- 6a. Leaves membranous ; style very short.
- 7a. Lower pedicels .8 - 2.5 cm long. ... *B. petiolaris* 8
- 7b. Lower pedicels .2 - .5 cm long ... *B. zabelina* 11
- 6b. Leaves coriaceous ; style O ... *B. umbellata* 10
- 5b. Ripe fruits blue - black.
- 8a. Twigs and inflorescence brownish - purple ... *B. pseudumbellata* 9
- 8b. Twigs and inflorescence pale - yellow.
- 9a. Leaves glossy - green, not glaucous beneath ... *B. aristata* 1
- 9b. Leaves pale glaucous beneath.
- 10a. Leaves 1.2 - 4 cm broad ; secondary nerves prominent above ... *B. asiatica* 2
- 10b. Leaves .8 - 1.25 cm broad ... *B. lycium* 6

1. *Berberis aristata* DC. Syst. Nat. 2 : 8. 1821 ; Hook. f. Fl. Brit. Ind. 1 : 110. 1872. p. p.

Shrubs ; leaves glossy green ; raceme simple ; fruits with pale - bloom.

Fl. & Fr. : April - November.

Bhyundar valley, Hanumanchatii, Trijuginarayan. 2500 m (24233).

2. *Berberis asiatica* Roxb. ex DC. Syst. Nat. 2 : 13. 1821 ; Hook. f. Fl. Brit. 1 : 119. 1872. '*Kingor*.'

Shrubs ; leaves pale glabrous beneath ; secondary nerves prominent above.

Fl. & Fr. : March - June.

Mondal. 1650 m (43947).

3. *B. chitria* Lindl. Reg. 9 : t. 729. 1823 ; Hook. f. Fl. Brit. Ind. 1 : 110. 1872. '*chitri*'.

Large shrubs ; twigs pubescent bright pink ; inflorescence paniced ; fruits without bloom.

Fl. & Fr. : May - November.

Amritganga valley, Sitapur, Wan. 1600 - 2700 m (47914).

4. *B. edgeworthiana* C. K. Schn. in Bull. Herb. Boiss. Ser. 2, 8 : 263. 1905. *B. brachybotrys* Edgew. in Trans. Linn. Soc. 20 : 29. 1846 ; Hook. Fl. f. Brit. Ind. 1 : 109. 1872.

Small shrubs ; twigs glabrous, pale - grey ; berries ovoid red.

Fl. & Fr. : May - June.

Bampa, 3500 m (Osmaston). Lit.

5. *B. kumaonensis* C. K. Schn. in Bull. Herb. Boiss. 2, 5 : 397. 1905.

Dwarf deciduous shrubs ; flowers solitary ; fruits red, ovoid.

Fl. & Fr. : June - August.

Rambara, Tungnath, 3000 m (30922). Not Common.

6. *B. lycium* Royle, in Trans. Linn. Soc. 17 : 94. 1834 ; Hook. f. Fl. Brit. Ind. 1 : 110. 1872. '*Kingor*'.

Gregarious shrubs with white bark ; secondary nerves not prominent above ; fruits ovoid.

Fl. & Fr. : March - May.

Mondal, Nandprayag, Sitapur, 1500 m (47903).

7. *B. osmastonii* Dunn in Kew Bull. 355. 1920 ; Osmaston For. Fl. Kumaon 21. 1978 (rep. ed.).

Dwarf shrubs ; flowers solitary or fascicled 2-3 ; fruits ovoid with glaucous bloom.

Fl. & Fr. : April.

Khetia village, Gwaldam, 1700 m (41448). Not Common.

8. *Berberis petiolaris* Wall. ex G. Don, Gen. Syst. 1 : 116. 1831. 'chotra'.

Large shrubs, bark pale ; raceme simple ; fruits red, oblong.

Fl. & Fr. : May - November.

Occurs on slopes of main Himalaya range, 2800-3500 m (Osmaston). Lit.

9. *B. pseudumbellata* Parker in Kew Bull. 118. 1921 ; Osmaston For. Fl. Kumaon 21. 1978 (repr. ed.).

Large shrubs ; inflorescence subumbellate ; fruits ovoid with bloom.

Fl. & Fr. : May - June.

Malari, Laung, 3000-3500 m (55931).

10. *B. umbellata* Wall. ex G. Don, Gen. Syst. 1 : 116. 1831 ; Hook. f. Fl. Brir. Ind. 1 : 110. 1872. P.P.

Small shrubs ; young twigs reddish glabrous ; inflorescence subcorymbose ; fruits oblong.

Fl. & Fr. : May - November.

Badrinath, Bhyundar and Kedarnath glacial valleys. 2700-3500 m (29669).

11. *B. zabelina* C. K. Schn. Bull. Herb. Boiss. Ser. 2, 5 : 667. 1905 ; Osmaston For. Fl. Kumaon 18. 1978 (rep. ed.).

Shrubs. leaves membranous ; raceme Simple ; fruits oblong.

Fl. & Fr. : May - November.

Dhanpur, 3000-3500 m (Osmaston). Lit. Rare.

2. MAHONIA Nutt.

Mahonia acanthifolia G. Don, Gen. Syst. 1 : 118. 1831 ; Banerjee in Rec. Bot. Surv. Ind. 19 (2) : 22. 1966. '*Haldia*..

Shrubs ; leaves imparipinnate , fruits blue black prunosed.

Fl. & Fr. : March June.

Occurs in the area. 2000 - 3000 m (Osmaston). Lit.

7. LARDIZABALACEAE

(BERBERIDACEAE Sensu BH).

HOLBOELLIA Wall.

- | | | |
|--|-----|---|
| 1a. Terminal leaflets 2.5 - 7.5 cm broad | ... | <i>H. latifolia</i> 1 |
| 1b. Terminal leaflets 1.2 - 2.5 cm broad | ... | <i>H. latifolia</i> 2
var. <i>angustifolia</i> |

1. **Holboellia latifolia** Wall. Tent. Fl. Nap. 24, t. 16. 1824. var. *latifolia* ; Hook. f. Fl. Brit. Ind. 1 : 108. 1872. '*Gophla*'.

Climbers ; leaflets 3 - 5, oblong elliptic.

Fl. & Fr. : April - May.

Vickle Tal. 2000 - 2800 m. (31095).

2. **H. latifolia** Wall. Tent. Fl. Nap. 24, t. 16, 1824. var. *angustifolia* (Wall.) Hook. f. Fl. Brit. Ind. 1 : 108. 1872. '*Gophal*'.

Climbers ; leaflets 5 - 9, narrow linear - lanceolate.

Fl. & Fr. : April June.

Amritganga valley, Kanol, Trijuginarayan. 1700 - 2500 m (47987).

8. PODOPHYLLACEAE

PODOPHYLLUM L.

Podophyllum hexandrum Royle, Ill. Bot. Himal. 64. 1834. *P. emodi* var. *hexandrum* (Royle) Chat. & Muk. in Rec. Bot. Surv. Ind. 16 (2) : 45. 1953.

Succulent erect herbs ; leaves 2, purple spotted ; flowers solitary, purplish - white.

Fl. & Fr. : April - October.

Bhyundar valley, Tungnath. 3200 - 3500 m (39016).

9. PAPAVERACEAE

- | | | |
|---|-----|------------------------|
| 1a. Glabrous herbs ; juice milky ; flowers scarlet | ... | <i>Papaver</i> 3 |
| 1b. Hairy, prickly herbs ; juice yellow ; flowers blue, purple or yellow. | | |
| 2a. Herbs 10 - 15 cm. tall ; radical leaves lyrate-pinnatifid ; petiole winged ; capsules sub - cylindric | ... | <i>Dicranostigma</i> 1 |
| 2b. Herbs $\pm$ 30 cm. tall ; radical leaves irregularly pinnatifid ; capsules oblong - obovate | ... | <i>Meconopsis</i> 2 |

1. DICRANOSTIGMA Hook. f. & Thoms.

Dicranostigma lactucoides Hook. f. & Thoms. Fl. Ind. 255. 1855. *Stylophorum lactucoides* (Hook. f. & Thoms.) Benth. & Hook. f. Gen. Pl. 1 : 53. 1862 ; Hook. f. Fl. Brit. Ind. 1 : 119. 1872.

Hairy herbs with yellow juice ; flowers yellow ; fruits sub - cylindric.

Fl. & Fr. : ?

Inner ranges of the district. 3500 m (Duthie). Lit.

2. MECONOPSIS Vig.

- 1a. Herbs prickly ; flowers blue - purple ... *M. aculeata* 1
- 1b. Herbs hairy or pubescent ; flowers yellow.
- 2a. Capsules 7 - 8 valved, densely bristly at length, glabrous ... *M. robusta* 3
- 2b. Capsule, 8 - 10 valved, adpressed hairy and stellate down ... *M. paniculata* 2

1. *Meconopsis aculeata* Royle, Ill. Bot. Himal. 67, t. 45. 1839 ; Hook. f. Fl. Brit. Ind. 1 : 118. 1872.

Prickly herbs ; leaves pinnatifid ; flowers blue purple ; capsules prickly and bristly, short.

Fl. & Fr. : June - October.

Amritganga and Bhyundar valleys, Bampa, Gothing, Kedarnath. 3000 - 4500 m (24455).

2. *M. paniculata* Prain in Journ. As. Soc. Beng. 64 : 316. 1895. *Papaver paniculatum* D. Don, Prodr. Fl. Nep. 197. 1825 ; Hook. f. Fl. Brit. Ind. 1 : 118. 1872, *auct.* non DC.

Stellately pubescent stout herbs ; flowers golden - yellow.

Fl. & Fr. : August.

North Garhwal. 3500 - 4000 m (Rau). Lit.

3. *M. robusta* Hook. f. & Thoms. Fl. Ind. 253. 1855 ; Hook. f. Fl. Brit. Ind. 1 : 118. 1872.

Sparsely hairy stout herbs ; flowers yellow.

Fl. & Fr. : August.

Bajmora, Gandhi Tal, Rambara Kedarnath. 3000 m (38641). Not Common.

3. PAPAVER L.

- 1a. Leaves 1 - 2 pinnatifid ; capsules obovoid ... *P. dubium* 1
- 1b. Leaves simple, oblong ; capsules globose ... *P. somniferum* 2

1. *Papaver dubium* L. var. *laevigatum* (M. B.) Elkan, Pflazen. 40 : 318. 1909 ; Hook. f. Fl. Brit. Ind. 1 : 117. 1872.

Annual glabrous herbs with milky juice ; flowers scarlet ; fruits sessile.

Fl. & Fr. : April.

Bagrigar, Mandoli, Nagnath. 1800 1900 m (37213).

2. *P. somniferum* L. Sp. Pl. 508. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 117. 1872.

Large glaucous herbs ; flowers purple or white ; fruits stalked.

Sometimes planted.

10. FUMARIACEAE

- | | | |
|---|-----|--------------------|
| 1a. Leaf stalks ending in a tendril ; petals not spurred | ... | <i>Dicentra</i> 2 |
| 1b. Tendrils none ; upper petal spurred. | | |
| 2a. Spur half the length of the petal ; fruit a flat capsule | ... | <i>Corydalis</i> 1 |
| 2b. Spur less than one third the length of the petal ; fruit a globose nutlet | ... | <i>Fumaria</i> 3 |

1. CORYDALIS DC.

- | | | |
|--|-----|--------------------------|
| 1a. Base of the stem naked ; flowers blue | ... | <i>C. cashemiriana</i> 1 |
| 1b. Base of the stem surrounded by old - leaf sheath ; flowers yellow. | | |
| 2a. Leaves primarily ternately divided ; lowest pair longer than the subsequent pairs. | | |
| 3a. Stems simple. | | |
| 4a. Cauline leaves 0, or casually 1 ; petals not winged | ... | <i>C. crithmifolia</i> 5 |
| 4b. Cauline leaves 2, opposite ; petals winged | ... | <i>C. falconeri</i> 6 |

- 3b. Stems branched, elongate, slender with scattered leaves.
- 5a. Leaves equally 2 - ternate ; terminal segments not longer than the lateral.
- 6a. Lower outer petal not saccate ; spur of upper as long as lamina, $\pm$ recurved ; capsules linear ; seeds 1 - seriate ... *C. casimiriana* 1
- 6b. Lower outer petal saccate ; spur of upper shorter than lamina, straight ; capsules oval ; seeds 2 - seriate ... *C. longipes* 10
- 5b. Leaves very unequally ternate ; terminal segments much exceeding the laterals.
- 7a. Leaf - segments 2 - 3 times completely divided ; ultimate segments distinct.
- 8a. Ultimate leaf - segments round ; seeds opaque, punctate ... *C. cornuta* 4
- 8b. Ultimate leaf - segments linear or oblong ; seeds shining ... *C. vaginans* 15
- 7b. Leaf - segments once to twice completely divided ; ultimate segments decurrent ... *C. Chaerophylla*
var *Chaerophylla*
- 2b. Leaves pinnatisect ; lowest pair of segments not exceeding the others.
- 9a. Stems simple.
- 10a. Stout herbs ; cauline leaves non or one to two lower down the stem ... *C. govaniana* 9
- 10b. Weak herbs ; cauline leaves disposed throughout the stem ... *C. sikkimensis* 13
- 9b. Stems branched.
- 11a. Spur of upper petal tapering towards point or if obtuse then not saccate.
- 12a. Branching confined to the region of inflorescence only.
- 13a. Leaf - segments simple pinnatisect ; lobules ovate.
- 14a. Branches few ; bracts all large leafy ... *C. gortschakovii* 8

- 14b. Branches numerous ; lowest bracts only large ... *C. thyrsiflora* 14
- 13b. Leaf - segments 2 - 3 times pinnat-sect, lobules linear ; branches numerous ... *C. meifolia* 11
- 12b. Branching not confined to region of inflorescence ; bracts cuneate ... *C. nana* 12
- 11b. Spur of upper petal distinctly saccate ; leaves simply pinnate ; pinnae flabellate broad ... *C. flabellata* 7

1. *Corydalis cashemiriana* Royle, Ill. Bot. Himal. t. 16. f. 1. 1833 ; Hook. f. Fl. Brit. Ind. 1 : 123. 1872.

Herbs with bulbous rootstock ; flowers blue.

Fl. & Fr. May August.

Amritganga valley, Hemkund, Tungnath. 3500 4000 m (29456).

2. *C. casimiriensis* Duthie & Prain in Journ. As. Soc. Beng. 65 : 27. 1897.

Herbs with slender rootstock ; flowers small yellow.

Fl. & Fr. : August September.

Dunagiri, Malari, way to Nizmolli. 3000 3500 m (56021). not common.

3. *C. chaerophylla* DC. Prodr. 1 : 128. 1824. var. *chaerophylla* ; Hook. f. Fl. Brit. Ind. 1 : 126. 1872.

Simple stout herbs with long radical leaves ; flowers golden yellow.

Fl. & Fr. : August September.

Wan. 2200 m (30824).

4. *C. cornuta* Royle, Ill. Bot. Himal. 69. 1839 ; Hook. f. Fl. Brit. Ind. 1 : 126. 1872.

Stout herbs with straggling branches ; flowers yellow, tipped purple.

Fl. & Fr. : May - October.

Bhyundar valley, Rambara, Trijuginarayan. 2200 3200 m (24489).

5. *Corydalis crithmifolia* Royle, Ill. Bot. Himal. 68. 1839 ; Hook. f. Fl. Brit. Ind. 1 : 123. 1872.

Stout herbs ; roots fusiform ; flower yellow, tipped purple.

Fl. & Fr. : July September.

North of Garhwal, ascending to 4500 m (Rau). Lit.

6. *C. falconeri* Hook. f. & Thoms. in Fl. Brit. Ind. 1 : 124. 1872.

Rootstock woody ; erect herbs ; flowers yellow, purple tipped ; capsules, oblong, ; pedicels deflexed.

Fl. & Fr. : August September.

Tungnath. 3500 m (Semwal & Gaur). Lit. Rare.

7. *C. flabellata* Edgew., in Trans. Linn. Soc. Bot. 20 : 30. 1846 ; Hook. f. Fl. Brit. Ind. 1 : 127. 1872.

Perennial herbs ; leaves reniform ; flowers yellow ; capsules linear - lanceolate.

Fl. & Fr. : August September.

Malari. 3000 m (55909).

8. *C. gortschakovii* Schrank, Enum. Pl. Nov. 1 : 100. 1841. *C. moorcroftiana* Wall. ex. Hook. f. & Thoms. Fl. Ind. 266. 1855 ; Hook. f. Fl. Brit. Ind. 1 : 125. 1872. p. p.

Stout tufted herbs $\pm$ glandular ; bracts oblong, lanceolate, entire ; flowers, yellow.

Rimkhim. 3200 - 5500 m (Duthie). Lit.

9. *C. govaniana* Wall. Tent. Fl. Nap. 55. 1826 ; Hook. f. Fl. Brit. Ind. 1 : 124. 1872.

Simple herbs ; radical leaves equalling the stem ; flowers bright yellow.

Fl. & Fr. : May August.

Hemkund, Khankhelia, Tungnath. 3200 - 4000 m (44095).

10. *C. longipes* DC. Prodr. 1 : 128. 1824. *C. sibirica* non Pers. Sensu Hook. f. Fl. Brit. Ind. 1 : 125. 1872.

Weak slender herbs ; leaves long petioled ; flowers yellow.

Fl. & Fr. : August.

Dhauli valley, 2000 - 3500 m (Duthie). Lit.

11. *Corydalis meifolia* Wall. Tent. Fl. Nap. 52, t. 41. 1824 ; Hook. f. Fl. Brit. Ind. 1 : 126. 1872.

Tufted stout herbs ; leaves finely pinnately divided ; flowers yellow, tips purple.

Fl. & Fr. : September - October.

Hemkund, Kedarnath, 4000 - 4700 m (35896). Not Common.

12. *C. nana* Royle, Ill. Bot. Himal. 68. 1834, *C. ramosa* Wall. var. *nana* (Royle) Hook. f. & Thoms. Fl. Ind. 267. 1855 ; Hook. f. Fl. Brit. Ind. 1 : 125. 1872.

Dwarf tender diffuse herbs with ascending branching ; leaves spongy ; flowers brownish yellow in dense raceme.

Fl. & Fr. : August - September.

Way to Niti and Geoldong. 4000 - 5000 m (56115). Rare.

13. *C. sikkimensis* (Prain) Fedde in Fedde, Repert. 17 : 20. 1921. *C. duthei* Maxim. var. *sikkimensis* Prain in Journ. As. Soc. Beng. 65 (2) : 33. 1896.

Decumbent glabrous herbs ; leaves distant ; flowers crowded yellow.

Fl. & Fr. : July.

Rishiganga valley. 3500 m (2913). Rare.

4. *C. thysiflora* Prain in Journ. As. Soc. Beng. 65 (2) : 35. 1896. *C. gortschakovii* non Schrank. sensu Hook. f. Fl. Brit. Ind. 1 : 125. 1872.

Glabrous leafy herbs ; radical leaves long petioled ; flowers yellow, tips purple ; capsules small.

Fl. & Fr. : August - September.

Nanda Devi Sanctuary. 4500 - 5000 m (Hazra). Lit.

15. *C. vaginans* Royle, Ill. Bot. Himal. 68. 1831. *C. ramosa* Wall. ex. Hook. f. & Thoms. Fl. Ind. 267. 1855 non O. & B. Fedtsch ; Hook. f. Fl. Brit. Ind. 1 : 125. 1872.

Perennial herbs ; cauline leaves sheathing at the base ; flowers yellow with lacerate wings.

Fl. & Fr. : July - October.

Brahma Tal, Dunagiri, Hemkund, Rambara. 2500 - 4500 m (24264).

2. DICENTRA Borkhaus

Dicentra macrocapnos Prain in Journ. As. Soc. Beng. 65 : 12. 1896. *D. scandens* non Walp. Sensus Hook. f. Fl. Brit. Ind. 1 : 121. 1872.

Slender flexuous climbers ; flowers purplish - yellow.

Fl. & Fr. : August - September.

Anusuyia area, Bagarigar, Gaurikund. 750 - 1800 m (42023).

3. FUMARIA L.

Fumaria indica (Haussk.) Pugsley in Journ. Linn. Soc. Bot. 44 : 313. 1919. *Fumaria vaillantii* var. *indica* Haussk. in Flora 56 : 443. 1873. 'khairua'.

Delicate much branched herbs ; flowers purplish ; pedicel short.

Fl. & Fr. : February - April.

Weed of wheat cultivation, Debal Bagrigar, Trisula. 700 - 1800 m (35170).

11. BRASSICACEAE

1a. Pods dehiscent.

2a. Pods linear-long.

3a. Lower leaves at least pinnatisect or pinnatifid.

- 4a. Seeds in 2-rows.
- 5a. Flowers white ... *Nasturtium* 15
- 5b. Flowers yellow ... *Rorippa* 16
- 4b. Seeds in 1-row.
- 6a. Flowers yellow.
- 7a. Fruits with an indehiscent 1-seeded beak. ... *Brassica* 20
- 7b. Fruits without an indehiscent 1-seeded beak.
- 8a. Leaves simply pinnatifid : segments obtuse. ... *Barbarea* 4
- 8b. Leaves 2 or 3 pinnatisect ; segments linear. ... *Descurainia* 9
- 6b. Flowers white or tinged with violet ; leaves simple or pinnatifid ... *Cardamine* 6
- 3b. Leaves simple.
- 9a. Herbs fleshy. ... *Christolea* 7
- 9b. Herbs not fleshy.
- 10a. Stems .15-1.20 cm. long ; flowers racemose.
- 11a. Flowers white, straw-coloured or pink.
- 12a. Septum not veined.
- 13a. Glabrous, glaucous herbs ; seeds in 2-row ... *Turritis* 19
- 13b. Hairy stellate pubescent herbs ; seeds in 1-row. ... *Arabis* 2
- 12b. Septum 1-veined ; stigma obscurely 2-lobed ... *Arabidopsis* 1
- 11b. Flowers orange or pale yellow.
- 14a. Simple hairy herbs ; septum 3-veined ... *Sisymbrium* 17
- 14b. Stellately hairy herbs ; septum not veined. ... *Erysimum* 12

- 10b. Stemless ; scapes 5-7.5 cm long ; flowers corymbose, white. ... *Arcyosperma* 3
- 2b. Pods short, broad various.
- 15a. Seeds in 2-rows ... *Draba* 11
- 15b. Seeds not in rows.
- 16a. Seed 1-in each cell.
- 17a. Large fleshy, perennial herbs ; pods didymus ... *Megacarpaea* 14
- 17b. Diffuse or erect herbs ; pods elliptic or oblong, notched. ... *Lepidium* 13
- 16b. Seeds more than 1 in each cell.
- 18a. Leaves pinnatisect ; pods triangular ... *Capsella* 5
- 18b. Leaves simple ; pods orbicular or ovate or oblong-lanceolate ... *Thlaspi* 18
- Pods indehiscent.
- 19a. Pods not jointed.
- 20a. Pods oblong-terete ... *Raphanus* 21
- 20b. Pods curved, many celled ... *Chorispora* 8
- 19b. Pods transversely jointed, globose. ... *Crambe* 10

1. ARABIDOPSIS Schr.

- 1a. Cauline leaves sagittate.
- 2a. Flowers racemed, bracteate. ... *A. himalaica* 1
- 2b. Flowers capitate, ebracteate ... *A. mollissima* 2
- 1b. Cauline leaves not sagittate.
- 3a. Flowers white ; pods 1.2 - 2.5 cm. long. ... *A. thaliana* 4
- 3b. Flowers pink ; pods 2.5 - 5 cm long. ... *A. stricta*

1. *Arabidopsis himalaica* (Edgew.) O. E. Schultz. in Engl. Pflreich I V 105 (Ht. 86) : 283. 1924 ; *Arabis himalaica* Edgew. in Trans. Linn.

Soc. 20 : 31. 1846. *Sisymbrium himalaicum* (Edgew.) Hook. f. & Thoms. in Journ. Linn. Soc. 5 : 160. 1861 ; Hook. f. Fl. Brit. Ind. 1 : 147. 1872.

Hispidly tomentose herbs ; racemes bracteate ; flowers purple, tinged white.

Fl. & Fr. : June.

Hemkund on way 3500 4200 m (39041).

2. *Arabidopsis mollissima* (C. A. Mey.) N. Busch. Re. Sibes. or Efr. 1 : 136. in Observe. 1913. *Sisymbrium mollissima* C. A. Mey. in Ledeb. Fl. Alt. 3.140, 1831 ; Hook. f. Fl. Brit. Ind. 1 : 147. 1872.

Glabrous - hairy herbs ; flowers purplish white.

Fl. & Fr. : June.

Badrinath, Rimkhim. 2500 3000 m (2838).

3. *A. stricta* (Camb.) N. Busch. Fl. Cauc. Crit. 3, 4 : 457. 1909. *Malcolmia stricta* Camb. in Jacq. Voy. Bot. Ind. 4 : 16. 1844. *Sisymbrium strictum* Hook. f. & Thoms. Journ. Linn. Soc. Bot. 5 : 161. 1861 ; Hook. f. Fl. Brit. Ind. 1 : 149. 1872.

Stellately hairy rough herbs ; pods very slender, terete.

Fl. & Fr. : August.

Ghangaria, 3100 m (29096).

4- *A. thaliana* (L.) Heynh. in Holl & Heynh. Fl. Sachs. 2 : 538. 1842. *Arabis thaliana* L. Sp. Pl. 665. 1753. *Sisymbrium thalianum* (L.) Gay & Monn. in Gaud. Fl. Helv. 4 : 348. 1829 ; Hook. f. Fl. Brit. Ind. 1 : 148. 1872.

Slender branching stellate hairy herbs ; pods very glabrous, curved.

Fl. & Fr. : September October.

Arwasaraswati Gastoli. 700 4000 m (35175).

2. ARABIS L.

1a. Sparsely hairy herbs ; cauline leaves absent.

... *A. saxicola* S

1b. stellately hairy herbs ; cauline leaves present.

2a. Cauline leaves auricled at the base.

3a. Perennial herbs.

4a. Leaves ovate, ovate-oblong; petals 1 cm long. ... *A. amplexicaule* 1

4b. Leaves narrow oblong; petals 1.4 cm long ... *A. bijuga* 2

3b. Annual herbs.

5a. Leaves sinuately toothed; pedicels .5-.7 cm long; pods minutely pubescent ... *A. nova* 3

5b. Leaves coarsely toothed; pedicels .8-1.2 cm long; pods glabrous ... *A. pterosperma* 4

2b. Cauline leaves not auricled at the base. ... *A. tibetica* 6

1. *Arabis amplexicaulis* Edgew. in Trans. Linn. Soc. Bot. 20 : 31. 1846; Hook. f. Fl. Brit. Ind. 1 : 136. 1872,

Glabrous or slightly setellate hairy herbs; basal lobes of leaves obtuse; flowers white.

Fl. & Fr. : April June.

Badrinath, Bhyundar valley. 2700 - 3000 m (2839).

2. *A. bijuga* Watt in Journ. Linn. Soc. Bot. 8 : 378. 1881.

Perennial $\pm$ stellate hairy herbs; cauline leaves narrow oblong, sessile $\frac{1}{2}$ amplexicaule; flowers large.

Bhyundar valley. 2550 m (Sharma).

3. *A. nova* Vill. Prosp. Pl. Dauph. 39. 1779. *Arabis auriculata* Lam. Encycl. Meth. Bot. 1 : 219. 1783; Hook. f. Fl. Brit. Ind. 1 : 135. 1872.

Stellate hairy herbs; pods 2.5 - 4 cm long.

Fl. & Fr. : June August.

Bhyundar valley. 2400 m (29358).

4. *A. pterosperma* Edgew. in Trans. Linn. Soc. 20 : 33. 1851. *A. alpina* non L. Sensus Hook. f. Fl. Brit. Ind. 1 : 135. 1872.

Stellate hairy herbs; pods 4 - 11 cm long.

Fl. & Fr. : July August.

Badrinath, Jumma area, Malari. 2700 3000 m (53846).

5. *Arabis saxicola* Edgew. in trans. Linn. Soc. Bot. 2 : 32. 1851.
var *saxicola*.

Perennial sparsely hairy herbs ; cauline leaves. Orvery short linear,
entire ; flowers white.

Fl. & Fr. : ?

Garhwal. North West Himalaya. (Jafri). Lit.

6. *A. tibetica* Hook. f. & Thoms. Journ. Linn. Soc. Bot. 5 : 143.
1861 ; Hook. f. Fl. Brit. Ind. 1 : 136. 1872.

Perennial stellate hairy herbs ; leaves not auricled ; pods falcate,
glabrous.

Fl. & Fr. : July August.

Geoldong. 5000 5500 m (55910).

3. *ARCYOSPERMA* O. E. Schulz

Arcyosperma primulifolium (Thoms.) O. E. Schulz in Engl. pflreich
IV 105. (Ht. 86) : 183. f. 35. 1824. *Sisymbrium primulaefolium* Thoms.
in Kew Journ. Bot. 4 : t. 10. 1852. *Eutrema primulaefolium* (Thoms.)
Hook. f. & Thoms. in Journ. Linn. Soc. 5. 164. 1861 ; Hook. f. Fl. Brit.
Ind. 1 : 152. 1872.

Glabrous scapigerous herbs with woody rootstock ; pods cylindric,
curved.

Fl. & Fr. : May June.

Bajmora, Hemkund, Kukinakhal. 3000 3800 m (27235).

4. *BARBAREA* R. Br. nom cons.

Barbarea vulgaris R. Br. in Ait. Hort. Kew ed. 2. 4 : 109. 1812 ;
Hook. f. Fl. Brit. Ind. 1 : 134. 1872. non *B. taurica* DC. Syst. 207. 1821.

Perennial herbs ; flowers yellow.

Fl. & Fr. : May - September.

Amritgana valley, Kedarnath, Mangu, 3000 - 3800 m (48138).

5. *CAPSELLA* Medik.

Capsella bursa pastoris (L.) Medik. Pfl. Gatt. 1 : 85. 1792.
Thlaspi bursa - pastoris L. Sp. Pl. 647. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 159. 1872.

Branching stellate hairy herbs ; pods triangular flat.

Fl. & Fr. : April - October.

Bhuna, Pokhri - Nagnath, Tunganath. 2000 - 4000 m (27278).

6. *CARDAMINE* L.

- | | | |
|---|-----|-------------------------|
| 1a. Leaflets large, 3 - 8 cm long, serrate ; flowers 1.2 cm long ; petals spreading | ... | <i>C. macrophylla</i> 2 |
| 1b. Leaflets small, .5 - 1.5 cm long, irregularly subdentate ; flowers .1 cm long ; petals erect. | | |
| 2a. Leafbase auricled ; petals shorter than the sepals | ... | <i>C. impatiens</i> 1 |
| 2b. Leafbase not auricled ; petals longer than the sepals | ... | <i>C. scutata</i> 3 |
| | | Subsp. <i>flexuosa</i> |

Cardamine impatiens L. Sp. Pl. ed. 1. 2 : 655. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 138. 1872.

Herbs with stem leaves lobed at the base ; flowers white ; petals erect.

Fl. & Fr. : April - June.

Mandoli. 2100 m (37208).

2. *C. macrophylla* Willd. Sp. Pl. 3 (1) : 484. 1800 ; Hook. f. Fl. Brit. Ind. 1 : 139. 1872.

Rootstock creeping ; perennial herbs ; flowers white, tinged violet.

Fl. & Fr. : June July.

Chandrapaduka valley, 2800 m (2925).

3. *Cardamine scutata* Thunb. in trans. Linn. Soc. 2 : 339. 1794. subsp. *flexuosa* (With.) Hara in Journ. Fac. Sci. Uni. Tokyo Bot. 6 : 59. 1952 *C. hirsuta* var. *Sylvatica* non Link Senu Hook. f. *Fl. Brit. Ind.* 1 : 138. 1872, *p. p.*

Weak herbs ; stem leaves not lobed at the base ; flowers .3 cm long ; petals erect.

Fl. & Fr. : May June.

Anusuya Devi, Pangarbasa. 700 2000 m (44126).

7. *CHRISTOLEA* Camb.

Christolea himalayensis (Camb.) Jafri in Notes Roy. Bot. Gdn. Edin, 22 : 53, fig. 1, F. 1955. *Cherianthus himalayensis* Camb. in Jacq. Voy. Bot. 14. 1844 ; Hook, f. *Fl. Brit. Ind.* 1 : 132. 1872.

Perennial branched or simple hairy herbs ; cauline leaves spatulate to linear, subfleshy, pilose ; flowers lilac ; pods linear oblong, 2 3cm, compressed pilose.

Fl. & Fr. : August September.

North Garhwal. 4500 5500 m (Rau). Lit.

8. *CHORISPORA* R. Br. ex DC. nom. cons.

Chorispora sabulosa Camb. in Jacq. Voy. 4 (Bot.) : 15, t. 15. 1835 ; Hook. f. *Fl. Brit. Ind.* 1 : 167. 1872.

Glandular hairy herbs ; flowers yellowish purple ; pods deeply torulose.

Fl. & Fr. : July August.

Rimkhim, 3000 4000 m (Duthie). Lit.

9. CRAMBE L.

Crambe cordifolia Steven in Mem. Soc. Nat. Mosc. 3 : 261. 1812.
sub. sp. **Kotschyana** (Boiss.) Jafri Stat nov. Fl. West. Pakistan 37 : 1973.

Bristly perennials ; radical leaves, petioled, rounded, cordate, thick ;
flowers white ; fruits globose.

Fl. & Fr. : July August.

Rimkhim. 3500 - 4400 m (Duthie). Lit.

10. DESCURAINIA Webb. & Berth. nom. cons.

Descurainia sophia (L.) Webb. ex Prantl in Engl. Pfl. fam. 3 : 2 :
192. 1891. *Sisymbrium sophia* L. Sp. Pl. 659. 1753 ; Hook. f. Fl. Brit. Ind.
1 : 150. 1872.

Pubescent herbs, 25 - 50 cm tall ; leaves pinnatisect ; flowers yellow.

Fl. & Fr. : July.

Badrinath valley. 3300 m (2945).

11. DRABA L.

1a. Flowers white ... *D. lasiophylla* 2

1b. Flowers yellow.

2a. Perennial very tomentose herbs ; pods elliptic-oblong... *D. winterbottomii* 3

2b. Annual hoary herbs ; pods linear, erect ... *D. gracillima* 1

1. **Draba gracillima** Hook. f. & Thoms. in Journ. Linn. Soc. 4 : 153.
1861. Hook. f. Fl. Brit. Ind. 1 : 144. 1872.

Herbs with several scapes ; flowers small yellow ; pods linear.

Fl. & Fr. : June.

Bhyundar valley, Hemkund. 4000 - 4400 m (39038).

2. *D. lasiophylla* Royle Ill. Bot. Himal. 1 : 71. 1839. *D. incana* auct.
non L. Sensus Hook. f. Fl. Brit. Ind. 1 : 143. 1872, *p. p.*

Densely hairy herbs ; stems sparsely leafy ; pods much shorter twisted.

Fl. & Fr. : August.

Bhyundar valley. 2700 - 3000 m (Smythe). Lit.

3. *Draba winterbottomii* (Hook. f. & Thoms.) Pohle in Fedde, *Repert.* 32 : 138. 1925. *D. tibetica* var. *winterbottomii* Hook. f. & Thoms. in *Journ. Linn. Soc. Bot.* 5 : 152. 1861. *D. incompta* auct. non Stev. Sensus Hook. f. *Fl. Brit. Ind.* 1 : 142. 1872.

Herbs with many crowded tufts of leaves ; scapes naked ; pods slightly curved.

Fl. & Fr. : July - August.

Bhyundar valley. 3500 - 4500 m (Smythe). Lit.

12. ERYSIMUM L.

- 1 a. Diffusely branched appressed hoary herbs ; pedicles upto .4 cm long in fruits, thickened ... *E. repandum* 2
- 1b. Tall erect appressed 2 - 4 parted hairy herbs ; pedicles .6 - 1 cm long in fruits. ... *E. hieracifolium* 1

1. *Erysimum hieracifolium* L. *Cent. Pl.* 1 : 18. 1755 in Sensus lato ; Hook. f. *Fl. Brit. Ind.* 1 : 153. 1872.

Stellately hairy herbs, flowers orange - yellow.

Fl. & Fr. : May - October.

Bhyundar valley, Kanol, Vasudhara. 2000 - 3500 m (29360).

2. *E. repandum* L. *Demonstr. Pl.* 7. 1755 ; Hook. f. *Fl. Brit. Ind.* 1 : 1872.

Branched, adpressed hairy herbs ; pods glabrous.

Fl. & Fr. May - October.

Bhyundar valley. 2900 - 3000 m (Smythe). Lit.

13. LEPIDIUM L.

- 1a. $\pm$ Glandular hairy herbs ; racemes $\pm$ capitate, not more
than 3 cm. long in fruits ; petals present ... *L. capitatum* 2
1b. Glabrous or pubescent herbs ; Corymbs lateral ; apetalous *L. apetalum* 1

1. *Lepidium apetalum* Willd. Sp. Pl. 3 : 439. 1800. *Lepidium ruderae*
non L. Sensus. Hook. f. & Thoms. in Journ. Linn. Soc. 5 : 175. 1861 ;
Hook. f. Fl. Brit. Ind. 1 : 160. 1872.

Spreading herbs ; pods orbicular oblong.

Fl. & Fr. : ?

Dhauli valley. 2000 2500 m (Duthie). Lit.

2. *L. capitatum* Hook. f. & Thoms. in Journ. Linn. Soc. 5 : 175.
1861 ; Hook. f. Fl. Brit. Ind. 1 : 160. 1872.

Glandular herbs ; pods ovate $\pm$ entire.

Fl. & Fr. : August.

Jumma area. 2600 m (53839).

14. MEGACARPAEA DC.

Megacarpaea polyandra Benth. in Hook. Kew Journ. Bot. 7 : 356, t.
7. 1855 ; Hook. f. Fl. Brit. Ind. 1 : 161. 1872.

Large coarse fleshy herbs ; flowers yellow ; pods notched ; wings
orbicular.

Fl. & Fr. : May June.

Bhyundar valley. 2500 3000 m (Smythe). Lit.

15. NASTURTIIUM R. Br.

Nasturtium officinale R. Br. in Aiton, Hort. Kew ed. 2. 4 : 110.
1812 ; Hook. f. Fl. Brit. Ind. 1 : 133. 1872.

Creeping aquatic herbs ; pods linear.

Fl. & Fr. : April,

Agastamuni, Dhotidhar, 9000 2000 m (26849).

16. RORIPPA Scop.

- 1a. Annual robust herbs, 50 - 60 cm tall ; flowering axis $\pm$ straight ;
 pods $\pm$ upcurved ... *R. indica* 1
- 1b. Perennial less robust herbs, 20 - 40 cm tall ; flowering axis zig-
 zag ; pods straight ... *R. montana* 2

1. *Rorippa indica* (L.) Hiern, Cat. Afr. Pl. Welw. 2 : 481. (Errata).
 1899. *Sisymbrium indicum* L. Sp. Pl. ed. 2 : 917. 1763 ; Hook. f. Fl. Brit.
 Ind. 1 : 134. 1872.

Herbs ; flowers yellow ; pods cylindric oblong.

Fl. & Fr. : May - June.

Trijuginarayan. 2000 - 2500 m (48018).

2. *R. montana* (Wall. ex Hook. f. & Andrs.) Small, Fl. S.E.U.S. ed.
 2 : 1330. 1913 ; *Nasturtium montanum* Wall. ex Hook. f. & Anders. in Fl.
 Brit. Ind. 1 : 134. 1872 *p.p.*

Herbs with sinuate pinnatifid radical leaves ; pods slender.

Fl. & Fr. : March - April.

Outer ranges ascending. 2500 m (Duthie). Lit.

17. SISYMBRIUM L.

Sisymbrium orientale L. Cent. Fl. 2 : 24. 1756. *S. columnae* Jacq. Fl.
 Austr. 4 : 12. 1776 ; Hook. f. Fl. Brit. Ind. 1 : 150. 1872.

Stout hairy herbs, 1 m tall ; flowers yellow ; pods 3 - nerved.

Fl. & Fr. : July.

Rimkhim. 3000 m (Duthie). Lit.

18. **THLASPI L.**

- 1a. Pods not winged ... *T. andersonii* 1
- 1b. Pods winged.
- 2a. Stem - leaves toothed ; pods orbicular, 1.5 cm broad ; style very short ... *T. arvense* 2
- 2b. Stem - leaves entire ; pods oblong - ovate, $\pm$.6 cm broad ; style long ... *T. cochleariforme* 3

1. ***Thlaspi andersonii*** (Hook. f. & Thoms.) O.E. Schulz in Anz. Akad. Wien Math - Nat. 63 : 98 in Obs. 1926. *Iberidella andersoni* Hook. f. & Thoms. in Journ. Linn. Soc. 5 : 177. 1861 ; Hook. f. Fl. Brit. Ind. 1 : 163. 1872.

Branched herbs ; flowers white or pale rose ; pods flat curved.

Fl. & Fr. : July - August.

North Garhwal. 4000 - 4500 m (Duthie). Lit.

2. ***T. arvense*** L. Sp. Pl. 641. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 162. 1872.

Herbs with toothed leaves ; flowers white ; pods orbicular.

Fl. & Fr. : May - June.

Trijuginarayan. 2500 m (47964).

3. ***T. cochleariforme*** DC. Syst. Nat. 2 : 381. 1821 ; Prodr. 1 : 176. 1824. *T. alpestre* non L. sensu Hook. f. Fl. Brit. Ind. 1 : 162. 1872, *p.p.*

Tufted herbs ; leaves entire ; pods oblong - ovate.

Fl. & Fr. : April - June.

Rajhoti. 3500 - 4000 m (Duthie). Lit.

19. *TURRITIS* L.

Turritis glabra L. Sp. Pl. 666. 1753. *Arabis glabra* Crantz, Strip. Austr. 1 : 36. 1762 ; Hook. f. Fl. Brit. Ind. 1 : 135. 1872.

Glaucous herbs ; basal lobes of stem - leaves pointed ; flowers pale yellow or white.

Fl. & Fr. : July - September.

Bampa, Bhyundar valley. 2500 - 3000 m (Duthie). Lit.

20. *BRASSICA* L.

- | | | |
|--|-----|---|
| 1a. Pods erect, nearly glabrous, appressed to the axis of the raceme | ... | <i>B. nigra</i> 2 |
| 1b. Pods more or less spreading. | | |
| 2a. Stem - leaves tapering to the base, not amplexicaule | ... | <i>B. juncea</i> 1 |
| 2b. Stem - leaves broad based, the upper ones amplexicaule | ... | <i>B. rapa</i> ssp. <i>campestris</i> 3 |

1. *Brassica juncea* (L.) Czern. et Coss. in Czern. Conspect. Pl. Charc. 8. 1859. *Sinapis juncea* L. Sp. Pl. 666. 1753.

Stout slightly hispid herbs ; upper leaves oblong - linear ; seeds reddish - brown.

Cultivated.

2. *B. nigra* (L.) Koch in Rohling Deutsch. Fl. ed. 3, 4 : 713. 1833. *Sinapis nigra* L. Sp. Pl. 668. 1753.

Bristly hairy to glabrous herbs ; upper leaves narrowly elliptic or lanceolate, short stalked ; seeds dark-brown.

Cultivated.

3. **B. rapa** L. Sp. Pl. 668. 1753. Subsp. **Compestris** (L.) Clapham in Fl. Brit. Isles, ed. 2 : 124. 1962.

Hairy glabrous herbs ; upper leaves oblong – lanceolate 1/2 stem – clasping, glabrous ; seeds pale – yellow brown.

Cultivated.

21. **RAPHANUS** L.

Raphanus sativus L. Sp. Pl. 669. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 166. 1872.

Annual or biennial herbs ; flowers white – lilac ; pods indehiscent, terete thick.

Agastamuni, cultivated. 900 m. (96818).

12. **CAPPARACEAE**

- | | | |
|-------------------------------------|-----|-------------------|
| 1a. Erect herbs ; leaves compound | ... | <i>Cleome</i> 1 |
| 1b. Trailing shrubs ; leaves simple | ... | <i>Capparis</i> 2 |

1. **CLEOME** L.

Cleome viscosa L. Sp. Pl. ed. 1 : 672. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 170. 1872. '*Jakhiya*'.

Viscidly pubescent, smelling herbs ; flowers yellow ; capsules linear glandular.

Fl. & Fr. : July – August.

Paduli. Common throughout in waste places ascending to 2000 m. (144, Kala & Gaur). Lit.

2. CAPPARIS L.

Capparis spinosa L. Sp. Pl. 503. 1753 var. **himalayensis** (Jafri) Jacobs in Blumea 12 : 419. 1965. *C. himalayensis* Jafri in Pakistan Journ. For. 6 : 197, t. 1, f. 13 map 1956, Hook. f. Fl. Brit. Ind. 1 : 173. 1872.

Branched, white pubescent, prickly trailing shrubs ; flowers white fading to pink.

Fl. & Fr. : June - October.

Pipalkoti - Gulabkoti. 1500-1800 m (2750). Not Common.

13. VIOLACEAE

VIOLA L.

- 1a. Flowers yellow ... *V. biflora* 1
- 1b. Flowers lilac or pale blue.
 - 2a. Leaves narrowly triangular ; stigma 3 - lobed, hollowed at the top *V. betonicifolia* Subsp. *nepalensis* 3
 - 2b. Leaves ovate.
 - 3a. Stipules entire or toothed ; stigma 3 - lobed, beaked ... *V. pilosa* 4
 - 3b. Stipules fringed ; stigma truncate, not beaked ... *V. canescens* 2

1. **Viola biflora** L. Sp. Pl. ed. 1, 2 : 936. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 182. 1872. *p.p.*

Delicate herbs ; leaves reniform ; flowers yellow.

Fl. & Fr. : June - August.

Badrinath, Ghangaria, Tunganath. 2800-3000 m. (29620).

2. **Viola canescens** Wall. in Roxb. Fl. Ind. ed. Carrey 2 : 450. 1824. *V. serpens* Wall. var. *canescens* (Wall. ex Roxb.) Hook. f. & Thoms. in Fl. Brit. Ind. 1 : 184. 1872.

Densely white pubescent herbs ; stems none ; stipules fringed ; flowers violet.

Fl. & Fr. : April - November.

Mangu, Mohankhal. 2000 3000 m (24462).

3. *V. betonicifolia* J. E. Smith Subsp. *napalensis* (Ging.) Becker in Bot. Jahrb. 54 : Beibl. 120, 166. 1917. *V. patrinii* var. *nepalensis* Ging in DC. Prodr. 1 : 293. 1824. *V. Patrinii auct.* non Ging. 1824 ; Hook. f. Fl. Brit. Ind. 1 : 183. 1872.

Herbs with triangular leaves ; flower dark lilac.

Fl. & Fr. : August - September.

Bampa on way. 3000 in (56038).

4. *V. pilosa* Bl. Cat. Gew. Buit. 57. 1823. *V. serpens* Wall. ex Ging in DC. Prodr. 1 : 296. 1824 ; Hook. f. Fl. Brit. Ind. 1 : 184. 1872. '*Banafsā*'.

Sparsely hairy green herbs ; stipules entire.

Fl. & Fr. : August - September.

Bhyundar & Rishiganga valleys. 2500 - 3000 m (47975).

14. FLACOURTIACEAE

(Incl. SAMYDACEAE)

- | | | |
|--|-----|---------------------|
| 1a. Fruits capsular | ... | <i>Casearia</i> 1 |
| 1b. Fruits berry. | | |
| 2a. Leaves pubescent, ovate, 2.5 - 7 cm long ; styles 4 or 5 | ... | <i>Flacourtia</i> 2 |
| 2b. Leaves glabrous, oblong - lanceolate, 5 - 15 cm long ; style 1 | ... | <i>Xylosma</i> 3 |

1. CASEARIA Jacq.

Casearia graveolens Dalz. in Hook. Journ. Bot. 4 : 107. 1841 ; Hook. f. Fl. Brit. Ind. 2 : 592. 1879.

Small trees ; twigs and leaves glabrous ; fruits yellow.

Fl. & Fr. : May – July.

Throughout the area upto 1800 m. (Osmaston). Lit.

2. FLACOURTIA L. Herit.

Flacourtia indica (Burm. f.) Merr. Interpret. Rumph. Herb. Amb. 377. 1917. *Gmelina indica* Burm. f. Fl. Ind. 132, t. 39, f. 5. 1768. *F. ramontchii* L' Herit, in Hook. Fl. Brit. Ind. 1 : 193. 1872.

Deciduous spinous trees ; flowers greenish yellow.

Fl. & Fr. : February – June.

Pandukeswar. 2000 – 2500 m. (2782).

3. XYLOSMA Forst.

Xylosma longifolium Clos in Ann. Sci. Nat. Ser. 8 : 231. 1857 ; Hook. f. Fl. Brit. Ind. 1 : 194. 1872.

Evergreen trees ; branches stout, spinous ; style 1.

Fl. & Fr. : March – December.

Throughout the area. upto 1800 m (Osmaston). Lit

15. PITTOSPORACEAE

PITTOSPORUM Banks ex Solander, nom. cons.

Pittosporum eriocarpum Royle, Ill. Bot. Himal. 77. 1839 ; Hook. f. Fl. Brit. Ind. 1 : 199. 1872.

Tomentose shrubs or small trees ; capsules tomentose.

Fl. & Fr. : March – November.

Occurs throughout. 1200 m – 2300 m (Osmaston). Lit. Rare.

16. POLYGALACEAE

POLYGALA L.

1a. Flowers purple or pink.

2a. Keel 2 - lobed at the tip, not crested ... *P. tatarinowii* 6

2b. Keel with a fringed crest at the tip.

3a. Stems and leaves densely hairy ... *P. crotalarioides* 3

3b. Stems and leaves glabrous or nearly so.

4a. Perennials ; rootstock woody ; leaves linear, 1.2 - 2.5 cm long ... *P. abyssinica* 1

4b. Annuals ; rootstock fibrous ; leaves lanceolate, 2.5 - 5 cm ... *P. persicariaefolia* 5

1b. Flowers yellow.

5a. Pubescent, erect or diffuse herbs ; capsules ovate, notched, fringed ... *P. arvensis* 2

5b. Glabrous, slender, erect herbs ; capsules orbicular, entire ... *P. furcata* 4

1. **Polygala abyssinica** R. Br. ex Fresen. in Mus. Senck. 2 : 273. 1837 ; Hook. f. Fl. Brit. Ind. 1 : 202. 1872.

Glabrous herbs ; racemes terminal ; Capsules ovate, notched.

Fl. & Fr. April - July.

Joshimath, Ramni - Sutul. 2500 m (10156).

2. ***P. arvensis*** Willd. Sp. Pl. 3(2) : 876. 1800. *P. chinensis* auct. non L. *Sensue* Hook. f. Fl. Brit. Ind. 1 : 204. 1872.

Much branched pubescent herbs ; racemes axillary ; seeds brown hairy.

Fl. & Fr. : June - August.

Nandprayag across Alaknanda. 800 m (71084).

3. ***P. crotarioides*** Buch. - Ham. ex DC. Prodr. 1 : 327. 1824 ; Hook. f. Fl. Brit. Ind. 1 : 201. 1872.

Villous herbs with long and short hairs ; capsules cordate ; seeds pilose.

Fl. & Fr. : April. - October.

Bhyundar valley, Loharjung, Ramni, Trijuginaryana. 2000 - 2500 m (35848).

4. ***P. furcata*** Royle, Ill. Bot. Himal. t. 19 B, 1 4. 1834. *P. triphylla* Buch. - Ham. var. 2. *glaucescens* (Wall.) Benn. in Hook. f. Fl. Brit. Ind. 1 : 201. 1872.

Small glabrous herbs ; leaves fascicled at the top ; flowers yellow ; seeds black, punctate.

Fl. & Fr. : August - September.

Langasu, Soragarh. 600 m (6348). Not common.

5. ***P. persicariifolia*** DC. Prodr. 1 : 326. 1824 ; Hook. f. Fl. Brit. Ind. 1 : 202. 1872.

Sparsely hairy herbs ; inner sepals orbicular ; racemes terminal.

Fl. & Fr. : August - October.

Chamoli, Jakhmola on way, Nandkeshri. 600 - 1800 m (38767).

6. ***P. tatarinowii*** Regel in Bull. Soc. Nat. Mosc. 34(2) : 523. 1861. *P. triphylla* auct. non Buch - Ham. ex D. Don nee Burm. f. *sensu* Hook. f. Fl. Brit. Ind. 1 : 201. 1872, ex var. *glaucescens*.

Small herbs ; leaves scattered on the stem ; Capsules Orbicular.

Fl. & Fr. : August - October.

Gaurikund, Jakhmola, Trigunaryan. 2000 m (35847). Not Commom.

17. CARYOPHYLLACEAE

1a. Sepals fused.

2a. Calyx bell - shaped not inflated.

3a. Calyx 5 - nerved ; fruits capsular ... *Gypsophila* 5

3b. Calyx 10 - nerved ; fruits fleshy ... *Cucubalus* 3

2b. Calyx tubular more or less inflated ... *Silene* 8

1b. Sepals free or connate at the base.

4a. Petals present.

5a. Styles 2 - 3 combined ... *Drymaria* 4

5b. Styles free.

6a. Each petal bipartite or deeply bifid.

7a. Capsules cylindric with twice as many short valves as styles ... *Cerastium* 2

7b. Capsules short, splitting at base into as many valves as there are styles ... *Stellaria* 9

6b. Each petal entire.

8a. Carpels 4 - 5 ... *Sagina* 7

8b. Carpels 2 - 3 ... *Thylacospermum* 10

4b. Petals absent.

9a. Capsules opening by as many valves as styles ... *Minuartia* 6

9b. Capsules opening by twice as many teeth or valves as styles ... *Arenaria* 1

1. ARENARIA L.

1a. Densely tufted herbs ; leaves crowded, subulate, rigid or grass like.

- 2a. Peduncles elongate ; flowers in cymes ... *A. festucoides* 2
- 2b. Peduncles very shortly pedicelled or sessile ; flowers solitary ... *A. perlevis* 5
- 1b. Laxly tufted herbs ; leaves ovate or oblong, never subulate.
- 3a. Flowers small, cymes, few or many flowered.
- 4a. Leaves ovate - acuminate, 1 - 3 - nerved ; sepals 3 - 5 - ribbed ... *A. serpyllifolia* 7
- 4b. Leaves elliptic or obovate or orbicular ; sepals 1 nerved.
- 5a. Sepals pubescent ; seeds rough ... *A. neelgherrensis* 6
- 5b. Sepals glabrous ; seeds smooth ... *A. orbiculata* 4
- 3b. Flowers solitary.
- 6a. Hairs flexuous, jointed ; flowers white ... *A. ciliolata* 1
- 6b. Hairs glandular, not jointed ; flowers rosy ... *A. glanduligera* 3

1. ***Arenaria ciliolata*** Edgew. in Hook. f. Fl. Brit. Ind. 1 : 240. 1874.

Perennial, hairy, eglandular, laxly tufted herbs ; leaves ovate or oblong acute ; sepals lanceolate acute.

Fl. & Fr. : August.

Garhwal, Nanda Devi Sanctuary. 4500 - 5500 m (Rau, Hazra). Lit.

2. ***A. festucoides*** Benth. in Royle, Ill. Bot. Himal. 81, t. 21. 1834 ; Hook. f. Fl. Brit. Ind. 1 : 256. 1874.

Loosely tufted green herbs ; flowers 1 - few ; calyx glandular pubescent.

Fl. & Fr. : June - October.

Kailu - Vinayak, Malari, Vasudhara. 3600 - 4200 m (30955).

3. ***A. glanduligera*** Edgew. ex Edgew. & Hook. f. in Fl. Brit. Ind. 1 : 240. 1874.

Perennial glandular tufted herbs ; flowers solitary, dull, purplish white.

Fl. & Fr. : September - October.

Bhuundar valley, Kailuvinayak. 4500 - 5000 m (30949).

4. *Arenaria orbiculata* Royle ex Edgew. et. Hook. f. in Fl. Brit. Ind. 1 : 240. 1874.

Prostrate glabrous herbs ; leaves orbicular ; styles 5.

Fl. & Fr. : April - October.

Bagrigar, Bhuundar valley, Mondal. 1600 - 4000 m (42079).

5. *A. perlevis* (Williams) Hand - Maz. in Oesterr. Bot. Zeitsch. 79 : 32. 1930. *A. polytrichoides* Edgew var. *perlevis* Williams (1898). *A. musciformis* Wall. ex Edgew. et Hook. f. Fl. Brit. Ind. 1 : 237. 1874.

Matted hard tufted herbs with long woody roots ; flowers $\pm$ sessile, solitary.

Fl. & Fr. : September - October.

Bhyundar valley. 4000 mm (24357).

6. *A. neelgherrensis* Wt. & Arn. Prodr. 43. 1834 ; Hook. f. Fl. Brit. Ind. 1 : 239. 1874.

Annual, procumbent pubescent herbs ; leaves elliptic ; sepals 1-nerved.

Fl. & Fr. : September.

Mondal, Ukhimath. 2000 m (26896).

7. *Arenaria serpyllifolia* L. Sp. Pl. 423. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 239. 1874.

Much branched pubescent herbs, leaves ovate ; sepals 3 - 5 ribbed.

Fl. & Fr. : July - August.

Bagrigar, way to Dunagiri. 1600-2000 m (35176).

2. CERASTIUM L.

Cerastium glomeratum Thuill. Fl. Env. Paris ed 2 : 226. 1799. *C. vulgatum* var. *glomeratum* (Thuill.) Edgew. et Hook. f. in Fl. Brit. Ind. 1 : 228. 1874.

Pubescent viscid branching herbs ; upper leaves sessile ; capsules cylindric much exerted.

Fl. & Fr. : February – June.

Bagrigar, Hemkund on way, 2000-3000 m (35177).

3. CUCUBALUS L.

Cucubalus baccifer L. Sp. Pl. 414. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 222. 1874.

Pubescent sub-climbers ; flowers white, tinged with yellowish - green; fruits globose, black.

Fl. & Fr. : June – September.

Bhuundar valley, 2500 m (29640).

4. DRYMARIA Willd. ex Roem. & Schult.

Drymaria diandra Bl. Bijdr. 62. 1825. *D. cordata* non Willd. Sensus Edgew. et. Hook. f. Fl. Brit. Ind. 1 : 244. 1874.

Slender dichotomously branched herbs ; leaves ovate, orbicular cordate 3-5 nerved ; flowers, axillary or terminal solitary.

Fl. & Fr. : April – May & August – November.

Kanara-Mohankhal, Narayankoti. 1500 – 2000 m (35821).

5. GYPSOPHILA L.

Gypsophila eerastioides D. Don Prodr. Fl. Nep. 213. 1825 ; Hook. f. Fl. Brit. Ind. 1 : 217. 1874.

Perennial pubescent herbs ; flowers white streaked-purple ; calyx bell shaped.

Fl. & Fr. : May - October.

Hemkund on way, Rambara Guaurikund, Shutul Bhuna. 2800 - 3500 m (39039).

6. MINUARTIA Loeffl. ex L.

1a. Glabrous slender branching herbs ; pedicels equalling or exceeding the sepals ... *M. lineata* 2

1b. Glandular pubescent herbs ; pedicels shorter than the sepals ... *M. kashmirica* 1

1. **Minuartia kashmirica** (Edgew.) Matt. in Fedd. Repert. t. 15 : 154. 1922. *Arenaria kashmirica* Edgew. & Hook. f. Fl. Brit. Ind. 1 : 236. 1874.

Densely tufted glandular pubescent herbs ; leaves rigid strongly 3 nerved.

Fl. & Fr. : July - August.

Bhyundar valley, 2000 - 2500 m (Smythe). Lit.

2. **M. lineata** (C. A. Mey.) Bornm. in Beih. Bot. Centralbl. 27. Alet. 1 : 381. 1910. *Arenaria foliosa* Royle ex Hook. f. Fl. Brit. ind. 1 : 236. 1874.

Loosely tufted glabrous herbs ; leaves flexuous 1 - 3 nerved.

Fl. & Fr. : June - August.

Jelam, 3000 - 4500 m (Duthie). Lit.

7. SAGINA L.

Sagina saginoides (L.) Karsten Deutsche Fl. 539. 1882. *Sagina procumbens* non L. Sensu Edgew et Hook. f. Fl. Brit. Ind. 1 : 242. 1874, p. p.

Tufted slender glabrous herbs ; flowers white.

Fl. & Fr. : June - October.

Alaknanda bank, Bhyundar valley, Jumma area. 2000 - 3500 m (15817).

8. *SILENE* L.

1a. Capsules dehiscing by teeth equal to number of styles.

2a. Herbs scape - like ; seeds compressed, winged, not granulate or tubercled.

3a. Stems short densely leafy ; carpophore $\pm$ 0. *S. gonosperma* ssp. *bimalensis* 5

3b. Stems simple laxly leafy ; carpophore, 4 - .6 cm long... *S. nigrescens* 10

2b. Simple or branched herbs ; seeds reniform, wingless, granulate or tubercled.

4a. Stems simple ; leaves narrowly lanceolate.

5a. Slender, 30 - 60 cm tall ; calyx ovoid pale, nerved ... *S. duthiei* 2

5b. Strict, 60 - 90 cm tall ; calyx oblong campanulate... *S. nepalensis*

4b. Stems laxly dichotomously branched.

6a. Finely pubescent ; seeds strongly granulate on sides.

7a. Petals bifid ; styles 3. ... *S. indica* 6

7b. Petals fimbriate ; styles 5.

8a. Fringe short ; segments entire. ... *S. thomsonii* 12

8b. Fringe long ; segments 2 - lobed ... *S. edgeworthii* 3

6b. Glandular hairy herbs ; seeds strongly granulate on the back ...

S. laxantha 8

1b. Capsules dehiscing by twice as many teeth as there are styles.

9a. Flowers white.

10a. Glabrous ; calyx ovoid, inflated ; petals not fringed... *S. vulgaris* 14

10b. Viscidly prbescent ; calyx tubular ; petals fringed ... *S. viscosa* 13

9b. Flowers pink or brown - purple.

11a. Petals not lobed.

12a. Petals pink ; limbs short, obovate ... *S. conoidea* 1

- 12b. Petals brown - purple ; limbs long, narrow ... *S. falconeriana* 4
- 11b. Petals 2 - lobed.
- 13a. Branches, brown purple; leaves elliptic lanceolate *S. kumaonensis* 7
- 13b. Branches, dull yellowish - brown ; leaves linear lanceolate ... *S. persica* Subsp. *moorecroftiana* 11

1. **Silene Conoidea** L. Sp. Pl. 418. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 218. 1874.

Pubescent herbs ; Panicles terminal ; capsules conical.

Fl. & Fr. : March - April.

Kanara - Mohankhal. 700 - 2100 m (27232).

2. **S. duthiei** Majumdar in Journ. Ind. Bot. Soc. 42 : 648. 1964. *Lychnis brachypetala* Hornem. Hort. Hafn. Suppl. 51. 1819 ; Edgew et Hook. f. in Fl. Brit. Ind. 1 : 223. 1874.

Perennial pubescent herbs ; leaves grass - like : flowers dirty white.

Fl. & Fr. : July - August.

Laptal. 4000 - 5000 m (Duthie). Lit.

3. **S. edgeworthii** Bocquet in Candollea, 22 : 13. 1967 ; Mazumdar in Bull. Bot. Surv. Ind. 15 : 42. 1973. *Lychnis fimbriata* Benth. in Royle Ill. Bot. Himal. 80, t. 208. 1834. *L. indica* Benth. var. *fimbriata* (Benth.) Edgew. et Hook. f. Fl. Brit. Ind. 1 : 225. 1874.

Scabrous or pubescent herbs ; flowers purplish - white ; petals fimbriate.

Fl. & Fr. : September - October.

Bhyundar valley. 2500 - 2800 m (24231).

4. **S. falconeriana** Benth. in Royle Ill. Bot. Himal. 79, t. 20. 1834 ; Hook. f. Fl. Brit. Ind. 1 : 220. 1874.

Branched pubescent herbs ; leaves linear lanceolate ; cymes axillary ; petals not auricled.

Fl. & Fr. : September - October.

Bhyundar valley, Hemkund, Rambara - Gaurikund. 2000 - 2500 m (24230).

5. *Silene Gonosperma* (Rupr.) Bocquet Subsp. *himalensis* (Rohrb.) Bocquet var. *himalensis*. *Lychnis himalensis* (Rohrb.) Edgew. in Hook. f. Fl. Brit. India 1 : 223. 1874. *Lychnis apetala* auct. non L. Senu Hook. f. Fl. Brit. Ind. 1 : 222. 1874.

Glandular pubescent scape like herbs ; radical leaves linear lanceolate ; flowers solitary purplish – white, sometimes 2 – 3.

Fl. & Fr. : September – October.

Bhyundar valley. 4000 – 5500 m (Smythe). Lit.

6. *S. indica* Roxb. ex Otth in DC. Prodr. 1 : 368. 1824 ; Majumdar in Bull. Bot. Surv. Ind. 15 : 42 1973. *Lychnis indica* (Roxb. ex Otth) Edgew. & Hook. f. Fl. Brit. Ind. 1 : 225. 1874.

Perennial dichotomously branched pubescent herbs ; flowers purplish-green ; petals short bifid.

Fl. & Fr. : August – October.

Bhyundar valley, Dhotidhar, Vickie Tal. 2400 – 2700 m (24231).

7. *S. kumaonensis* Williams in Journ. Linn. Soc. Bot. 32 : 43. 1896.

Branched dull purplish pubescent herbs ; flowers purplish – white.

Fl. & Fr. : August – September.

Kaga area way to Dunagiri. 2500 – 3000 m (53913).

8. *S. laxantha* Majumdar in Journ. Ind. Bot. Soc. 42 : 650. 1963. *Lychnis pilosa* Edgew. et Hook. f. Fl. Brit. Ind. 1 : 226. 1874.

Elongate viscid pubescent herbs ; flowers exerted, greenish – white.

Fl. & Fr. : September – October.

Hindustan Tibet Road, Mana – Vasudhara, Tungnath. 3000 – 3500 m (10570).

9. *S. nepalensis* Majumdar in Journ. Bot. Soc. 42 : 649. 1963. *Lychnis multicaulis* Wall. ex Edgew. in Hook. f. Fl. Brit. Ind. 1 : 224. 1874.

Pubescent herbs ; leaves linear – lanceolate ; flowers included, greenish – purplish.

Fl. & Fr. : June – August.

Badrinath. 3200 m (Duthie). Lit.

10. *Silene nigrescens* (Edgew.) Majumdar in Journ. Ind. Bot. Soc. 42 : 647. 1963. *Lychnis nigrescens* Edgew. in Hook. f. Fl. Brit. Ind. 1 : 223. 1874.

Scape – like glandular pubescent perennials ; flowers solitary ; calyx purplish – brown much inflated.

Fl. & Fr. : June – August.

North Garhwal. 4500 m (Rau). Lit.

11. *S. persica* Boiss. Dingn. Pl. Nov. Or. Ser. 1 (1) : 27. 1842. subsp. *moorcroftiana* (Rohrb.) Chowdhuri in Notes Roy. Bot. Gdn. Edind. 22(3) : 267. 1957. *S. moorcroftiana* Wall. ex Roxb. Mon. Sil. 129. 1868 ; Hook. f. Fl. Brit. Ind. 1 : 219. 1874.

Sparsely pubescent herbs ; flowers 1 – 3 terminal paniced cymes ; petals auricled.

Fl. & Fr. : August – November.

Badrinath, Gothing, 3200 – 3500 m (10434).

12. *S. thomsonii* Majumdar in Jour. Ind. Bot. Soc. 42 : 650. 1963. *Lychnis nutans* Benth. in Royle, Ill. Bot. Himal. 80. 1834 ; Hook. f. Fl. Brit. Ind. 1 : 225. 1874. *p.p.*

Lower leaves lanceolate ; upper leave sbroadly ovate ; calyx globose, 1.2 cm long ; capsules ovoid.

Fl. & Fr. : August.

Way to Badrinath. 300 – 3800 m (339, Kala & Gaur). Lit.

13. *S. viscosa* (L.) Pers. Synops. 1 : 497. 1805. *Cucubalus viscosum* L. Sp. Pl. 414. 1753. *S. griffithii* Boiss. Dingn. Ser. 2. 1 : 76. 1854 ; Hook. f. Fl. Brit. Ind. 1 : 220. 1874.

Pubescent herbs ; leaves oblong to ovate – lanceolate ; flowers in usually 3 flowered cymes.

Fl. & Fr. : August.

Way to Dunagiri. 2500 – 3500 m (54048).

14. *S. vulgaris* (Moench.) Garcke Fl. Nord. Mittel – Deutsch. ed. 9, 64. 1869. *Behen vulgaris* Moench Meth. 709. 1794. *S. inflata* Sm. Fl. Brit. 467. 1800 ; Hook. f. Fl. Brit. Ind. 1 : 218. 1874.

Ascending herbs ; flowers few drooping ; calyx reticulately veined, inflated.

Fl. & Fr. : May - October.

Ghangaria, Kanol, Khiraum valley, 2200 - 2300 m (2950).

9. STELLARIA L.

1a. Ovary 1 - celled ; capsules many seeded.

2a. Sepals connate at the base.

3a. Petals minute or 0.

4a. Stems slender or wiry, 4 - angled ; glabrous herbs ; seeds tubercled or granulate.

5a. Stems wiry, red brown, 7 - 10 cm tall ; seeds granulate ... *S. cherleriae* 3

5b. Stems slender, much branched, green, 15 - 45 cm tall ; seeds tubercled ... *S. alsine* 1

4b. Densely tufted $\pm$ hairy herbs ; seeds smooth ... *S. decumbens* 4

3b. Petals prominently deeply 2 - partite ; woolly or silky herbs. ... *S. patens* 9

2b. Sepals free to the base.

6a. Styles 2 or 3 ; capsules with 4 - 6 entire valves.

7a. Styles 2 ; seeds $\pm$ smooth ... *S. himalayensis* 5

7b. Styles 3 ; seeds tubercled.

8a. Stems procumbent with lines of hairs ; leaves ovate, acuminate ... *S. media* 6

8b. $\pm$ Woolly, elongate, stout, decumbent branched herbs ; leaves subulate, recurved ... *S. semivestita* 10

6b. Styles 5 ; capsules 5 with 2 - fid valves ... *S. aquatica* 2

1b. Ovary 3 - celled ; seeds 1 - 2.

9a. Leaves all sessile ; petals as long or twice as long as the sepals ; seeds granulate ... *S. monosperma* 7

9b. Lower leaves stalked ; petals shorter than the sepals ; seeds wrinkled *S. monosperma* var. *paniculata* 8

1. ***Stellaria alsine*** Grimm in Nov. Act. Leopdl. 3 App. 313. 1767. *S. uliginosa* non L. Senu Edgew. et Hook. f. Fl. Brit. Ind. 1 : 233. 1874.

Spreading filiform glabrous herbs ; leaves undulate margined ; flowers white.

Fl. & Fr. : February – March & August – October.

Ghangaria, Nigol valley. 1000 – 3800 m (24416).

2. ***S. aquatica*** (L.) Scop. Fl. Carn. ed. 2. 1 : 319. 1772. *Cerastium aquiticum* L. Sp. Pl. 439. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 229. 1874.

Pubescent perennial herbs ; leaves ovate, cordate acute ; sepals viscid, lanceolate ; petals nerveless, deeply 2 – lobed.

Fl. & Fr. : May – October.

Dewar. 1200 – 2400 m (59, Kala & Gaur). Lit.

3. ***S. cherleriae*** (Fish.) Williams in Bull. Herb. Boiss. Ser. 2, 7 : 830. 1907. *p.p.* et *guoad.* *S. depauperata* Edgew. in Hook. f. Fl. Brit. Ind. 1 : 234. 1874.

Slender erect herbs ; flowers white ; pedicels recurved.

Fl. & Fr. : October.

Kailu – Venayak. 4500 m (30945).

4. ***S. decumbens*** Edgew. in Trans. Linn. Soc. 20 : 35. 1846 ; Hook. f. Fl. Brit. Ind. 1 : 234. 1874.

Prostrate matted herbs ; flowers white ; sepals connate at the base.

Fl. & Fr. : August – October.

Bhyundar valley, Dhotidhar, Tunganath. 3000 – 4700 m (42196).

5. ***S. himalayensis*** Majumdar in Journ. Ind. Bot. Soc. 44 : 141. 1965. *S. latifolia* (Benth. ex Royle) Edgew. & Hook. f. in Fl. Brit. Ind. 1 : 231. 1874, non Pers.

Decumbent herbs ; upper leaves ovate orbicular ; lower leaves lanceolate.

Fl. & Fr. : April – June.

Bagrigar, Bajmora, Trijuginarayan. 2000 – 3700 m (10245).

6. *Stellaria media* (L.) Vill. Hist. Pl. Dauph. 3 : 615. 1789. *Alsine media* L. Sp. Pl. 272. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 230. 1874.

Prostrate glabrous herbs with a line of hair running down the stem ; lower leaves stalked.

Fl. & Fr. : January – May.

Mondal. 600 – 1650 m (43935).

7. *S. monosperma* Buch. – Ham. ex D. Don Prodr. Fl. Nep. 215 : 1825. *S. crispata* Wall. ex Edgew. & Hook. f. Fl. Brit. Ind. 1 : 229. 1874.

Sparsely hairy spreading tender herbs ; leaves sessile crisped ; seeds 1 – 2, large.

Fl. & Fr. : August – October.

Bhyundar valley, Phata, Trijuginarayan. 3500 – 4000 m (42035).

8. *S. monosperma* var. *paniculata* (Edgew.) Majumdar in Journ. Ind. Bot. Soc. 44(1) : 141. 1965 ; Mizushima in. Journ. Jap. Bot. 32 : 248. f. 1 – p. 1957. *S. paniculata* Edgew. in Hook. f. Fl. Brit. Ind. 1 : 229. 1874.

Spreading herbs ; lower leaves petioled ; capsules 1 – seeded.

Fl. & Fr. : August – October.

Ghangaria, Kukinakhal, Vickie Tal. 1600 – 3500 m (31118).

9. *S. patens* D. Don Prodr. Fl. Nep. 215. 1825. *S. longissima* Wall. ex Edgew. in Hook. f. Fl. Brit. Ind. 1 : 232. 1874.

Prostrate white hairy herbs ; leaves under surface white hairy ; corolla equalling the calyx.

Fl. & Fr. : June – July.

Badrinath, Bhuna – Bistola, Hanumanchatti. 2000 – 3500 m (2980).

10. *S. Semivestita* Edgew. et Hook. f. Fl. Brit. Ind. 1 : 230. 1874.

Large compact woolly herbs ; corolla longer than the calyx.

Fl. & Fr. : May – September.

Narayankoti, Trijuginaryan. 1500 – 2500m (47990).

10. THYLACOSPERMUM Fenzl.

Thylacospermum Caespitosum (Camb.) Schischk. Herb. Fl. Ross. 9 : 90. 1932. *Periandra caespitosa* Camb. in Jacq. Voy. 4 : (Bot.) 27, t. 29. 1835 ; Hook. f. Fl. Brit. Ind. 1 : 243. 1874.

Densely tufted herbs forming hemispheric cushions ; leaves minute ; flowers solitary, sessile, white.

Fl. & Fr. : August.

Sarsaupatal 4500 – 5500 m (73728, Hazra) Lit.

18. PORTULACACEAE

PORTULACA L.

Portulaca oleracea L. Sp. Pl. ed. 1, 445. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 246. 1874.

Prostrate purplish – green succulent herbs ; flowers yellow.

Fl. & Fr. : October – December.

Common as weed in lower valleys, ascending to 1800 m (FBI). Lit.

19. TAMARICACEAE

MYRICARIA Desv.

- | | | |
|--|-----|-----------------------|
| 1a. Stems 30 - 90 cm high ; leaves .3 - .8 cm long | ... | <i>M. bracteata</i> 1 |
| 1b. Stems upto 5 m high, leaves .8 - 2 cm long | ... | <i>M. elegans</i> 2 |

1. *Myricaria bracteata* Royle, Ill. Bot. Himal. 214, t. 44, 1839.
M. germanica auct. plur non Desv. Sensus Hook. f. Fl. Brit. Ind. 1. 250.
 1874.

Deciduous shrubs ; leaves linear - lanceolate ; capsules, .75-1.25 cm.

Fl. & Fr. : June - October.

Alkapuri, Bhyundar valley. 3500 - 3800 m (24348).

2. *M. elegans* Royle, Ill. Bot. Himal. 214, 1839 ; Hook. f. Fl. Brit.
 Ind. 1 : 250. 1874. 'Wombu'.

Deciduous shrubs ; leaves oblong - lanceolate ; capsules, .6-.75 cm.

Fl. & Fr. : June. - July.

Inner dry ranges bordering Tibet. 2600 - 4500 m (Osmaston). Lit.

20. HYPERICACEAE

HYPERICUM L.

1a. Shrubs.

2a. Styles longer than the ovary.

- | | | |
|---|-----|---------------------------|
| 3a. Branches terete ; sepals ovate | ... | <i>H. oblongifolium</i> 6 |
| 3b. Branches 4 - angled ; sepals lanceolate | ... | <i>H. dyeri</i> 1 |

2b. Styles not longer than the ovary.

- | | | |
|---|-----|-------------------------|
| 4a. Shrubs more than 1.80 m tall ; branches terete ; sepals
ovate | ... | <i>H. hookerianum</i> 3 |
| 4b. Shrubs 30 - 90 cm tall ; branches 2 - edged ; sepals
elliptic - obtuse | ... | <i>H. uralum</i> 7 |

1b. Herbs.

- | | | |
|--|-----|-----------------------|
| 5a. Annuals ; stamens connate at the base ; ovary 1 - celled | ... | <i>H. japonicum</i> 4 |
|--|-----|-----------------------|

5b. Perennial herbs ; stamens 3 - adelphous ; ovary 3 - celled.

6a. Simple erect herbs.

- | | | |
|--|-----|-------------------------|
| 7a. Stems terete, 30 - 60 cm tall ; cymes paniculate | ... | <i>H. elodeoides</i> 2 |
| 7b. Stems 2 - edged, 10 - 30 cm tall ; cymes 1 - 3
flowered | ... | <i>H. monanthemum</i> 5 |

- | | | |
|---|-----|------------------------|
| 6b. Weak slender branching prostrate or diffuse herbs | ... | <i>H. wightianum</i> 8 |
|---|-----|------------------------|

1. **Hypericum dyeri** Rehder in Journ. Arn. Arb. 20 : 422. 1939.
H. lysimachioides Wall. ex Dyer in Hook. f. Fl. Br. Ind. 1 : 254. 1874,
non Boiss. & Noe 1853.

Shrubs ; leaf bases not decurrent ; petals narrowly oblong.

Fl. & Fr. : April – August.

Ramni. 1800 – 2500 m (3002).

2. **H. elodeoides** Choisy in DC. Prodr. 1 : 552. 1824 ; Hook. f. Fl.
Brit. Ind. 1 : 255. 1874.

Stoloniferous herbs ; flowers yellow, black dotted.

Fl. & Fr. : July – August.

Bhyundar valley, Pangarbasa – Dhotidhar. 2000 – 2700 m (42161).

3. **H. hookerianum** Wt. & Arn. Prodr. 1 : 99. 1834. Hook. f. Fl.
Brit. Ind. 1 : 254. 1874.

Deciduous shrubs ; leaves not decurrent ; petals orbicular ; capsules
1.25 cm long.

Fl. & Fr. : July – August.

Bhyundar valley. 3000 – 3500 m (24347). Not common.

4. **H. Japonicum** Thunb. ex Marray Syst. Veg. ed. 14, 702 (Jul.
1784) ; Hook. f. Fl. Brit. Ind. 1 : 250. 1874.

Prostrate glabrous herbs ; leaves stem clasping, glandular ; sepals
3 – nerved.

Fl. & Fr. : May – June.

Amritganga valley, Masoli. 2000 – 2500 m (44057).

5. **H. monanthemum** Hook. f. & Thoms. ex Dyer in Hook. f. Fl.
Brit. Ind. 1 : 256. 1874.

Reddish brown herbs ; leaves sparsely dotted along the margin
beneath ; sepals dark glandular.

Fl. & Fr. : August – September.

Hemkund on way. 3700 m (29513).

6. **H. oblongifolium** Choisy Prodr. Monogr. Hyper. 42, t. 4. 1821.
H. cernuum Roxb. ex D. Don Prodr. Fl. Nep. 218. 1825 ; Hook. f. Fl. Brit.
Ind. 1 : 253. 1874. '*Chaya*'.

Evergreen shrubs ; leaf under surface gland-dotted ; capsules. 7 1.4 cm long.

Fl. & Fr. : March – July.

Occurs throughout the hills. 1500-2500 m. (Osmaston). Lit.

7. ***Hypericum uralum*** Buch. Ham. ex D. Don in Bot. Mag. t. 2375. 1823. *H. patulum* non Thunb. 1784. Sensus Hook. f. Fl. Brit. Ind. 1 : 254. 1874.

Evergreen shrubs ; leaves decurrent ; petals suborbicular ; capsules 1 cm long.

Fl. & Fr. : July – October.

Mondal. 2500 3000 m (3024).

8. ***H. wightianum*** Wall. ex Wt. & Arn. Prodr. 99. 1834. *H. napaulense* non Choisy 1824. Sensus Hook. f. Fl. Brit. Ind. 1 : 256. 1874.

Weak branched herbs ; sepals and petals not glandular.

Fl. & Fr. : April – October.

Brahm Tal Ridge. 3500 – 4000 m (31109).

21. THEACEAE

(TERNSTROEMIACEAE Sensus BH)

- | | | |
|---|-----|-------------------|
| 1a. Flowers small, dioecious in axillary clusters ; stamens 15 or less ; fruits berry | ... | <i>Eurya</i> 2 |
| 1b. Flowers axillary, solitary or aggregated ; stamens numerous ; fruits capsular | ... | <i>Camellia</i> 1 |

1. CAMELLIA L.

Camellia sinensis (L.) O. Kuntz. in Act. Hort. Petrop. 10 : 195. 1887. *Thea chinensis* L. Sp. Pl. ed. 1, 515. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 292. 1874.

Evergreen shrubs ; flowers white ; capsules leathery trigonous.

Gwaldam. Planted. 1800 m (41450).

2. EURYA Thunb.

Eurya acuminata DC. in Mem. Soc. Phys. Geneve 1 : 418. 1822 ;
Hook. f. Fl. Brit. Ind. 1 : 285. 1874. '*Deura Chopti or China*'.

Evergreen shrubs ; flowers white, clustered.

Fl. & Fr. : August – December.

Amritganga valley, Anusuya, Mondal. 1600 – 4000 m (42075).

22. ACTINIDIACEAE

(TERNSTROEMIACEAE SENSU BH)

- | | | |
|---|-----|--------------------|
| 1a. Trees or shrubs ; petioles rusty tomentose ; flowers pink | ... | <i>Saurauia</i> 2 |
| 1b. Climbing shrubs ; petioles pink ; flowers white | ... | <i>Actinidia</i> 1 |

1. ACTINIDIA Lindl.

Actinidia callosa Lindl. Nat. Syst. ed. 2 : 439. 1836 ; Hook. f. Fl. Brit. Ind. 1 : 286. 1874.

Subdeciduous climbers ; flowers 1.2 – 2.5 cm diam. ; berries, fleshy, ovoid.

Fl. & Fr. : May – October.

Mondal. 1650 m (43998). Rare.

2. SAURAUIA Willd.

Saurauia napaulensis DC. in Mem. Soc. Phys. Genev. 1 : 421. 1822 ;
Hook. f. Fl. Brit. Ind. 286. 1874. '*Gogna*'.

Evergreen small trees ; leaves crowded towards the end of the branches ; flowers. 1.2 cm diam ; berries fleshy with sweet pulp.

Fl. & Fr. : February – July.

Occurs between 1200 – 2000 m (Osmaton). Lit. Rare.

23. MALVACEAE

- 1a. Herbs or shrubs ; staminal tube entire or slightly divided at the apex.
 - 2a. Fruit composed of several carpels.
 - 3a. Carpels not spinescent.
 - 4a. Bracteoles 0 ... *Sida* 4
 - 4b. Bracteoles 3 ... *Malva* 3
 - 3b. Carpels densely spinescent ... *Urena* 5
 - 2b. Fruit capsular.
 - 5a. Calyx elongate, spathaceous ... *Abelmoschus* 1
 - 5b. Calyx 5 - toothed or 5 fid ... *Hibiscus* 6
- 1b. Trees. Staminal tube dividing into 5 bundles of stamens ... *Kydia* 2

1. ABELMOSCHUS Medik.

- 1a. Deciduous shrubs ; bracteoles broad, leafy ; capsules oblong *A. manihot* 2
hirsute subsp. *tetraphyllus* var. *pungens*
- 1b. Herbaceous annuals ; bracteoles linear.
 - 2a. Very bristly herbs ; capsules ovoid, furrowed ... *A. crinitus* 1
 - 2b. Rough hairy herbs ; capsules pyramidal - oblong ... *A. esculentus* 3

1. *Abelmoschus crinitus* Wall. Pl. As. Rar. 1 : 39, t. 44. 1830.
Hibiscus cancellatus Roxb. Fl. Ind. ed. 2, 3 : 201. 1832 ; Hook. f. Fl. Brit. Ind. 1 : 342. 1874.

Bristly herbs ; flowers pale yellow with purple centre ; calyx folded spathe ; bracteoles linear.

Fl. & Fr. : July – August.

Helang, 1400 m (29308).

2. *Abelmoschus manihot* subsp. *tetraphyllus* (Roxb. ex Hornem.) Borss. var. *pungens* (Roxb.) Hochr. in *Candollea* 2 : 87. 1924. *Hibiscus pungens* Roxb. *Fl. Ind.* ed 2, 3 : 213. 1832 ; Hook. f. *Fl. Brit. Ind.* 1 : 341. 1874.

Deciduous shrubs ; bracteoles leafy ; capsules 3 – 6 cm long, oblong.

Fl. & Fr. : August – October.

Ghat, 800 – 1800 m (53758).

3. *A. esculentus* (L.) Moench. *Menth.* 617. 1794. *Hibiscus esculentus* L. *Sp. Pl.* 696. 1753 ; Hook. f. *Fl. Brit. Ind.* 1 : 343. 1874.

Hairy herbs ; flowers yellow with crimson centre.

Cultivated throughout in lower elevations.

2. KYDIA Roxb.

Kydia calycina Roxb. *Pl. Corom.* 3 : 11, t. 215. 1811 ; Hook. f. *Fl. Brit. Ind.* 1 : 348. 1874.

Deciduous trees ; panicles tomentose ; flowers white ; capsules 3 – valved.

Fl. & Fr. : March – November.

Batwalchhari, Ramni Valley, 1000 m (6419).

3. MALVA L.

- | | | |
|--|-----|--------------------------|
| 1a. Stellately hairy erect herbs ; petals much longer than the calyx | ... | <i>M. verticillata</i> 2 |
| 1b. Pubescent decumbent herbs ; petals hardly longer than the calyx | ... | <i>M. parviflora</i> 1 |

1. *Malva parviflora* L. Demontr. Pl. Ups. O. Crop. Hoyer 18. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 321. 1874.

Decumbent pubescent herbs ; flowers pale – pink, small.

Fl. & Fr. : April – June.

Kanara – Mohankhal, Pokhri – Nagnath. 2000 m (27279).

2. *M. verticillata* L. Sp. Pl. 689. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 320. 1874.

Erect stellately pubescent herbs ; flowers small crowded in nearly sessile clusters.

Fl. & Fr. : May – October.

Badrinath, Bhyundar valley, Ghangaria. 2800 – 3200 m (29663).

4. SIDE L.

1a. Petioles of the lower leaves exceeding 1.2 cm long.

2a. Carpels 5 ; peduncles jointed about the middle ... *S. cordata* 1

2b. Carpels 7 - 10 ; peduncles jointed near the top ... *S. cordifolia* 2

1b. Petioles less than 1.2 cm long ... *S. rhombifolia* 3

1. *Sida cordata* (Burm. f.) Boiss. Waalk. in Blumea 14 : 182. 1966. *Melochia Cordata* Burm. f. Fl. Ind. 143. 1768. *S. humilis* Cav. Diss. 5 : 277, t. 136. f. 2. 1788 ; Hook. f. Fl. Brit. India 1 : 322. 1874. 'Bhiyonli.'

Herbs or shrubs ; leaves broadly ovate orbicular ; flowers pale – yellow ; carpels smooth.

Fl. & Fr. : September – October.

Rudraprayag, Trisula. 800 – 1200 m (42269).

2. *S. cordifolia* L. Sp. Pl. ed. 1, 2, 684. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 324. 1874.

Erect deciduous shrubs ; leaves ovate or ovate – oblong ; flowers pale – yellow ; carpels covered with stiff hairs.

Fl. & Fr. : August – October.

Kalimath forest. 1000 m (8764).

3. ***Sida rhombifolia*** L. Sp. Pl. 684. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 323. 1874. '*Bhiyonli*'

Deciduous shrubs ; leaves rhomboid or suborbicular, stellate pubescent beneath.

Fl. & Fr. : August – November.

Occurs throughout the area upto 1000 m (Osmaston). Lit.

5. URENA L.

Urena lobata L. Sp. Pl. ed. 1 : 692. 1753 ; Hook f. Fl. Brit. Ind. 1 : 329. 1874. '*Chatkura*'

Deciduous shrubs ; flowers pink with dark centre ; carpels stellately hairy echinate.

Fl. & Fr. : June – November.

Jakhmola, Saragarh (Agastamuni). 600 m – 1500 m (42256).

6. HIBISCUS L. nom. cons.

- | | |
|---|-------------------------------|
| 1a. Shrubs ; glabrous, woody ; flowers purple or red | ... <i>H. rosa-sinensis</i> 2 |
| 1b. Herbs, annual or perennial, bristly or prickly ; flowers yellow with crimson centre | ... <i>H. cannabinus</i> 1 |

1. ***Hibiscus cannabinus*** L. Syst. Nat. ed. 10, 2 : 1149. 1759 ; Hook. f. Fl. Brit. Ind. 1 : 339. 1874.

Leaves 3 – 7 palmately lobed ; sepals with a gland on the back ; capsules 5 – valved.

Agastamuni. Cultivated. 600 m (6366).

2. *H. rosa-sinensis* L. Sp. Pl. ed 1, 2 : 694. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 344. 1874.

Glabrous shrubs ; flowers rosy with exerted stigma.

Planted near the temples.

24. BOMBACACEAE

BOMBAX L.

Bombax ceiba L. Sp. Pl. 511. 1753. *B. malabaricum* DC. Prodr. 1 : 479. 1824 ; Hook. f. Fl. Brit. Ind. 1 : 349. 1874. '*Semal*'.

Tall deciduous trees ; branches with prickles ; flowers thick fleshy crimson.

Fl. & Fr. : January – May.

Way to Gaucher, Nandprayag. 900 m (27305). Not Common.

25. STERCULIACEAE

| | | |
|--|-----|--------------------|
| 1a. Follicles coriaceous or woody | ... | <i>Sterculia</i> 2 |
| 1b. Follicles membranous, opening long before maturity | ... | <i>Firmiana</i> 1 |

1. FIRMIANA Marsigli

Firmiana pallens (Wall. ex King) Stearn in Blatter & Millard, Beaut. In. Tr. ed 2. 79. 1954. *Sterculia pallens* Wall. ex King in Journ. As. Soc. Beng. 60 (2) : 73 in Obs. 1891. '*Budalla*'.

Deciduous trees ; flowers pale – yellow ; follicles membranous.

Fl. & Fr. : February – June.

Occurs upto 1500 m (Osmaston). Lit.

2. STERCULIA L.

Sterculia villosa Roxb. ex Sm. in Rees, Cyclop. 34 : n 16 1816 ;
Hook. f. Fl. Brit. Ind. 1 : 355. 1874, '*Udala*'

Deciduous trees ; leaves 25 - 45 cm in diam ; flowers yellow.

Fl. & Fr. : February - May.

Birih - Gohna. 1500 m, (10018).

26. TILIACEAE

- | | | |
|--|-----|---------------------|
| 1a. Petals sepaloid, incised, not twisted in the bud ; anthers linear,
opening by a terminal pore | ... | <i>Sloanea</i> 3 |
| 1b. Petals glabrous or rarely downy, coloured, thin, twisted in the
bud ; anthers globose or oblong, by slit. | | |
| 2a. Petals glandular at the base ; fruits globose or ovoid. | | |
| 3a. Stamens numerous ; fruit a smooth drupe | ... | <i>Grewia</i> 2 |
| 3b. Stamens about 10 ; fruit a prickly capsule | ... | <i>Triumfetta</i> 4 |
| 2b. Petals not glandular at the base ; fruits long, narrow,
glabrous. | ... | <i>Corchorus</i> 1 |

1. CORCHORUS L.

Corchorus aestuans L. Syst. Nat. ed. 10, 2 : 1079. 1759, non Forsk.
C. acutangulus Lam. Encycl. 2 : 104. 1786 ; Hook. f. Fl. Brit. Ind. 1 :
398. 1874.

Small erect herbs ; leaves ovate or oblong, acute, serrate ; capsules
6 - angled ; beaks 3 - fid.

Fl. & Fr. : July - August.

Nandprayag across Alaknanda 800 m (71091).

2. GREWIA L.

- 1a. Leaves 3 - nerved ; cymes leaf opposed. ... *G. Optiva* 3
- 1b. Leaves 5 - 7 nerved ; cymes axillary.
- 2a. Leaves $\pm$ whitish beneath ; base not cordate ... *G. elastica* 1
- 2b. Leaves green beneath ; base usually cordate ... *G. hainesiana* 2

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

Medium sized trees ; leaves oblong - ovate or elliptic, under surface white, obliquely rounded base ; fruits. 6 cm diam, globose.

Fl. & Fr. : April - June.

Chamoli, Gohna. 1000 - 1500 m (10014).

2. *G. hainesiana* Hole in Ind. Forester 43 : 316. 1917 ; Rao in Ind. Forester 93 : 44. 1967.

Small trees or shrubs ; leaves ovate or sub - orbicular ; fruits .7 - 1.2 cm diam.

Fl. & Fr. : April - August.

Occurs throughout the area. upto 1000 m (Osmaston). Lit.

3. *G. Optiva* J. R. Drumm. ex Burret in Notizbl 9 : 692. 1926.
G. oppositifolia Buch. Ham. ex D. Don, Prodr Fl. Nep. 227. 1825 ; Hook. f. Fl. Brit. Ind. 1 : 384. 1874. '*Bhimal*'.

Small trees ; leaves ovate pubescent ; fruits .6 - 2.5 cm diam, greenish - black.

Fl. & Fr. : April - December.

Nandprayag, Pipalkoti - Gulabkoti. 800 - 1600 m (33812).

3. SLOANEA L.

Sloanea tomentosus (Benth.) Rehder & Wilson in Sarg. Pl. Wilson 2 : 362. 1915. *Ecaïnocarpus tomentosus* Benth. in Proc. Linn. Soc. 5. Suppl. 2 : 72. 1861 ; Hook. f. Fl. Brit. Ind. 1 : 400. 1874.

Evergreen trees ; leaves elliptic, 15 – 30 cm long ; flowers solitary ; capsules bristly.

Fl. & Fr. : April – September.

Sirkot (Rare). 1000 – 1800 m (Osmastom). Lit.

4. TRIUMFETTA L.

1a. Stems and leaves densely pubescent or bristly ; flowers yellow ; capsules woolly or hairy.

2a. Bristly shrubs ; flowers 1.2 - 1.8 cm long ; prickles of capsules .6 cm ... *T. pilosa* 2

2b. Pubescent shrubs ; flowers .6 cm long ; prickles .2 cm ... *T. rhomboidea* 3

1b. Stems and leaves nearly glabrous flowers ; orange ; capsules glabrous ... *T. annua* 1

1. **Triumfetta annua** L. Mant. Pl. 1 : 73. 1767 ; f. Fl. Brit. Ind. 1 : 396. 1874.

Glabrous herbs ; flowers orange ; fruits prickly, glabrous.

Fl. & Fr. : August – October.

Vishnuprayag. 1400 m (24202).

2. **T. pilosa** Roth Nov. Pl. Ind. Or. 223. 1821 ; Hook. f. Fl. Brit. Ind. 1 : 394. 1874. '*Kura*'.

Deciduous shrubs ; lower leaves ovate entire, not lobed.

Fl. & Fr. : June – October.

Throughout the area upto 2000 m (Osmaston). Lit.

3. *Triumfetta rhomboidea* Jacq. Enum. Pl. Carib. 22. 1760 ; Hook. f. Fl. Brit. Ind. 1 : 395. 1874. '*Leswa Kura*'.

Subdeciduous shrubs ; lower leaves rounded, usually 3 – lobed.

Fl. & Fr. : June – February.

Batwalchari. 1000 m (6413).

27. LINACEAE

- | | | |
|--|-----|----------------------|
| 1a. Herbs, 10 - 30 cm long ; styles 5 | ... | <i>Linum</i> 1 |
| 1b. Shrubs, 60 - 90 cm long ; styles 3 | ... | <i>Reinwardtia</i> 2 |

1. LINUM L.

Linum usitatissimum L. Sp. Pl. 277. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 410. 1875. '*Alsi*'.

Glaucous erect herbs ; leaves linear – lanceolate ; flowers terminal leaf – opposed corymbs ; capsules globose.

Fl. & Fr. : March – April.

Gopeswar – Mondal. 1400 m (580, Kala & Gaur). Lit.

2. REINWARDTIA Dumort.

Reinwardtia indica Dumort. Comm. Bot. 19. 1822. *R. trigyna* (Roxb.) Planch. in Hook. Lond. Jour. Bot. 7 : 522. 1848 ; Hook. f. Fl. Brit. Ind. 1 : 412. 1874. '*Phiyunli*'.

Deciduous glabrous shrubs ; flowers yellow, sweet scented.

Fl. & Fr. : December – June.

Agastamuni, Nandprayag. 1000 – 2500 m (26832).

28. MALPIGHIACEAE

- | | | |
|------------------------------|-----|-----------------------|
| 1a. Style 1 ; petals unequal | ... | <i>Hiptage</i> 2 |
| 1b. Styles 3 ; petals equal | ... | <i>Aspidopterys</i> 1 |

1. ASPIDOPTERYS Juss.

Aspidopterys wallichii Hook. f. in Fl. Brit. Ind. 1 : 421. 1874.

Climbers upto 3 m high ; flowers white with one coloured petal.

Fl. & Fr. : July – February.

Longasu. 1000 – 1200 m (71940).

2. HIPTAGE Gaertn.

Hiptage benghalensis (L.) Kurz in Journ. As. Soc. Beng. 43(2) : 136. 1874. *Banisteria benghalensis* L. Sp. Pl. 427. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 418. 1874.

Climbers upto 15 m high ; flowers pale greenish – yellow.

Fl. & Fr. : March – June.

Throughout the area upto 1200 m (Osmaston). Lit.

29. GERANIACEAE

- | | | |
|--|-----|-------------------|
| 1a. Stamens, all anther - bearing ; styles glabrous on the inner surface | ... | <i>Geranium</i> 2 |
| 1b. Stamens, only 5 anther - bearing ; styles silky on the inner surface | ... | <i>Erodium</i> 1 |

1. ERODIUM L' Herit

***Erodium stephanianum* Willd. Sp. Pl. 3 : 625. 1800 ; Hook. f. Fl. Brit. Ind. 1 : 434. 1874.**

Pilose, pubescent, diffuse herbs ; flowers purple ; fruits hispid.

Fl. & Fr. : July - August.

Jumma area. 2600 m. (53827).

2. GERANIUM L.

- | | | |
|--|-----|--------------------------|
| 1a. Perennials ; peduncles axillary and terminal, solitary, 2 - flowered flower buds oblong. | | |
| 2a. Flowers large $\pm$ 2.5 cm in diam. | | |
| 3a. Sepals long awned. | | |
| 4a. Stipules bifid or bipartite | ... | <i>G. lambertii</i> 3 |
| 4b. Stipules not bifid or bipartite. | | |
| 5a. Leaves orbicular 7 - 9 partite ; carpels glandular - hairy | ... | <i>G. pratense</i> 7 |
| 5b. Leaves pentagonal, deeply 3 - 5 lobed ; carpels pilose | ... | <i>G. wallichianum</i> 9 |
| 3b. Sepals $\pm$ shortly awned. | | |
| 6a. Leaves orbicular 5 - 7 lobed ; stipules small ovate acute | ... | <i>G. collinum</i> 1 |

- 6b. Leaves pentagonal, deeply 3 - 5 lobed ; stipules, subulate - lanceolate ... *G. himalayense* 2
- 2b. Flowers less than 2.5 cm in diam.
- 7a. Stems slender, not rooting at joints ... *G. polyanthes* 6
- 7b. Stems diffuse, rooting at joints ... *G. nepalense* 4
- 1b. Annuals or biennials ; peduncles 2 - flowered ; flower buds pyramidal.
- 8a. Erect much branched herbs ; leaves triangular - oblong in outline ; flowers streaked with dark and light red ... *G. robertianum* 8
- 8b. prostrate slender herbs ; leaves orbicular in outline ; flowers rose with dark purple eye. ... *G. ocellatum* 5

1. ***Geranium collinum*** Steph. ex Willd. Sp. Pl. 3 : 705, 1800 ; Hook. f. Fl. Brit. Ind. 1 : 429. 1874.

Stout, glandular, Pubescent herbs ; leaves 1.2 - 5 cm in across, palmately 5 - 7 - lobed ; sepals acute, minutely awned.

Fl. & Fr. : August.

Bhyundar valley. 3800 m (29569).

2. ***G. himalayense*** Klotz. Bot. Reise Pr. Waldem. 122, t. 16. 1862 *G. Palustre* auct. non L. *G. grandiflorum* Edgew. in Trans. Linn. Soc. 20. 42. 1846. *G. Pratense* auct. non L. Sensus Edgew. & Hook. f. Fl. Brit. Ind. 1 : 429. 1874.

Prostrate hairy herbs ; leaves 5 - 7.5 cm diam, variously cut ; flowers large purple.

Fl. & Fr. : August.

Bhyundar valley. 3800 m. (29553).

3. ***G. Lambertii*** Sw. Geran. 4 : t. 338. 1827. *G. grevilleanum* Wall. Pl. As. Rar. 3 : 4, t. 209. 1831 ; Hook. f. Fl. Brit. Ind. 1 : 430. 1874, *p.p.*

Prostrate, hairy herbs ; leaves pentagonal 5 - 7 - lobed ; flowers rose.

Fl. & Fr. : July - August.

Bhyundar valley. 2800 - 3500 m (Smythe). Lit.

4. **Geranium nepalense** Sw. Geran. 1 : t. 12. 1820 ; Hook. f. Fl. Brit. Ind. 1 : 430. 1874.

Prostrate hairy herbs ; stems Prostrate, diffuse, 15 – 45 cm, orbicular, 3 – 5 lobed, 4 – 7 cm across ; petals slightly notched.

Fl. & Fr. : April – September.

Ghangaria, Masoli, Mongu, Trijuginarayan. 1700 – 3000 m (47998).

5. **G. ocellatum** Camb. Jacq. Voy. 4 (Bot) : 33, t. 38. 1835. Hook. f. Fl. Brit. Ind. 1 : 433. 1874.

Prostrate, hoary pubescent herbs ; leaves 1.2 – 5 cm in across, palmately 5 – 7 – lobed ; sepals acute, minutely awned.

Fl. & Fr. : February – May.

Pokhri – Nagnath. 2000 m (27270).

6. **G. Polyanthes** Edgew. et Hook. f. in Fl. Brit. Ind. 1 : 431. 1874.

Sparsely hairy slender herbs ; leaves orbicular reniform 7 – 9 partite or lobed ; flowers dark purple.

Fl. & Fr. : June – September.

Tungnath, 3500 m (Semwal & Gaur). Lit.

7. **G. pratense** L. Sp. Pl. 681. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 429. 1874.

Branched herbs with spreading hairs ; leaves 5 – 7.5 cm in diam ; flowers purplish – blue.

Fl. & Fr. : August – September.

Bhyundar valley. 3900 m (24319).

8. **G. robertianum** L. Sp. Pl. 681. 1753 ; Hook. f. Fl. Brit. Ind. 432. 1874.

Glandular hairy, strongly scented herbs ; leaves 2.5 – 7 cm, pinnately 3 – 5 lobed ; sepals acute long – awned.

Fl. & Fr. : June – October.

Bhyundar valley, Hanumanchatti. 2200 – 2700 m (39130).

9. **G. wallichianum** D. Don ex Sw. Geran. 1 : t. 90. 1821 ; Hook. f. Fl. Brit. Ind. 1 : 430. 1874. '*Kaphla*'.

Robust, hairy herbs ; leaves. 5 – 1.25 cm across ; flowers purplish blue.

Fl. & Fr. : July – October.

Dhotidar, Ghangaria, Mandoli. 2300 – 3000 m (31132).

30. OXALIDACEAE

(GERANIACEAE SENSU BH)

OXALIS L.

- | | | |
|---|-----|---------------------------|
| 1a. Herbs with branched stems ; rooting at joints | ... | <i>O. corniculata</i> 1 |
| 1b. Stemless herbs. | | |
| 2b. Flowers yellow or pink | ... | <i>O. acetosella</i> 2 |
| 2b. Flowers violet | ... | <i>O. dehradunensis</i> 3 |

1. ***Oxalis acetosella* L.** Sp. Pl. ed. 1, 1 : 433. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 436. 1974.

Scapigerous pubescent herbs ; flowers Solitary on long radical stalks ; fruits ovoid.

Fl. & Fr. : May – June.

Way to Khankelia. 3200 m (48078). Not. common.

2. ***O. corniculata* L.** Sp. Pl. 435. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 439. 1874. '*Chalmori*'

Branched hairy herbs rooting at the joints ; flowers long stalked umbels ; fruits cylindric.

Fl. & Fr. : February – November.

Bhyundar valley, Mongu. Rudraprayag area. 1650 – 2700 m (43939).

3. ***O. dehradunensis* Raizada.** Suppl. F. U. G. P. 37 : 1976. *O. intermedia* A. Rich. Eass. Fl. Cuba 315. 1845 (1842) (non Steud. Apr. 1841). *O. Latifolia* auct. non H. B. K. 1821.

Bulbous herbs, 16 - 25 cm high ; leaflets broadly obdeltoid, glabrous ; stigmas 5.

Fl. & Fr. : March - April.

Gopeswar College garden, 1350 m (565, Kala & Gaur). Lit.

31. BAISAMINACEAE

(GERANIACEAE SENSU BH).

IMPATIENS L.

- | | | |
|---|-----|---------------------------|
| 1a. Spur minute or none | ... | <i>I. brachycentra</i> 4, |
| 1b. Spur prominently present. | | |
| 2a. Flowers pink, purple or crimson. | | |
| 3a. Flowers in racemes ; capsules glabrous. | | |
| 4a. Leaves stalked. | | |
| 5a. Flowers 2.5 - 4 cm long, excluding the spur. | | |
| 6a. Capsules club - shaped ; thick at the tip, gradually narrowed to the base | ... | <i>I. glandulifera</i> 5 |
| 6b. Capsules linear. | | |
| 7a. Stems 1.2 - 3.2 m tall ; leaves opposite or whorled | ... | <i>I. sulcata</i> 7 |
| 7b. Stems 0.3 - 1 m tall ; leaves alternate | | <i>I. bicornuta</i> 8 |
| 5b. Flowers 1.2 - 2 cm long, excluding the spur | ... | <i>I. thomsonii</i> 9 |
| 4b. Leaves sessile, stem - clasping | ... | <i>I. amplexicaulis</i> 1 |
| 3b. Flowers solitary ; capsules tomentose | ... | <i>I. balsamina</i> 2 |
| 2b. Flowers yellow. | | |
| 8a. Flowers 3 - 3.5 cm long, excluding the spur ; lip abruptly contracted into a curved spur | ... | <i>I. scabrida</i> 8 |
| 8b. Flowers not more than 2.5 cm long, including the spur, lip gradually narrowed into a nearly straight spur | ... | <i>I. racemosa</i> 6 |

1. **Impatiens amplexicaulis** Edgew. in Trans. Linn. Soc. 20 : 37. 1846 ; Hook. f. Fl. Brit. Ind. 1 : 469. 1875.

Glabrous herbs with amplexicaule leaves ; flowers purple, 2.5 cm long.

Fl. & Fr. : August.

Ghangaria. 3000 m (29426).

2. **I. balsamina** L. Sp. Pl. 938. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 453. 1875. 'Mehandi'.

Flaccid glabrous or sparsely hairy herbs ; leaves alternate lanceolate - oblong ; capsules ellipsoid.

Fl. & Fr. : August - September.

Kothiyalsain. 900 - 1500 m (281, Kala & Gaur). Lit.

3. **I. bicornuta** Wall. in Roxb. Fl. Ind. ed. Carrey 2 : 460. 1824 var. **bicornuta** ; Hook. f. Fl. Brit. Ind. 1 : 475. 1875.

Tall leafy herbs, bristly at the base ; petiole $\pm$ 15 cm long ; flowers pale - purple.

Fl. & Fr. : October.

Ghangaria. 3000 m (29427).

4. **I. brachycentra** Kar. et Kir. in Bull. Soc. Nat. Mosc. 15 : 179. 1842 ; Hook. f. Fl. Brit. Ind. 1 : 481. 1875.

Erect glabrous herbs ; leaves ovate lanceolate ; flowers white.

Fl. & Fr. : August.

Jumna area, Malari, 2500 - 3000 m (55904).

5. **Impatiens glandulifera** Royle, Ill. Bot. Himal. 151, t. 28, f. 2, 1834 - 35. **I. roylei** Walp. Rep. 1 : 475. 1842 ; Hook. f. Fl. Brit. Ind. 1 : 468. 1875.

Tall glabrous herbs ; leaves stalked ; capsules 2.5 cm, thickest near the tip.

Fl. & Fr. : July - August.

Bhyundar valley. 2000 - 3000 m (Smythe). Lit.

6. **I. racemosa** DC. Prodr. 1 : 688. 1824 ; Hook. f. Fl. Brit. Ind. 1 : 479. 1875.

Tall glabrous herbs. flowers 1.2 cm long ; capsules linear.

Fl. & Fr. : August – October.

Amritganga valley, Ghangaria. 25000 – 4000 m (42060).

7. ***Impatiens sulcata*** Wall. in Roxb. Fl. Ind. 2 : 458. 1824.
I. gigantea Edgew in Trans. Linn. Soc. 20 : 38. 1846 ; Hook. f. in Fl. Brit. Ind. 1 : 469. 1875.

Tall glabrous herbs ; flowers 2.5 – 3 cm long excluding the the Spur ; capsules linear.

Fl. & Fr. : July – October.

Bhyundar valley, Kedarnath 3200 – 4000 m (31043).

8. ***I. scabrida*** DC. Prodr. 1 : 687. 1824 ; Hook. f. Fl. Brit. Ind. 1 : 472. 1875 p.p.

Pubescent herbs ; flowers 3 – 3.5 cm long excluding the spur, spotted brown ; capsules linear.

Fl. & Fr. : July – September.

Ghat, Jakhmola. Mondal. 1500 – 2800 m (41922).

9. ***I. thomsonii*** Hook. f. in Journ. Linn. Soc. 128. 1869 ; Hook. f. Fl. Brit. Ind. 1 : 469. 1875.

Glabrous herbs ; flowers 1.2 – 1.8 cm long ; capsules club – shaped.

Fl. & Fr. : July – August.

Bhyundar valley, 2500 – 3000 m (Smythe). Lit.

32. RUTACEAE

1a. Armed.

2a. Climbing shrubs ... *Toddalia* 5

2b. Trees or erect shrubs.

3a. Prickly shrubs.

4a. Petiole winged ... *Zanthoxylum* 7

4b. Petiole not winged ... *Fagara* 6

- 3b. Trees with axillary spines.
- | | | |
|--------------------------|-----|-----------------|
| 5a. Leaves 1 - foliolate | ... | <i>Citrus</i> 2 |
| 5b. Leaves 3 - foliolate | ... | <i>Aegle</i> 8 |
- 1b. Unarmed.
- | | | |
|--|-----|---------------------------|
| 6a. Leaves simple ; stamens - 5 | ... | <i>Skimmia</i> 4 |
| 6b. Leaves 1 - 2 pinnate ; stamens 6-10. | | |
| 7a. Perennial herbs ; fruits of distinct carpels | ... | <i>Boenninghausenia</i> 1 |
| 7b. Shrubs or trees ; fruits of 1 - 2 celled berry | ... | <i>Murraya</i> 3 |

1. BOENNINGHAUSENIA Reich. nom. cons.

Boenninghausenia albiflora (Hook.) Reichb. ex Meisn. Chnsp. 197
1828. *Ruta albiflora* Hook. Exot. Fl. 1 : t. 79. 1823 ; Hook. f. Fl. Brit.
Ind. 1 : 486. 1875. '*Upanaya Ghas*'.

Perennial glabrous herbs ; flowers small white.

Fl. & Fr. : July - October.

Ansuya area, Bhyundar valley, Loharjung. 1750 - 2700 m (30862).

2. CITRUS L.

Citrus medica L. Sp. Pl. 782. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 514.
1875. '*Limbba*'.

Evergreen shrubs ; branches armed ; flowers white, tinged pink
without.

Fl. & Fr. : December - April.

Nigol valley. 8000 - 1200 m (S. n.).

3. MURRAYA L. nom. cons.

Murraya koenigii Spreng. Syst. Veg. 2 : 315. 1825 ; Hook. f. Fl. Brit. Ind. 1 : 503. 1875.

Evergreen shrubs ; flowers white scented, 1.2 cm long ; berries black.

Fl. & Fr. : February - April.

Nandprayag Rudraprayag across Alaknanda 800 1000 m (26762).

4. SKIMMIA Thunb.

Skimmia laureola (DC.) Sieb. & Zucc. ex Walp. Rep. 5 : 405. 1842 - 47. *Limonia laureola* DC. Prodr. 1 : 536. 1824 ; Hook. f. Fl. Brit. Ind. 1 : 499. 1875. 'Nair'

Evergreen glabrous shrubs ; flowers pale green ; fruits red.

Fl. & Fr. : April - November.

Badrinath, Kanara Mohankhal, Khiraum valley. 1800 - 3500 m (42216).

5. TODDALIA Juss. nom. cons.

Toddalia asiatica (L.) Lam. Tab. Encycl. 2 : 116. 1797. *Paullinia asiatica* L. Sp. Pl. ed. 1, 1 : 365. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 497. 1875.

Evergreen prickly climbers ; leaves trifoliate ; flowers greenish - yellow.

Fl. & Fr. : April - September.

Throughout the area. 1000 1500 m (Osmaston). Lit.

6. FAGARA L.

Fagara oxyphylla (Edgew.) Engl. Pfam. 3, 4 : 11 118. B. 1896.
Zanthoxylum oxyphyllum Edgew. in Trans. Linn. Soc. 20 : 42. 1846 ;
 Hook. f. Fl. Brit. Ind. 1 : 494. 1875.

Evergreen prickly shrubs with rambling stems ; flowers polypetalous,
 deep purple red.

Fl. & Fr. : June September.

Amritganga valley, Rāmni Gohna, Trijuginarayan. 2000 4000 m
 (44082).

7. ZANTHOXYLUM L.

Zanthoxylum armatum DC. Prodr. 1 : 727. 1824. *Z. alatum* Roxb.
 Fl. Ind. 3 : 768. 1832 ; Hook. f. Fl. Brit. Ind. 1 : 493, 1875.

Small glabrous prickly trees ; flowers yellow, 1 – or. 2 – Sexual.

Fl. & Fr. : April October.

Ghat, Kanara Mohankhal, Mondal. 1500 1650 m (10408).

8. AEGLE Corr. nom. cons.

Aegle marmelos (L.) Corr. in Trans. Linn. Soc. 5 : 222. 1800.
Crateva marmelos L. Sp. Pl. 444. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 516.
 1875.

Deciduous trees, armed with spines ; flowers greenish white.

Fl. & Fr. : May June.

Planted near temples, common in lower valleys, upto 1500 m.

33. SIMAROUBACEAE

PICRASMA Bl.

Picrasma quassioides (D. Don) Benn. Pl. Jav. Rar. 198. 1844.
Simaba quassioides Buch - Ham. ex D Don, Prodr. Fl. Nep. 248. 1825 ;
Hook. f. Fl. Brit. Ind. 1 : 520. 1875.

Large deciduous trees ; leaves pinnate pubescent ; flowers green.

Fl. & Fr. : May June.

Occurs on the slopes of the main Himalayan ranges in the area.
2000 3000 m (Osmaston). Lit.

34. BURSERACEAE

GARUGA Roxb.

Garuga pinnata Roxb. Corom. Pl. 3 : 5, t. 208. 1819 ; Hook. f. Fl.
Brit. Ind. 1 : 528. 1875.

Small deciduous trees ; leaves imparipinnate ; flowers small yellow.

Fl. & Fr. : March - October.

Occurs throughout the area upto 1200 m (Osmaston). Lit.

35. MELIACEAE

- | | | |
|--|-----|----------------|
| 1a. Stamens 10 - 12, united in a tube ; seeds not winged | ... | <i>Melia</i> 1 |
| 1b. Stamens 5, free ; seeds $\pm$ winged | ... | <i>Toona</i> 2 |

1. MELIA L.

Melia azedarach L. Sp. Pl. 384. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 544. 1875. '*Daikan*'.

Small deciduous trees ; flowers lilac ; fruits globose.

Fl. & Fr. : April – May.

Nigol valley. 900 m (26855).

2. TOONA M. Roem.

- | | |
|---|---------------------|
| 1a. Leaflets entire ; panicles shorter than the leaves ; ovary hairy ... | <i>T. ciliata</i> 1 |
| 1b. Leaflets toothed ; panicles longer than the leaves ; ovary glabrous ... | <i>T. serrata</i> 2 |

1. **Toona ciliata** M. Roem. Syn. Monogr. 1 : 139. 1846. *Cedrela toona* Roxb. ex Rottl. & Willd. in Ges. Naturf. Fr. Neue Schr. 4 : 198. 1803 ; Hook. f. Fl. Brit. Ind. 1 : 568. 1875, *p.p.* '*Tun*'.

Large deciduous trees ; flowers cream coloured ; capsules oblong.

Fl. & Fr. : March – July.

Agastamuni, Mondal, Pandukeswar. 900 – 1650 m (26842).

2. **T. serratta** (Royle) M. Roem. Syn. Monogr. 1 : 139. 1846. *Cedrela serrata* Royle Ill. Bot. Himal. 144, t. 25. 1834 ; Hook. f. Fl. Brit. Ind. 1 : 568. 1875. '*Tun*'.

Deciduous trees ; flowers foetid, pinkish ; capsules ovoid.

Fl. & Fr. : May – October.

Pandukeswar. 2500 m (3003).

36. AQUIFOLIACEAE

ILEX L.

- | | | |
|--|-----|----------------------|
| 1a. Leaves entire ; stones usually 5 | ... | <i>I. excelsa</i> 2 |
| 1b. Leaves serrate and usually spinous - toothed ; stones 2 - 4. | | |
| 2a. Leaves 5 - 10 cm long ; stones usually 2 | ... | <i>I. dipyrena</i> 1 |
| 2b. Leaves 10 - 20 cm long ; stones 4 | ... | <i>I. odorata</i> 3 |

1. *Ilex dipyrena* Wall. in Roxb. Fl. Ind. 1 : 473. 1820 ; Hook. f. Fl. Brit. Ind. 1 : 599. 1875.

Small evergreen trees ; leaves spinous toothed ; flowers greenish yellow ; fruits globose.

Fl. & Fr. : December - June.

Mondal. 1650 m (43957).

2. *I. excelsa* (Wall.) Hook. f. in Fl. Brit. Ind. 1 : 603. 1875. *Cassine excelsa* Wall. in Roxb. Fl. Ind. 2 : 376. 1824 *I. doniana* DC. Prodr. 2 : 644, in erratum. 1825.

Small evergreen trees ; leaves entire ; fruits bright red.

Fl. & Fr. : December - June.

Occurs throughout the area. 2000 - 3000 m (Osmaston). Lit.

3. *I. odorata* Buch. Ham. ex D. Don Prodr. Fl. Nep. 189. 1825 ; Hook. f. Fl. Brit. Ind. 1 : 601. 1875.

Evergreen trees ; leaves serrate ; fruits black, globose.

Fl. & Fr. : April - May.

Occurs throughout the area. 1000 - 18000 m (Osmaston). Lit.

37. CELASTRACEAE

| | | |
|--|-----|--------------------|
| 1a. Fruit a capsule | | |
| 2a. Leaves opposite. | ... | <i>Euonymus</i> 3 |
| 2b. Leaves alternate. | | |
| 3a. Climbers, unarmed ; flowers racemose | ... | <i>Celastrus</i> 2 |
| 3b. Erect, armed shrubs ; flowers cymosa | ... | <i>Maytenus</i> 4 |
| 1 b. Fruit a drupe | ... | <i>Cassine</i> 1 |

1. CASSINE L.

Cassine glauca (Rottb.) Kuntz. Rev. Gen. Pl. 1 : 114. 1891.
Mangifera glauca Rottb. in Nye Sam. Vid. Seisk. Skrift. 2 : 534, t. 4, f. 1.
 1783. *Elaedendron glaucum* Pers ; Hook. f. Fl. Brit. Ind. 1 : 623. 1875.

Deciduous trees ; flowers greenish white ; fruits greenish – yellow.

Fl. & Fr. ; January – June.

Occur throughout the area upto 1500 m (Osmaston). Lit.

2. CELASTRUS L.

Celastrus paniculatus Willd. Sp. Pl. 1 : 1125. 1797 ; Hook. f. Fl.
 Brit. Ind. 1 : 617. 1875.

Large deciduous climbers ; flowers green ; fruit globose bright
 yellow.

Fl. & Fr. : November – June.

Occurs throughout the area upto 1500 m (Osmaston). Lit.

3. EUONYMUS L.

1a. Erect trees or shrubs ; capsules not echinate.

2a. Leaves evergreen, thick.

3a. Midrib and primary nerves prominent and pale above ;
capsules winged ... *E. pendulus* 4

3b. All nerves much depressed above ; capsules 4 - 5 angled ... *E. tingens* 5

2b. Leaves deciduous.

4a. Capsules lobed, $\pm$.7 cm broad ... *E. hamiltonianus* 3

4b. Capsules winged, $\pm$.2 cm across the wings ... *E. fimbriatus* 2

1b. Creeping or climbing shrubs ; capsules echinate ... *E. echinatus* 1

1. *Euonymus echinatus* Wall. in Roxb. Fl. Ind. ed. Carey 2, 410. 1824 ; Hook. f. Fl. Brit. Ind. 1 : 611. 1875.

Evergreen creeping shrubs ; flowers greenish - yellow ; capsules globose.

Fl. & Fr. : March - June.

Ramni - Gohna, Sitapur. 1600 m (47909).

2. *E. fimbriatus* Wall. in Roxb. Fl. Ind. ed. Carrey 2, 408. 1824 ; Hook. f. Fl. Brit. Ind. 1 : 611. 1875.

Deciduous shrubs ; flowers greenish - white ; capsules tapering winged.

Fl. & Fr. : May - October.

Ghangaria, Hemkund, Niti. 3000 - 4000 m (24250).

3. *E. hamiltonianus* Wall. in Roxb. Fl. Ind. ed. Carey 2, 403. 1824 ; Hook. f. Fl. Brit. Ind. 1 : 612. 1875.

Deciduous trees ; capsules 4 lobed.

Fl. & Fr. : May - October.

Bhyundar valley. Pandukeswar. 2500 - 2700 m (24470).

4. *E. pendulus* Wall. in Roxb. Fl. Ind. ed. Carey 2, 406. 1824 ; Hook. f. Fl. Brit. Ind. 1 : 612. 1875.

Small evergreen trees ; flowers green ; capsules with 4 broad wings.

Fl. & Fr. : February - November.

Occurs throughout the area. 1500 - 2500 m (Osmaston). Lit.

5. *Eunymus tingens* Wall. in Roxb. Fl. Ind. ed Carey 2, 406. 1824 ; Hook. f. Fl. Brit. Ind. 1 : 610. 1875.

Evergreen trees ; leaves thick ; flowers yellowish white, purple - veined ; capsules smooth.

Fl. & Fr. : April - December.

Dhotidhar, Pangarbasa. 2500 m (44114).

4. MAYTENUS Molina

Maytenus royleana (Lawson) Cufodont in Bull. Jard. Bot. E. tat. Brux. Suppl. 28. 1958. *Gymnosporia royleana* Lawson in Fl. Brit. Ind. 1 : 620. 1875.

Evergreen shrubs ; branches armed with straight spines ; flowers greenish - yellow.

Fl. & Fr. : February - December.

Occurs throughout the area. 1000 - 2000 m (Osmaston). Lit.

38. RHAMNACEAE

1a. Fruits superior ; tendrils absent.

2a. Fruit a drupe ; stone 1 - 4 celled.

3a. Leaves palmately 3 - 5 nerved ; stipules spiny ... *Ziziphus* 6

3b. Leaves penninerved ; stipules not spiny ... *Berchemia* 1

2b. Fruits baccate, containing 2 - 4 pyrenes or cocci.

4a. Disc thin ; shrubs or very small trees ... *Rhamnus* 4

4b. Disc fleshy.

| | | |
|---|-----|-------------------------------|
| 5a. Unarmed large trees | ... | <i>Hovenia</i> 3 |
| 5b. Shrubs usually armed, erect or climbing | ... | <i>Sageretia</i> 5 |
| 1b. Fruits inferior ; tendrils present | ... | <i>Helinus</i> 2 |

1. *BERCHEMIA* DC. nom. cons.

| | | |
|--|-----|-------------------------|
| 1a. Large climbers ; leaves 5 - 10 cm long | ... | <i>B. floribunda</i> 1 |
| 1b. Erect shrubs ; leaves 1.2 - 3 cm long | ... | <i>B. edgeworthii</i> 2 |

1. *Berchemia floribunda* (Wall.) Brongn. Mem. Fam. Rhamn. 50, t. 2. 1. 1826. *Zizyphus floribunda* Wall. in Roxb. Fl. Ind. 2 : 368. 1824 ; Hook. f. Fl. Brit. Ind. 1 : 637. 1875.

Deciduous climbers ; flowers green ; fruits black.

Fl. & Fr. : March - September.

Rambara Gaurikund, Phata. 1800 m (38617). Not common.

2. *B. edgeworthii* Lawson in Hook. f. Fl. Brit. Ind. 1 : 638. 1875.
B. lineata auct. non DC.

Deciduous shrubs ; flowers yellowish green ; fruits purplish black.

Fl. & Fr. : May - October.

Gohna. 2000 - 3000 m (15680).

2. *HELINUS* E. Mey. ex Endl. nom. cons.

Helinus lanceolatus Brandis, For. Fl. 574. 1874 ; Hook. f. Fl. Brit. Ind. 1 : 644. 1875.

Evergreen slender climbers ; flowers greenish - yellow.

Fl. & Fr. : February - September.

Nandprayag Rudraprayag across Alaknanda. 800 1500 m (26764).

3. HOVENIA Thunb.

Hovenia acerba Lindl. in Bot. Reg. 6 : t. 501. 1820. *H. dulcis* Roxb. Fl. Ind. 2 : 414. 1824 ; Hook. f. Fl. Brit. Ind. 1 : 640. 1875.

Large deciduous unarmed trees ; leaves 3- nerved membranous, bases unequal ; fruits globose.

Fl. & Fr. : May December.

Occurs throughout the Central and inner hills ranges. 1000 – 2000 m (Osmaston). Lit.

4. RHAMNUS L.

1a. Erect trees or shrubs.

2a. Shrubs ; branches often ending in a thorn ; flowers 4-merous *R. virgatus* 5

2b. Unarmed shrubs ; flowers 5 - merous.

3a. Deciduous ; leaves membranous, upper surface glabrous ; bark smooth ... *R. purpureus* 3

3b. Evergreen ; leaves subcoriaceous, upper surface minutely pubescent ; bark rough ... *R. triqueter* 4

1b. Dwarf or procumbent shrubs (nearly suberect).

4a. Evergreen ; larger leaves exceeding 2 cm long *R. procumbens* 1

4b. Deciduous ; leaves 0.7 - 2 cm long ... *R. prostrata* 2

1. *R. procumbens* Edgew. in Trans. Linn. Soc. 20 : 43. 1846 ; Hook. f. Fl. Brit. Ind. 1 : 640. 1875.

Evergreen creeping or prostrate shrubs ; flowers minute on arrested side - shoot.

Fl. & Fr. : January August.

Occurs throughout the hills. 2000 – 3000 m (Osmaston). Lit. Not common.

2. **Rhamnus prostrata** Jacq. ex Parker in Kew Bull. 217. 1921. *R. persicus* non Boiss, Senu Hook. f. Fl. Brit. Ind. 1 : 638. 1875. '*Koni or Kauntia*'.

Dwarf deciduous rigid shrubs ; branches with subspiniscent tips ; fruits obovoid, 3 lobed.

Fl. & Fr. : May - August.

Drier ranges bordering Tibet. 3000 - 4500 m (Osmaston). Lit.

3. **R. purpureus** Edgew. in Trans. Linn. Soc. 20 : 44. 1846 ; Hook. f. Fl. Brit. Ind. 1 : 639. 1875.

Unarmed deciduous shrubs ; flowers greenish purple ; fruits black, globose.

Fl. & Fr. : May - July.

Occurs throughout the hills. 2000 - 3000 m (Osmaston). Lit.

4. **R. triqueter** (Wall.) Lawson in Hook. f. Fl. Brit. Ind. 1 : 639. 1875. *Ceanothus triquetra* wall. in Roxb. Fl. Ind. 2 : 376. 1824.

Unarmed evergreen shrubs ; flowers yellowish green, solitary.

Fl. & Fr. : July - December.

Ghat, Nandprayag, Tharali. 1000 - 2000 m (37266).

5. **R. virgatus** Roxb. Fl. Ind. ed. Carey, 2,351. 1824. *R. dahuricus* auct. non Pall. Senu Hook. f. Fl. Brit. Ind. 1 : 639. 1875. '*Chentulu*'.

Deciduous shrubs ; branches ending in a sharp thorn ; flowers pale green, clustered.

Fl. & Fr. : March - Oct.

Pandukeswar. Rudraprayag, Sutul - Bhuna 800 - 3000 m (15633).

5. SAGERETIA Brongn.

- | | |
|--|------------------------|
| 1a. Climbers or rarely suberect with sarmentose branches, armed with stout deflexed lateral thorns ; leaves exceeding 5 cm ... | <i>S. filiformis</i> 1 |
| 1b. Erect shrubs with stiff branches ; sometimes armed with terminal straight thorns ; leaves not exceeding 5 cm long ... | <i>S. thea</i> 2 |

1. *Sageretia filiformis* (Roth ex Schult.) G. Don, Gen. Syst. 2 : 29. 1832. *Rhamnus filiformis* Roth ex Schult. Syst. Veg. 5 : 282. 1820. *S. oppositifolia* (Wall.) Brongn. 1826 ; Hook. f. Fl. Brit. Ind. 1 : 641. 1875. 'Abinkania'.

Shrubs with climbing branches ; leaves 5 – 12 cm, ovate – oblong, acuminate, serrate ; flowers greenish – yellow.

Fl. & Fr. : April – October.

Occurs throughout the hills, 1000 – 2500 m (Osmaston). Lit.

2. *S. thea* (Osbeck) M.C. Johnston in Journ. Arn. Arb. 49 : 378. 1968 *Rhamnus thea* Osbeck, Dagb. ostind ; Resa 232. 1757. *S. theezans* (Vahl) Brongn. Mem. Fam. Rham. 53. 1826 ; Hook. f. Fl. Brit. Ind. 1 : 641. 1875. 'khadgu, kuthu'.

Erect shrubs with stiff branches ; flowers green ; fruits black.

Fl. & Fr. : May – September.

Dhaulī valley, between Joshimath – Tapovan, 1500.– 2800 m (Osmaston). Lit.

6. ZIZIPHUS Mill.

Ziziphus mauritiana Lam. Encycl. Meth. 3 : 319. 1789. *Z. zujuba* Lam. non Mill. ; Hook. f. Fl. Brit. Ind. 1 : 632. 1875. 'Ber'.

Small subdeciduous trees with spreading crown ; leaves buff tomentose beneath ; flowers green.

Fl. & Fr. : May – September.

Gaucher. 600 m (68027).

39. VITACEAE

1a. Flowers polygamous.

2a. Inflorescence usually tendril bearing ; stigma simple.

3a. Petals 5, usually calyptrate ; leaves simple

...

Vitis 6

- 3b. Petals 4 - 5 ; spreading or recurved ; leaves simple or digitate ... *Ampelocissus*
- 2b. Inflorescence not tendril bearing ; leaves 3 - foliolate, sometimes 2 - 1 foliolate by reduction ... *Tetrastigma* 5
- 1b. Flowers hermaphrodite.
 - 4a. Petals 5, less often 4 ; leaves trifoliate ; seeds globose ... *Parthenocissus* 4
 - 4b. Petals 4, at first connivent then spreading.
 - 5a. Berries usually 1 - seeded ; seeds ellipsoid ; leaves usually simple ... *Cissus* 3
 - 5b. Berries 2 - seeded ; seeds hemispheric ; leaves 3 - foliolate or pedate or digitate ... *Cayratia* 2

1. AMPELOCISSUS Planch. nom. cons.

- 1a. Leaves glabrescent when mature ... *A. latifolia* 2
- 1b. Leaves with persistent dense felted tomentum beneath.
 - 2a. Leaves simple ... *A. rugosa* 3
 - 2b. Leaves usually trifoliate ... *A. divaricata* 1

Ampelocissus divaricata (Wall. ex Lawson) Planch. in DC. Monogr. Phaner. 5 : 378. 1887. *Vitis divaricata* Wall. ex Lawson in Hook. f. Fl. Brit. Ind. 1 : 657. 1875. '*Pan - laguli*'.

Annual climbers ; leaves Sometimes simple or 3 - lobed ; terminal leaflets upto 20 cm ; flowers red.

Fl. & Fr. : July - October.

Jakhmolla, 1200 - 2500 m (42252).

2. ***A. latifolia*** (Roxb.) Planch. in Vigne Amer. Vitic. Europe 1884 : 374. 1884. *Vitis latifolia* Roxb. Fl. Ind. 2 : 474. 1824 ; Hook. f. Fl. Brit. Ind. 1 : 652. 1875.

Climbers ; leaves simple, glabrous ; fruits succulent black, globose.

Fl. & Fr. : July – October.

Occurs throughout the area upto 1500 m (Osmaston). Lit.

3. *A. rugosa* (Wall.) Planch. in Jacq. Vigne Am. 1884 : 374. 1884. *Vitis rugosa* Wall. in Roxb. Fl. Ind. 2 : 480. 1824. *V. lanata* var. *rugosa* (Wall.) Lawson in Fl. Brit Ind. 1 : 651. 1875.

Climbers ; leaves simple, dense felted tomentose beneath ; fruits globose, shining.

Fl. & Fr. : June – November.

Occurs throughout the hills between 1800 – 2500 m (Osmaston). Lit.

2. CAYRATIA Juss. nom. cons.

Cayratia trifolia (L.) Domin in Bibl. Bot. 89 : 371. 1927. *Vitis trifolia* L. Sp. Pl. 203. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 654. 1875.

Herbaceous fleshy climbers ; leaves trifoliate ; inflorescence without tendrils ; flowers 4 merous, green.

Fl. & Fr. May – December.

Lobha, 800 m (Duthie). Lit.

3. CISSUS L.

Cissus repanda Vahl, Symb. L. 3 : 18. 1794. *Vitis repanda* (Vahl) Wt. & Arn. Prodr. 125. 1834 ; Hook. f. Fl. Brit. Ind. 1. 648. 1875.

Large deciduous climbers ; leaves simple ; inflorescence without tendrils ; fruits pyriform ; seed one.

Fl. & Fr. : June – August.

Occurs throughout the area upto 1500 m (Osmaston). Lit.

4. **PARTHENOCISSUS** Planch. nom. cons.

Parthenocissus semicordata (Wall.) Planch in DC. Monogr Phaner. 5 : 451. 1887. *Vitis Semicordata* Wall. in Roxb. Fl. Ind. 2 : 481. 1824. *Vitis himalayana* var. *semicordata* (Wall.) Lawson in Hook. f. Fl. Brit. Ind. 1 : 655 - 56. 1875.

Large deciduous climbers ; leaves trifoliate ; flowers yellowish green ; fruits purplish - black.

Fl. & Fr. : May November.

Dhotidhar, Masoli. Tri Juginarayan. 1700 - 2000 m (42211).

5. **TETRASTIGMA** Planch.

- | | | |
|---------------------------------|-----|------------------------|
| 1a. Leaves digitately 5-foliate | ... | <i>T. obtectum</i> 1 |
| 1b. Leaves pedately 5-foliate | ... | <i>T. Serrulatum</i> 2 |

1. **T. obtectum** (Wall. ex Lawon) Planch. ex Franch. in Bull. Soc. Bot. Fr. 33 : 458. 1886. *Vitis obtecta* Wall. ex Lawson in Hook. f. Fl. Brit. Ind. 1 : 657. 1875.

Evergreen climbers with tendrils and adventitious roots ; fruits globose, black.

Fl. & Fr. : May November.

Mondal. 1650 m (43924).

2. **T. serrulatum** (Roxb.) Planch. in DC. Monogr. Phaner 5 : 432. 1887. *Cissus serrulata* Roxb. Fl. Ind. 1 : 414. 1820. *Vitis capriolata* D. Don, Prodr. Fl. Nep. 188. 1825 ; Hook. f. Fl. Brit. Ind. 1 : 659. 1875.

Evergreen climbers ; fruits globose, black.

Fl. & Fr. : May October.

Anusuyia area Mondal. 1500 - 2500 m (44035).

6. VITIS L.

- 1a. Leaves 3.75 - 10 cm broad, glabrescent ... *V. parvifolia* 2
- 1b. Leaves 10 - 20 cm broad, hairy.
- 2a. Flowers umbellately cymose ... *V. pedicellata* 3
- 2b. Flowers peniculately cymose.
- 3a. Lower surface of mature leaves clothed all over with dense rusty tomentum ... *V. lanata* 1
- 3b. Lower surface of mature leaves $\pm$ green tomentose ... *V. vinifera* 4

1. **Vitis lanata** Roxb. Fl. Ind. ed. Carey 2, 1 : 660 1832 ; Hook. f. Fl. Brit. Ind. 1 : 651. 1875.

Deciduous climbers ; stems reddish brown ; leaves 10 - 22 cm broadly ovate, serrate sharply ; fruits black, transparent bloomed.

Fl. & Fr. : April - July.

Anusuya area, Bagrigar, Rudraprayag area upto 1500 - 2500 m (37252).

2. **Vitis parvifolia** Roxb. Fl. Ind. ed. Carey, 2, 1 : 662. 1832 ; Hook. f. Fl. Brit. Ind. 1 : 652. 1875.

Perennial deciduous climbers ; leaves glabrous on both surface ; fruits globose.

Fl. & Fr. : April - August.

Debal. 1500 m (35162).

3. **V. pedicellata** Lawson in Hook. f. Fl. Brit. Ind. 1 : 650. 1875.

Deciduous climbers ; leaves simple, hairy on nerves beneath ; fruits pyriform.

Fl. & Fr. : June - October.

Malla Chandpur and Kankrakhat R. F. 2000 - 2800 m (Osmaston).
Lit.

4. **V. vinifera** Linn. Sp. Pl. 202. 1753 ; Hook. f. Fl. Brit. Ind. 1 : 652. 1875.

Glabrous weak climbers ; peduncles without tendrils.

Cultivated in many places.

Agastamuni. 900 m (26846).

40. LEEACEAE

LEEAE L. nom. cons.

Leea asiatica (L.) Ridsdale in Manilal, Bot. Hist. Malab. 189. 1980.
Phytolacca asiatica L. Sp. Pl. 474, 1753. *L. aspera* Edgew. Trans. Linn. Soc. 20 : 36, 1846. non Wall. ex G. Don ; Hook. f. Fl. Brit. Ind. 1 : 665. 1875.

Deciduous herbs or shrubs ; flowers pale green ; fruits slaty green, blue black.

Fl. & Fr. : June November.

Phata, Trijuginarayan, Trisula. 1400 - 2000 m (44226).

41. HIPPOCASTANACEAE

AESCULUS L.

Aesculus indica (Colebr. ex Camb.) Hook. in Curtis Bot. Mag. 85, t. 5117. 1859. *Pavia indica* Colebr. ex Camb in Jacq. Voy. 4 (Bot.) 31, t. 35. 1835 ; Hook. f. Fl. Brit. Ind. 1 : 675. 1875. '*Pangur*'.

Tall deciduous trees ; leaves digitate ; flowers yellowish - white streaked ; fruits depressed dark brown.

Fl. & Fr. : May November.

Ramni, Gohna, Trijuginarayan, Wan. 2000 - 3000 m (47950).

42. SAPINDACEAE

- 1a. Climbing herbs ; leaves ternately pinnate, 3-leaflets on division ;
capsules membranous, inflated ... *Cardiospermum* 2
- 1b. Trees ; leaves simply pinnate ; leaflets about 15 ; drupes yellow,
fleshy ... *Sapindus* 1

1. SAPINDUS L.

Sapindus mukorossi Gaertn. Fruct. 1 : 342. t. 70, f. 3g. h 1788 ;
Hook. f. Fl. Brit. Ind. 1 : 683. 1875. '*Ritha*'.

Deciduous trees ; leaves 22.5 - 45 cm long ; flowers purplish - white ;
drupes pale brown ; seed 1, black.

Planted near the villages.

Throughout the area upto 1800 m (Osmaston). Lit.

2. CARDIOSPERMUM L.

Cardiospermum halicacabum L. Sp. Pl. ed. 1, 366, 1753 ; Hook. f. Fl.
Brit. Ind. 1 : 670. 1875.

Glabrous climbers ; branches wiry ; leaves biternate ; flowers white ;
fruits inflated pyriform, membranous, veined.

Fl. & Fr. : August - September.

Nandprayag across Alakanda. 1000 m (71098). Not Common.

43. ACERACEAE

(SAPINDACEAE Sensus BH)

ACER L.

1a. Leaves not lobed.

2a. Lobes entire ; leaves pale glaucous beneath ... *A. oblongum* 5

2b. Lobes serrate or sub-entire ; leaves glossy green beneath ... *A. leavigatum* 4

1b. Leaves lobed.

3a. Leaves 3 - 5 - lobed, margins serrate or toothed.

4a. Lobes pointed, but not produced in tail - like tips.

5a. Margins of leaves not fringed ; lower surface white... *A. caesium* 2

5b. Margins of leaves minutely fringed ; lower surface green ... *A. sterculiaceum* 6

4b. Lobes narrowed into long linear, tail - like tips ... *A. acuminatum* 1

3b. Leaves 5 - 7 lobed ; margin entire ... *A. cappadocicum* 3

1. *Acer acuminatum* Wall. ex D. Don, Prodr. Fl. Nep. 249. 1825.
A. caudatum non Wall. Sensus. Hook. f. Fl. Brit. Ind. 1 : 695. 1875. p.p.
'*Rath-Kanchula*.'

Large deciduous shrubs ; leaves 5 - 12 cm, caudate, green beneath ;
flowers green, appearing with the leaves.

Fl. & Fr. : April - November.

Bhuna - Bistola, Ghangaria. 3000 - 3500 m (29617).

2. *A. caesium* Wall. ex Brandis, For. Fl. 111. t. 21. 1874 ; Hook.
f. Fl. Brit. Ind. 1 : 695 ; 1875. '*Kanjula*'.

Large deciduous trees ; leaves 10 - 20 cm, serrate, pale beneath ;
flowers yellowish green, appearing with the young leaves.

Fl. & Fr. : April - November.

Ramni - Gohna forest. 2700 m (10138).

3. *Acer cappadocicum* Gledt. in Schriff. Ges. Nat. Freund. Berl. 6 : 116. t. 2, 1785, var. *indicum* (Pax) Rehdr, 1 : 86. in adnota. 1911. *A. Pictum auct.* non Thunb. Sensus Hook. f. Fl. Brit. Ind. 1 : 696. 1875.

Deciduous trees ; leaves 7 - 14 cm, entire, green beneath ; flowers greenish yellow, appearing with the young leaves.

Fl. & Fr. : March June.

Bagrigar, Bhyundar valley. 2400 m (35189).

4. *A. laevigatum* Wall. Pl. As. Rar. 2 : 3, t. 104. 1830 ; Hook. f. Fl. Brit. Ind. 1 : 693. 1875.

Medium subdeciduous trees ; leaves 10 - 20 cm, undivided entire, glossy green beneath ; flowers white in glabrous panicles.

Fl. & Fr. : April November.

Throughtout the area 1500 - 2500 m (Osmaston). Lit.

5. *A. oblongum* Wall. ex DC. Prodr. 1 : 593. 1824 ; Hook. f. Brit. Ind. 1 : 693. 1875. '*Pharbanj*'.

Subdeciduous trees ; leaves 6.5 - 15 cm, undivided, entire, pale glaucous beneath ; flowers white in terminal corymbose panicles.

Fl. & Fr. : February July.

Nagnath Pokhri, 1400 - 2500 m (42280).

6. *A. sterculiaceum* Wall. Pl. As. Rar. 2 : 3, t. 105. 1830. *A. villosum* Wall. Pl. As. Rar. 2 : 4. 1830 ; Hook. f. Fl. Brit. Ind. 1 : 695. 1875. '*Mandra*'.

Deciduous trees ; leaves 15 - 25 cm, densely clothed with pale - tomentum, beneath ; flowers pale green in racemes.

Fl. & Fr. : March November.

Pandukeswar, Trijuginrayan. 2000 - 3000 m (47971).

44. STAPHYLEACEAE

STAPHYLEA L.

Staphylea emodi Wall. ex Brandis For. Fl. N. W. & C. India 114. 1874 ; Hook. f. Fl. Brit. Ind. 1 : 698. 1875. '*Sablata or Surkhi*'.

Deciduous shrubs ; leaves trifoliolate opposite 15 - 37 cm long
flowers white ; capsules inflated bladder like.

Fl. & Fr. : July - October.

Joshimath, Rambara Gaurikund. 2000 - 3000 m (8735).

45. SABIACEAE

1a. Climbing shrubs ; leaves entire ; flowers $\geq$ 2 cm in diam. ... *Sabia* 2

1b. Erect trees ; leaves toothed ; flowers minute ... *Meliosma* 1

1. MELIOSMA Bl.

1a. Flowers pedicelled ; leaves ovate ... *M. dillenifolia* 1

1b. Flowers sessile ; leaves lanceolate ... *M. simplicifolia* 2

1. *Meliosma dillenifolia* (Wall. ex Wt. & Arn.) Walp. Rep. Bot. Syst. 1 : 423. 1842. *Millingtonia pinnata* Roxb. Fl. Ind. 1 : 103. 1820 ; *M. dellinifolia* wall ex wt. & Arn. 1833 ; Hook, f. Fl. Brit. Ind. 2 : 4. 1876 ; 'Guguna or Gweb'.

Deciduous shrubs or small trees ; leaves numerous, obovate, closely toothed ; lateral nerves 15 - 26 pairs, straight.

Fl. & Fr. : May - September.

Throughout the hills 2000 - 3000 m (Osmaton). Lit.

2. *M. simplicifolia* (Roxb.) Walp. Repert. 1 : 423. 1842. *Millingtonia simplicifolia* Roxb. (Hort. Beng. 3. 1814. nom. nud) Pl. Corom. 3 : 50, t. 254. 1820 ; Fl. Ind. 1 : 103. 1820 ; Hook, f. Fl. Brit. Ind. 2 : 4. 1876.

Evergreen trees ; leaves few oblanceolate, distantly toothed ; lateral nerves 8 - 10 pairs, curved ; flowers white, scented.

Fl. & Fr. : April - November.

Bhyundar valley. 1500 - 2500 m (S.n.).

2. *SABIA* Coleb.

Sabia campanulata Wall. ex Roxb. Fl. Ind. ed. Carey. 2 : 311. 1824 ; Hook. f. Fl. Brit. Ind. 2 : 1. 1876.

Deciduous climbers ; flowers solitary purplish green, appearing before the leaves.

Fl. & Fr. : April June.

Amritganga valley, Loharjung, Ramni Gohna. 2000 3000 m (44062).

46. ANACARDIACEAE

1a. Leaves simple.

2a. Fruits. 5 cm. long dry ... *Cotinus* 1

2b. Fruits larger usually succulent ... *Mangifera* 6

1b. Leaves trifoliate or pinnate.

3a. Petals 0 ... *Pistacia* 3

3b. Petals present.

4a. Fruits not exceeding .8 cm in diam, dry ... *Rhus* 4

4b. Fruit 1 cm in diam. or more, succulent.

5a. Leaflets without an intramarginal vein ... *Lannea* 2

5b. Leaflets with an intramarginal vein ... *Spondias* 5

1. *COTINUS* Mill.

Cotinus cogyria Scop. in Fl. Carinol. 2 ed, 1 : 220. 1772. *Rhus cotinus* L. Sp. pl. 267. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 9. 1876. '*Jal-Tunga*'.

Deciduous shrubs ; branches brownish purple ; leaves simple $\pm$ tomentose beneath ; flowers yellow ; fruits pink, hairy.

Fl. & Fr. : April July.

Common between 1500 - 2500 m (Osmaston). Lit.

2. LANCEA A. Rich. nom. cons.

Lancea coromandelica (Houtt.) Merrill in Journ. Arn. Arb. 19 : 353. 1938. *Dialicum Coromandelicum* Houtt. Nat. Hist 2 : 39, t. 5, f. 2 1774. *Odina wodier* Roxb. Fl. Ind. 2 : 293. 1832 ; Hook. f. Fl. Brit. Ind. 2 : 29. 1876. '*kalmina*,'.

Deciduous trees ; leaves pinnate ; flowers yellowish green ; fruits dull red.

Fl. & Fr. : March July.

Birehi, Nandprayag, Rudraprayag, 1000 2000 m (44241).

3. PISTACIA L.

Pistacia khinjuk Stocks in Hook. Kew Journ. 4 : 143. 1852. '*kakra*'.

Deciduous trees ; leaves pinnate, glabrous ; flowers red.

Fl. & Fr. : March July.

Nandprayag, Sitapur, 1000 1200 m (35147).

4. RHUS L.

- | | | |
|---|-----|-------------------------|
| 1a. Leaves of 3 leaflets | ... | <i>R. parviflora</i> 3 |
| 1b. Leaves pinnates 7-18. | | |
| 2a. Leaflets toothed ; leaf - stalk winged | ... | <i>R. javanica</i> 2 |
| 2b. Leaflets not toothed usually ; leaf - stalk not Winged. | | |
| 3a. Leaves glabrous. | | |
| 4a. Leaflets sessile ; drupes tomentose | ... | <i>R. punjabensis</i> 4 |
| 4b. Leaflets stalked ; drupes glabrous | ... | <i>R. acuminata</i> 1 |
| 3b. Leaves tomentose | ... | <i>R. wallichii</i> 5 |

1. *Rhus acuminata* DC. Prodr. 2 : 68. 1825. *R. succedanea* L. var. *acuminata* (DC.) Hook. f. Fl. Brit. Ind. 2 : 12. var. 3 : 1876.

Deciduous trees ; leaves pinnate ; leaflets 2 - 5 pairs, glabrous ; drupes globose flattened, wrinkled.

Fl. & Fr. : June - October.

Bhyundar valley. 2400 m (24243).

2. *R. javanica* L. Sp. Pl. 1 : 265. 1753. *R. semialata* murray in Comm. Soc. Sci. Gotting 6 : 27. t. 3. 1784 ; Hook. f. Fl. Brit. Ind. 2 : 10. 1876. '*Dhamila*.'

Deciduous trees ; leaves pinnate ; leaflets toothed ; flowers white ; fruits purplish red, pubescent globose.

Fl. & Fr. : July - November.

Govindghat. 1800 m (29681).

3. *R. parviflora* Roxb. Fl. Ind. 2, 2 : 100. 1832 ; Hook. f. Fl. Brit. Ind. 2 : 9. 1876. '*Saunla, Tungla*'.

± Evergreen shrubs ; leaves trifoliate ; flowers yellowish - green ; fruits globose brown, shining.

Fl. & Fr. : May - November.

Occurs throughout. 1500 - 2500 m (Osmaston). Lit.

4. *R. punjabensis* Stewart in Brandis For. Fl. 120. 1874 ; Hook. f. Fl. Brit. Ind. 2 : 10. 1876. '*Titari*'.

Deciduous trees ; leaves pinnate ; leaflets usually entire ; flowers greenish - yellow.

Fl. & Fr. : June - November.

Bhyundar valley. 2000 - 3000 m (393662).

5. *R. Wallichii* Hook. f. Fl. Brit. Ind. 2 : 11. 1876.

Deciduous trees ; leaves pinnate ; rachis not winged ; leaflets 5 - 9 ; drupes pubescent.

Fl. & Fr. : May - October.

Occurs throughout the hills. 1200 - 2500 m (Osmaston). Lit.

5. SPONDIAS L.

Spondias pinnata (L. f.) Kurz, Pegu Rep. A. 44, 1875. *Mangifera pinnata* L. f. Suppl. 156. 1781. *S. mangifera* Willd. Sp. Pl. 2 : 751. 1799 ; Hook. f. Fl. Brit. Ind. 2 : 42. 1877. 'Amara'.

Small deciduous trees ; leaflets with an intramarginal vein ; flowers greenish yellow ; fruits greenish yellow succulent.

Fl. & Fr. : March - September.

Nandrayag F. R. H. 1000 m (71910).

6. MANGIFERA L.

Mangifera indica L. Sp. Pl. 200. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 13. 1876. 'Aam'.

Large evergreen trees ; leaves simple, shining entire ; flowers greenish - yellow.

Fl. & Fr. : March - July.

Planted in and around the villages upto 1000 m.

47. CORIARIACEAE

CORIARIA L.

Coriaria nepalensis Wall. Pl. As. Rar. 3 : 67, t. 289. 1832 ; Hook. f. Fl. Brit. Ind. 2 : 44. 1876. 'Makroli'.

Deciduous shrubs ; leaves simple, glabrous 3 - 5 nerved ; flowers small green ; fruits blue - black.

Fl. & Fr. : March - June.

Ramni - Gohna, Sutul - Bhuna, Wan. 2000 - 3000 m (35194).

48. MORINGACEAE

MORINGA Adans.

Moringa Pterygosperma Gaertn. Fruct. 2 : 314. 1791. *M. Oleifeta* auct. non. Lam. 1785 ; Hook. f. Fl. Brit. Ind. 2 : 45. 1876.

Deciduous trees ; leaves pinnate ; flowers pink ; capsules elongate.

Fl. & Fr. : March June.

Occurs throughout the area upto 1000 m (Osmaston) Lit.

49. PAPILIONACEAE

PISUM L. not included in the key

1a. Stamens free.

2a. Leaves unequally pinnate ; pods winged ... *Sophora* 36

2b. Leaves digitate ; pods not winged.

3a. Shrubs with connate stipules ... *Piptanthus* 30

3b. Herbs with free stipules ... *Thermopsis* 38

1b. Stamens adelphous.

4a. Stamens monadelphous.

5a. Anthers dimorphic.

6a. Pods jointed, prickly ... *Zornia* 47

6b. Pods not jointed, not prickly.

7a. Keel obtuse ... *Argyrolobium* 5

7b. Keel beaked ... *Crotalaria* 12

5b. Anthers uniform.

8a. Trees ; pods strap shaped, thin, glabrous ... *Dalbergia* 13

8b. Herbs or shrubs ; pods pubescent or hairy.

- | | | |
|---|-----|----------------------|
| 9a. Pods linear-oblong, recurved, pubescent | ... | <i>Glycine</i> 49 |
| 9b. Pods flat, densely hairy | ... | <i>Pueraria</i> 31 |
| 4b. Stamens diadelphous. | | |
| 10a. Leaves simple. | | |
| 11a. Pods jointed ; flowers not enclosed within bracts. | | |
| 12a. Petals shorter than the calyx | ... | <i>Alysicarpus</i> 3 |
| 12b. Petals longer than the calyx | ... | <i>Desmodium</i> 14 |
| 11b. Pods not jointed ; flowers enclosed within bracts | ... | <i>Moghania</i> 26 |
| 10b. Leaves compound. | | |
| 13a. Pods dehiscent, not jointed. | | |
| 14a. Petiole ending in a tendril or bristle. | | |
| 15a. Climbers with the tenth stamen absent | ... | <i>Abrus</i> 1 |
| 15b. Herbs with diadelphous stamen. | | |
| 16a. Leaflets toothed | ... | <i>Cicer</i> 11 |
| 16b. Leaflets entire. | | |
| 17a. Tube of stamens oblique at mouth. | | |
| 18a. Style bearded on the inner surface | ... | <i>Lens</i> 43 |
| 18b. Style dorsally bearded | ... | <i>Vicia</i> 42 |
| 17b. Tube of stamens truncate at mouth | ... | <i>Lathyrus</i> 21 |
| 14b. Petiole not ending in a tendril or bristle. | | |
| 19a. Leaflets usually toothed. | | |
| 20a. Leaves digitately 3 - foliolate. | | |
| 21a. Petals persistent, adnate to the staminal tube | ... | <i>Trifolium</i> 39 |
| 21b. Petals caducous, free from the staminal tube | ... | <i>Parochetus</i> 29 |
| 20b. Leaves pinnately 3 - foliolate. | | |
| 22a. Pods elongated, straight or recurved | ... | <i>Trigonella</i> 40 |
| 22b. Pods short, round or oblong | ... | <i>Melilotus</i> 24 |

- 19b. Leaflets usually entire, very seldom toothed.
- 23a. Leaves pinnately foliolate.
- 24a. Leaves pinnately 5 - foliolate.
- 25a. Flowers yellow ... *Lotus* 23
- 25b. Flowers red ... *Tephrosia* 37
- 24b. Leaves pinnately 3 - foliolate.
- 26a. Leaves not gland-dotted beneath.
- 27a. Trees.
- 28a. Armed ; petals very unequal ... *Erythrina* 17
- 28b. Unarmed ; petals equal ... *Butea* 8
- 27b. Erect, climbing or trailing shrubs.
- 29a. Erect shrubs.
- 30a. Keel obtuse, not much incurved *Lespedeza* 22
- 30b. Keel acute, much incurved ... *Campylotropis* 9
- 29b. Climbing or trailing shrubs.
- 31a. Style bearded below the stigma.
- 32a. Stigma oblique.
- 33a. Keel spiral ... *Phaseolus* 45
- 33b. Keel not spiral ... *Vigna* 46
- 32b. Stigma terminal.
- 34a. Style thickened upwards, narrowed to the base, bearded down the inner edge ... *Lablab* 50
- 34b. Style filiform, minutely penicillate round the stigma, not bearded down the edge ... *Macrotyloma* 44
- 31b. Style not bearded.
- 35a. Nodes of raceme tumid.
- 36a. Petals very unequal.
- 37a. Anthers dimorphous ... *Mucuna* 27
- 37b. Anthers uniform ... *Aptis* 4
- 36b. Petals equal ... *Spatholobus* 35
- 35b. Nodes of raceme not tumid.
- 38a. Style filiform ; calyx-teeth distinct ... *Shuteria* 33

- 38b. Style flattened upwards ; calyx truncate ... *Dumasia* 15
- 26b. Leaves gland-dotted beneath.
- 39a. Ovules 3 or more.
- 40a. Seeds with a large grooved aril ... *Atylosia* 7
- 40b. Aril absent ... *Cajanus* 48
- 39b. Ovules 1 - 2.
- 41a. Funiculus at the end of the heilum ... *Eriosema* 16
- 41b. Funiculus centric on the heilum.
- 42a. Leaves pinnate ; pods compressed ... *Rhychosia* 32
- 42b. Leaves digitate ; pods turgid ... *Moghania* 26
- 23b. Leaves unequally pinnate.
- 43a. Pods not jointed.
- 44a. Trees ... *Dalbergia* 13
- 44b. Herbs or shrubs.
- 45a. Anthers [apiculate ; hairs fixed by centre ... *Indigofera* 20
- 45b. Anthers obtuse ; hairs basifixed.
- 46a. Pods few seeded, late in dehiscing ... *Millettia* 25
- 46b. Pods many seeded, soon dehiscing.
- 47a. Calyx very oblique ... *Caragana* 10
- 47b. Calyx not oblique.
- 48a. Keel very short, obtuse ... *Gueldenstaedtia* 18
- 48b. Keel long.
- 49a. Keel incurved, obtuse ... *Astragalus* 6
- 49b. Keel pointed with a distinct cusp ... *Oxytropis* 28
- 43b. Pods jointed.
- 50a. Leaflets 6 - 13 ; stalks not glandular.
- 51a. Flowers pale - blue or white, rachis ending in a bristle ... *Smithia* 34
- 51b. Flowers bright red, rachis not ending in a bristle ... *Hedysarum* 19
- 53b. Leaflets 41 - 61 ; stalks glandular ... *Aeschynomene* 2

13b. Pods indehiscent, jointed.

52a. Pod of several joints, folded so that the
broad faces are in contact ... *Uraria* 41

52b. Pod not folded as above ... *Desmodium* 14

1. ABRUS L.

1a. Pods flat ; seeds compressed ; leaflets oblong ... *A. pulchellus* 2

1b. Pods turgid ; seeds round ; leaflets linear or linear-oblong ... *A. Precatorius* 1

1. *Abrus precatorius* L. Syst. Nat. ed. 12. 472. 1767 ; Hook. f. Fl. Brit. Ind. 2 : 175. 1876. '*Ratti*'.

Deciduous climbers ; leaflets linear oblong ; fruits turgid ; seeds orbicular, scarlet, black spotted.

Fl. & Fr. : May June.

Gaucher. 700 1000 m (Osmaston). Lit. Not common.

2. *A pulchellus* Wall. ex thaw. Enum. 91 1859. *A. fruticulosus* auct. non wall. ex Wt & Arn. Sensus Breteler in Blumea 10 : 612. 1960 ; Hook. f. Fl. Brit. Ind. 2 : 175. 1876.

Deciduous climbers ; leaflets oblong ; fruits flat : Seeds greenish brown.

Fl. & Fr. : August September.

Occurs throughout the area. 700 1500 m (Osmaston) Lit.

2. AESCHYNOMENE L.

Aeschynomene indica L. Sp. Pl. 713. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 151. 1876.

Much branched annuals ; stems fistular warty ; leaflets 13 35 pairs ; pods 6 10 jointed.

Fl. & Fr. : August September.

Paduli. ascending upto 1200 m (158, Kala & Gaur). Lit.

3. *ALYSICARPUS* Necker & Desvaux, *nom. cons.*

- | | | |
|---|-----|-----------------------|
| 1a. Calyx not longer than the first joint of the pod | ... | <i>A. vaginalis</i> 2 |
| 1b. Calyx much longer than the first joint of the pod | ... | <i>A. rugosus</i> 1 |

Alysicarpus rugosus (Willd.) DC. Prodr. 2. 353. 1825. *Hedysarum rugosum* Willd. Sp. Pl. 3 : 1172. 1802 ; Hook. f. Fl. Brit. Ind. 2 : 159. 1876.

Glabrous, diffuse herbs ; leaflets ovate oblong ; flowers pale pink ; pods turgid moniliform, included within the calyx.

Fl. & Fr. : August October.

Chamoli, Himalaya upto 1500 m (226, Kala & Gaur). Lit.

2. *A. vaginalis* (L.) DC. Prodr. 2 : 353. 1825. *Hedysarum vaginale* L. Sp. Pl. 746. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 158. 1876.

Herbs ; stems robust ; leaflets oblong - orbicular ; flowers pale tinged purple ; pods terete longer than the calyx.

Fl. & Fr. : August - October.

Gaucher, Nandprayag across Alaknanda. 1000 - 1500 m (70949).

4. *APIOS* Moench.

Apios carnea (Wall.) Benth. ex Baker in Hook. f. Fl. Brit. Ind. 2 : 188. 1876. *Cyrtotrophis Carnea* Wall. Pl. As. Rar. 1 : 50, t. 62. 1829.

Slender climbers ; flowers red ; pods linear, glabrous .

Fl. & Fr. : August September.

Sankot, Pindarwar. 2500 m (Osmaston). Lit. Rare.

5. ARGYROLOBIUM Eckl. & Zeyh

Argyrolobium flaccidum (Royle) Jaub. & Spach. in Ann. Sci Nat. Ser. 2, 19 : 48, 1843. *Cystisus flaccidus* Royle, Ill. Bot. Himal. 197. 1835 ; Hook. f. Fl. Brit. Ind. 2 : 63. 1876.

Large spreading densely silky herbs ; leaflets lanceolate, acute ; flowers yellow.

Fl. & Fr. : July September.

Way to Ramni. 1000 3000 m (63772). Frequent.

6. ASTRAGALUS L.

- 1a. Stigma penicillate ... *A. amherstianus* 1
- 1b. Stigma naked.
- 2a. Flowers lilac or purple.
 - 3a. Herbs with adpressed white silky stems ; pods recurved ... *A. strictus* 13
 - 3b. Herbs with $\pm$ glabrous stems ; pods not recurved.
 - 4a. Stout elongate herbs ; pods sessile ... *A. melanostachys* 8
 - 4b. Slender herbs ; pods stalked.
 - 5a. Leaflets 19 - 21 ; pods 3 - 4 seeded ... *A. meddenianus* 7
 - 5b. Leaflets 21 - 25 ; pods 5 - 6 seeded ... *A. himalayanus* 5
- 2b. Flowers yellow or pale - yellow green tinged $\pm$ purple.
 - 6a. Leaf rachis ending in a spine.
 - 7a. Spines short ; flowers sessile in the leaf axils ... *A. psilocentrus* 11
 - 7b. Spines long ; flowers peduncled heads in leaf axils ... *A. oplites* 9
 - 6b. Leaf rachis ending in a leaflet.
 - 8a. Flowers in an elongated raceme.
 - 9a. Leaflets 13 - 17 ; pods oblong, turgid ... *A. chlorostachys* 3
 - 9b. Leaflets 17 - 19 ; pods ensiform, subcompressed ... *A. graveolens* 4
 - 8b. Flowers in heads.

- 10a. Calyx not gibbous ; slender herbs ; pods minute, unilocular ... *A. leucorephalus* 6
- 10b. Calyx gibbous ; stout low shrubs ; pods prominent, bilocular.
- 11a. Stemless.
- 12a. Leaflets and pods densely silky ... *A. rhizanthus* 12
- 12b. Leaflets and pods glabrous ... *A. webbianus* 14
- 11b. Stems distinct.
- 13a. Pods narrow from the middle to both ends ... *A. candolleanus* 2
- 13b. Pods rounded at both ends ... *A. pindreensis* 10

1. *Astragalus amherstianus* Royle ex Benth. in Royle, Ill. Bot. Himal. 119. 1835 ; Hook. f. Fl. Brit. Ind. 2 : 119. 1876.

Densely silky, herbs ; leaflets 13 - 17 ; pods linear, thinly silky, curved ; seeds 10 - 20.

Fl. & Fr. : July - August.

Way to Dunagiri, 2600 m (54044).

2. *A. candolleanus* Royle ex Benth. in Royle, Ill. Bot. Himal. 199. 1835 ; Hook. f. Fl. Brit. Ind. 2 : 132. 1876.

Prostrate grey hairy shrubs ; leaflets 17 - 25 sparsely silky ; flowers 2.4 cm long ; fruits silky hairy.

Fl. & Fr. : June - October.

Bhyundar valley, 3000 - 4500 m (Smythe). Lit.

3. *A. chlorostachys* Lindl. in Trans. Hort. Soc. 2 : 249. 1828 ; Hook. f. Fl. Brit. Ind. 2 : 128. 1876.

Shrubs, pubescent at maturity ; leaflets 1.8 - 2.5 cm, obtuse ; pods glabrous, seeds 6 - 10.

Fl. & Fr. : August - October.

Bhyundar valley, Kedarnath. 2800 - 3600 m (29611).

4. *A. graveolens* Buch. Ham. ex Benth. in Royle, Ill. Bot. Himal. 199. 1835 ; Hook. f. Fl. Brit. Ind. 2 : 131. 1876.

Undershrubs ; leaflets 1.2 - 2.5 cm, obtuse ; pods glabrous, ensiform ; seeds 12 - 18.

Fl. & Fr. : August - September.

Dhaulī valley - Jumma area. 2600 m (53851).

5. *Astragalus himalayanus* Klotz. in Klotz. & Garcke, Reise. Pr. Wald. Bot. 160, t. 4. 1862 ; Hook. f. Fl. Brit. Ind. 2 : 126. 1876.

± Glabrous, elongated, slender herbs ; leaflets thin oblong ; flowers purple ; pods black silky ; seeds 5 - 6.

Fl. & Fr. : August - October.

Bhyundar valley, Laxmiban. 3500 - 4000 m (29565).

6. *A. leucocephalus* Grah. ex Benth. in Royle, Ill. Bot. Himal. 198, t. 33. fig. 2. 1835 ; Hook. f. Fl. Brit. Ind. 2 : 128. 1876.

Perennial, densely silky herbs ; leaflets 21 - 31 ; flowers pale-yellow ; pods finely dwany ; seeds 3 - 4.

Fl. & Fr. : April - August.

Way to Dunagiri. 2600 m (54045).

7. *A. maddenianus* Benth. ex Baker in Hook. f. Fl. Brit. Ind. 2 : 127. 1876.

Elongated slender herbs clothed with black white hairs ; leaflets ob-lanceolate, oblong, obtuse ; flowers purple ; pods membranous white-silky ; seeds 3 - 4.

Fl. & Fr. : June - August.

Badrinath. 3000 - 4000 m (Duthie). Lit :

8. *A. melanostachys* Benth. ex Bunge in Mem. Acad. Sci. St. Pet. Ser. 7, 11 (16) : 21. 1868 ; Hook. f. Fl. Brit. Ind. 2 : 125. 1876.

Perennial herbs with glabrous elongate stems ; leaflets 12 - 15 ; flowers dense purple in heads ; pods black silky, included within the calyx.

Fl. & Fr. : July - August.

Rojhoti. 3000 - 4000 m (Duthie). Lit:

9. *A. Oplites* Benth. ex Parker in Kew Bull. 1921 : 270. 1921. *A. cicerifolius* Royle ex Bunge in Mem. Acad. Sci. St. Pet. Ser. 7 11(16) :

44. 1868. non Royle ex Fischer (1853) ; Hook. f. Fl. Brit. Ind. 2 : 134. 1876.

Undershrubs, densely armed with erect spinous rachis ; leaflets 31 - 41 ; flowers yellow ; pods densely silky ; seeds 15 - 20.

Fl. & Fr. : July - August.

Niti proper. 3000 - 5500 m (56123).

10. *Astragalus pindereensis* (Benth. ex Baker) Ali in Kew Bull. 1958 : 312. 1958. *A. cundolleanus* Royle ex Benth. var. *pindereensis* Benth. ex Baker in Hook. f. Fl. Brit. Ind. 2 : 133. 1876.

Perennial herbs ; stems upto 15 cm long ; leaflets 15 - 25 ; pods pilose, hairy yellow.

Fl. & Fr. : July - August.

Badrinath, Garhwal. 2500 - 3500 m (Falconer). Lit.

11. *A. psilocentrus* Fisch. in Bull. Soc. Nat. Mosc. 25(2) : 405. 1853. *A. polemius* Boiss. Fl. Or. 2 : 306. 1872 ; Parker, For Fl. Punjab 140. 1924.

Much branched $\pm$ prostrate shrubs ; leaflets 8 - 10 pairs ; leaf rachis ending in a spine ; flowers yellow solitary or paired ; pods grey hairy.

Fl. & Fr. : May.

Tapovan. 2200 m (Osmaston). Lit. Rare.

12. *A. rhizanthus* Royle ex Benth. in Royle Ill. Bot. Himal. 200. 1835 ; Hook. f. Fl. Brit. Ind. 2 : 131 - 132. 1876.

Rootstock woody ; tufted low shrubs ; leaflets 31 - 41 ; flowers yellow in dense heads ; pods densely silky ; seeds 15 - 20.

Fl. & Fr. : June - July.

Badrinath. 3000 - 3500 m (2959).

13. *A. strictus* Grah. ex Benth. in Royle Ill. Bot. Himal. 198. 1835 ; Hook. f. Fl. Brit. Ind. 2 : 124. 1876.

Caespitose slender silky hairy herbs ; flowers lilac in heads ; pods recurved hairy ; seeds 6 - 8.

Fl. & Fr. : June - July.

Chandrapaduka valley. 3600 m. (2920).

14. *Astragalus webbianus* Grah. ex Benth. in Royle Ill. Bot. Himal. 199. 1835 ; Hook. f. Fl. Brit. Ind. 2 : 132. 1876.

Densely caespitose glabrous low shrubs ; leaflets 31 - 51 ; flowers yellow ; pods oblong glabrous ; seeds 15 - 20.

Fl. & Fr. : July - August.

Guje. 4000 - 5500 m (Duthie). Lit.

7. *ATYLOSIA* Wt. & Arn.

1a. Flowers 2 - 3 cm. long ; pods 3.5 - 5 cm.

2a. Leaflets longer than broad ; corolla persistent ; pods .8 cm broad, grey-pubescent ... *A. mollis* 1

2b. Leaflets as long as broad ; corolla soon falling off ; pod 1.2 cm broad, thinly hairy ... *A. platycarpa* 2

1b. Flowers hardly .8 cm long ; pods 2 - 2.5 cm ... *A. scarabaeoides* 3

1. *Atylosia mollis* Benth. in Miq. Fl. Jungh. 243. 1851 - 52 ; Hook. f. Fl. Brit. Ind. 2 : 213. 1876, *p.p.*

Deciduous climbers ; flowers yellow, 2 - 3 cm long ; pods hairy ; seeds 7 - 10.

Fl. & Fr. : August - September.

Chandrapuri 800 m. (6390).

2. *A. platycarpa* Benth. in Miq. Pl. Jungh. 243. 1851 - 52 ; Hook. f. Fl. Brit. Ind. 2 : 216. 1876.

Slender hairy climbers ; leaves orbicular ; flowers yellow 1.8 cm long ; pods thinly hairy ; seeds 5 - 6.

Fl. & Fr. : August - September.

Garthadar, occurs upto 2500 m Garhwal. (133, Kala - Gaur) Lit.

3. *A. scarabaeoides* (L.) Benth. in Miq. Pl. Jungh 242. 1851 - 52

Dolichos scarabaeoides L. Sp. Pl. 726. 1753 ; Hook. f. Fl. Brit Ind. 2 : 215. 1876.

Slender pubescent climbers ; leaves ovate - oblong ; flowers yellow, 8 cm long ; pods densely hairy ; seeds 4 - 6.

Fl. & Fr. : April - November.

Badrinath, Chamoli. 1000 - 1200 m (42293).

8. BUTEA Roxb. ex Willd. *nom. cons.*

Butea monosperma (Lam.) Taub. in Nat. Pflanzenfam. 3(3) : 366. 1894. *Erythrina monosperma* Lam. Dict. 1. 391. 1785 ; *Butea frondosa* koening ex Roxb. As. Res. 3. 469. 1792 ; Hook. f. Fl. Brit. Ind. 2 : 194. 1876.

Deciduous trees ; leaves pinnately 3 - foliolate ; flowers bright red, tinged orange ; pods thin, flat, grey silky.

Fl. & Fr. : March - July.

Occurs upto 1500 m (Osmaston). Lit.

9. CAMPYLOTROPIS Bunge

- | | | |
|-----------------------------------|-----|------------------------|
| 1a. Undershrubs ; branches woolly | ... | <i>C. macrostyla</i> 2 |
| 1b. Shrubs ; branches pubescent. | | |
| 2a. Racemes sessile | ... | <i>C. stenocarpa</i> 3 |
| 2b. Racemes peduncled | ... | <i>C. eriocarpa</i> 1 |

1. **Campylotropis eriocarpa** (Maxim.) Schindler in Fedde Repert. Sp. Nov. 11 : 347. 1912. *Lespedeza eriocarpa* Maxim. in Acta Hort. Petrop. 2 : 350 1873, non Dc.

Branched pubescent shrubs ; leaflet pubescent beneath ; flowers deep purple ; pods adpressed hairy.

Fl. & Fr. : August – October.

Bhyundar valley, Phata. 1800 – 2000 m (24233).

2. *Campylotropis macrostyla* (D. Don) Schindler in Fedde Repert. Sp. Nov. 11. 344. 1912. *Crotalaria macrostyla* D. Don Prodr. Fl. Nep. 242. 1825.

Undershrubs ; branches woody woolly ; leaflets tomentose beneath ; flowers deep red ; pods tomentose, silky.

Fl. & Fr. : ?

Garhwal, 800 – 2500 m (Mill.) Lit.

3. *C. stenocarpa* (Klotz.) Schindler in Fedde Repert. Sp. Nov. 11 : 345. 1912. *Oxyramphis stenocarpa* Klotz. in Klotz. & Garcke, Bot. Ergebn. Reise Wald. 158. t. 1. f. 2. 1862.

Densely pubescent shrubs ; leaflets as long as broad ; flowers deep red ; pods oblong, pubescent.

Fl. & Fr. : March – November.

Occurs in all parts. 1200 – 2500 m (Osmaston). Lit.

10. CARAGANA Lam.

- | | | |
|--|-----|------------------------|
| 1a. Leaves more or less digitate | ... | <i>C. versicolor</i> 5 |
| 1b. Leaves imparipinnate. | | |
| 2a. Stems dwarf, less than 15 cm high | ... | <i>C. nubigena</i> 3 |
| 2b. Stems 30 cm or more in height. | | |
| 3a. Flowers in few flowered umbels | ... | <i>C. brevispina</i> 1 |
| 3b. Flowers solitary or paired, sub-sessile. | | |
| 4a. Stipules connate behind the leaf rachis | ... | <i>C. gerardiana</i> 2 |
| 4b. Stipules not connate behind | ... | <i>C. suktensis</i> 4 |

1. *Caragana brevispina* Royle, Ill. Bot. Himal. 198. 1835 ; Hook. f. Fl. Brit. Ind. 2 : 116. 1876.

Shrubs upto 1 – 2.5 m tall ; leaves imparipinnate ; flowers yellow in umbels ; pods pubescent without, woolly within.

Fl. & Fr. : May – August.

Bhyundar valley. 2300 – 2500 m (29651). Not common.

2. *C. gerardiana* Royle, Ill. Bot. Himal. 198, t. 39, fig. 1. 1835 ; Hook. f. Fl. Brit. Ind. 2 : 116. 1876. 'Juara'.

Shrubs upto 1 m tall ; leaves imparipinnate ; rachis spinescent ; stipules connate behind the leaf rachis.

Fl. & Fr. : July – August.

Niti. 3500 – 4500 m (56125).

3. *C. nubigena* Bunge Mong. Astrag. 240. 1868. *C. crassicaulis* Benth. ex Baker in Hook. f. Fl. Brit. Ind. 2 : 117. 1876.

Dwarf shrubs upto 10 cm tall ; leaflets, 18 – 30 ; flowers yellow ; pods sparsely hairy.

Fl. & Fr. : July – August.

Kaga area way to Dunagiri. 4000 – 4500 m (53983). Rare.

4. *C. suklensis* C. K. Schneid. in Bull. Herb. Boiss. Ser. 2, 7 : 313. 1907. *C. hoplites* Dunn. in Kew Bull. 338. 1920.

Shrubs upto 2 m tall ; leaflets 8 – 10 ; stipules not connate behind ; flowers yellow, fading to orange – brown.

Fl. & Fr. : June – July.

Nandakini valley above Sutul, 3000 – 3500 m (Osmaston). Lit. Rare.

5. *C. versicolor* (Wall.) Benth. in Royle, Ill. Bot. Himal. t. 34. 1834 & 198. 1835. *Genista Versicolor* Wall. in Royle Ill. Bot. Himal t. 34. 1834. *C. Pygmaea* non DC. Sensus Hook. f. Fl. Brit. Ind. 2 : 116. 1876. 'Dam'.

Low, dense, prickly shrubs ; leaves digitate ; flower solitary, yellow tinged in orange ; pods linear, glabrous.

Fl. & Fr. : June – August.

Niti. 2500 – 5500 m (56146).

11. Cicer L.

Cicer microphyllum Benth. in Royle, Ill. Bot. Himal. 200. 1835.
C. saongaricum auct. non steph sensu. Hook. f. Fl. Brit. Ind. 2 : 176. 1876,
 p.p. 'chana'.

Diffuse pubescent herbs ; leaves ending in a tendril ; flowers violet ;
 pods linear – oblong densely pubescent.

Fl. & Fr. : July – August.

Way to Geoldong & Niti. 3800 m (56106). Frequent.

12. CROTALARIA L.

1a. Leaves simple ; pods many seeded.

2a. Flowers yellow.

3a. Petals never much longer than the calyx.

4a. Pods 1.2 cm or less.

5a. Stems prostrate ; calyx and lower surface of
 leaves densely red - hairy ; flowers .4 cm or
 less.

6a. Pods 1.2 cm ... *C. prostrata* 7

6b. Pods .6 cm or less ... *C. humifusa* 4

5b. Stems erect.

7a. Lower surface of leaves and calyx white -
 pubescent ; flowers .8 cm long ... *C. albida* 1

7b. Lower surface of leaves and calyx brown-
 hairy ; flowers 2 - 2.5 cm long ... *C. calycina* 3

4b. Pods 2.5 - 3 cm.

8a. Stipules large, decurrent as conspicuous wings
 on the stem and branches ... *C. alata* 2

8b. Stipules small, not decurrent ... *C. mysorensis* 6

3b. Petals $1\frac{1}{2}$ - 2 times as long as the calyx.

9a. Corolla much exerted ; pods glabrous ... *C. spectabilis* 9

9b. Corolla little exerted ; pods densely velvety ... *C. tetragona* 10

2b. Flowers pale - blue ... *C. sessiliflora* 8

1b. Leaves 3 - foliolate ; pods globose, 2 - seeded ... *C. medicaginea* 5

Crotalaria albida Heyne ex Roth, Nov. Pl. Sp. 333. 1821 ; Hook. f. Fl. Brit. Ind. 2 : 71. 1876.

Much branched silvery pubescent undershrubs ; flowers yellow ; pods oblong, glabrous ; seeds 6 – 12.

Fl. & Fr. : July – November.

Masoli, Nandkeshri Nigol valley. 1300 – 1700 m (18258).

2. **C. alata** Buch – Ham. ex D. Don, Prodr. Fl. Nep. 241. 1825. *C. bialata* auct. non Schrank Sensus Roxb. Fl. Ind. 2, 3 : 274. 1832 ; Hook. f. Fl. Brit. Ind. 2 : 69. 1876.

Densely hairy undershrubs with winged stems ; pods oblong, long stalked glabrous.

Fl. & Fr. : Aug. – November.

Nigol valley. 1200 m (18296).

3. **C. calycina** Schrank, Pl. Rar. Hort. Monac. t. 12. 1817 ; Hook. f. Fl. Brit. Ind. 2 : 72. 1876.

Erect brown - hairy herbs ; leaves oblong lanceolate ; pods glabrous 20 – 35 seeded.

Fl. & Fr. : August – September.

Patiyaldhar. 1500 m (121, Kala & Gaur). Lit.

4. **C. humifusa** Grah. ex Benth. in Hook. Lond. Journ. 2 : 476. 1843 ; Hook. f. Fl. Brit. Ind. 2 : 67. 1876.

Perennial prostrate hairy herbs ; pods oblong glabrous ; seeds 6 – 8.

Fl. & Fr. : August – October.

Jakhmola. 1500 m (42233).

5. **C. medicaginea** Lam. Encycl. 2 : 201. 1790 ; Hook. f. Fl. Brit. Ind. 2 : 81. 1876 incl. var.

Erect appressed – pubescent herbs ; leaflets sessile ; flowers dense racemed.

Fl. & Fr. : April.

Gopeswar, Kothiyalsain 800 – 1350 m (450, Kala & Guar). Lit.

6. **C. mysorensis** Roth, Nov. Pl. Sp. 338. 1821 ; Hook. f. Fl. Brit. Ind. 2 : 70. 1876.

Densely brown silky undershrubs ; pods oblong, glabrous ; seeds 20 – 30

Fl. & Fr. : October – November.

Chamoli. 1200 m (s.n.).

7. *Crotalaria prostrata* Rottl. ex Willd. Enum. Hort. Berol. 2 : 747. 1809 ; Hook. f. Fl. Brit. Ind. 2 : 67. 1876.

Prostrate slender hairy herbs ; leaves under surface red hairy ; pods linear – oblong, glabrous ; Seeds 12 – 18.

Fl. & Fr. : August – November.

Nigol valley, Trisula. 1400 m (42268).

8. *C. sessiliflora* L. Sp. Pl. 2, 1004. 1763 ; Hook. f. Fl. Brit. Ind. 2 : 73. 1876.

Hairy herbs ; leaves linear acute ; flowers .8 cm long, sessile ; pods glabrous, sessile, seeds 10 – 15.

Fl. & Fr. : September – October.

Nigol valley. 1750 – 2700 m. (30801).

9. *C. spectabilis* Roth, Nov. Pl. Sp. Ind. or. 341. 1821. *C. sericea* Retz. Obs. 5 : 36. 1788 ; Hook. f. Fl. Brit. Ind. 2 : 75. 1876. 'Ghungri'.

Silky pubescent shrubs ; leaves undersurface silky ; pods glabrous, stalked, 2.5 – 5 cm long.

Fl. & Fr. : September – March.

Batwalchari Chamoli. 1000 – 1200 m. (18261).

10. *C. tetragona* Andr. Bot. Rep. 10 : t. 593 1810 & Fl. Ind. 3 : 363. 1832 ; Hook. f. Fl. Brit. Ind. 2 : 78. 1876.

Stiff shrubs upto 2 m tall ; branches sulcate thinly silky ; flowers 2.5 – 3 cm long ; pods dark brown – velvety, 3 – 5 cm long ; seeds 12 – 20.

Fl. & Fr. : September – March.

Occur upto 1200 m in dry open situations. (Osmaston). Lit.

13. *DALBERGIA* L. f. *nom. cons.*

- | | | |
|--|-----|---------------------|
| 1. Leaflets acuminate ; stamens monadelphous | ... | <i>D. sissoo</i> 2 |
| 1b. Leaflets obtuse ; stamens diadelphous | ... | <i>D. sericea</i> 1 |

1. *Dalbergia sericea* G. Don Gen. Syst. 2 : 375. 1832 ; Osmaston For. Fl. Kumaon 183. (rep. ed.).

Deciduous trees ; leaflets 17 - 25, pubescent ; flowers pale - lilac ; pods linear, glabrous ; seeds 1 - 3.

Fl. & Fr. : February - June.

Birahi, Gohna, 1500 m (10026).

2. *D. sissoo* Roxb. (Hort. Beng. 53. 1841 nom nud.) ex DC. Prodr. 2 : 416. 1825 ; Hook. f. Fl. Brit. Ind. 2 : 231. 1876. '*Sesam*'.

Deciduous trees ; leaflets 3 - 5, glabrous ; flowers yellow ; pods thin flat, glabrous ; seeds 1 - 4.

Fl. & Fr. : February - May.

Chandrangar, Nandprayag across Alaknanda. 900 m (26858).

14. *DESMODIUM* Desv. *nom. cons.*

1a. Petioles not winged ; flowers often 2 or several from a node in raceme.

2a. Pods distinctly jointed ; joints generally indehiscent.

3a. Leaves 1 - foliolate.

| | | |
|--------------------------------------|-----|------------------------|
| 4a. Leaves entire, glabrescent above | ... | <i>D. gangeticum</i> 4 |
|--------------------------------------|-----|------------------------|

| | | |
|---------------------------------|-----|------------------------|
| 4b. Leaves repand, hispid above | ... | <i>D. velutinum</i> 12 |
|---------------------------------|-----|------------------------|

3b. Leaves 3 - foliolate.

5a. Stems suberect or prostrate.

| | | |
|---|-----|--------------------------|
| 6a. Pods slightly indented on the ventral suture ; joints 5 - 8 | ... | <i>D. heterocarpon</i> 5 |
|---|-----|--------------------------|

- 6b. Pods deeply indented on both sutures ; joints
3 - 5 ... *D. microphyllum* 7
- 5b. Stems erect.
- 7a. Pods stalked ; flowers .3 cm long ... *D. podocarpum* 9
- 7b. Pods sessile.
- 8a. Flowers 1.2 cm long ; racemes much branched ... *D. elegans* 2
- 8b. Flowers .6 - 1 cm long ... Subsp. *elegans* var. *elegans*
- 9a. Bracts minute.
- 10a. Erect shrubs, 1.20 - 2.50 m high ; flowers
pink ... *D. sequax* 10
- 10b. Undershrubs, 20 - 30 cm high ; flowers pale-
yellow, tinged purple ... *D. laxiflorum* 6
- 9b. Bracts .5 cm long or longer.
- 11a. Petioles 2.5 - 6.25 cm long ... *D. floribundum* 3
- 11b. Petioles usually not exceeding 2.5 cm ; leaves
adpressed silky above ... *D. concinnum*
- 2b. Pods indistinctly jointed and not articulate, dehiscent along
the ventral suture ... *D. motorium* 8
- 1b. Petioles winged ; flowers racemose ... *D. triquetrum* ssp.
pseudotriquetrum 11

1. *Desmodium concinnum* DC. in Ann. Sci. Nat. 4 : 101. Jan. 1825 ;
Hook. f. Fl. Brit. Ind. 2 : 170. 1876, *p.p.*

Pubescent deciduous shrubs ; leaves thinly hairy on both surfaces ;
flowers deep - purple, fading blue ; pods minutely hairy, joints 3 - 6.

Fl. & Fr. : August - November.

Batwalchari, Mondal, Narayankoti. 1000 - 1600 m. (35842).

2. *D. elegans* DC. in Ann. Sci. Nat. 4 : 100 Jan. 1825. Subsp. *elegans*
var. *elegans*. *D. tilaefolium* D. Don Gen. Syst. 2 : 297. 1832 ; Hook. f. Fl.
Brit. Ind. 2 : 168. 1876.

Tomentose shrubs ; leaflets broad lyrate, matted, white, silky
beneath ; flowers pale - pink ; pods pubescent, joints 6 - 9.

Fl. & Fr. : April - November.

Badrinath, Bhyundar valley, Kanol. 2000 - 35000 m (29326).

3. **Desmodium floribundum** (D. Don) G. Don, Gen. Syst 2 : 297. 1832. *Hedysarum floribundum* D. Don, Prodr. Fl. Nep. 224. 1825. *D. sambuense* (D. Don) DC. Prodr. 2 : 335. 1825 ; Hook. f. Fl. Brit. Ind. 2 : 167. 1876.

Deciduous pubescent shrubs ; leaflets silky beneath ; flowers purple ; pods hairy, joints 6 - 8.

Fl. & Fr. : June - November.

Gwaldam, Jakhmola, Loharjung, 1800 - 2500 m. (42227).

4. **D. gangeticum** (L.) DC. Prodr. 2 : 327. 1825. *Hedysarum gangeticum* L. Sp. Pl. 746. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 168. 1876.

Undershrubs with pubescent stems ; leaves simple ; flowers pink ; pods pubescent curved, joints 6 - 8.

Fl. & Fr. : April - December.

Rudraprayag, Nandprayag. 600 - 2000 m (26767).

5. **D. heterocarpon** (L.) DC. prodr. 2 : 337. 1825. *Hedysarum heterocarpon* L. Sp. Pl. 747. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 171. 1876.

Deciduous undershrubs ; leaves trifoliate ; flowers purple ; pods rusty hooked hairy, joints 4 - 8.

Fl. & Fr. : August - October.

Narayankoti, Soragarh. (Agas tamuni). 900 - 2500 m (35823).

6. **D. laxiflorum** DC. in Ann. Sc. Nat. Paris Ser. 1. 4 : 100. 1825 ; Hook. f. Fl. Brit. Ind. 2 : 164. 1876.

Deciduous undershrubs ; stems upto .8 cm diam. ; leaves trifoliate ; flowers pale yellow ; pods clothed with hooked hairs, joints 4 - 5.

Fl. & Fr. : July - November.

Occurs upto 2000 m (Osmaston). Lit.

7. **D. microphyllum** (Thunb.) DC. Prodr. 2 : 337. 1825. *Hedysarum microphyllum* Thunb. Fl. Jap. 284. 1784 ; Hook. f. Fl. Brit. Ind. 2 : 174. 1876. '*Khet - sunsuni*'.

Tufted trailing glabrous shrubs ; flowers bluish-purple ; pods straight, pubescent, joints 4 - 5.

Fl. & Fr. : July - October.

Bhyundar valley, Mondal, Loharjung. 600 - 2000 m (41902).

8. *Desmodium motorium* (Houtt.) Merr. in Journ. Arn. Arb. 19 : 345. 1938. *Hedysarum motorium* Houtt. Nat. Hist. 2, 10 : 246. 1779. *D. gyrans* (L. f.) DC. Prodr. 2 : 326. 1825 ; Hook. f. Fl. Brit Ind. 2 : 174. 1876.

Glabrous undershrubs ; lateral leaflets very small ; flowers pale - yellow, tinged with purple ; pods glabrous curved, joints 6 - 10.

Fl. & Fr. : June - November.

Nigol valley, Phata, Vickie Tal. 600 - 1700 m (35840).

9. *D. podocarpum* DC. in Ann. Sci. Nat. 4 : 102. Jan. 1825. *D. racemosum* (Thunb.) DC. Prodr. 2 : 337. 1825.

Pubescent undershrubs ; leaves trifoliate, orbicular ; flowers pink ; pods 1.2 cm, joints 1 - 2.

Fl. & Fr. : July - October.

Gwaldam, Phata. 1700 - 2500 m (35843).

10. *D. sequax* Wall. Pl. As. Rar. 2 : 46. t. 157. 1831 ; Hook. f. Fl. Brit. Ind. 2 : 170. 1876.

Shrubs with tomentose stems ; flowers .8 - 1 cm long ; pods densely clothed with hooked hairs, joints 5 - 13.

Fl. & Fr. : August - February.

Occurs throughout the area upto 2000 m (Osmaston). Lit. Rare.

11. *D. triquetrum* (L.) DC. Prodr. 2 : 326. 1825. subsp. *pseudotriquetrum* (DC.) Prain in Journ. Asiat. Soc. Beng. 66(2) : 390. 1897. *D. pseudotriquetrum* DC. in Ann. Sci. Nat. Paris 4 : 100. 1825 (Jan.)

Prostrate or decumbent ascending herbs ; stems 3 - quetrous ; leaves ovate - lanceolate to oblong ; flowers purplish ; pods glabrous.

Fl. & Fr. : August - March.

Chamoli 750 m (228, Kala & Gaur). Lit.

12. *D. velutinum* (Willd.) DC. Prodr. 2 : 328. 1825. *Hedysarum Velutinum* Willd. Sp. Pl. 3 : 117. 1803. *D. latifolium* (Roxb. ex Ker - Gawler) DC. Prodr 2 : 328. 1825. Baker in Hook. f. Fl. Brit. Ind. 2 : 168. 1876.

Deciduous shrubs ; leaves simple ovate, 15 cm long, hispid ; flowers purple dense ; pods clothed with hooked hairs, joints 4 - 6.

Fl. & Fr. : August - December.

Occurs throughout the area upto 1500 m (Osmaston). Lit.

15. DUMASIA DC.

Dumasia villosa DC. in Ann. Sci. Nat. 4 : 67. 1825 ; Hook. f. Fl. Brit. Ind. 2 : 183. 1876.

Densely hairy slender twining perennials ; flowers yellow ; pods yellow tomentose.

Fl. & Fr. : August - September.

Bhyundar valley. 2000 m (24209).

16. ERIOSEMA DC.

Eriosema himalaicum Ohashi in Journ. Jap. Bot. 41. 96. 1966. *E. chinense* non Vogl. Sensus Hook. f. Fl. Brit. Ind. 2 : 219. 1876, *p.p.* 'Bhatya'.

Slender herbs with woody perennial tuber ; flowers purplish-yellow ; pods densely pubescent, oblong.

Fl. & Fr. : September - November.

Nigol valley. 1300 m (18263).

17. ERYTHRINA L.

1a. Deciduous shrubs ; flowers Sept. - Oct. ; seeds black ... *E. arborescens* 1

1b. Deciduous trees ; flowers March - April ; seeds dull-brown ... *E. suberosa* 2

1. **Erythrina arborescens** Roxb. Pl. Corom. 3 : t. 219. 1811 ; Hook. f. Fl. Brit. Ind. 2 : 190. 1876.

Deciduous shrubs ; bark deeply cracked ; leaflets glabrous ; flowers scarlet, 4 cm long.

Fl. & Fr. : September – October.

Occurs between 1200 – 2500 m (Osmaston). Lit. Rare.

2. *Erythrina suberosa* Roxb. Fl. Ind. 3 : 253. 1832 ; Hook. f. Fl. Brit. Ind. 2 : 189. 1876. '*Manura*'.

Deciduous trees with vertically fissured corky barks ; leaflets downy beneath.

Fl. & Fr. : March – June.

Occurs upto 1500 m (Osmaston). Lit.

18. *GULDENSTAEDTIA* Fisch.

Guldenstaedtia himalaica Baker in Hook. f. Fl. Brit. Ind. 2 : 147. 1876.

Prostrate velvety silky herbs ; leaflets 11 – 13, obovate, oblong ; flowers blue.

Fl. & Fr. : June.

Narayan Parbat. 3500 m (2843).

19. *HEDYSARUM* L.

Hedysarum microcalyx Baker in Hook. f. Fl. Brit. Ind. 2 : 147. 1876.

Stout glabrous herbs ; leaflets large, membranous ; flowers bright red ; pods glabrous, thin margined.

Fl. & Fr. : July – August.

Badrinath region (Falconer). Lit.

20. INDIGOFERA L.

1a. Herbs.

2a. Leaves compound ; pods, 6 - 8, seeded.

3a. Leaflets 3 ; pods pubescent. ... *I. trifoliata* 93b. Leaflets 5 - 11 ; pods short, straight, hairy ... *I. hirsuta* 72b. Leaves simple ; pods, 1 - seeded ... *I. linifolia* 8

1b. Shrubs ; pods linear or oblong.

4a. Flowers pink.

5a. Pods hairy ; bracts minute.

6a. Flowers 1 - 1.2 cm long ; pods 3 - 5 cm long ... *I. gerardiana* 46b. Flowers .5 - .8 cm long ; pods 2 - 3 cm long ... *I. heterantha* 65b. Pods glabrous ; bracts prominent ; bracts boat - shaped, exceeding the buds ... *I. cassioides* 2

4b. Flowers deep red.

7a. Leaflets 6 - 15, thinly hairy ; pod glabrous.

8a. Bracts lanceolate ; leaflets 11 - 15 ... *I. atropurpurea* 18b. Bracts boat - shaped ; leaflets 6 - 9 ... *I. hebeptala* 57b. Leaflets 15 - 37, densely hairy or tomentose ; pods tomentose ... *I. dosua* 3

1. *Indigofera atropurpurea* Buch. - Ham. ex Horn. Reg. Bot. Hafn. Suppl. 152. 1819 ; Hook. f. Fl. Brit. Ind. 2 : 101. 1876, p.p.

Glabrous, branched shrubs ; leaflets 1.8 - 6 cm ; bracts lanceolate narrowed to a point ; flowers 1 cm long ; pods linear, glabrous.

Fl. & Fr. : May - December.

Occurs throughout the hills between 1200 - 1500 m. (Osmaston).
Lit.

2. *I. cassioides* Rottl. ex DC. Prodr. 2 : 225. 1825. *I. puchella* auct. non Roxb. sensu Hook. f. Fl. Brit. Ind. 2 : 101. 1876.

Deciduous shrubs ; leaflets 11 - 19 ; bracts lanceolate, narrowed to a long point ; flowers 1.2 cm long ; pods glabrous.

Fl. & Fr. : April – June.

Occurs between 1500 – 2000 m (Osmaston). Lit.

3. *Indigofera dosua* Buch. – Ham. ex D. Don, Prodr. Fl. Nep. 244. 1825 ; Hook. f. Fl. Brit. Ind. 2 : 102. 1876. '*Sakina*'.

Deciduous densely hairy dwarf shrubs ; leaflets 19 – 35 ; bracts lanceolate cuspidate ; flowers 1 – 1.6 cm long ; pods tomentose.

Fl. & Fr. : May – October.

Chamoli, Mondal, Pipalkoti – Gulabkoti. 1600 – 1800 m (43914).

4. *I. gerardiana* Wall. ex Baker in Hook. f. Fl. Brit. Ind. 2 : 100. 1876. '*Sakina*'.

Branched deciduous shrubs ; leaflets 5 – 23, white - hairy ; corolla hairy ; seeds upto 10.

Fl. & Fr. : July – October.

Throughout the hills. 2000 – 3500 m. (Osmaston). Lit.

5. *I. hebeptala* Benth. ex Baker in Hook. f. Fl. Brit. Ind. 2 : 101. 1876.

Glabrous deciduous shrubs ; leaflets 3 – 6 cm ; bracts boat – shaped, narrowed to a tail like point ; flowers .6 cm long ; pods glabrous.

Fl. & Fr. : May – June.

Pandukeswar. 2000 m (2790).

6. *I. heterantha* Wall. ex Brandis For. Fl. 135. 1874. *I. gerardiana* Wall. ex Baker var. *heterantha* Hook. f. Fl. Brit. Ind. 2 : 100. 1876. '*Sakina*'.

Silvery pubescent shrubs ; leaflets 7 – 35 ; bracts minute ; flowers pale – red or purple ; pods cylindric pubescent.

Fl. & Fr. : May – October.

Amritganga valley, Hanumanchatti. Pandukeswar 1500 – 3000 m (44020).

7. *I. hirsuta* L. Sp. Pl. 751. 1753 ; Hook. f. Fl. Brit. ind. 2 : 98. 1876.

Annual or biennial hairy herbs ; stems erect ; leaflets 2.5 – 5 cm long.

Fl. & Fr. : May – October.

Chimnau upto 1350 m. (356, Kala & Gaur). Lit.

8. *Indigofera linifolia* (L. f.) Retz. Obs. 4 : 29. 1786. *Hedysarum linifolium* L. f. Suppl. 331. 1781 ; Hook. f. Fl. Brit. Ind. 2 : 92. 1876.

Silvery - hairy branched herbs ; flowers bright red ; pods globose, silvery ; seed 1.

Fl. & Fr. : August – September.

Nandprayag across Alaknanda. 600 – 800 m (71901).

9. *I. trifoliata* L. Cent. Pl. 2 : 29. 1757 ; Hook. f. Fl. Brit Ind. 2 : 96. 1876.

Perennial pubescent herbs ; stems procumbent or ascending ; leaflets 1.2 – 2.5 cm long, gland – dotted.

Fl. & Fr. : July – October.

Gopeswar. 1350 m (139, Kala & Gaur). Lit.

21. LATHYRUS L.

1a. Rachis ending in a long tendril.

2a. Leaflets none ; stipules leaf - like ; flowers yellow ... *L. aphaca* 1

2b. Leaflets 2.

3a. Flowers solitary, blue - purple ... *L. sativus* 4

3b. Flowers racemed, yellow ... *L. pratensis* 3

1b. Rachis ending in a short bristle ; leaflets 6 - 8 ; flowers bright yellow ...

L. emodi 2

1. *Lathyrus aphaca* L. Sp. Pl. 729. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 179. 1876.

Glabrous trailing herbs, $\pm$ 30 cm ; stipules, cordate, triangular ; flowers .8 cm long ; pods linear - oblong.

Fl. & Fr. : April – May.

Agastamuni. 900 m (26826).

2. *Lathyrus emodi* (Wall. ex Fritsch) Ali in *Biologia* 11(2) : 4. 1965. *Orobis emodi* Wall. ex Fritsch in *Sitzungsbr. Akad. Wissensch. Wien. Math. - naturw. Classe* 104 : 489. 1896. *L. luteus auct.* non Moench 1794. *Sensu* Hook. f. *Fl. Brit. Ind.* 2 : 180. 1876.

Glabrous perennials ; leaflets ovate - lanceolate ; flowers tinged purple ; pods linear, beaked.

Fl. & Fr. : May - June.

Throughout west Himalaya between 2500 - 3000 m (Gupta). Lit.

3. *L. pratensis* L. *Sp. Pl.* 733. 1753 ; Hook. f. *Fl. Brit. Ind.* 2 : 180. 1876.

Trailing hairy herbs ; leaflets lanceolate, 2.5 - 5 cm ; pods glabrous

Fl. & Fr. : June - September.

Garhwal. Temperate west Himalaya, 2000 - 2800 m (Duthie). Lit.

4. *L. sativus* L. *Sp. Pl.* 730. 1753 ; Hook. f. *Fl. Brit. Ind.* 2 : 179. 1876.

Glabrous much branched herbs ; leaflets linear - lanceolate or oblong ; pods glabrous, upper margin 2 - winged.

Fl. & Fr. : February - March.

A weed. in cultivated fields upto 1500 m (Collett). Lit.

Gopewar. 1300 m (Kala & Gaur 581). Lit.

22. *LESPEDeza* Michx.

1a. Flowers pale - yellow or white ; pods as long as calyx ... *L. juncea* var. *sericea* 2

1b. Flowers pale - yellow ; keel tipped with purple ; pods much shorter than calyx ... *L. gerardiana* 1

1. *Lespedeza gerardiana* Grah. ex Maxim. in Acta Horti Petrop. 2 : 373. 1873 ; Hook. f. Fl. Brit. Ind. 2 : 142. 1876.

Unbranched pubescent shrubs, $\pm$ 60 cm tall ; leaflets oblanceolate ; flowers numerous, small in axillary clusters ; pods silky, shorter than the calyx.

Fl. & Fr. : August – September.

Anusuyia area, Loharjung. 1750 – 2750 m (42027).

2. *L. juncea* (L. f.) Pers. var. *sericea* (Thunb.) Forbes & Hemsley in J. Linn. Soc. (Bot.) : 23 : 181. 1887. *Hedysarum sericeum* Thunb. Fl. Jap. 287. 1784, non Mill. 1768. *L. cuneata* (du Mont de Courset) G. Don. Gen. Syst. 307. 1832.

Slender pubescent shrubs ; leaflets wedged shaped ; flowers nearly sessile, .8 cm ; pods silky as long as the calyx.

Fl. & Fr. : July – October.

Bhyundar valley, Chamoli. 1200 – 2200 m (24567).

23. *Lorus* L.

Lotus corniculatus L. Sp. Pl. 775. 1753. var. *corniculatus* Hook. f. Fl. Brit. Ind. 2 : 91. 1876.

Perennial glabrous herbs ; leaflets 5 ; flowers yellow ; pods cylindric straight.

Fl. & Fr. : April – September.

Rambara – Gaurikund. 300 m (8623).

24. *Melilotus* Juss.

Melilotus indica (L.) All. Fl. Pedem. 1 : 308. 1785. *Trifolium indica* L. Sp. Pl. 765. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 89. 1876.

Erect much branched herbs ; leaflets obovate, oblanceolate to cuneate ; pods reticulately ribbed.

Fl. & Fr. : March - April.

Gopeswar. 1350 m. (664, Kala & Gaur). Lit.

25. MILLETTIA Wt. & Arn.

Millettia extensa (Benth.) Baker in Hook. f. Fl. Brit. Ind. 2 : 109. 1876. *Otosema extensa* Benth. in Miq. Pl. Jungh 249. 1852. *M. auriculata* Baker ex Brand. For. Fl. 138. 1874.

Large climbers upto 20 cm high ; flowers white, tinged with yellowish - brown ; pods woody, brownish velvety.

Fl. & Fr. : May - June & November - December.

Nandprayag - Langosu across Alaknanda. Occurs upto 1500 m (Osmaston). Lit.

26. MOGHANIA Jame St. Hill.

- | | | |
|--|-----|-------------------------|
| 1a. Leaves simple ; flowers enclosed in folded bracts | ... | <i>M. fruticulosa</i> 1 |
| 1b. Leaves digitately 3 - foliolate ; flowers without enveloping bracts. | | |
| 2a. Racemes condensed, shorter than the petioles | ... | <i>M. macrophylla</i> 2 |
| 2b. Racemes elongated, exceeding the petioles. | ... | <i>M. vestita</i> 3 |

1. *Moghania fruticulosa* (Wall. ex Benth.) Mukerjee, Bull. Bot. Soc. Beng. 6, 1 : 12. 1952. *Flemingia fruticulosa* Wall. ex Benth. in Miq. Pl. Jungh. 245. 1852 ; Hook. f. Fl. Brit. Ind. 2 : 227. 1876.

Low shrubs with trailing branches ; leaves simple ; flowers pink or white enclosed in folded bracts ; pods pubescent ; seeds 2.

Fl. & Fr. : August - October.

Gaurikund, Gwaldam, Jakhmolla. 1800 - 2000 m (42224).

2. *Moghania macrophylla* (Willd.) Kuntz. Rev. Gen. 1 : 199. 1891. *Crotalaria macrophylla* Willd. Sp. Pl. 3 : 982. 1803. *Flemingia congesta* Roxb. var. *semialata* (Roxb.) Baker in Hook. f. Flora Brit. Ind. 2 : 229. 1876.

Woody very variable shrubs ; petiole narrowly winged ; flowers greenish - red ; pods oblong, faintly pubescent ; seeds 2.

Fl. & Fr. : September - October.

Jakhmolla, Trisula. 1400 - 1500 m (42240).

3. *M. vestita* (Benth. ex Baker) Kuntz. Rev. Gen. Pl. 1 : 199. 1891. *Flemingia vestita* Benth. ex Baker in Hook. f. Fl. Brit. Ind. 2 : 230. 1876.

Root tuberous ; pubescent trailing herbs ; flowers bright red, clustered ; seed 1.

Fl. & Fr. : August - October.

Anusuya area, Bagrigar, Bhyundar valley. 1750 - 2500 m (30884).

27. MUCUNA Adans. *nom. cons.*

Mucuna nigricans (Lour.) Steud. Nomencl. Bot. ed. 2(2) : 163. 1841. *Citta nigricans* Lour. Fl. Cochin. 456. 1790. *M. imbricata* DC. Prodr. 2 : 406. 1825 ; Hook. f. Fl. Brit. Ind. 2 : 185. 1876. '*Gaunchi*'.

Deciduous climbers, 10 m high ; flowers dark purple ; fruits plaited bristly.

Fl. & Fr. : September - October.

Paduli. Occurs in all parts of the area. 700 - 1200 m (Osmaston).
Lit.

28. OXYTROPIS DC.

1a. Flowers purple.

2a. Leaflets one from the same point ; pods hairy ... *O. lapponica* 1

2b. Leaflets in pairs from the same point ; pods glabrous ... *O. microphylla* 2

1b. Flowers yellow ... *O. tatarica* 3

1. *Oxytropis lapponica* (Wahb.) Gay, Correspondence Fl. 10 : 30. 1827. *Phaca lapponica* Wahb. Veg. Clim. Helv. 131. 1813. Hook. f. Fl. Brit. Ind. 2 : 137. 1876.

± Stemless perennial herbs ; leaflets not more than one from the same point ; flower 6 – 20 in dense heads ; pods linear-oblong white and black hairy.

Fl. & Fr. : June – September.

Rajhoti. 3000 – 5500 m (Duthie). Lit.

2. *O. microphylla* (Pallas) DC. Astrag. 83. 1802. *Phaca microphylla* Pallas, Reise 3 : 744. t. 10, f. 1. 1776 ; Hook. f. Fl. Brit. Ind. 2 : 139. 1876.

± Stemless perennial herbs ; leaflets usually in pairs from the same point ; flowers 4 – 15 in elongate heads ; pods linear recurved, gland-dotted.

Fl. & Fr. : June – September.

Rimkhim. 3500 – 4500 m (Duthie). Lit.

3. *O. tatarica* Camb. ex Bunge in Mem. Acad. Imp. Sci. St. Pets. Ser. 7. 22(1) : 16. 1874 ; Hook. f. Fl. Brit. Ind. 2 : 138. 1876.

Stemless perennial herbs ; leaflets one from the same point ; flowers 20 – 40 in dense heads ; pods inflated round – oblong, densely white – silky.

Fl. & Fr. : June – August.

Rajhoti. 4000 – 5500 m (Duthie). Lit.

29. *PAROCHETUS* Buch. – Ham. ex D. Don.

Parochetus communis Buch. – Ham. ex D. Don, Prodr. Fl. Nep. 240. 1825 ; Hook. f. Fl. Brit. Ind. 2 : 86. 1876.

Slender creeping hairy herbs ; flowers deep violet – blue, solitary or in pairs.

Fl. & Fr. : May – September.

Ghangaria, Khoplutal, Pangarbasa. 2000 – 3000 m (31119).

30. PIPTANTHUS D. Don.

Piptanthus nepalensis (Hook.) D. Don in Sweet, Brit. Fl. Gdn. t. 264. 1828. *Baptisia nepalensis* Hook. Exot. Fl. t. 131 Nov. 1824 ; Hook. f. Fl. Brit. Ind. 2 : 62. 1876.

Evergreen shrubs ; leaves digitately trifoliate ; flowers yellow ; pods stalked flat.

Fl. & Fr. : May - October.

Hanumanchatti, Kukinakhal, Tunganath. 2500 - 3500 m (42212).

31. PUERARIA DC.

- | | | |
|---|-----|--------------------------|
| 1a. Shrubs ; flowers after the leaf-fall ; pods clothed with grey silky bristles, constricted | ... | <i>P. tuberosa</i> 2 |
| 1b. Herbs ; flowers with the leaves ; pods glabrous, not constricted | | <i>P. peduncularis</i> 1 |

1. **Pueraria peduncularis** (Benth.) Grah. ex Benth. in Journ. Linn. Soc. 9. 124. 1867. *Neustanthus peduncularis* Benth. in Miq. Pl. Jungh. 235. 1852. in adnota ; Hook. f. Fl. Brit. Ind. 2. 197 - 98. 1876.

Slender twiner with hairy branches ; flowers red ; pods strape shaped.

Fl. & Fr. : June - October.

Bhyundar valley. 1000 - 3000 m (Smythe). Lit.

2. **P. tuberosa** (Roxb. ex Willd.) DC. in Ann. Sci. Nat. 4 : 97. 1825. *Hedysarum tuberosum* Roxb. ex Willd. Sp. Pl. 3 : 1197. 1802 ; Hook. Fl. Brit. Ind. 2 : 197. 1876.

Large deciduous climbers with larger tuberous roots ; flowers violet - blue ; pods flat.

Fl. & Fr. : April - November.

Rudraprayag Up. 600 - 1200 m (26809).

32. *RHYNCHOSIA* Lour. *nom. cons.*

- *a. Stems erect ; lower surface of leaves white tomentose ; flowers yellow ... *R. pseudo-cajan* 3
- 1b. Stems strailing or climbing.
 - 2a. Flowers yellow, or yellow streaked with purple.
 - 3a. Leaflets obtuse ; lowest calyx-tooth much shorter than corolla ; standard hairy ... *R. falconeri* 1
 - 3b. Leaflets long pointed ; lowest calyx-tooth as long as corolla ; standard glabrous ... *R. himalensis* 2
 - 2b. Flowers dark red ... *R. rothli* 4

1. *Rhynchosia falconeri* Baker in Hook. f. Fl. Brit. Ind. 2 : 224. 1876.

Hairy climbers ; leaflets ovate ; flowers, 1.2 cm ; pods hairy, seeds 2.

Fl. & Fr. : July – August.

Garhwal, between 2000 – 2500 m (Falconer) Lit.

2. *R. himalensis* Benth. ex Baker in Hook. f. Fl. Brit. Ind. 2 : 225. 1876.

Viscidly glandular hairy climbers ; leaflets ovate, base rounded ; flowers 1.6 cm ; pods 3 cm long pubescent.

Fl. & Fr. : July – August.

Bhyunder valley, 2000 – 2500 m (29378).

3. *R. pseudo-cajan* Camb. in Jacq. Voy. Bot. 45, t. 55, 1835 ; Hook. f. Fl. Brit. Ind. 2 : 223. 1876.

Evergreen shrubs ; flowers, 1.2 cm ; pods hard grey tomentose ; seeds 1 – 2.

Fl. & Fr. : April – June.

Occurs between 1000 – 2000 m (Osmaston). Lit. Rare.

4. *R. rothli* Benth. ex Aitch. Cat. Pl. Punj. Sind. 50, 1869. *R. sericea*

Span. in *Linnaea* 15 : 195. 1841, non Hook. & Arn. 1833 ; Hook. f. *Fl. Brit. Ind.* 2. 225. 1876.

Deciduous climbers ; flowers, 1.8 cm ; pods turgid, pubescent ; seeds 2.

Fl. & Fr. : July – November.

Occurs between 800 ~ 1800 m (Osmaston). Lit.

33. *SHUTERIA* Wt. & Arn.

- | | | |
|------------------------------------|-----|-------------------------|
| 1a. Racemes laxer ; calyx silky | ... | <i>S. involucrata</i> 2 |
| 2b. Racemes dense ; calyx glabrous | ... | <i>S. densiflora</i> 1 |

1. *Shuteria densiflora* Benth. Pl. Jungh. 232. 1851 – 1855. *S. vestita* Wt. & Arn. var. *densiflora* Baker in Hook. f. *Fl. Brit. Ind.* 2 : 182. 1876.

Slender glabrous climbers ; flowers pale – yellow, tipped purple in dense racemes ; pods glabrous.

Fl. & Fr. : December – April.

Chandrapuri, Nandprayag. 800 – 1000 m (10398). Not common.

2. *S. involucrata* (Wall.) Wt. & Arn. Prodr. 207. 1834. *S. vestita* Wt. & Arn. var. *involucrata* (Wall.) Baker in Hook. f. *Fl. Brit. Ind.* 2 : 181 – 82. 1876.

Slender subglabrous twiners ; under surface of leaflets, hairy ; flowers, white, tinged with pink ; pods hairy.

Fl. & Fr. : September – October.

Mondal. 1650 m (42011).

34. *SMITHIA* Ait. nom. Cons.

Smithia ciliata Royle, Ill. Bot. Himal. t. 35, f. 2. 1834 ; 201. 1835 ; Hook. f. *Fl. Brit. Ind.* 2 : 150. 1876.

Annual glabrous herbs ; leaf – rachises ending in a bristle ; flowers pale – blue or white ; pods rough flattened.

Fl. & Fr. : August – October.

Gwaldam, Mondal, Phata. 1650 – 1800 m (41992).

35. SPATHOLOBUS Hassk.

Spatholobus parviflorus (Roxb.) Kuntz. Rev. Gen. Pl. 1 : 205. 1891.
Butea parviflora Roxb. Fl. Ind. 2, 3 : 248. 1832 ; Hook. f. Fl. Brit. Ind. 2 : 193. 1876. 'Maulu'

Larger stout climbers ; flowers white in fascicles of 3 ; pods soft, brown tomentose.

Fl. & Fr. : September – April.

Nandprayag – Langasu area near the villages. 800 m. (s.n.).

36. SOPHORA L.

Sophora mollis (Royle) Baker in Hook. f. Fl. Brit. Ind. 2 : 251. 1876.
Edwardsia mollis Royle, Ill. Bot. Himal. t. 32, fig. 2. 1834 ; 188. 1835.

Erect deciduous shrubs ; leaves imparipinnate ; flowers bright yellow ; pods glabrous four winged.

Fl. & Fr. : February – April.

Occurs between 600 – 1500 m (Osmaston). Lit. Rather rare.

37. *TEPHROSIA* Pers. nom. Cons.

Tephrosia pumila (Lam.) Pers. Syn. Pl. 2 : 330. 1809. *Galega Pūmīla* Lam. Encycl. Meth. 2 : 599. 1786. *T. purpurea* L. var. *pumila* (Lam.) Baker in Hook. f. Fl. Brit Ind. 2 : 113. 1876.

Small diffuse downy perennials ; leaflets 9 - 11, small ; pods, 2.5 - 4 cm long, finely downy.

Fl. & Fr. : June - August.

Alkapuri, Paduli. 800 m (40, Kala & Gaur). Lit.

38. *THERMOPSIS* R. Br.

- | | | |
|---|-----|---------------------|
| 1a. Flowers deep purple ; leaflets oblanceolate | ... | <i>T. barbata</i> 1 |
| 1b. Flowers yellow ; leaflets obovate - cuneate | ... | <i>T. inflata</i> 2 |

1. *Thermopsis barbata* Royle, Ill. Bot. Himal. t. 32, fig. 1. 1834 ; 196. 1835 ; Hook. f. Fl. Brit. Ind. 2 : 62. 1876.

Perennial tufted herbs ; leaflets 2.5 - 5 cm, entire, sessile ; flowers 2.5 cm long, crowded ; pods liner - oblong, hairy ; seeds 1 - 6.

Fl. & Fr. : May - June.

Bhyundar valley, 3800 m (29564).

2. *T. inflata* Camb. in Jacq. Voy. Bot. 4 : 34, t. 39. 1843 ; Hook. f. Fl. Brit. Ind. 2 : 63. 1876.

Perennial downy herbs ; leaflets 1.2 - 1.8 cm ; flowers in 2 or 3 ; pods broad - oblong, membranous ; seeds 6 - 10.

Fl. & Fr. : June - July.

Rajhoti, 4500 - 5500 m (Duthie). Lit.

39. TRIFOLIUM L.

Trifolium repens L. Sp. Pl. 767. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 86. 1876.

Glabrous perennials with trailing stems ; flowers white tinged with pink.

Fl. & Fr. : April - July.

Bhuna Bistola, Kanara Mohankhal. 2300 - 3500 m (10199).

40. TRIGONELLA L.

1a. Pods long turgid ; strongly scented herbs ... *T. foenumgraecum* 4

1b. Pods linear or linear - oblong flat.

2a. Flowers 1 - 4 in an umbel ; petals slightly longer than the calyx ... *T. pubescens* 3

2b. Flowers 6 - 12 in a raceme ; petals 2 or 3 times as long as the calyx.

3a. Pods straight ; breadth $\pm$.5 cm ... *T. emodi* 2

3b. Pods curved ; breadth $\pm$.2 cm ... *T. corniculata* 1

1. **Trigonella corniculata** (L.) L. Syst. ed. 10 : 1180. 1759. *T. corniculata* L. Sp. Pl. 766. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 88. 1876.

Robust glabrous branched herbs ; flowers racemed ; pods glabrous, falcate - curved, transversely veined.

Fl. & Fr. : April - September.

Bhyundar valley, Niti, Ramni. 1800 - 4000 m (Smythe). Lit.

2. **Trigonella emodi** Benth. in Royle, Ill. Bot. Himal. 197. 1835 ; Hook. f. f. Fl. Brit. Ind. 2. 88. 1876.

Glabrous stout herbs ; flowers in raceme ; pods glabrous.

Fl. & Fr. : June - October.

Ghangaria, Hanumanchati, Laxmiban. 2500 - 3800 m (39105).

3. *Trigonella pubescens* Edgew. ex Baker in Hook. f. Fl. Brit. Ind. 2 : 88. 1876.

Glabrous stout shrubs ; flowers in umbels, stalks not tipped with bristle ; pods transversely straight veined, hairy.

Fl. & Fr. : July - August.

Malari, Mana. 3000 m (55922).

4. *T. foenum-graecum* L. Sp. Pl. 777. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 87. 1876. '*Methi*'.

Strongly scented annuals ; flowers lemon - yellow ; pods pubescent, slender.

Cultivated as pot herb.

41. URARIA Desv.

- | | | |
|---|-----|----------------------|
| 1a. Petioles 1.2 - 5 cm long ; joints of pods shining, glabrous | ... | <i>U. neglecta</i> 2 |
| 1b. Petioles 5 - 10 cm long ; joints of pods hairy | ... | <i>U. lagopus</i> 1 |

1. *Uraría lagopus* DC. in Ann. Sc. Nat. Ser. 1(4) : 100. 1825 ; Hook. f. Fl. Brit. Ind. 2 : 156. 1876.

Subscandent $\pm$ deciduous shrubs ; leaves 1 and 3 foliolate ; flowers purple ; pods of 2 - 6 joints.

Fl. & Fr. : August - November.

Jakhmola, Trijuginarayan, Trisula. 1500 - 2000 m (42264).

2. *U. neglecta* Prain in Journ. As. Soc. Beng. 66(2) : 382. 1896.

Deciduous shrubs ; leaflets not cordate at the base ; pods of several joints.

Fl. & Fr. : August - November.

Probably occurs between 800 - 2000 m (Osmaston). Lit.

42. VICIA L.

- 1a. Rachis ending in a tendril.
- | | | |
|--|-----|---------------------|
| 2a. Flowers pink - purple, numerous | ... | <i>V. bakeri</i> 1 |
| 2b. Flowers white tinged with pale - blue, solitary. | | |
| 3a. Pods hairy | ... | <i>V. hirsuta</i> 2 |
| 3b. Pods glabrous | ... | <i>V. sativa</i> 3 |
- 1b. Rachis not ending in a tendril
- | | | |
|--|-----|------------------|
| | ... | <i>V. faba</i> 4 |
|--|-----|------------------|

1. *Vicia bakeri* Ali in Bot. Notiser 120 : 52. 1967 ; *V. pallida* auct. non Turcz. Sensus Hook. f. Fl. Brit. Ind. 2 : 178. 1876.

Extensively glabrous twiners ; flowers .8 - 1.6 cm long ; pods glabrous, thin.

Fl. & Fr. : August - September.

Bhyundar valley, Pandukeswar. 1900 - 2500 m (29357).

2. *V. hirsuta* (L.) Gray Nat. Syst. Arr. Brit. Pl. 2 : 614. 1821. *Ervum hirsutum* L. Sp. Pl. 739. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 177. 1876.

Trailing hirsute herbs ; leaves 1.2 - 2.5 cm ; leaflets 12 - 20 ; pods oblong, acute.

Fl. & Fr. : February - June.

Agastamuni, Ramni - Gohna. Trijuginarayan. 900 - 2000 m (48009).

3. *V. sativa* L. Sp. 736. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 178. 1876.

Suberect glabrous herbs ; leaflets 8 - 12 ; pods 3 - 5 cm long.

Fl. & Fr. : May - June.

Kanara - Mohankhal. 2100 m (27247).

4. *V. faba* L. Sp. Pl. 737. Hook. f. Fl. Brit. Ind. 2 : 179. 1876. '*Shivchana*'.

Glabrous annual herbs ; flowers white ; pods tomentose.

Cultivated throughout in cold season. Nandkeshri. 600 - 1000 m.

43. LENS Mill. nom. cons.

Lens culinaris Medik in Vorles Churpf. Phys. Ges. 2 : 361. 1787.
Ervum lens L. Sp. Pl. 738. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 179. 1876.
 'Masoor'.

Annual pubescent herbs ; flowers pale - purple ; pods smooth,
 compressed ; seeds 2.

Cultivated.

44. MACROTYLOMA Verdcourt

Macrotyloma uniflorum (Lam.) Verdcourt. in Kew Bull. 24 : 322.
 1970. *Dolichos uniflorus* Lam. Encycl. 2 : 299. 1786. *D. biflorus* auct. non
 L. Senu Hook. f. Fl. Brit. Ind. 2 : 210. 1876.

Annual hairy branching climbers ; flowers yellow in clusters ; pods
 flat, hairy, curved; seeds 5 - 7.

Cultivated upto 1000 m.

*PISUM L.

The genus *Pisum* is principally distinguished from *Lathyrus* by its
 thick laterally compressed style.

- | | | |
|--|-----|--|
| 1a. Leaflets 4 - 6 ; seeds rounded of uniform colour | ... | <i>P. sativum</i> 1 |
| 1b. Leaflets 2 - 4 ; seeds compressed, marbled | ... | <i>P. sativum</i> var.
<i>arvense</i> 2 |

1. *Pisum sativum* L. Sp. Pl. 727. 1753. var. *arvense* (L.) Poir. in
 Lam. Encycl. Meth. Bot. 5 : 456. 1804. *P. arvense* L. Sp. Pl. 727. 1753 ;
 Hook. f. Fl. Brit. Ind. 2: 181. 1876.

Prostrate annuals ; leaflets 2 - 4 ; flowers pink.

Cultivated during cold season.

2. **Pisum sativum** L. Sp. Pl. 727. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 181. 1876.

Prostrate annuals ; leaflets 4 - 6 ; flowers white.

Cultivated in gardens.

45. PHASEOLUS L.

- | | | |
|---|-----|----------------------|
| 1a. Flowers greenish - yellow ; bracteoles minute ; pods oblong 2-4 seeded | ... | <i>P. lunatus</i> 1 |
| 1b. Flowers white - purple ; bracteoles exceeding the calyx ; pods linear, 4 - 6 seeded | ... | <i>P. vulgaris</i> 2 |

1. **Phaseolus lunatus** L. Sp. Pl. 724. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 200. 1876.

Biennial twiners ; flowers greenish-yellow ; pods curved ; seeds 2 - 4.

Cultivated in lower valleys.

2. **P. vulgaris** L. Sp. Pl. 723. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 200. 1876.

Annual twiners ; flowers white or pink - lilac ; seeds 4 - 6.

Cultivated, preferably in cold seasons.

46. VIGNA Savi

- | | | |
|---|-----|------------------------|
| 1a. Keel prolonged into distinct beak ; flowers purple | ... | <i>V. vexillata</i> 1 |
| 1b. Keel not prolonged into beak ; flowers yellow or red. | | |
| 2a. Racemes few flowered, long peduncled | ... | <i>V. sinensis</i> 3 |
| 2b. Racemes capitate. | | |
| 3a. Leaves and pods glabrous | ... | <i>V. trilobatus</i> 4 |
| 3b. Leaves and pods hairy | ... | <i>V. mungo</i> 2 |

1. *Vigna vexillata* (L.) A. Rich. Hist. Fis. Polit. Nat. 1. Cuba 11 : 191. 1845. *Phaseolus vexillata* L. Sp. Pl. 724. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 206. 1876.

Perennial hairy twiners from the fusiform rootstocks ; leaflets ovate lanceolate ; pods flat.

Fl. & Fr. : August – September.

Bhyundar valley, Phata – Gaurikund. 1500 – 2000 m (38754).

2. *V. mungo* (L.) Hepper in Kew Bull. 11 : 128. 1956. *Phaseolus mungo* L. Mant. 1 : 101. 1767. non Roxb. & auct. Hook. f. Fl. Brit. Ind. 2 : 203. 1876. 'Urad'.

Hairy annuals ; flowers yellow ; pods hairy ; seeds black.

Cultivated in lower valleys.

3. *V. sinensis* (L.) Savi ex Hassk. Cat. Hort. Bogor. 279. 1844. *Dolichos sinensis* L. Cent. Pl. 2 : 28. 1756. *V. cataiang* (Burm. f.) Walper in Linnaea 13 : 533. 1839 ; Hook. f. Fl. Brit. Ind. 2 : 205. 1876.

Suberect $\pm$ glabrous herbs ; flowers yellow or red ; pods 30 – 60 cm long, cylindric.

Cultivated in lower valleys or in garden.

4. *V. trilobatus* (L.) Verdcourt in Taxon 17 : 172. 1968. *Dolichos trilobatus* L. Mant. 1 : 101. 1767. *Phaseolus trilobatus* Baker in Hook. f. Fl. Brit. Ind. 2 : 201. 1876. auct. non (L.) Ait.

Twining hairy herbs ; flowers yellow in short axillary capitate raceme ; pods glabrous ; seeds 6 – 12.

Cultivated upto 2300 m.

47. ZORNIA Gmel.

Zornia gibbosa Span. in Linnaea 15 : 192. 1841. *Z. diphylla* auct. *Plur* non (L.) Pers. 1807 ; Hook. f. Fl. Brit. India 147. 1876 *p.p.*

Caespitose glabrous - pubescent herbs ; leaflets gland - dotted ; flowers yellow ; pods densely prickly ; seed 1.

Fl. & Fr. : August – September.

Agastamuni, Nandprayag across Alaknanda. 800 – 1500 m. (71089).

48. CAJANUS DC.

Cajanus cajan (L.) Huth in Helios 11 : 133. 1893. *Cyrtus cajan* L. Sp. Pl. 739. 1753. *C. indicus* Spreng. Syst. Veg. 3 : 248. 1826 ; Hook. f. Fl. Brit. Ind. 2 : 217. 1876. 'Tor'.

Shrubs ; flowers yellow ; pods finely downy.

Cultivated up to 2000 m.

49. GLYCINE L.

Glycine max (L.) Merr. Interpr. Herb. Amboin. 274. 1917. *Phaseolus max* L. Sp. Pl. 725. 1753. *Glycine soja auct.* non Sieb & Zucc. **Sensu** Hook. f. Fl. Brit Ind. 2 : 184. 1876. 'Bhatt'.

Suberect or climbing upwards, rusty hairy herbs ; flowers red ; pods pubescent, recurved.

Cultivated in lower valleys.

50. LABLAB Adans.

Lablab purpureus (L.) Sw. Hort. Brit. ed. 1 : 481. 1827. *Dolichos lablab* L. Sp. Pl. 725. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 209. 1876.

Perennial climbers ; root tuberous ; flowers white or pale – purple ; pods oblong, glabrous.

Cultivated 2500 m.

50. CAESALPINIACEAE

- | | | |
|--|-----|----------------------|
| 1a. Leaves simple, mostly 2 - lobed at the apex | ... | <i>Bauhinia</i> 1 |
| 1b. Leaves not simple. | | |
| 2a. Leaves ample, abruptly bipinnate ; pods oblong - ovoid | ... | <i>Caesalpinia</i> 2 |
| 2b. Leaves simply pinnate ; pods cylindric straight | ... | <i>Cassia</i> 3 |

1. BAUHINIA L.

- | | | |
|--|-----|-----------------------|
| 1a. Trees. | | |
| 2a. Leaves entire or notched at the apex | ... | <i>B. Semla</i> 1 |
| 2b. Leaves cleft 1.2 - 3.8 cm deep | ... | <i>B. variegata</i> 3 |
| 1b. Climbers | ... | <i>B. Vahlii</i> 2 |

1. *Bauhinia semla* Waunderlin in Taxon 25 ; 362. 1976. *Bauhinia retusa* Buch. - Ham. ex Roxb. Fl. Ind. 2 : 322. 1832 ; Hook. f. Fl. Brit. Ind. 2 : 279. 1878. non Poir. (1811).

Deciduous trees ; leaves cordate, orbicular, 10 - 15 cm ; flowers cream - white mottled purple ; pods glabrous hard flat ; seeds 6 - 8.

Fl. & Fr. : September - November & April - May.

Occurs between 1000 - 1500 m (Osmaston). Lit.

2. *B. vahlii* Wt. & Arn. Prodr. 279. 1834 ; Hook. f. Fl. Brit. Ind. 2 : 279. 1878.

Large climbers ; branchlets terminating in pair of tendrils ; flowers white ; pods rusty velvety woody.

Fl. & Fr. : April - June.

Langasu - Nandprayag across Alaknanda upto 1500 m (s.n.).

3. *B. variegata* L. Sp. Pl. 375. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 284. 1878. 'Gwiral'.

Small deciduous trees ; leaves cordate, orbicular, 5 - 10 cm ; flowers whitish - purple ; pods hard dehiscent flat ; seeds 10 - 15.

Fl. & Fr. February - April.

Nandprayag - Langasu across Alaknanda. 800 - 2000 m (s.n.).

2. CAESALPINIA L.

Caesalpinia decapetala (Roth) Alston in Trimen Handb. Fl. Ceylon 6 (Suppl.) : 89. 1931. *Reichardia decapetala* Roth, Nov. Pl. Or. 212. 1821. *C. sepiaria* Roxb. Fl. Ind. 2 : 360. 1832 ; Hook. f. Fl. Brit. Ind. 2 : 256. 1878. '*Kingari*'.

Scandent prickly shrubs ; leaves bipinnate ; flowers yellow ; pods dark - brown, smooth glabrous.

Fl. & Fr. : April - June.

Gaucher area, Mondal, Sitapur. 1000 - 1650 m (43999).

3. CASSIA L.

- | | | |
|---|-----|-----------------------------|
| 1a. Trees ; pods 30 - 60 cm long | ... | <i>C. fistula</i> 2 |
| 1b. Shrubs or herbs ; pod 2.5 - 20 cm long. | | |
| 2a. Leaflets 4 - 10, ovate or elliptic - oblong, 2.5 - 12 cm. | | |
| 3a. Leaflets 4 or 6. | | |
| 4a. Leaflets 4 ; perfect stamens 5 ; pods flat | ... | <i>C. absus</i> 1 |
| 4b. Leaflets 6 ; perfect stamens 7 ; pods 4 - angled | ... | <i>C. tora</i> 7 |
| 3b. Leaflets 6 - 10. | | |
| 5a. Leaves with a solitary gland near the base of the petiole | | <i>C. occidentalis</i> 6 |
| 5b. Leaves with glands on the rachis between the leaflets ... | | <i>C. floribunda</i> 3 |
| 2b. Leaflets 40 - 100 narrowly oblong, .6 cm or less long. | | |
| 6a. Stems procumbent ; stamens 10 | ... | <i>C. leschenaultiana</i> 5 |
| 6b. Stems erect ; stamens 5 or 4 | ... | <i>C. kleinii</i> 4 |

1. *Cassia absus* L. Sp. Pl. 376. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 265. 1878.

Viscidly glandular herbs ; leaflets oblong oblique ; flowers red - yellow ; pods hairy flat, 6 seeded.

Fl. & Fr. : August - September.

Langasu - Nandprayag across Alaknanda. 800 m (71919).

2. *C. fistula* L. Sp. Pl. 377. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 261. 1878. '*Simara*'.

Medium sized trees ; leaves paripinnate ; flowers bright yellow ; pods cylindric filled with soft pulp.

Fl. & Fr. : April - June.

Occurs throughout the area except innermost valleys upto 1500 m (Osmaston). Lit.

3. *C. floribunda* Cavan Deser. 132. 1802 ; Osmaston For. Fl. Kumaon 188. 1978 (rep. ed.). *C. laevigata* Willd. Enum. Hort. Berol. 441. 1809.

Shrubs ; leaflets, elliptic - oblong, acuminate, entire ; flowers yellow ; pods glabrous.

Fl. & Fr. : June - November.

Kund. 900 m (26868).

4. *C. kleinii* Wt. & Arn. Prodr. 293. 1834. *C. dimidiata* Klein, Wal l. Cat. No. 5328 non Don Senu Baker in Hook. f. Fl. Brit. Ind. 2 : 266. 1878.

Low diffuse perennials ; petiole glands sessile ; stamens 5.

Fl. & Fr. : August - September.

Alkapuri 800 m (417, Kala & Gaur). Lit.

5. *C. leschenaultiana* DC. in Mem. Soc. Phys. Geneve 2 : 132. 1824. *C. mimosoides* L. Sp. Pl. 379. 1753. var. *wallichiana* (DC.) Baker in Hook. f. Fl. Brit. Ind. 2 : 266. 1878.

Perennial herbs with downy branches ; gland solitary on the rachis below the leaflets ; flowers yellow ; pods hairy.

Fl. & Fr. : August - September.

Batwalchhari, Phata. 1000 - 1500 m (28611).

6. *Cassia occidentalis* L. Sp. Pl. 377. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 262. 1878.

Herbs, sometimes attain the shrubby habit ; the terminal pair of leaflets oblong - lanceolate, acute ; pods glabrous $\pm$ falcate.

Fl. & Fr. : July - October.

Nandprayag. 1000 m (71085).

7. *C. tora* L. Sp. Pl. 376. 1753 ; Hook. f. Fl. Brit Ind. 2 : 263. 1878.

Glabrous herbs attaining to undershrubs habit ; leaflets 6, ovate - oblong ; flowers bright - yellow ; pods long slender.

Fl. & Fr. : July - November.

Occurs as weed upto 1600 m Gaucher - Sricot. 900 m (68009).

51. MIMOSACEAE

- | | | |
|--|-----|------------------|
| 1a. Stamens 8, free ; pods jointed | ... | <i>Mimosa</i> 3 |
| 1b. Stamens numerous ; pods not jointed. | | |
| 2a. Stamens free or united only at the base | ... | <i>Acacia</i> 1 |
| 2b. Stamens united upto the top of the corolla | ... | <i>Albizia</i> 2 |

1. ACACIA Mill.

- | | | |
|---|-----|-------------------------|
| 1a. Erect trees or shrubs. | | |
| 2a. Spines absent | ... | <i>A. decurrens</i> 3 |
| 2b. Spines present. | | |
| 3a. Flowers in axillary globose heads ; spines straight | ... | <i>A. farnestiana</i> 4 |
| 3b. Flowers in axillary spikes ; spines recurved | ... | <i>A. catechu</i> 1 |
| 1b. Climbers | ... | <i>A. pinnata</i> 2 |

1. *Acacia catechu* (L. f.) Willd. Sp. Pl. 4 : 1079. 1806. *Mimosa catechu* L. f. Suppl. Pl Syst. Veg. 439. 1781 ; Hook. f. Fl. Brit. Ind. 2 : 295. 1878. 'Khair'.

Deciduous trees ; prickles curved below the petiole ; flowers pale cream - white ; pods thin flat dehiscent.

Fl. & Fr. : March - July.

Occurs upto 1500 m (Osmaston). Lit.

2. *A. pennata* (L.) Willd. Sp. Pl. 4 : 1090. 1806 ; Hook. f. Fl. Brit. Ind. 2 : 297. 1878. *p. p.*

Rambling climbers ; leaflets 30 - 50 pairs ; flowers white in globose heads ; pods dark - brown glabrous, thin flat ; seeds 8 - 14.

Fl. & Fr. : August - September.

Occurs upto 1500 m (Osmaston). Lit.

3. *A. decurrens* (Wendl.) Willd. Sp. Pl. 4 : 1072. 1806. *Mimosa decurrens* Wendl. Bot. Beobacht. 57. 1798 ; Gamble, Fl. Pres. Madras 1 : 305. 1957 (rep. ed.).

Trees ; leaflets 30 - 40 pairs with gland between each pairs ; flowers deep yellow.

Planted, Nagnath. 2000 m (27293).

4. *A. farnesiana* (L.) Willd. Sp. Pl. 4 : 1083. 1806. *Mimosa farnesiana* L. Sp. Pl. 521. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 292. 1878.

Evergreen thorny shrubs ; flowers yellow fragrant ; pods cylindric, tinged brown.

Planted upto 1800 m (Osmaston). Lit.

2. ALBIZIA Durazz.

| | | |
|--|-----|--------------------------|
| 1a. Pinnae 6 - 20 pairs ; corolla .5 - .6 cm | ... | <i>A. chinensis</i> 1 |
| 1b. Pinnae 2 - 8 pairs ; corolla + .75 cm. | | |
| 2a. Leaflets less than 1.2 cm broad. | | |
| 3a. Stamens 1.4 - 2 cm long, white | ... | <i>A. odoratissima</i> 4 |
| 3b. Stamens 2.4 - 3.8 cm long, pink | ... | <i>A. julibrissin</i> 3 |
| 2b. Leaflets more than 1.2 cm broad ; pinnae 2 - 3 pairs | ... | <i>A. lebbeck</i> 2 |

1. *Albizia chinensis* (Osbeck.) Merr. in Anner. Journ. Bot. 73 : 55. 1916. *Mimosa chinensis* Osbeck. Dagbok Ostnid Resa : 223. 1757. *A. stipulata* (Roxb.) Boivin in Encycl. 19(2) : 33. 1838 ; Hook. f. Fl. Brit. Ind. 2 : 300. 1878.

Deciduous trees ; dark grey smooth, horizontal wrinkled ; flowers yellowish - white ; pods thin light brown glabrous.

Fl. & Fr. : December - June.

Occurs upto 1500 m (Osmaston). Lit.

2. *A. lebbeck* (L.) Willd. Sp. Pl. 4 : 1066. 1806. *Mimosa lebbeck* L. Sp. Pl. 516. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 298. 1878. '*Siris*'.

Large deciduous trees ; leaflets oblong, obtuse ; pods thin, flat, strap - shaped, rigid, yellow.

Fl. & Fr. : March - May.

Occurs upto 1200 m (Osmaston). Lit.

3. *A. julibrissin* Durazz. in Mag. Tose. 3(4) : 11. 1772 ; Hook. f. Fl. Brit. Ind. 2 : 300. 1878. '*Sirsa*'.

Deciduous trees ; leaflets, oblong, falcate ; flowers in short terminal raceme ; pods pale - brown, thin.

Fl. & Fr. : April - June & November - December.

Occurs between 1800 - 2800 m (Osmaston). Lit.

4. *A. odoratissima* (L. f.) Benth. in Hook. Lond. Journ. Bot. 3 : 88. 1844. *Mimosa odoratissima* L. f. Suppl. Pl. 437 1781 ; Hook. f. Fl. Brit. Ind. 2 : 299 1878.

Deciduous trees ; leaflets oblong, obtuse ; flowers in large terminal panicles ; pods reddish brown.

Fl. & Fr. : March - June.

Occurs upto 1200 m. Scarce within the hills (Osmaston). Lit.

MIMOSA L.

Mimosa himalayana Gamble in Kew Bull. 1920 : 4. 1920.

Large straggling deciduous shrubs ; prickles present : flowers pink ; pods flat, prickly on the sutures, glabrous.

Fl. & Fr. : July – September & January.

Occurs throughout upto 1600 m (Osmaston). Lit.

52. ROSACEAE

1a. Carpel or carpels superior ; fruits not enclosed in the calyx-tube.

2a. Calyx without bracteoles.

3a. Carpel only one.

4a. Unarmed trees ; calyx falling early ... *Prunus* 12

4b. Armed shrubs ; calyx persistent in fruit ... *Prinsepia* 11

3b. Carpels more than one.

5a. Unarmed shrubs ; carpels on the base of the calyx ; fruit of small follicles.

6a. Ovules 2 ; disc obsolete ... *Filipendula* 6

6b. Ovules many ; disc present.

7a. Leaves simple ... *Spiraea* 21

7b. Leaves pinnate.

8a. Carpels free ... *Aruncus* 3

8b. Carpels connate below ... *Sorbaria* 19

5b. Prickly shrubs ; carpels on a conical or oblong receptacle ; fruit of many succulent drupelets ... *Rubus* 16

2b. Calyx with 5 bracteoles alternate with its lobes.

9a. Fruits dry, consisting of a head of numerous small achenes.

10a. Achenes hairy ; styles terminal, long.

11a. Styles straight in fruits ... *Acomastylis* 1

11b. Styles hooked at the tip or below in fruits ... *Geum* 8

10b. Achenes glabrous (except *P. fruticosa*) ; styles lateral, very short.

12a. Stamens 4, 5 or 10 ... *Sibbaldia* 18

12b. Stamens numerous ... *Potentilla* 10

- 9b. Fruits succulent, consisting of the enlarged receptacle bearing the minute, glabrous achenes.
- 13a. Flowers yellow ... *Duchesnea* 5
- 13b. Flowers white ... *Fragaria* 7
- 1b. Carpels superior or inferior ; fruits adnate to the calyx-tube or wholly enclosed within it.
- 14a. Herbs.
- 15a. Flowers yellow ; calyx with a ring of small hooked bristles outside the mouth ... *Agrimonia* 2
- 15b. Flowers dark - purple ; ebracteolate ... *Sanguisorba* 17
- 14b. Shrubs or trees.
- 16a. Carpels free from the calyx-tube but wholly enclosed within it ... *Rosa* 15
- 16b. Carpels adnate to the calyx-tube.
- 17a. Fruits Pomaceus ; ovary 5 - celled.
- 18a. Endocarp membranous.
- 19a. Leaves pinnate ... *Sorbus* 20
- 19b. Leaves simple.
- 20a. Styles united below ... *Malus* 9
- 20b. Styles free ... *Pyrus* 14
- 18b. Endocarp crustaceous, dehiscing longitudinally *Stranvaesia* 22
- 17b. Fruits drupaceous ; ovary 3 - 5 celled.
- 21a. Leaves toothed or serrate ... *Pyracantha* 13
- 21b. Leaves entire ... *Cotoneaster* 4

1. ACOMASTYLIS E.L. Greene

Acomastylis elata (Wall. ex Royle) F. Bolfe in Fedde Rep. Beih. 72. 83. 1933. *Sieversia elata* Wall. ex Royle, Ill. Bot. Himal. 207, t. 39. 1835. *Geum elatum* Hook. f. Fl. Brit. Ind. 2 : 343. 1878.

Sparsely hairy with radical leaves 15 - 30 cm long ; flowers bright yellow ; styles straight and glabrous, not jointed.

Fl. & Fr. : August – October & May – June.

Ghangaria, way to Khankelia, Rudranath. 3000 – 4000 m (48070).

2. AGRIMONIA L.

Agrimonia pilosa Ledeb. var. *nepalensis* (Don) Nakai in Tokyo Bot. Mag. 47 : 247. 1933. *A. eupatorium* Hook. f. Fl. Brit. Ind. 2. 361. 1878, non L. *p. p.*

Perennial hairy herbs ; leaflets 6 – 21 ; bracts 3 – cleft ; fruits hooked bristly.

Fl. & Fr. : July – September.

Batwalchari, Gwaldam, Pangarbasa. 1000 – 3000 m (24517).

3. ARUNCUS L.

Aruncus dioicus (Walter) Fernald. in Rhodora 41 : 423. 1939. Subsp. *triternatus* (Maxim.) Hara in Journ. Jap. Bot. 30. 67. 1955. *Spiraea aruncus* auct. non L. sensu Hook. f. Fl. Brit. Ind. 2 : 323. 1878.

Perennial undershrubs ; leaves ternately pinnate, glabrous ; flowers white ; fruits dense, shining.

Fl. & Fr. : May – June.

Amritganga Valley, Bhuna, Hemkund on Way. 3000 – 4000 m (42128).

4. COTONEASTER Medik.

1a. Flowers white.

2a. Leaves glabrous.

3a. Small trees ; branches pink ; fruits blue

...

C. confusus 3

- 3b. Deciduous shrubs ; branches ashy brown ; fruits black *C. obtusa* 13
- 2b. Leaves hairy, at least beneath.
- 4a. Deciduous erect tall or stunted shrubs.
- 5a. Stunted shrubs ; leaf margins recurved ... *C. marginatus* 10
- 5b. Tall deciduous shrubs.
- 6a. Flowers in panicles ; leaves elliptic or oblanceolate *C. affinis* 2
- 6b. Flowers in tomentose cyme ; leaves broadly ovate... *C. lindleyi* 9
- 4b. Prostrate shrubs
- 7a. Leaf margins recurved.
- 8a. Leaves pale bristly beneath ... *C. microphyllus* 11
- 8b. Leaves densely white hairy beneath ... *C. integrifolius* 7
- 7b. Leaf margins not recurved ... *C. rotundifolius* 15
- 1b. Flowers pink.
- 9a. Prostrate shrubs.
- 10a. Leaf margins recurved ... *C. duthleana* 5
- 10b. Leaf margins not recurved.
- 11a. Leaves broadly ovate, acuminate ... *C. garhwalensis* 6
- 11b. Leaves orbicular with rounded ends ... *C. disticha* 4
- 9b. Erect or suberect shrubs.
- 12a. Suberect shrubs ; leaf margins recurved ... *C. duthleana* 5
- 12b. Erect shrubs ; leaf margin not recurved.
- 13a. Cymes loose, 3 - many flowered.
- 14a. Leaves glabrous or nearly so ... *C. rosea* 14
- 14b. Leaves tomentoses beneath ... *C. obovata* 12
- 13b. Cymes 1 - 5 flowered.
- 15a. Leaves adpressed hairy, apex acute ... *C. ?acuminatus* 1
- 15b. Leaves $\pm$ tomentose beneath, rounded at both ends ... *C. integerrima* 8

1. *Contoneaster acuminatus* Lindl. in Trans. Linn. Soc. 13 : 101, t. 9. 1821 ; Hook. f. Fl. Brit. Ind. 2 : 385, 1878, '*Cham - ruins* or '*Kuis*'.

Deciduous erect shrubs ; leaves appressed hairy, 1 – 2.5 cm long, base round, apex acute ; flowers .7 – .8 cm diam ; Corolla erect ; fruits red.

Fl. & Fr. : May – October.

Amritganga and Bhyundar valleys, Mongu area, 2500 – 3500 m (48095).

2. *Cotoneaster affinis* Lindl. in Trans. Linn. Soc. 13 : 101, 1821. var. *bacillaris* (Lindl.) Schneid Ill. Handb. Laubh 9 : 757, 1906. *C. bacillaris* Wall. ex Lindl. in Bot. Reg. ad. t. 1229, 1829. var. *affinis* Hook. f. Fl. Brit. Ind. 2 : 384, 1878. 'Ruins'.

Erect deciduous shrubs ; leaves elliptic or oblanceolate $\pm$ tomentose, 4 – 8 cm long ; flowers white in panicles ; corolla spreading ; fruits black.

Fl. & Fr. : September – June.

Near Karchi village (Tapovan). 2000 – 2800 m (70986).

3. *C. confusus* Klotz Bull. Bot. Suev. Ind. 5 : 213, 1963 ; Wiss z. Univ. Halle 15 : 539, 1966.

Small trees with pink branches ; leaves variable, shining glabrous ; flowers white in condensed cymes ; fruits blue.

Fl. & Fr. : May – June.

Trijuginarayan area. 2000 – 2500 m (47949).

4. *C. disticha* Lange in Bot. Tiddssk. 13 : 19, 1882 : Osmaston For. Fl. Kumaon 222, 1978. (rep. ed.) 'Kautia'.

Prostrate rigid much branched deciduous shrubs ; leaves $\pm$ orbicular with rounded ends, glabrous 1.2 cm long ; flowers .7 cm diam ; solitary ; corolla erect, red.

Fl. & Fr. : June – October.

Occurs in drier valleys between 3500 – 4000 m (Osmaston). Lit.

5. *C. duthieana* (Schneid.) Klotz in Bull. Bot. Surv. Ind. 511, 1963. *C. disticha* var. *duthieana* Schneid. Ill. Handb. Laubh. 1 : 745, 1906.

Stunted suberect or prostrate shrubs ; leaves broadly elliptic – orbicular, glabrous or scattered hairy on lower surface, mucronate, margins recurved ; flowers red ; calyx glabrous.

Fl. & Fr. : June – October.

Bampa, Gothing, Hemkund on way. 3000 – 4000 m (39058).

6. *Cotoneaster garhwalensis* Klotz Wiss. Z. Univ. Halle 15 : 539. 1966.

Prostrate stunted woody shrubs ; leaves broadly ovate acuminate glabrous, margins plain ; flowers pinkish - white ; fruits red.

Fl. & Fr. : June - October.

Sarswati bank, Vasudhara, 3500 - 4000 m (37491).

7. *C. integrifolius* (Roxb.) Klotz Wiss Z. Halle 15 : 539. 1966. *caragana integrifolia* Roxb. Fl. Ind. 2, 2 : 509. 1832 ; Hook. f. Fl. Brit. Ind. 2 : 387. 1878.

Prostrate woody shrubs ; leaves elliptic olong $\pm$ 10 cm long, densely white hairy beneath ; margins recurved ; flowers white ; calyx pubescent

Fl. & Fr. : May - July.

Gohna - Ramni, Mohankhal. 1500 - 3500 m (48128).

8. *C. integerrima* Medik. Gesch. d. Bot. 85 : 1793. *C. vulgaris* Lindl. 1821 ; Hook. f. Fl. Brit. Ind. 2 : 385 - 86. 1878.

Erect deciduous shrubs ; leaves rounded at both ends, 2.5 - 5 cm long $\pm$ tomentose beneath ; flowers .75 cm diam. ; corolla erect ; fruits deep orange.

Fl. & Fr. : May - September.

Jumma, Rimkhim beyond Chorhoti pass near the Tibet border at 4500 m (Osmaston). Lit.

9. *C. lindleyi* Steud. nom. ed. 2, 1 : 426. 1840. *C. nummularia* non Fisch. & Mey. sensu Hook. f. Fl. Brit. Ind. 2 : 387. 1878. *p.p.* 'Dhuis'.

Deciduous shrubs ; leaves broadly ovate, tomentose beneath, $\pm$ 2 cm long ; flowers .7 - .8 cm diam. in densely woolly tomentose cymes ; corolla spreading ; fruits black.

Fl. & Fr. : May - September.

Occurs in the dry inner valleys bordering Tibet between 2500 - 3500 m (Osmaston). Lit.

10. *C. marginatus* Lindl. ex Schlecht. in Linnaea 27 : 541. 1854. *C. buxifolia* var. *marginata* Loudon, Encycl. Trees & Shr. 411. 1842

Stunted shrubs ; leaves broadly elliptic margins recurved, tomentose beneath ; flowers white ; calyx woolly ; fruits red.

Fl. & Fr. May - July.

Lohajung. 2000 m (37257).

11. *Cotoneaster microphyllus* Wall. ex Lindl. in Bot. Reg. 13, t. 1114. 1827 ; Hook. f. Fl. Brit. Ind. 387. 1878.

Evergreen prostrate shrubs ; leaves variable pale bristly hairy beneath, 1 cm long ; flowers .8 cm diam. 1 - 3 together ; fruits scarlet.

Fl. & Fr. : April - October.

Amritganga valley, Kukinakhal, Malari. 1500 - 4000 m (31053).

12. *C. obovata* Wall. ex Dunn in Kew Bull. 119. 1921 ; Osmaston For. Fl. Kumaon 223. 1978 (rep. ed.).

Erect deciduous shrubs ; leaves variable, $\pm$ 1.2 cm. long ; tomentose beneath ; flowers .7 cm diam 3 - many ; corolla erect ; fruits red.

Fl. & Fr. : May - June.

Niti valley opposite laung village at 3000 m (Osmaston). Lit.

13. *C. obtusa* Wall. ex Lindl. Bot. Reg. Sub. t. 1229. 1829. *C. bacillaris* non Wall. ex Lindl. sensu Hook. f. Fl. Brit. Ind. 2 : 384. 1878, *p. p.*

Deciduous shrubs branchlets glabrous ; leaves glabrous 7 cm long, obtuse ; flowers white ; fruits small brown.

Fl. & Fr. : May - October.

Anusuya area, Bhyundar Valley. 1700 - 2500 m (42040).

14. *C. rosea* Edgew. in Trans. Linn. Soc. 20 : 46. 1846. *C. multiflora* non Bunge. sensu Hook. f. Fl. Brit. Ind. 2 : 386. 1878, *p. p.*

Erect deciduous shrubs ; leaves elliptic, thin ; flowers pink ; fruits bright red.

Fl. & Fr. : May - June.

Kurkutti in the Niti valley at 3500 m (Osmaston). Lit.

15. *C. rotundifolius* Wall. ex Lindl. in Bot. Reg. 15 sub. t. 1229. *p* (2). 1829 ; Hook. f. Fl. Brit. Ind. 2 : 386. 1878.

Rigid shrubs ; branches horizontal ; leaves elliptic - orbicular, mucronate sparsely appressed hairy, .8 - 1.2 cm long ; flowers solitary ; fruits scarlet.

Fl. & Fr. : May - September.

Anusuya area, Kedarnath. 1700 - 4000 m (8711).

5. DUCHESNEA Sm.

Duchesnea indica (Andr.) Fock. in Engl. Pflanzenfam. 3(3) : 33. 1888. *Fragaria indica* Andr. Bot. Rep. 7 : t. 479. 1807 ; Hook. f. Fl. Brit. Ind. 2 : 343. 1878. '*Bhiun - kaphal*'.

Softly silky herbs with runners ; flowers yellow ; bracteols 3 toothed.

Fl. & Fr. : March May.

Mondal, Rudraprayag up. 600 1500 m (43929).

6. FILIPENDULA Mill.

Filipendula vestita (Wall. ex G. Don) Maxim. in Ach. Hort. Petrop ; 6. 248. 1879. *Spiraea vestita* Wall. ex G. Don. Gen. Syst. 2 : 521. 1832 ; Hook. f. Fl. Brit. Ind. 2 : 323. 1878.

Perennial pubescent undershrubs ; leaves irregularly pinnatisect ; flowers white in Corymbs ; fruits hairy.

Fl. & Fr. : May October.

Hemkund on way, Kukinakhal. 2500 4000 m (29447).

7. FRAGARIA L.

- | | | |
|---|-----|------------------------|
| 1a. Flowers few ; leaflets $\pm$ sessile | ... | <i>F. nubicola</i> 2 |
| 1b. Flowers solitary ; leaflets petiolulate | ... | <i>F. daltoniana</i> 1 |

1. **Fragaria daltoniana** Gay in Ann. Sci. Nat. Ser. 4, 8 : 204. 1857 ; Hook. f. Fl. Brit. Ind. 2 : 345. 1878.

Stoloniferous herbs ; flowers solitary ; fruits ovoid bright scarlet.

Fl. & Fr. : May – August.

Tungnath. 3500 m (Semwal & Gaur). Lit.

2. *Fragaria nubicola* Lindl. ex Lacaita in Journ. Linn. Soc. 43. 467. 1916. *F. vesca* L. Sp. Pl. 494. 1753. var. *nubicola* Hook. f. Fl. Brit. Ind. 2 : 344. 1878. Pro. Syn.

Slender silvery herbs with glabrous runners ; flowers 1.8 – 2.5 cm diam, few ; bracteoles entire.

Fl. & Fr. : May – June.

Amritganga valley, Ghangaria. Mondal. 1600 – 3500 m (44070).

8. GEUM L.

Geum roylei Bolle in Fedde, Repert. Beih. 72 : 66. 1933. *G. urbanum* auct. non L. Sensus Hook. f. Fl. Brit. Ind. 2 : 342. 1878.

Hairy herbs with radical leaves 10 – 15 cm long ; flowers pale – yellow ; styles jointed in the middle, upper portion hairy.

Fl. & Fr. : May – October.

Bhyundar valley, Ghangaria, Trijuginarayan. 2500 – 3000 m (47974).

9. MALUS L.

Malus baccata (L.) Barkhausen Theor – Prakt. Hand. Forst. bot. 2 : 1280. 1803. var. *himalaica* (Maxim.) Schneidr, Ill. Handb. Laubh. 1 : 721. 1906. *Pyrus baccata* L. Mant Pl. 75. 1767 ; Hook. f. Fl. Brit. Ind. 2 : 373. 1878.

Deciduous trees ; leaves simple, glabrous ; flowers white ; fruits red.

Fl. & Fr. : April, October – November.

Niti, 3500 – 4000 m (Osmaston). Lit.

10. POTENTIALA L.

- 1a. Achenes concealed by the long hairs of the receptacle.
- 2a. Leaves pinnate.
- 3a. Low erect shrubs ; leaflets coriaceous *P. fruticosa* var. *regida* 9
- 3b. Dwarf, tufted or depressed shrubs ; leaflets silky.
- 4a. Depressed shrubs ; flowers sessile *P. fruticosa* var. *pumila* 8
- 4b. Very dwarf tufted shrubs ; flowers often peduncled ... *P. biflora* 4
- 2b. Leaves digitately 3 foliolate.
- 5a. Root stock thick, clothed with stipular sheaths ; leaflets cuneate, incised, thin ; styles terminal ... *P. eriocarpa* 7
- 5b. Root stock slender ; leaflets ovate or orbicular-cuneate, 3 - toothed or 3 - fid ; styles ventral ... *P. cuneata* 6
- 1b. Achenes not concealed by the long hairs of the receptacle.
- 6a. Roots annual ; sparsely hairy herbs ; flowers .6 cm in diam. ... *P. kleiniana* 13
- 6b. Roots perennial.
- 7a. Leaves pinnate.
- 8a. Alternate leaflets or more pairs much smaller.
- 9a. Leaves 15 - 25 cm long ; calyx villous ... *P. polyphylla* 19
- 9b. Leaves 5 - 15 cm long ; calyx very silvery ... *P. fulgens* 10
- 8b. Alternate leaflets not smaller (except sometimes in *P. leuconota*).
- 10a. Dwarf, densely tufted plants ; leaflets numerous ; scape 1 or rarely 2 - flowered ... *P. microphylla* 16
- 10b. Elongate slender or robust plants.
- 11a. Flowers corymbose.
- 12a. Leaflets linear oblong or obovate, pinnatifid ... *P. multifida* 17
- 12b. Leaflets obovate or broadly elliptic, obtuse, coarsely toothed.
- 13a. Robust villous herbs ; leaflets white silvery beneath *P. leschenaultiana* 14
- 13b. Small soft silky herbs ; leaflets not silky white beneath. ... *P. gerardiana* 12

- 11b. Flowers not corymbose.
- 14a. Leaves 5 - 15 cm long ; leaflets numerous ... *P. leuconota* 15
- 14b. Leaves 1.2 - 2.5 cm long ; leaflets 5 - 15 ... *P. bifurca* 5
- 7b. Leaves digitately 3 or 5 foliolate.
- 15a. Leaves digitately 5 foliolate ; flowers dark crimson ... *P. nepalenana* 18
- 15b. Leaves digitately 3 - foliolate.
- 16a. Flowers yellow.
- 17a. Leaflets dull brown - green, nerves indistinct ... *P. gelida* 11
- 17b. Leaflets white-silky beneath ; nerves prominent.
- 18a. Tall erect herbs ; leaflets 5 - 7.5 cm long ... *P. argyrophylla* 1
- 18b. Small tufted herbs ; leaflets upto 1.2 cm long ... *P. atrosanguinea* 3
var. *Cataclinea*
16. Flowers crimson ; tall herbs ... *P. atrosanguinea* 2

1. *Potentilla argyrophylla* Wall. ex Lehm. Pugill. 3 : 36. 1831 ; Hook. f. Fl. Brit Ind. 2 : 356 - 57. 1878.

White silky hairy perennials ; leaflets white beneath ; achenes smooth.

Fl. & Fr. : June - October.

Bhyundar valley, Ghangaria, Mana - Gastoli. 3000 - 4000 m (10574).

2. *P. atrosanguinea* Lodd. Bot. Cab. 7, t. 786. 1824. *P. argyrophylla* Wall. ex Lehm. var. *atrosanguinea* Hook. f. Fl. Brit. Ind. 2 : 357. 1878. *p. p.*

Perennial herbs not differing from *P. argyrophylla* ; flowers crimson.

Fl. & Fr. : June - October.

Amritganga and Bhyundar valleys. Kedarnath, 3000 - 4500 m (10258).

3. *Potentilla atosanguinea* Lodd. var. *cataclinea* Th. Wolf. in Bot. Central Bl. 16 : heft 71 : 230. 1908. *P. leucochroa* Wall. ex Lehm. var. *leucochroa* Hook. f. in Fl. Brit Ind. 2 : 357. 1878. p. p.

Much smaller perennials ; leaflets silky flowers yellow or red, 1 - few.

Fl. & Fr. : June.

Hemkund on way. 4400 m (39060).

4. *P. biflora* Willd. ex Schlecht. in Ges. Naturf. Fr. Berl Mag 7 : 197. 1816. *Potentilla inglishii* Royle, Ill. Bot. Himal. 207, t. 41, 1835. *P. fruticosa* var. *inglishii* (Royle) Hook. f. Fl. Brit. Ind. 2 : 348. 1878.

Very dwarf, densely tufted hairy perennials ; leaves pinnate ; leaflets 3 - 7 linear - lanceolate ; flowers pedunculate.

Fl. & Fr. : August - October.

Bhyundar valley. 3500 - 4500 m (Smythe). Lit.

5. *P. bifurca* L. Sp. Pl. 497. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 353. 1878.

Slender silky hairy perennials ; leaves pinnate ; leaflets linear - oblong ; fruits glabrous.

Fl. & Fr. : July - August.

Geoldong, Gothing. 4000 - 5000 m (56224).

6. *P. cuneata* Wall. ex Lehm. Pugill. 3 : 34. 1831. *P. ambigua* Camb. in Jacq. Voy. Bot. 51, t. 62. 1844 ; Hook. f. Fl. Brit. Ind. 2 : 348. 1878.

Tufted silky herbs ; leaves digitately 3 - foliolate ; leaflets orbicular or obovate ; flowers yellow ; stamens numerous ; achenes silky hairy.

Fl. & Fr. : June - October.

Bampa, Ghangaria, Gothing, Mana valley. 3000 - 4500 m (56228).

7. *P. eriocarpa* Wall. ex Lehm. Pugill. 3 : 35. 1831 ; Hook. f. Fl. Brit. Ind. 2 : 348. 1878.

Deciduous shrubs with overlapping silky stipules ; leaves digitately 3 - foliolate ; flowers 2 - 2.8 cm in diam ; stamens numerous.

Fl. & Fr. : August - October.

Bhyundar valley, Kailu Vinayak. 3000 - 4500 m (30972).

8. *Potentilla fruticosa* L. var. *pumila* Hook. f. in Fl. Brit. Ind. 2 : 348. 1878.

Depressed, dwarf perennial with spreading branches ; leaves pinnate ; leaflets linear - lanceolate ; flowers sessile.

Fl. & Fr. : July - October.

Bhyundar valley, Geoldong. 2500 - 3500 m (35947).

9. *P. fruticosa* L. var. *rigida* (Wall. ex Lehm.) Wolf in Bibl. Bot. 71 : 57. 1908. *P. rigida* Wall. ex Lehm. Pugill. 3 : 3. 1831 ; Hook. f. Fl. Brit. Ind. 2 : 347. 1878.

Shrubs ; leaflets 3 - 7, upper surface densely hairy ; flowers 2.5 - 3.5 cm in diam, solitary terminal ; fruits hairy.

Fl. & Fr. : August - October.

Hemkund on way, Pandukeswar, Rudranath. 2500 - 4000 m (42112).

10. *P. fulgens* Wall. ex Hook in Bot. Mag. 53 : t. 2700. 1826 ; Lehm. Rev. Poten. 54. 1856 ; Hook. f. Fl. Brit. Ind. 2 : 349. 1878. '*Bajardantii*'.

Perennial robust hairy herbs ; leaves pinnate ; leaflets numerous, lower surface silvery tomentose ; flowers orange yellow in dense corymbs.

Fl. & Fr. : May - October.

Amritganga valley, Bhuna - Bistola, Mondoli. 2000 - 4000 m (42138).

11. *P. gelida* C.A. Mey. In Verz. Plf. Canc. 16. 7. 1831 ; Hook. f. Fl. Brit. Ind. 2 : 357. 1878.

Sparsely glandular pubescent herbs ; leaves digitately 3 - foliolate ; leaflets membranous entire ; flowers 1 - 4 on long slender pedicles.

Fl. & Fr. : June - October.

Bhyundar valley. 3400 m (39049).

12. *P. gerardiana* Lindl. ex Lehm. Rex. Bot. 42. 1856. *P. fragarioides* auct. non L. sensu Hook. f. in Fl. Brit. Ind. 2 : 350. 1878.

Perennial hairy herbs ; leaves pinnate ; leaflets 5 - 9, pale - white hairy beneath ; flowers on long stalks.

Fl. & Fr. : April - September.

Betwalchari, Gwaldam, Joshimath. 1000 - 1600 m (35152).

13. **Potentilla kleiniana** Wt. Illustr. t. 85. 1831 ; Hook. f. Fl. Brit. Ind. 2 : 359. 1878.

Annual herbs with many slender thinly hairy stems ; leaves digitately 3 – 5 foliolate ; flowers in terminal corymbs.

Fl. & Fr. : May – October.

Trijuginarayan. 1000 – 2500 m (47988).

14. **P. leschenaultiana** Ser. in DC. Prodr. 2 : 584. 1825 ; Hook. f. Fl. Brit. Ind. 2 : 350. 1878.

Robust hairy perennials ; leaflets 5 – 7, white beneath ; flowers in corymbs ; achenes minute wrinkled.

Fl. & Fr. : August – October.

Amritganga and Bhyundar valleys, Kedarnath. 1900 – 4000 m (42133).

15. **P. leuconota** D. Don, Prodr. Fl. Nep. 230. 1825 ; Hook. f. Fl. Brit. Ind. 2 : 352. 1878.

Perennial herbs ; leaves pinnate ; leaflets numerous, appressed silky beneath ; flowers .7 cm in diam. ; achenes fewer.

Fl. & Fr. : September – October.

Bhyundar valley, Brahmtal. 3600 m (3117).

16. **P. microphylla** D. Don. var. **achillaeifolia** Hook. f. Fl. Brit. Ind. 2 : 353. 1878.

Densely tufted dwarf perennials ; leaflets numerous, silky beneath ; scapes 1 flowered, 1.2 – 1.8 cm in diam ; achenes minute smooth.

Fl. & Fr. : June – October.

Bhuna – Bistola, Hemkund on way, way to Vasuki Tal. 3500 – 4000 m (29459).

17. **P. multifida** L. Sp. Pl. 496. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 353. 1878.

Perennials ; leaflets 3 – 5, silky hairy beneath ; flowers 1.2 – 1.7 cm in diam ; achenes numerous.

Fl. & Fr. : July – August.

Hoti, Niti. 3500 – 5500 m (Duthic). Lit.

18. **Potentilla nepalensis** Hook. f. Exot. Fl. t. 88. 1823 - 27 ; Hook. f. Fl. Brit. Ind. 2 : 355. 1878.

Softly hairy perennials ; leaflets ovate or oblong - ovate, 2.5 - 5 cm ; flowers 1.8 - 2.5 cm diam ; achenes wrinkled.

Fl. & Fr. : July - October.

Trijugarayan. 1800 - 3000 m (37757).

19. **P. polyphylla** Wall. ex Lehm. Pugill. 3 : 13. 1831 ; Revis. Poten. 54. 1856. *P. mooniana* Wt. Ic. t. 233. 1839 ; Hook. f. Fl. Brit. Ind. 2 : 349. 1878.

Prostrate hirsute perennials ; leaves pinnate ; leaflets many, paler beneath ; flowers pale upto 1.7 cm in diam ; achenes glabrous.

Fl. & Fr. : August - September.

Bhyundar valley. 3800 m (29581).

11. PRINSEPIA Royle

Prinsepia utilis Royle, Ill. Bot. Himal. t. 38, f. 1. 1834 ; Hook. f. Fl. Brit. Ind. 2 : 323. 1878. '*Bhekal*'.

Subdeciduous shrubs ; leaves coriaceous, simple, glabrous ; flowers white in axillary raceme ; fruits purple.

Fl. & Fr. : December - July.

Mondal, Brahamatal, Jakhmola, Okhimath. 1500 - 2500 m (47933).

12. PRUNUS L.

1a. Flowers pink, solitary or fascicled.

2a. Leaves 2.5 - 3.8 cm long.

3a. Shrubs ; petioles eglandular

... *P. jacquemontii* 3

3b. Trees ; petioles glandular

... *P. armeniaca* 6

- 2b. Leaves exceeding 5 cm in length.
- 4a. Pedicels slender, .8 - 1.5 cm long ... *P. cerasoides* 1
- 4b. Pedicels 0 or very short ... *P. persica* 7
- 1b. Flowers white, in racemes.
- 5a. Leaf base cordate ; petioles glandular, 1.8 cm long or more ... *P. cornuta* 2
- 5b. Leaf base not cordate ; petioles eglandular, less than 1.8 cm long.
- 6a. Secondary nerves 8 - 12 pairs. ... *P. vanosa* 5
- 6b. Secondary nerves 16 - 25 pairs. ... *P. nepalensis* 4

Prunus cerasoides D. Don, Prodr. Fl. Nep. 239. 1825. *P. Puddum* (Roxb. ex ser.) Roxb ex Brand. For. Fl. 194. 1874 ; Hook. f. Fl. Brit. Ind. 2 : 314. 1878. 'Payan'.

Deciduous trees ; leaves elliptic or ovate - lanceolate ; flowers in umbellate fascicles ; fruits red or yellow.

Fl. & Fr. : October - December. & April - May.

Gohna. 1000 - 2000 m (10091).

2. **P. cornuta** (Wall. ex Royle) Steud. Nom. Bot. ed. 2, 2 : 403. 1841. *cerasus cornuta* Wall. ex Royle, Ill. Bot. Himal. t. 38, t. 2. 1834. *P. padus auct.* non L. sensu Hook. f. Fl. Brit. Ind. 2 : 315. 1876.

Small deciduous trees ; leaves oblong - lanceolate or ovate, acuminate ; flowers white in racemes ; fruits blackish red.

Fl. & Fr. : May - October.

Arwasaraswati, Bhyundar valley, Mongu area. 2000 - 3500 m (37220).

3. **P. Jacquemontii** Hook. f. Fl. Brit. Ind. 2 : 213. 1876 ; Osmaston, For. Fl. Kumaon 202. 1978 (rep. ed.) 'kursang'. (Bhotia).

Small deciduous shrubs : leaves elliptic - ovate or narrowly oblong ; flowers pink, 1 - 3 together.

Fl. & Fr. : May - August.

Niti valley, Malari. 3000 - 3500 m (Osmaston). Lit.

4. *Prunus napalensis* (Ser.) Steud. Nom. Bot. ed. 2, 2 : 403. 1841. *Cerasus napalensis* Ser. in DC. Prodr. 2 : 540. 1825 ; Hook. f. Fl. Brit. Ind. 2 : 316. 1878. *Bhang - bhalu* (Bhotia).

Small deciduous trees ; leaves lanceolate or oblong - lanceolate ; fruits purplish - black, 1 - 2 cm long.

Fl. & Fr. : April - October.

Central & inner ranges, 1800 - 2500 m (Osmaston) Lit.

5. *P. venosa* Koehn. in Serg. Pl. Welson 1 : 60. 1911. *P. undulata* auct. non Sensus Hook. f. Fl. Brit. Ind. 2 : 316. 1878. '*Gad - Aru*'.

Small deciduous trees ; leaves oblong or elliptic base rounded, shallowly apiculate - crenate, glabrous ; flowers white in racemes ; fruits black, .5 cm long.

Fl. & Fr. : April - July.

Anusuya Devi, Trijuginaryan, 1500 - 3000 m (44012).

6. *P. armeniaca* L. Sp. Pl. 1 : 474. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 313. 1878. '*cholo*'

Trees ; leaves broad ovate ; flowers pinkish or white ; fruits smooth yellow.

Cultivated and almost naturalised in North - West India upto 3500 m

7. *P. persica* (L.) Batsch, Beytr. Entw. Pragm. Gesch. Nat. - Reiche 1 : 30. 1801. *Amygdalus persica* L. Sp. Pl. 47.2. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 313. 1878. '*Khirola or Aru*'.

Small deciduous trees ; leaves simple, lanceolate or ovate - lanceolate ; flowers pink ; fruits downy succulent.

Fl. & Fr. : January - October.

Cultivated. Malari, Niti, 2500 - 3500 m (56016).

13. PYRACANTHA M. Roem.

Pyracantha crenulata (Don) Roem. Syn. 3 : 220. 1847. *Mespilus crenulata* D. Don, Prodr. Fl. Nep. 238. 1825. *Crataegus crenulata* Roxb. 1824 ; Hook. f. Fl. Brit. Ind. 2 : 384. 1878. '*Ghingaru*'.

Evergreen shrubs, armed with stout spines ; leaves crowded on short lateral branches ; flowers white in corymbs ; fruits orange red.

Fl. & Fr. : March – May.

Anusuya Devi, Pipalkoti – Gulabkoti, Sitapur, 1500 – 2500 m (44011).

14. PYRUS L.

- | | | |
|--|-----|--------------------|
| 1a. Leaves glabrous or glabrescent beneath when mature | ... | <i>P. pashia</i> 1 |
| 1b. Leaves persistently tomentose beneath. | | |
| 2a. Leaves lobulate ; flowers white | .. | <i>P. lanata</i> 1 |
| 2b. Leaves not lobulate ; flowers pink | ... | <i>P. malus</i> 3 |

1. *Pyrus lanata* D. Don, Prodr. Fl. Nep. 237. 1825 ; Hook. f. Fl. Brit. Ind. 2 : 375. 1878. '*Galao*'.

Deciduous trees ; leaves simple, lobulate and serrate, white tomentose beneath ; flowers 1.5 – 2.5 cm diam, fragrant ; fruits globose orange yellow, speckled with dots.

Fl. & Fr. : April – May.

Amritganga valley, Bhuna Bistola. 3000 – 3500 m (37384).

2. *P. pashia* Buch. – Ham ex D. Don Prodr. Fl. Nep. 236. 1825 ; Hook. f. Fl. Brit. Ind. 2 : 374. 1878. '*Mehal*'.

Deciduous trees ; leaves simple, glabrous beneath ; flowers white fragrant ; fruits brown turning black rough.

Fl. & Fr. : April – May.

Mondal, Ramni – Gohna, Sitapur. 900 – 2000 m (47938).

3. *P. malus* L. Sp. Pl. 479. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 313. 1878. '*Seb*'.

Small deciduous trees ; leaves simple entire ; flowers pink ; fruits globose, intruded at both end.

Fl. & Fr. : March April.

Cultivated between 1800 3000 m apparently wild in North - Western Himalaya.

Joshimath, Mohankhal, Ramni. 2000 2500 m (37243).

15. ROSA L.

1a. Sepals deciduous in fruit ... *R. anserinaefolia* 1

1b. Sepals persistent in fruit.

2a. Erect shrubs.

3a. Flowers 5 - merous, pink.

4a. Leaves 5 - 20 cm long ; leaflets elliptic ovate ... *R. macrophylla* 3

4b. Leaves 1.2 - 5 cm long ; leaflets oblong orbicular ... *R. webbiana* 6

3b. Flowers 4 - merous, white or yellow.

5a. Twigs without bristles ; leaves not aromatic ... *R. sericea* 4

5b. Twigs glandular bristly ; leaves very aromatic ... *R. sericea*
var. *glandulosa* 5

2b. Climbers ; flowers white ... *R. brunonii* 2

1. *Rosa anserinaefolia* Boiss. Fl. Orient. 2 : 677. 1872 ; Hook. f. Fl. Brit. Ind. 2 : 365. 1878.

Subscandent shrubs ; prickles hooked ; bristles 0 ; flowers white fragrant ; styles distinct ; fruits small smooth.

Fl. & Fr. : May June.

Alaknanda bank, Badrinath, Mane-vasudhara. 3500 m (2846).

2. *R. brunonii* Lindl. Monogr. Ros. 120. t. 14. 1820. *R. moschata* non Mill. Sensus Hook. f. Fl. Brit. Ind. 2 : 367. 1878. '*Kunja*'.

Subdeciduous rambling climbers ; prickles recurved, brown ; leaflets 5 - 9 ; flowers white fragrant ; style column exerted ; fruits orange red.

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

Agastamuni, Bagrigar, Mangu. 700 2000 m (48008).

3. *Rosa macrophylla* Lindl. Monogr. Ros. 35, t. 6. 1820 ; Hook. f. Fl. Brit. Ind. 2 : 366. 1878. '*Dand - Kun Ju*'.

Deciduous shrubs ; prickles nearby straight brown ; leaflets 7 11 ; flowers solitary or in corymbs ; fruits red glandular hairy.

Fl. & Fr. : May October.

Bhuna Bistola, Ghangaria. 1500 3500 m (47962).

4. *R. sericea* Lindl. Monogr. Ros. 105, t. 12. 1820 ; Hook. f. Brit. Ind. 2 : 367. 1878. '*Dhur Kunja*'.

Deciduous shrubs ; prickles straight compressed ; leaflets 7 9 ; flowers solitary ; fruits bright red.

Fl. & Fr. : May October.

Amritganga and Bhyundar valley, Ghangaria. 300 4500 m (29658).

5. *R. sericea* Lindl. Monogr. Ros. 105, t. 12. 1830. var. *glandulosa* Osmaston, For. Fl. Kumaon 217. 1978 (repr. ed.). '*Shedum*'. (Bhotia).

Deciduous shrubs ; stems reddish ; twigs densely clothed with glandular bristles ; leaflets 7 12 hairy ; flowers pale white ; calyx tube pubescent.

Fl. & Fr. : May July.

Drier inner ranges bordering Tibet. 3000 4000 m (Osmaston). Lit.

6. *R. webbiana* Wall. ex Royle Ill. Bot. Himal. 208, t. 52, f. 2. 1834 ; Hook. f. Fl. Brit. Ind. 2 : 366. 1878. Osmaston, For. Fl. Kumaon 216. 1978 (rep. ed.). '*Shedum*'. (Bhotia).

Deciduous shrubs ; prickles numerous pink to grey ; leaflets 5 9 ; flowers usually solitary ; fruits red ovoid globose.

Fl. & Fr. : June July.

Dhauli valley, Niti. 3000 - 4500 m (Osmaston). Lit.

16. RUBUS L.

- 1a. Leaves simple, obscurely lobed ... *R. paniculatus* 9
- 1b. Leaves compound.
 - 2a. Leaves digitately or pedately 3 - 5 foliolate ; flowers white ... *R. pentagonus* 10
 - 2b. Leaves pinnate.
 - 3a. Flowers white.
 - 4a. Leaflets 3.
 - 5a. Unarmed ; slender, creeping or prostrate shrubs ... *R. nepulensis* 7
 - 5b. Armed.
 - 6a. Bristles 0 ; trailing stout shrubs ; leaves glabrous ... *R. macilentus* 6
 - 6b. Bristles numerous.
 - 7a. Lower leaf - surface with dense short tomentum ... *R. ellipticus* 2
 - 7b. Lower leaf - surface glabrous ... *R. fasciculatus* 3
 - 4b. Leaflets 5 - 7.
 - 8a. Leaflets white tomentose beneath ... *R. biflorus* 1
 - 8b. Leaflets pale - green, glabrous beneath ... *R. rosaeifolius* 11
 - 3b. Flowers pink or red.
 - 9a. Leaflets 3.
 - 10a. Large rambling shrubs ; flowers solitary or in pairs ... *R. foliolosus* 4
 - 10b. Low procumbent shrubs ; flowers in short terminal racemes ... *R. foliolosus* var. *racemosus* 5
 - 9b. Leaflets 5 - 7, upper sometimes with 3 leaflets ... *R. niveus* 8

1. **Rubus biflorus** Buch. Ham. ex Sm. in Rees. Cyclop. 30, n. 9. 1819 ; Hook. f. Fl. Brit. Ind. 2 : 338. 1878.

Deciduous shrubs ; stems with white waxy look ; leaves pinnate ; leaflets 7 ; flowers white ; fruits orange or yellow.

Fl. & Fr. : April - July.

Throughout the hills, 2000 - 3500 m (Osmaston). Lit.

2. *Rubus ellipticus* Sm. in Rees. Cyclop. 30 : n. 16. 1819 ; Hook. f. Fl. Brit. Ind. 2 : 336. 1878. '*Hinsal*'.

Evergreen shrubs ; stems rusty brown bristly, prickly ; leaflets usually 3, tomentose beneath ; flowers .7 - 1.2 cm diam ; fruits yellow.

Fl. & Fr. : January - May.

Agastamuni, Mondal. 900 - 2000 m (26821).

3. *R. fasciculatus* Duthie Ann. Bot. Gdn. Cal. 9 : 39, t. 48 ; Osmaston, For. Fl. Kumaon 209. 1978 (rep. ed.).

Evergreen shrubs with pink tomentose bristly branchlets ; leaflets 3, glabrous beneath ; flowers 1.25 - 1.5 cm diam ; fruits yellow.

Fl. & Fr. : March - June.

Throughout the hills. 1800 - 2500 m (Osmaston). Lit.

4. *R. foliolosus* D. Don. Prodr. Fl. Nep. 256. 1825. *R. Pedunculatus* D. Don. Prodr. Fl. Nep. 234. 1825. *R. niveus* Wall. ex G. Don Syst. 2 : 550. 1832. var. *pedunculatus* (D. Don) Hook. f. Fl. Brit. Ind. 2 : 335. 1878.

Deciduous, prickly shrubs ; leaves pinnate ; leaflets 3, glabrous beneath ; flowers prickly, solitary or in pairs ; fruits black.

Fl. & Fr. : June - October.

Hemkund on way, Kukinakhal, Tunganath. 2300 - 3800 m (24444).

5. *R. foliolosus* Var. *racemosus* (Hook. f.) B. D. Naithani Comb. nov. *R. niveus* Wall. ex G. Don Syst. 2. 550. 1832. var. *racemosus* Hook. f. Fl. Brit. Ind. 2 : 335. 1878.

Deciduous shrubs with arching stems ; leaves pinnate ; leaflets 3, softly white tomentose beneath ; flowers pink, in terminal racemes ; fruits orange red.

Fl. & Fr. : April - July.

Dhauli valley. 2300 - 2800 m (Osmaston). Lit. Rare.

6. *R. macilentus* Camb. in Jacq. Voy. 4 (Bot.) : 49, t. 60. 1835 ; Hook. f. Fl. Brit. Ind. 2 : 336. 1878. '*Insula*'.

Evergreen prickly shrubs without white bloom, bristles 0 ; leaflets usually 3 ; flowers white in solitary or in clusters ; fruits yellow or orange.

Fl. & Fr. : April - July.

Amritganga valley, Mohankhal. 2000 - 3500 m (27257).

7. *R. nepalensis* (Hook. f.) Kuntz. Meth. Sp. Rubs 125. 1879. *R. nutans* var. *nepalensis* Hook. f. Focke in Bibl. Bot. 17 (Ht. 72) : 39. 1910 ; Hook. f. Fl. Brit. Ind. 2 : 334. 1878. 'Gangoor'.

Unarmed slender creepers ; leaves trifoliate ; flowers white ; calyx $\pm$ clothed with pink bristles ; fruits red.

Fl. & Fr. : May - October.

Anusuya Devi, Dhotidhar. 2000 - 3500 m (42181).

8. *R. niveus* Thunb. Dessert. de Rub. 9, t. 1. f. 3. 1813. *R. lasiocarpus* Sm. in Rees Cyclop. 30 : no. 6. 1819 ; Hook. f. Fl. Brit. Ind. 2 : 339. 1878. 'Kali Hinsar'.

Shrubs with spinous stems ; leaflets usually 5 - 7 ; flowers pink ; fruits black.

Fl. & Fr. : May - September.

Birhi, Mondal, Sitapur, Gulakoti. 500 - 2000 m (43923).

9. *R. paniculatus* Sm. in Rees Cyclop. 30 : Rubus n. 41. 1819 ; Hook. f. Fl. Brit. Ind. 2 : 329. 1878. 'Kathulu'.

Evergreen climbers ; leaves 1 foliolate, pale tomentose beneath ; flowers white in panicles ; fruits glabrous.

Fl. & Fr. : May - July.

Mondal. 1600 m (43909).

10. *R. pentagonus* Wall. ex Focke. in Bibl. Bot. 17. Ht. 72 : 145. 1911. *R. alpestris* non Bl. sensu Hook. f. Fl. Brit. Ind. 2 : 323. 1878.

Deciduous shrubs ; twigs smooth, pink ; spines straight, leaves digitately 3 - 5 foliolate, elliptic or oblong ; flowers white, tinged green ; fruits bright red.

Fl. & Fr. : June - September.

Throughout the main himalayan range. 2500 - 3500 m (Osmaston). Lit.

11. *R. rosaefolius* Sm. Pl. Icon. Hact. Ined. 3 : t. 60. 1791. Hook. f. Fl. Brit. Ind. 2. 341. 1878.

Subdeciduous shrubs with weak straggling branches ; leaflets 5 - 7, pale green or glabrous beneath ; flowers 2.5 - 3 cm diam ; fruits scarlet.

Fl. & Fr. : April - June.

Throughout the hills. 2000 - 2500 m (Osmaston). Lit.

17. *SANGUISORBA* Rupr. ex. L.

Sanguisorba diandra (Hook. f.) Nordborg in Opera B. (Lund) 11 (2) : 60, 1966. *Poterium diandrum* Hook. f. Fl. Brit. Ind. 2 : 362, 1878.

Perennial glabrous herbs ; Leaves pinnate ; leaflets oblong, cordate, crenate ; flowers dark purple in globose heads ; stamens 2 : fruits oblong deeply 4 winged.

Fl. & Fr. : July - August.

Bhyundar valley. 3800 m (29575).

18. *SIBBALDIA* L.

1a. Leaves digitately compound ; leaflets 3 ... *S. parviflora* 2

1b. Leaves pinnately compound, leaflets 5 - 9 ... *S. micropetala* 1

1. *Sibbaldia micropetala* (D. Don) Hand. - Maz. in Kraston et Scheneck, Vegbild. 22 R, H. 8 : 6, 1932. *Potentilla albitfolia* Wall. ex Hook. f. Fl. Brit. Ind. 2 : 347, 1878.

Hairy herbs ; stems flexuous ; leaves imparipinnate ; flowers solitary or paired, yellow ; achenes wrinkled.

Fl. & Fr. : May - June.

Way to Tungnath. 3000 m (48066).

2. *S. parviflora* Willd. in Ges. Naturf. Fr. Neue Schr. 2 : 125. t. 5, f. 2, 1799. *Potentilla sibbaldia* non Hall. f. (1818). Sensus Hook. f. Fl. Brit. Ind. 2 : 345, 1876, *p. p.* excl. Syn. *S. procumbens* L. var. *Parviflora* Dixit et Panigrahi Rev. Sibbaldia Proc. Ind. Acad. Sci. Plant Sc.) 90(3) : 253 - 272, 1981.

Herbs ascending - erect, tomentose ; leaves ternate ; flowers yellow.

Fl. & Fr. : May - October.

Bhyundar valley, Tungnath. 3000 - 4000 m (29583).

19. SORBARIA A. Br.

Sorbaria tomentosa (Lindl.) Rehder in Journ. Arn. Arb. 19 : 74. 1938. *Schizonotus tomentosus* Lindl. in Bot. Reg 26 (Misc) : 71. 1841. *Spiraea sorbifolia* non L. Sensus Hook. f. Fl. Brit. Ind : 2 : 324. 1878. 'Bhiloka'.

Deciduous shrubs ; leaves pinnate ; flowers white.

Fl. & Fr. : June - October.

Central and inner ranges. 2000 - 3500 m (Ostmason). Lit.

20. SORBUS L.

- 1a. Leaves simple ... *S. cuspidata* 2
- 1b. Leaves compound.
- 2a. Corymb - branches and lower surface of leaves glabrous.
 - 3a. Small trees ; leaflets 1.8 - 3.8 cm long entire towards the rounded base ... *S. aucuparia* 1
 - 3b. More slender, subscaudent shrubs ; leaflets .8 - 1.8 cm long, deeply and acutely serrate ... *S. microphylla* 4
- 2b. Corymb - branches and lower surface of leaves red - tomentose *S. ursina* 3

1. *Sorbus aucuparia* L. Sp. Pl. 477. 1753. *Pyrus aucuparia* Gaertn. Fruct. 2. 45, t. 87 ; Hook. f. Fl. Brit. Ind. 2 : 375 - 376. 1878.

Small trees ; leaves pinnate ; leaflets 7 - 12, glabrous, serrate ; flowers pink ; style bases woolly.

Fl. & Fr. : June - October.

Hemkund, Kedarnath. 3000 - 4000 m (29458).

2. *S. cuspidata* (Spach) Hedlund in Svensk. Vet. Akad. Handl. 35 : 89. 1901. *Crataegus cuspidata* Spach, Hist. Nat. Veg. 2 : 106. 1834. *Pyrus vestita* Wall. ex Hook. f. Fl. Brit. Ind. 2 : 375. 1878.

Deciduous trees ; leaves simple, irregular, small serrate, white wooly beneath ; flowers white ; calyx woolly without and within ; fruits globose greenish yellow, tinged red.

Fl. & Fr. : May - October.

Bhyundar valley, Dhotidhar, way to Dudatoli. 2500 - 2800 m (29671).

3. ***Sorbus microphylla*** Wenzig in *Linnaea* 38 : 76. 1873 ; Dcne. in *Nouv. Arch. Mus. Paris* 10 : 159. 1874. *Pyrus microphylla* Wall. ex Hook. f. *Fl. Brit. Ind.* 2 : 376. 1878. '*Saulo, Halao*'.

Deciduous, subscandent slender shrubs ; leaves pinnate ; leaflets 17 - 20 ; flowers pink ; fruits pink glabrous.

Fl. & Fr. : May - October.

Dunagiri. 3500 - 4200 m (53992).

4. ***S. ursina*** (Wenzig) Dcne. *Nouv. Arch. Mus. Paris* 10 : 159. 1874. *Sorbus foliolosa* var. *ursina* Wenzig in *Linnaea* 38 : 75. 1873 ; Hook. f. *Fl. Brit. Ind.* 2 : 376. 1878. *p. p.* '*Saulu*'.

Large deciduous shrubs ; leaflets 17 - 25, 2.5 - 5 cm long ; flowers white fragrant ; styles pubescent.

Fl. & Fr. : May - October.

Bhuna Bistola, Bhyundar valley, Baradioldunga. 3000 - 4500 m (39057).

21. SPIRAEA L.

- | | |
|--|---------------------------|
| 1a. Inflorescence corymbose ; pedicels normally 1 flowered ... | <i>S. arcuata</i> 1 |
| 1b. Inflorescence paniculate, lower branches cymose, more than 1 flowered. | |
| 2a. Flowers bi-sexual, white. | |
| 3a. Ripe carpels villous ... | <i>S. canescens</i> 3 |
| 3b. Ripe carpels glabrous ... | <i>S. vacciniifolia</i> 4 |
| 2b. Flowers uni-sexual, pink ... | <i>S. bella</i> 2 |

1. *Spiraea arcuata* Hook. f. Fl. Brit. Ind. 2 : 325. 1878.

Small deciduous shrubs ; leaves elliptic ovate ; flowers white tinged with pink.

Fl. & Fr. : July August.

Inner dry ranges bordering Tibet. 2000 – 3500 m (Osmaston). Lit.

2. *S. bella* Sims in Bot. Mag. t. 2426. 1823 ; Hook. f. Fl. Brit. Ind. 2 : 324. 1878.

Small deciduous shrubs ; leaves elliptic – ovate or lanceolate ; flowers .8 cm in diam ; pedicels villous ; carpels brown shining.

Fl. & Fr. : May – August.

Bajmora. Bhuna, Hemkund on way. 2800 – 3500 m (29517).

3. *S. canescens* D. Don, Prodr. Fl. Nep. 227. 1825 ; Hook. f. Fl. Brit. Ind. 2 : 325. 1878. '*Jhar Mairala*'.

Erect deciduous shrubs ; leaves simple pubescent ; flowers .8 cm in diam, paniculate white ; carpels villous, half exposed.

Fl. & Fr. : May – October.

Anusuyia area, Bhyundar valley, Kanol. 1600 – 3000 m (18399).

4. *S. vacciniifolia* D. Don, Prodr. Fl. Nep. 227. 1825 ; Hook. f. Fl. Brit. Ind. 2 : 325. 1878.

Subdeciduous shrubs ; leaves simple $\pm$ glabrous ; flowers .3 .5 in diam ; carpels partially exposed, glabrous.

Fl. & Fr. : May October.

Alli, Birhi Gohna, Pipalkoti Gulabkoti. 1500 - 2500 m (27334).

22. STRANVAESIA Lindl.

Stranvaesia naussia (D. Don) Dcne. in Nouv. Arch. Mus. Paris 10 : 178. 1874. *Stranvaesia glaucescens* Lindl. in Bot. Reg. t. 1956. 1837 ; Hook. f. Fl. Brit. Ind. 2 : 382. 1878.

Subdeciduous or evergreen trees ; leaves simple, glabrous ; flowers white, fragrant ; fruits globose, glabrous.

Fl. & Fr. : May - October.

Mondal. 1650 m (43940).

53. SAXIFRAGACEAE

1a. Stamens 5.

2a. Leaves compound, 2 - pinnate ; petals none ... *Astilbe* 1

2b. Leaves simple, sometimes lobed ; petals 5.

3a. Herbs ; flowers solitary, terminal, on erect scapes ... *Parnassia* 3

3b. Shrubs or small trees ; flowers racemed.

4a. Leave not lobed ; fruit a capsule ... *Itea* 4

4b. Leaves 3 or 5 lobed ; fruit a berry ... *Ribes* 6

1b. Stamens more than 5.

5a. Leaves alternate or rosulate.

6a. Petals more ; flowers minute ... *Chrysosplenium* 3

6b. Petals 5 ; flowers, .6 - 3 cm in diam.

7a. Flowers pink ... *Bergenia* 2

7b. Flowers yellow or white ... *Saxifraga* 7

5b. Leaves opposite ... *Chrysosplenium* 3

1. ASTILBE Buch - Ham. ex D. Don

Astilbe rivularis Buch - Ham. ex D. Don, Prodr. Fl. Nep. 211. 1825 ; Hook. f. Fl. Brit. Ind. 2 : 389. 1878.

Perennial herbs, 1 - 1.20 m high ; leaves pinnate ; leaflets usually 3 ; flowers greenish white ; panicles 30 - 60 cm long ; capsules 2 beaked.

Fl. & Fr. : July - October.

Bhyundar valley. 1500 - 2400 m (24473).

2. BERGENIA Moench.

- | | | |
|---|-----|-----------------------|
| 1a. Pedicels and calyx pubescent ; calyx - teeth oblong | ... | <i>S. stracheyi</i> 2 |
| 1b. Pedicels and calyx glabrous ; calyx - teeth ovate | ... | <i>B. ligulata</i> 1 |

1. *Bergenia ligulata* (Wall.) Engl. in Bot. Zeit. 26 : 814. 1868. *Saxifraga ligulata* Wall. As. Res. 13 : 398. 1820 ; Hook. f. Fl. Brit. Ind. 2 : 398. 1878. '*Silphori*'.

Rootstock thick ; leaves simple thick, orbicular or obovate, glabrous, ciliate ; flowers white or rose in spreading cymose panicles.

Fl. & Fr. : April - June.

Lohujung, 2500 - 3500 m (37207).

2. *B. stracheyi* (Hook. f. et Thoms) Engl. in Bot. Zeit. 26 : 842. 1868. *Saxifraga stracheyi* Hook. f. & Thoms. in Journ. Linn. Soc. 2 : 61. 1857 ; Hook. f. Fl. Brit. Ind. 2 : 398. 1878.

Root stock thick ; leaves obovate glabrous ; flowers white or rose.

Fl. & Fr. : June - October.

Alkapuri, Hemkund, on way to Khankhilia. 2500 - 4500 m (37416).

3. CHRYSOSPLENIUM L.

- | | | |
|---|-----|---------------------------|
| 1a. Stout herbs ; leaves ovate or elliptic, obtuse, crenate | ... | <i>C. trichospermum</i> 2 |
| 1b. Filiform procumbent herbs ; leaves reniform, cordate, crenate - lobed | ... | <i>C. tenellum</i> 1 |

1. **Chrysosplenium tenellum** Hook. f. & Thoms. in Journ. Linn. Soc. 2 : 73. 1857 ; Hook. f. Fl. Brit. Ind. 2 : 401. 1878.

Delicate annual glabrous herbs ; leaves stalked ; flowers solitary green yellow.

Fl. & Fr. : May June.

Hemkund on way, way to Khankhelia, Kuginakhal, 3000 3500 m (39040).

2. **C. trichospermum** Edgew. ex Hook. f. & Thoms. in Journ. Linn. Soc. 2 : 73. 1857 ; Hook. f. Fl. Brit. Ind. 2 : 400, 1878.

Glabrous branched herbs ; leaves opposite elliptic ; flowers green, shortly pedicelled.

Fl. & Fr. : April May.

Bagrigar, Wan. 2300 2800 m (37213).

4. ITEA L.

Itea nutans Royle, Ill. Bot. Himal. 226. 1835 ; Hook. f. Fl. Brit. Ind. 2 : 408. 1878.

Shrubs or small trees ; leaves alternate glabrous ; flowers pale-green, fascicled.

Fl. & Fr. : May - June.

Berhi - Gohna, 800 - 2000 m (10038).

5. PARNASSIA L.

- | | | |
|---|-----|----------------------|
| 1a. Style very short or 0 ; leaves 2.5 - 5 cm long | ... | <i>P. nubicola</i> 2 |
| 1b. Style manifest ; leaves 0.6 - 2 cm long. | | |
| 2a. Solitary cauline leaves in the lower half of the stem | ... | <i>P. laxmanni</i> 1 |
| 2b. Solitary cauline leaves in the upper half of the stem | ... | <i>P. pusila</i> 3 |

1. *Parnassia laxmanni* Pall. ex Schult. Syst. Veg. 6 : 696. 1820.
P. ovata auct. non Ledeb. Sensu Hook. f. Fl. Brit. Ind. 2 : 403. 1878.

Glabrous perennials ; leaves 1.2 – 1.8 cm long ; flowers white ;
 capsules .6 – .9 cm, obconic below.

Fl. & Fr. : August – October.

Loharjung, Narparbat. 2500–5000 m (30835).

2. *P. nubicola* Wall. ex Royle, Ill. Bot. Himal. 227. t. 50. f. 3.
 1835 ; Hook. f. Fl. Brit. Ind. 2 : 402. 1878.

Glabrous perennials ; leaves 2.5 – 5 cm long ; flowers white ; stigma,
 capitate, 3 – lobed.

Fl. & Fr. : August – October.

Ghangaria, Hanumanchatti, Rambara – Gaurikund. 2000 – 4000 m
 (10440).

3. *P. pusilla* Wall. ex Arn. in Comp. Bot. Mag. 2 : 315. 1837 ;
 Hook. f. Fl. Brit. Ind. 2 : 403. 1878.

Stems, 2.5 – 6 cm long ; leaves reniform or ovate cordate ; staminodes
 short.

Fl. & Fr. : August – September.

Garhwal. 4500 m (Rau). Lit.

6. RIBES L.

- | | | |
|--|-----|--|
| 1a. Prickly shrubs ; flowers solitary or clustered | ... | <i>R. alpestre</i> 1 |
| 1b. Unarmed shrubs ; flowers in racemes. | | |
| 2a. Calyx - limb short ; spreading. | | |
| 3a. Leaves sticky - glandular with obtuse lobes | ... | <i>R. orientale</i> 4 |
| 3b. Leaves with few or no glandular hairs and acute lobes. | | |
| 4a. Leaves 2.5 - 6.25 cm long | ... | <i>R. glaciale</i> 2 |
| 4b. Leaves 5 - 15 cm long | ... | <i>R. takare</i> 5
<i>F. takare</i> |
| 2b. Calyx - limb campanulate or tubular | ... | <i>R. himalense</i> 3 |

1. *Ribes alpestre* Wall. ex. Dene. in Jacq. Voy. 4 (Bot.) : 64, t. 75. 1835. *R. grossularia* non L. sensu Hook. f. Fl. Brit. Ind. 2 : 410. 1878. '*Imli, Lipchi*'.

Deciduous prickly shrubs ; leaves crowded on dwarf shoots, orbicular, lobed, bases 4 - 5 nerved : flowers white, bi-sexual, .5 - .7 cm diam ; berries glandular hairy.

Fl. & Fr. : May - September.

Malari, Mana. 3000 - 3500 m (56002).

2. *R. glaciale* Wall. in Roxb. Fl. Ind. ed. Carrey 2 : 513. 1824 ; Hook. f. Fl. Brit. Ind. 2 : 410. 1878, *p.p.*

Deciduous shrubs ; leaves 2.5 - 6 cm long and broad, 3 - 5 lobed, base rounded cordate : flowers pinkish or greenish brown ; berries red, globose glabrous.

Fl. & Fr. : May - October.

Bhuna-Bistola, Hemkund, way to Khankelia, 3500 - 4000 m (24291).

3. *R. himalense* Royle ex. Dene. in Jacq. Voy. 4 (Bot.) : 66. 1835. *R. rubrum* non L. Sensu Hook. f. Fl. Brit. Ind. 2 : 411. 1878. '*Kimkoli*'.

Deciduous shrubs ; leaves $\pm$ glabrous, pale beneath ; flowers greenish yellow or brownish pink ; berries red or black.

Fl. & Fr. : May - October.

Amritganga valley, Hemkund, Kukinakhal. 2500 - 3500 m (29465).

4. *R. orientale* Desf. Hist. Arb. 2 : 88. 1809 ; Hook. f. Fl. Brit. Ind. 2 : 410. 1878. '*Darbag*'.

Deciduous unarmed shrubs ; leaves orbicular or reniform $\pm$ 3 - 5 lobed ; flowers purplish brown ; berries orange red, globose glandular hairy.

Fl. & Fr. : April - June.

Malari, Niti. 3000 - 3500 m (Duthie). Lit.

5. *R. takare* D. Don, Prodr. Fl. Nep. 208. 1825. f. *takare* *R. acuminatum* Wall. ex G. Don Gen. Hist. 3 : 187. 1834. *R. glaciale* Wall. Fl. Ind. ed. Carey 2 : 513. 1824, *p.p.* ; Hook. f. Fl. Brit. Ind. 2 : 410. 1878, *p.p.*

Deciduous shrubs ; leaves sparsely pubescent 6 - 15 cm long ; flowers brownish purple.

Fl. & Fr. : May – June.

Trijuginarian. 2500 – 4000 m (47960).

7. SAXIFRAGA L.

1a. Flowers white.

- 2a. Bulbils in the upper axils ... *S. granulifera* 7
- 2b. No bulbils.
- 3a. Scapigerous herbs ... *S. pallida* 11
- 3b. Stems leafy.
- 4a. Flowers solitary ; stems 2.5 - 11 cm long ... *S. pulvinaria* 13
- 4b. Flowers 3 - 6 ; stems 12 - 25 cm long. ... *S. asarifolia* 1

1b. Flowers yellow.

5a. Herbs with runners.

- 6a. Sepals glabrous ... *S. brunonis* 4
- 6b. Sepals pubescent ... *S. stenophylla* 14

5b. Herbs without runners.

7a. Flowers corymbose.

8a. ± Glandular hairy herbs ; radical leaves ovate.

- 9a. Radical leaves narrowed into petiole ... *S. diversifolia* 5
- 9b. Radical leaves sub - cordate ... *S. parnassifolia* 12

8b. ± Glabrous herbs ; radical leaves narrow spatulate

... *S. hirculus* 8

7b. Flowers solitary or few flowered.

10a. Stems upwards with densely whorled, undivided small leaves

... *S. jacquemontii* 10

10b. Stems upwards without whorled leaves.

11a. Stems much branched ; glandular pilose ; leaf margins minutely denticulate

... *S. filicaulis* 6

11b. Stems simple.

12a. Leaves shining, densely imbricate.

| | |
|--|--|
| 13a. Leaves linear lanceolate, half amplexicaule | <i>S. brachypoda</i> 2
var. <i>brachypoda</i> |
| 13b. Leaves lanceolate, cordate at the base ... | <i>S. brachypoda</i> 3
var. <i>fimbriata</i> |
| 12b. Leaves, hispid on both surfaces ... | <i>S. hispidula</i> 6 |

1. *Saxifraga asarifolia* Sternb. in Rev. Saxifrag. Suppl. 2 : 33, t. 24. 1831. *S. odontophylla* Wall. ex Hook. f. & Thoms. in Journ. Linn. Soc. Bot. 2 : 64. 1857 ; Hook. f. Fl. Brit. Ind. 2 : 390. 1878.

Laxy villous brittle herbs, $\pm$ 25 cm high ; bulbils 0 ; radical leaves orbicular ; flowers white.

Fl. & Fr. : August.

Hemkund on way. 4000 m (29457).

2. *S. brachypoda* D. Don in Trans. Linn. Soc. 13 : 378. 1821. var. *brachypoda* ; Hook. f. Fl. Brit. Ind. 2 : 396. 1878.

Fl. & Fr. : August – September.

Garhwal. 3000 – 4500 m (Rau). Lit.

3. *S. brachypoda* D. Don, var. *fimbriata* (DC.) Engl. & Imrsch. in Bot. Jahrb. 48 : 591. 1912. *S. fimbriata* Wall. ex DC. Prodr. 4 : 1830 ; 45. Hook. f. Fl. Brit. Ind. 2 : 396. 1878.

Erect, glabrous or sparsely ciliate herbs upto 5 – 20 cm high ; bulbils in upper axils : leaves uniform, spinulose ; flowers yellow solitary or rarely 2 - 3.

Fl. & Fr. : August – October.

Hemkund on way, Kailu - Vinayag, Rudranath. 3500 - 4500 m (42113).

4. *S. brunonis* Wall. ex Sering in DC. Prodr. 4 : 45. 1830. *S. brunoniana* Wall. ex Sternb. Rev. Saxifrag. Suppl. 2 : 25, t. 23. 1831 ; Hook. f. Fl. Brit. Ind. 2 : 397. 1878.

Glabrous erect herbs ; runners present ; stem leaves linear, acute, shining ; flowers, terminal, 2 – 4 on a stem.

Fl. & Fr. : June – October.

Badrinath, Bajmora. 3500 – 5500 m (2966).

5. *Saxifraga diversifolia* Wall. ex Sering in DC. Prodr. 4 : 44. 1830 & ex Sternb. Rev. Saxifrag. Suppl. 2 : 29, t. 22. 1831 ; Hook. f. Fl. Brit. Ind. 2 : 393. 1878.

Erect leafy glandular herbs, glabrous towards maturity upto 20 – 45 cm high ; radical leaves ovate narrowed into petiole ; flowers yellow, 1.2 cm in diam ; petal base with 4 – stalked glands.

Fl. & Fr. : August – October.

Nar Parbat, Wan Vidhni. 2000 4000 m (35877).

6. *S. filcaulis* Wall. ex Sering in DC. Prodr. 4 : 46. 1830 & ex Sternb. Rev. Saxifrag ; Suppl. 2 : 23, t. 23. 1831 ; Hook. f. Fl. Brit. Ind. 2 : 386. 1878.

Glandular, pilose much branched herbs ; leaves linear oblong, minutely denticulate ; flowers yellow.

Fl. & Fr. : September. – October.

Ghangaria, Hemkund on way, Rambara. 3000 – 3500 m (24217).

7. *S. granulifera* H. Smith in Bull. Br. Mus. (Nat. Hist.) Bot. 2 : 259, t. 21 B. 1960. *S. Cernua auct.* non L. Sensus Engl. & Innsch. in Engl. Pflreich IV 117 (Ht. 67) : 270. 1916 p. p.

Erect herbs upto 15 cm high ; radical, leaves, reniform ; flowers white, terminal, solitary.

Fl. & Fr. : June – October.

Hemkund on way. 3500 – 4000 m (39034).

8. *S. hirculus* L. Sp. Pl. 402. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 392. 1878.

Variable glabrous herbs ; radical leaves, long petioled ; flowers yellow ; sepals $\pm$ free in fruits.

Fl. & Fr. : July – August.

Bhyundar Valley. 3500 – 4500 m (Smythe). Lit.

9. *S. hispidula* D. Don in Trans. Linn. Soc. 13 : 380. 1821 ; Hook. f. Fl. Brit. Ind. 2 : 396. 1878.

Small hispid herbs ; leaves oblong lanceolate ; flowers golden yellow.

Fl. & Fr. : July – August.

Tungnath. 3500 m (Semwal & Gaur). Lit.

10. *Saxifraga jacquemontiana* Dcne. in Jacq. Voy. 4 (Bot.): 68, t. 78, f. 2. 1835; Hook. f. Fl. Brit. Ind. 2 : 395. 1878.

Densely tufted 2.5 – 7 cm high herbs; leaves whorled entire, obtuse; flowers golden yellow, solitary on glandular pedicels.

Fl. & Fr. : July – August.

Bhyundar valley. 4500 – 6000 m (Duthie & Smythe). Lit.

11. *S. pallida* Wall. ex Sering in DC. Prodr. 4 : 38. 1830 & ex Sternh. Saxifrag. Suppl. 2 : 41, t. 23. 1831. *S. micrantha* Edgew. in Trans. Linn. Soc. 20 : 50. 1846; Hook. f. Fl. Brit. Ind. 2 : 394. 1878.

Pubescent herbs; scapes 10 – 20 cm high; radical leaves, long petioled; flowers white; seeds tubercled.

Fl. & Fr. : June – September.

Bajmora, Hemkund on way. 3500 – 4500 m. (29494).

12. *S. parnassifolia* D. Don in Trans. Linn. Soc. 13 : 405. 1821. *S. diversifolia* var. *parnassifolia* Sering in DC. Prodr. 4 : 44. 1830; Hook. f. Fl. Brit. Ind. 2 : 393. 1878, *p. p.* non Wall. ex Sternb.

Glandular hairy herbs, 15 – 30 cm. high; leaves ovate sub cordate, entire; petals glandular at the base.

Fl. & Fr. : August – October.

Amritganga, Bhyundar valleys, Kedarnath. 2500 – 5500 m (42097).

13. *S. pulvinaria* H. Smith in Bull. Br. Mus. (Nat. Hist.) Bot. 2 : 105, t. 4 m – O. 1958. *S. imbricata* Royle, Ill. Bot. Himal. 226, t. 49, f. 1. 1835; Hook. f. Fl. Brit. Ind. 2 : 394. 1878.

Densely tufted small herbs; flowers solitary, yellow.

Fl. & Fr. : May – June.

Bhyundar valley. 3500 – 4000 m (Smythe). Lit.

14. *S. stenophylla* Royle, Ill. Bot. Him. 227, t. 50, f. 1. 1835. *S. flagellaris* auct. non Willd. *Sensu* Hook. f. Fl. Brit. Ind. 2 : 397. 1878, *p. p.*

Pubescent herbs; leaves linear – lanceolate, pubescent; flowers yellow; pedicels 0.5 cm; petals with red lines.

Fl. & Fr. : August – September.

Bhyundar valley. 4500 – 5000 m (Smythe). Lit.

54. HYDRANGEACEAE

1a. Stamens 8 - 10.

2a. Flowers polygamous ; stamens not winged ... *Hydrangea* 2

2b. Flowers bi-sexual ; stamens winged ... *Deutzia* 1

1b. Stamens 20 - 40 ; petals 4 ... *Philadelphus* 3

1. DEUTZIA Thunb.

1a. Leaves green beneath ; calyx lobes blunt ... *D. Compacta* 1

1b. Leaves grey beneath ; Calyx - lobes acute ... *D. staminea* 2

1. *Deutzia Compacta* Craib. in Kew Bull. 1913 : 264. 1913. *D. hookeriana* (Schneid.) Airy - Shaw in Kew Bull. 1934 : 180. 1934. *D. corymbosa* non Br. Senu Hook. f. Fl. Brit. Ind. 2 : 406 1878, *p.p.*

Deciduous shrubs ; clothed with stellate hairs ; leaves sessile, 5 - 12 cm long ; flowers white, in a few corymbose panicles.

Fl. & Fr. : April - June.

Bajmora, Hanumanchatti, way to Vasukital. 2500 - 3500 m (42277).

2. *D. staminea* R. Br. ex Wall. Pl. As. Rar. 2 : 82. t. 191. 1831. Hook. f. Fl. Brit. Ind. 2 : 407. 1878.

Deciduous shrubs ; leaves shortly pedicled, 2.5 - 5 cm long ; flowers in numerous panicles.

Fl. & Fr. : April - May.

Anusuyia Devi area, Gwaldam, Kund. 1200 - 2800 m (37251).

2. HYDRANGEA L.

- 1a. Large deciduous climbing shrubs ; leaves glabrous except along the nerves beneath ... *H. anomala* 1
- 1b. Large deciduous erect shrubs ; leaves densely white tomentose beneath ... *H. heteromalla* 2

1. *Hydrangea anomala* D. Don. Prodr. Fl. Nep. 211. 1825. *H. altissima* Wall. Tent. Fl. Nap. t. 50. 1826 ; Hook. f. Fl. Brit. Ind. 2 : 404. 1878.

Climbing by means of adventitious roots ; leaves 7-18 cm, ovate, acuminate, thin ; flowers in terminal hairy corymbose cymes ; fruits truncate at the top.

Fl. & Fr. : April-June.

Lohjung, Mondal, Sitapur. 1800-3000 m (35178).

2. *H. heteromalla* D. Don. Prodr. Fl. Nep. 211. 1825. *H. vestita* Wall. Tent. Fl. Nap. t. 49. 1826 ; Hook. f. Fl. Brit. Ind. 2 : 405. 1878.

Leaves 15-30 cm, broadly elliptic ; flowers in terminal tomentose corymbose cymes ; fruits crowned at the top.

Fl. & Fr. : June-October.

Tunghnath, Vidni-bugyal, Wan. 2500-3500 m (42214).

3. PHILADELPHUS L.

Philadelphus tomentosus Wall. ex G. Don Gen. Syst. 2 : 807. 1832 ; Royle, Ill. Bot. Himal. t. 46, f. 1. 1834. *P. coronarium* L. var. *tomentosum* (Wall.) Hook. f & Thoms. in Journ. Linn. Soc. 2 : 83. 1857 ; Hook. f. Fl. Brit. Ind. 2 : 407. 1878.

Deciduous shrubs, clothed with simple hairs ; leaves opposite ; flowers white fragrant ; styles 4.

Fl. & Fr. : June - October.

Bhyundar valley, Pandukeswar. 2000 - 2500 m (24459).

55. CRASSULACEAE

1a. Stamens as many as the petals.

2a. Stems procumbent ; leaves opposite ; flowers minute axillary ... *Tillaea* 5

2b. Stems erect ; leaves alternate ; flowers relatively conspicuous in terminal cymes ... *Sinocrassula* 4

1b. Stamens twice as many as the petals, (except *S. oreades* ; stamens 5) ; flowers usually conspicuous.

3a. Petals united for the greater part. ... *Kalanchoe* 1

3b. Petals free.

4a. Calyx of 4 or 5 sepals ... *Sedum* 2

4b. Calyx of 8 sepals ... *Sempervivum* 3

1. KALANCHOE Adans.

Kalanchoe integra (Medik.) O. Kuntz. Rev. Gen. Pl. 1 : 221. 1891.
Cotyledon integra Medik. Acta Acad. Theod. Palat. 3 : 200. t. 49. 1775.
K. spathulata 1801 ; Hook. f. Fl. Brit. Ind. 2 : 414. 1878. '*Bakalpatta*'.

Perennial glabrous herbs ; leaves fleshy, opposite ; flowers yellow ; follicles 4, many seeded.

Fl. & Fr. : September - November.

Gopeswar. 1350 m (480, Kala & Gaur). Lit.

*Some species of *Sedum* are treated under *Rhodiola* by Hara & Williams, Enum. Pl. Nep. 2 : 159 - 163. 1979.

2. SEDUM L.

- 1a. Flowers pink - purple or red.
- 2a. Nonsucculent herbs ; stamens 5 ... *S. oreades* 11
- 2b. Succulent herbs ; stamens 8 - 10.
- 3a. Rootstock thin ; seeds obovoid, not compressed, testa not loose ... *S. ewersii* 5
- 3b. Rootstock thick ; seeds oblong ellipsoid, compressed, testa loose.
- 4a. Flowers dioecious or polygamous.; style short recurved in fruit.
- 5a. Cymes not carrying ract on the short branches.
- 6a. Leaves ovate, incise - dentate or toothed.
- 7a. Leaf base cordate or auricled, prominently white margined ... *S. heterodonton* 7
- 7b. Leaf base not white - margined ... *S. tibeticum* 15
- 6b. Leaves elliptic or broadly oblong. var. *Strachey*
- 8a. Cymes dense ; sepals purple ... *S. crenulatum* 4
- 8b. Cymes 5 - 1 flowered ; sepals not purple ... *S. quadrifidum* 12
- 5b. Cymes carrying bracts on the short branches.
- 9a. Stems 15 - 35 cm tall ; leaves ovate or ovate oblong ... *bupleuroides* 2
- 9a. Stems 5 - 5.5 cm tall ; leaves terete, oblong - linear ... *S. fastigiatum* 6
- 4b. Flowers hermaphrodite ; style straight ... *S. sinuatum* 14
- 1b. Flowers yellow or white.
- 10a. Rootstock thick ; seeds oblong ellipsoid, compressed,
- 11a. Flowers polygamous or dioecious ; style short, recurved in fruit ... *S. imbricatum* 8
- 11b. Flowers hermaphrodite ; style straight.
- 12a. Stems 15 - 30 cm tall ; flowers yellow ... *S. crassipes* 3
- 12b. Stems 7 - 12 cm tall ; flowers white ... *S. linearifolium* 9
- 10b. Rootstock thin ; seeds obovoid, not compressed, testa not loose.
- 13a. Follicles 3 - 5, divaricate in fruits ... *S. multicaule* 10

- 13b. Follicles 5, erect in fruits ; radical leaves rosulate.
- 14a. Rosulate leaves ovate - lanceolate ; sepal elliptic lanceolate acute ... *S. trillepetalum* 1
- 14b. Rosulate leaves spatulate or elongate obovate ; sepals oblong.
- 15a. Petals white, elliptic or oblong not very acute ... *S. rosulatum* 13
- 15b. Petals white streaked purple, lanceolate very acute... *S. adenotrichum* 1

1. *Sedum adenotrichum* Wall. ex Edgew. in Trans. Linn. Soc. 20 : 48. 1846 & ex Hook. f. & Thoms. in Journ. Linn. Soc. 2 : 101. 1858 ; Hook. f. Fl. Brit. Ind. 2 : 420. 1878.

Glandular pubescent $\pm$ erect herbs, 7 - 25 cm high ; leaves oblong, obovate ; flowers white tinged with pink.

Fl. & Fr. : April - June.

Mana, Nandkeshri. 1000 - 2500 m (35139).

2. *S. bupleuroides* Wall. ex Hook. f. et Thoms. in Journ. Linn. Soc. Bot. 2 : 98. 1858 ; Hook. f. Fl. Brit. Ind. 2 : 418. 1878. [*Rhodiola** *bupleuroides* (Wall. ex Hook. f. & Thoms.) Fu]

Glabrous erect herbs, 15 - 35 cm high ; leaves ovate, ovate oblong ; flowers black - purple.

Fl. & Fr. : September - October.

Hemkund on way. 3500 - 4500 m (24297).

3. *S. crassipes* Wall. ex Hook. f. et Thoms. in Journ. Linn. Soc. Lond. 2 : 99. 1858. *S. asiaticum* non DC. Sensus Hook. f. Fl. Brit. Ind. 2 : 419. 1878, [*Rhodiola** *wallichiana* (Hook.) Fu]

Glabrous herbs, 15 - 30 cm high ; leaves linear ; flowers crowded in terminal cymes.

Fl. & Fr. : June - September.

Ghangaria, Kedarnath glacial valley. 300 - 4000 m (29521).

4. *S. crenulatum* Hook. f. & Thoms. in Journ. Linn. Soc. 2 : 96. 1858 ; Hook. f. Brit. Ind. 2 : 417. 1878. [*Rhodiola** *crenulata* (Hook. f. & Thoms.) H. Ohba]

Herbs, 5 - 20 cm high ; leaves sessile elliptic or broadly oblong ; flowers pink, enclosed within the leaflike bracts ; sepals narrow oblong.

Fl. & Fr. : June - October.

Bhyundar valley, Niti. 4000 - 5500 m (Smythe). Lit.

5. *Sedum ewersii* Ledeb. Fl. Alt. 2 : 191. 1830 ; Hook. f. Fl. Brit. Ind. 2 : 421. 1878.

Erect glabrous herbs ; stems many, 15 - 30 cm high ; leaves ovate orbicular ; flowers .6 cm long in bud, crowded in cymes.

Fl. & Fr. : August - November.

Bandrinath, Mana, Rambara. 3000 - 5500 m (10483).

6. *S. fastigiatum* Hook. f. & Thoms in Journ. Linn. Soc. 2 : 98. 1858 ; Hook. f. Fl. Brit. Ind. 2 : 419. 1878. [*Rhodiola fastigiata* (Hook. f. & Thoms.) Fu]

Curved herbs ; stems many, 5 - 15 cm high ; leaves crowded terete, oblong linear ; flowers in lax pubescent cymes ; sepals lanceolate.

Fl. & Fr. : June - August.

Niti. 5000 - 6000 m (Duthie). Lit.

7. *S. heterodontum* Hook. f. & Thoms. in Journ. Linn. Soc. 2 : 95. 1858 ; Hook. f. Fl. Brit. Ind. 2 : 417. 1878. [*Rhodiola heterodonta* (Hook. f. & Thoms.) A. Boriss]

Herbs, 30 - 45 cm high ; leaves ovate with densely white margin ; flowers rose.

Fl. & Fr. : July - August.

Bhyundar valley, on way to Hemkund. 2500 - 4500 m (29523).

8. *S. imbricatum* (Edgew.) Walpers, Ann. Bot. Syst. 1 : 325. 1848. *Rhodiol imbricata* Edgew. in Trans. Linn. Soc. 20 : 47. 1846 ; Hook. f. Fl. Brit. Ind. 2 : 417. 1878. (*Rhodiola** *imbricata* Edgew.)

Roostock aromatic ; stems thick, 7 - 35 cm high, glabrous ; leaves obovate or broadly oblong ; flowers yellow ; sepals narrow oblong.

Fl. & Fr. : June - September.

Hemkund, Kedarnath glacier. 4000 - 5500 m (29523).

9. *S. linearifolium* Royle, Ill. Bot. Himal. 222, t. 48. f. 1. 1835 ; Hook. f. Fl. Brit. Ind. 2 : 420. 1878.

Glabrous erect herbs ; leaves narrowly oblong, flowers crowded.

Fl. & Fr. : July – October.

Ghangaria, Rambara. 2500 – 3500 m (24295).

10. *Sedum multicaule* Wall. ex Lindl. Bot. Reg. 58. 1840 ; Hook. f. Fl. Brit. Ind. 2 : 422. 1878.

Erect glabrous herbs ; stems many, 10 – 20 cm high ; leaves cylindric acute ; flowers .6 cm long in bud.

Fl. & Fr. : July – October.

Bhyundar valley, Gwaldam, Phata. 1200 – 2500 m (29677).

11. *S. oreades* (Dcne.) Hamet. in Bull. Bot. Soc. Fr. 56 : 571. 1909. *Umblicus ordeades* Dcne. in Jacq. Voy. 4 (Bot) : 62. 1835. *Cotyledon oreades* (Dcne.) Cl. in Hook. f. Fl. Brit. Ind. 2 : 416. 1878.

Small herbs, branching from the base, 5 – 10 cm high ; flowers white, nodding.

Fl. & Fr. : May – August.

Ghangaria, Mondal. 1600 – 3500 m (29563).

12. *S. quadrifidum* Pall. Reise 3 : 730, t. 6. fig. 1. 1776 ; Hook. f. Fl. Brit. Ind. 2 : 418. 1878. [*Rhodiola* quadrifida* (Pallas) Fisch. & Mey.].

Herbs, 5 – 15 cm high ; leaves oblong ; flowers red ; sepals oblong.

Fl. & Fr. : June – October.

Alkapuri, Hemkund on way, Huniyathar. 3500 – 6000 m (44160).

13. *S. rosulatum* Edgew. in Trans. Linn. Soc. 20 : 48. 1846 ; Hook. f. Fl. Brit. 2 : 420. 1878.

Erect glandular pubescent or glabrous herbs, 5 – 10 cm high ; leaves spatulate ; flowers long stalked, in loose cymes.

Fl. & Fr. : April – June.

Alaknanda bank, Amritganga valley, Ramni, Wan. 1800 – 3000 m (37248).

14. *S. sinuatum* Royle ex Edgew. in Trans. Linn. Soc. 20 : 47. 1846. *S. trifidum* Wall. ex Hook. f. & Thoms. in Journ. Linn. Soc. 2 : 100. 1858. *S. linearifolium* Royle var. *sinuatum* (Royle. ex Edgew.) Hamet in Act. Hort. Goth. 2 : 394. 1926 ; Hook. f. Fl. Brit. Ind. 2 : 420. 1878. [*Rhodiola* sinuata* (Royle ex Edgew.) Fu]

Tufted erect glabrous herbs, 5–15 cm high ; leaves narrowly oblong $\pm$ entire ; flowers .6 cm long, crowded in leafy cymes.

Fl. & Fr. : August–October.

Ghangaria, Hemkund on way, Kukinhal. 2500–3500 m (44085).

15. *S. tibeticum* Hook. f. & Thoms. var. *strachey* Hook. f. & Thoms. in Journ. Linn. Soc. 2 : 96. 1858 ; Hook. f. Fl. Brit. Ind. 2 : 418. 1878.

Glabrous erect herbs, 10–25 cm high ; leaves dimorphic ; flowers purple $\pm$ in dense cymes, 5-merous ; sepals triangular.

Fl. & Fr. : June–October.

Bhyundar valley. 4000–5500 m (Smythe). Lit.

16. *S. trullipetalum* Hook. f. & Thoms. in Journ. Linn. Soc. 2 : 102. 1858 ; Hook. f. Fl. Brit. Ind. 2 : 421. 1878.

Dwarf glabrous herbs, 5–10 cm high ; leaves lanceolate-linear ; flowers white.

Fl. & Fr. : September–October.

Hemkund on way, Bhundar Valley. 3500–5500 m (35940).

3. SEMPERVIVUM L.

1a. Basal rosulate leaves lanceolate, mucronate ciliate on the edge *S. mucronatum* 1

1b. Basal rosulate leaves oblong obovate, minutely pilose ... *S. sedoides* 2

1. *Sempervivum mucronatum* Edgew. in Trans. Linn. Soc. 20 : 49. 1846 ; Hook. f. Fl. Brit. Ind. 2 : 423. 1878.

Perennial fleshy herbs, 5–15 cm high, rosulate ; leaves lanceolate 2.5–3 cm long ; stem leaves oblong lanceolate $\pm$ pubescent ; flowers white.

Fl. & Fr. : June–August.

Bhyunder valley, Niti. 3500–4000 m (Smythe). Lit.

2. *Sempervivum sedoides* Dcne. in Jacq. Voy. Bot. t. 79. 1844 ; Hook. f. Fl. Brit. Ind. 2 : 423. 1878.

Perennial fleshy herbs, 5-8 cm high ; rosulate leaves, closely imbricate, 1.2-1.8 cm ; stem leaves, fleshy, nearly glabrous, sessile, obtuse ; flowers white pubescent.

Fl. & Fr. : July - August.

Garhwal, 2500-2800 m (Falconer). Lit.

4. *SINOCRASSULA* A. Berger.

Sinocrassula indica (Dcne.) A. Berger in Engl., Pflfam. ed. 2, 18a : 463. 1930. *Crassula indica* Dcne. in Jacq. Voy. 4 (Bot.) : 61, t. 73, f. 1. 1835 ; Hook. f. Fl. Brit. Ind. 2 : 413. 1878.

Fleshy, erect glabrous herbs, 10-30 cm high ; leaves thick ; flowers dull pink.

Fl. & Fr. : July - October.

Badrinath, Lambadgad, pandukeswar. 1000-2800 m (36695).

TILLAEA L.

- | | | |
|---|-----|---------------------------|
| 1a. Stems procumbent ; internodes shorter than the leaves | ... | <i>T. pentandra</i> 1 |
| 1b. Stems decumbent ; internodes longer than the leaves | ... | <i>T. pharnaceoides</i> 2 |

1. *Tillaea pentandra* Royle ex Edgew. in Trans. Linn. Soc. 20. 50. 1846 ; Hook. f. Fl. Brit. Ind. 2 : 412. 1878.

Prostrate glabrous clustered herbs, 5-10 cm high ; leaves opposite, narrowly lanceolate ; petals as long as the sepals.

Fl. & Fr. : July - October.

Loharjung, Nalachatti, Nandkeshri. 1000 - 2000 m (31082).

2. *Tillae pharmaceoides* Hochst. ex Steud. in Schip nom. ed. 2. 1840 ; Hook. f. Fl. Brit. Ind. 2 : 412. 1878.

Decumbent purplish branched herbs ; petals shorter than the sepals.

Fl. & Fr. : July - October.

Kedarnath on way, Rudranath. 3000 - 3500 m (42110).

56. DROSERACEAE

DROSEREA L.

Drosera peltata Sm. var. *lunata* (Buch - Ham ex DC.) Cl. in Hook. f. Fl. Brit. Ind. 2 : 425. 1878. *D. lunata* Buch. Ham. ex DC. Prodr. 1 : 319. 1825.

Minutely glandular branching herbs ; leaves semilunar ; margins glandular hairy ; flowers white.

Fl. & Fr. : June - October.

Bhyundar valley, Govindghad, Masoli. 1400 - 2500 m (44182).

57. HALORRHAGIDACEAE

- | | | |
|--|-----|----------------------|
| 1a. Glabrous robust aquatic herbs ; leaves in whorls of 4-12, linear or oblong ; style 1 | ... | <i>Hippuris</i> 2 |
| 1b. Glabrous slender aquatic herbs ; leaves opposite, linear or obovate - spatulate ; styles 2 | ... | <i>Callitriche</i> 1 |

1. CALLITRICHE L.

- 1a. Margin of fruit winged, acute ... *C. stagnalis* 2
 1b. Margin of fruit not winged, obtuse ... *C. palustris* 1

1. *Callitriche palustris* L. Sp. Pl. 969. 1753. ex parte. *C. verna* L. Fl. Succ. ed. (2) : 3. 1755 ; Hook. f. Fl. Brit. Ind. 2 : 434. 1878.

Glabrous aquatic herbs ; leaves oblong spathulate ; fruits longer than broad margins not winged, blunt.

Fl. & Fr. : August.

Kular (way to Kuwari pass), Kedarnath. 1800 - 2500 m (38766).

2. *C. stagnalis* Scop. Fl. Carn. 2, 2 : 251. 1771 ; Hook. f. Fl. Brit. Ind. 2 : 434. 1878.

Glabrous herbs in moist places ; leaves opposite, ovate or spathulate fruits suborbicular, winged, acute.

Fl. & Fr. : October.

Phata. 1800 - 3500 m (35832).

2. HIPPURIS L.

Hippuris vulgaris L. Sp. Pl. 4. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 432. 1878.

Glabrous aquatic herbs with thick stems ; leaves linear or oblong in whorls of 4 - 12 ; flowers solitary in the upper part of the stem ; petals 0 ; stamen 1.

Fl. & Fr. : June - August.

Rajhoti. 4000 - 5000 m (Duthie). Lit.

58. COMBRETACEAE

- | | | |
|--|-----|---------------------|
| 1a. Trees ; flowers in spikes ; petals 0 | ... | <i>Terminalia</i> 2 |
| 1b. Undershrubs ; flowers in terminal racemes ; petals 5 - 4 | ... | <i>Combretum</i> 1 |

1. COMBRETUM L.

Combretum nanum Buch. – Ham. ex D. Don, Prodr. Fl. Nep. 219. 1825 ; Hook. f. Fl. Brit Ind. 2 : 457. 1878.

Stunted undershrubs, 30 - 60 cm high ; flowers white, fragrant ; fruits elliptic, pink, winged.

Fl. & Fr. : March – June.

Nagnath – Pokhri. 1500 m (27298).

2. TERMINALIA L. nom. cons.

- | | | |
|---|-----|---------------------|
| 1a. Fruits drupaceous, not winged | ... | <i>T. chebula</i> 2 |
| 1b. Fruits winged ; spikes mostly panicle | ... | <i>T. alata</i> 1 |

1. **Terminalia alata** Heyne ex Roth Nov. Pl. Ind. 379. 1821. *T. tomentosa* (Roxb.) Wt. & Arn. Prodr. 314. 1834 ; Hook. f. Fl. Brit. Ind. 2 : 447. 1878. 'Asin'.

Deciduous trees ; leaves subopposite or upper alternate ; flowers dull yellow ; fruits coriaceous winged.

Fl. & Fr. : February - October.

Nandprayag, Trisula. 1500 m (42296).

2. *Terminalia chebula* Retz. Obs. Bot. 5 : 31. 1789 ; Hook. f. Fl. Brit. Ind. 2 : 446. 1878. '*Harar*'.

Medium sized deciduous trees ; leaves subopposite scattered on the branches ; drupes yellowish green, glabrous.

Fl. & Fr. : March June.

Occur throughout the area upto 1800 m (Osmaston). Lit.

59. MYRTACEAE

- | | | |
|---|-----|-------------------|
| 1a. Leaves glabrous on both surfaces, often pellucid - dotted ;
ovary 2 - celled | ... | <i>Syzygium</i> 1 |
| 1b. Leaves pubescent beneath ; not pellucid - dotted ; ovary many
celled | ... | <i>Psidium</i> 2 |

1. SYZYGIUM Gaertn. nom. cons.

Syzygium cumini (L.) Skeels in Dept. Agri. Bur. Pl. Indus. Bull. 248. : 25. 1912. *Myrtus Cumini* L. Sp. Pl. 471. 1753. *Eugenia jambolana* Lam. 1789 ; Hook. f. Fl. Brit. Ind. 2 : 499. 1879. '*Phalanda*'.

Evergreen glabrous trees ; leaves shining on both surfaces ; flowers white, fragrant ; fruits purplish black.

Fl. & Fr. : March July.

Across Alaknanda bank Langasu. 900 m (S. N.) & (Osmaston). Lit.

2. PSIDIUM L.

Psidium guajava L. Sp. Pl. 470. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 468. 1878. '*Amrood*'.

Large evergreen trees ; leaves pubescent beneath ; flowers white ; berries globose.

Fl. & Fr. : April May.

Cultivated in and around the villages upto 800 m.

60. MELASTOMACEAE

- | | | |
|--|-----|-------------------|
| 1a. Deciduous shrubs ; petals 5 - 4 ; stamens 10 - 8 | ... | <i>Osbeckia</i> 1 |
| 1b. Herbs ; petals 3 ; stamens 3 | ... | <i>Sonerila</i> 2 |

1. OSBECKIA L.

- | | | |
|--|-----|----------------------|
| 1a. Herbs ; leaves 3 - nerved ; anthers not beaked | ... | <i>O. truncata</i> 1 |
| 1b. Shrubs ; leaves 5 - nerved ; anthers long beaked | ... | <i>O. stellata</i> 2 |

1. *Osbeckia stellata* Buch. - Ham. ex Don in Edw. Bot. Reg. 8 : t. 674. 1822 ; Hook. f. Fl. Brit. Ind. 2 : 517. 1879. '*Kukuria - Makuri*'.

Deciduous shrubs ; branches 4 - angled ; leaves opposite, short bristly haired ; flowers dark purple ; fruits densely bristly brown.

Fl. & Fr. : August October.

Gaurikund, Mondal, Nigol valley. 1500 - 2000 m (41974).

2. *O. truncata* Don ex Wt. & Arn. Prodr. 322. 1834 ; Hook. f. Fl. Brit. Ind 2 : 514. 1879. *p. p.*

Patently hairy herbs ; leaves elliptic, hairy; flowers capitate; capsules ovoid oblong.

Fl. & Fr. : July August.

Chamoli. 750 m (27, Kala & Gaur). Lit.

2. SONERILA Roxb.

Sonerila tenera Royle, Ill. Bot. Himal. 215. t. 45, f. 2. 1834 ; Hook. f. Fl. Brit. Ind. 2 : 530 1879.

Small weak minutely pubescent herbs, 5 - 10 cm high ; leaves ovate $\pm$ entire ; flowers purple ; fruits funnel shaped.

Fl. & Fr. : August - September.

Soragarh (Agastamuni), 600 m (6347).

61. LYTHRACEAE

1a. Herbs ; calyx green, 2 cm long ; stamens 8 ... *Ammannia* 1

1b. Shrubs ; calyx red, 8 - 1.2 cm long ; stamens 12 ... *Woodfordia*

1. AMMANNIA L.

Ammannia auriculata Willd. Hort. Berol. 1 : 7, t. 7. 1803. *A. senegalensis auct.* non Lam. sensu Hook. f. Fl. Brit. Ind. 2 : 570. 1879.

Erect glabrous herbs, 15 - 60 cm high ; branches quadruangular ; leaves opposite elongate-oblong, sessile, auricled ; flowers in clusters.

Fl. & Fr. : September.

Agastamuni, 600 m (6356).

2. WOODFORDIA Salisb.

Woodfordia fruticosa (L.) Kurz in Journ. As. Soc. Beng. 40 (2) : 56. 1871. *Lythrum fruticosum* L. Sp. Pl. 2, 1 : 641. 1762. *W. floribunda* Salisb. 1806 ; Hook. f. Fl. Brit. Ind. 2 : 572. 1879. 'Dhauia'.

Pubescent Shrubs ; leaves opposite, white – black dotted beneath ; flowers red.

Fl. & Fr. : February – April.

Langasu (Alaknanda), 800 m (S. N.) & (Osmaston). Lit.

62. PUNICACEAE

PUNICA L.

Punica granatum L. Sp. Pl. 472, 1753 ; Hook. f. Fl. Brit. Ind. 2 : 581. 1879. '*Darim*'.

Deciduous shrubs or small trees armed with thorns ; flowers scarlet ; berries globose.

Fl. & Fr. : April – September.

Escape, Nandprayag. 1300 m (10413).

63. ONAGRACEAE

1a. Petals 4.

2a. Stamens 8 ; terrestrial herbs ; fruit 4 - celled, soft ; seeds numerous.

3a. Capsules elongate, 4 - angled ... *Epilobium* 2

3b. Capsules club - shaped, acute at the top, 8 - winged ... *Oenothera* 3

2b. Stamens 4 ; floating herbs ; fruit 1 - celled, bony ; seed 1 ... *Trapa* 4

1b. Petals 2 ; stamens 2 ; capsule 1 or 2 celled, 1 or 2 seeded ... *Circaea* 1

1. CIRCAEA L.

1a. Fruit 2 - seeded ; ovary 2 celled ... *C. repens* 2

1b. Fruit 1 - seeded ; ovary 1 - celled *C. alpina* ssp. *imaicola* 1

1. *Circaea alpina* L. subsp. *imaicola* (Ascher. et Magn.) Kitam. Fl. Afghan. 2 : 79 1960. *C. imaicola* (Ascher. et Magn.) Hand. Maz. in Symb. Sin. 7 : 603. 1933 ; Hook. f. Fl. Brit. Ind. 2 : 589. 1879.

15 - 45 cm high herbs ; leaves broadly ovate, rounded or cordate at the base ; seed 1.

Fl. & Fr. : August - October.

Amritganga, Gaurikund, Ghangaria, Khoplutal. 2500 - 3500 m (31104).

2. *C. repens* Wall. ex Ascher. & Magn. in Bot. Zeit. 28 : 761. 1870. *C. lutetiana* auct. non L. Sensus Hook. f. Fl. Brit. Ind. 2 : 589 1879.

25 - 60 cm high herbs ; leaves ovate, lanceolate, rounded or narrowed to the base ; seeds 2.

Fl. & Fr. : August - October.

Nandkeshri, Pangarbasa, Trijuginarayan, Vickie Tal. 2500 - 3500 m (31104).

2. EPILOBIUM L.

1a. Stigma distinctly 4 - lobed or partite.

2a. Leaves all alternate (rarely basal are opposite) ; flowers zygomorphic, large.

3a. Inflorescence spicate ; buds sharply deflexed ... *E. angustifolium* 1

3b. Inflorescence leafy ; flowers axillary ; buds erect, becoming pendulous individually before anthers ... *E. latifolium* 5

2b. Leaves opposite, at least below ; flowers actinomorphic.

4a. Leaves distinctly clasping ; flowers .7 - 1.2 cm long ; stigma elevated above the anthers of the longest stamens ... *E. hirsutum* 4

4b. Leaves sessile not clasping ; flowers .6 - .8 cm long ; stigma surrounded at the base by the anthers of 4 longest stamens ... *E. parviflorum* 9

1b. Stigma entire or shallowly emarginate.

5a. Leaves entire ; seeds .15 - .2 cm long ; beak prominent ... *E. palustre* 8

- 5b. Leaves serrulate ; seeds less than 1.5 cm long ; beak short pellucid.
- 6a. Flowers 3 - 4 cm long, erect ... *E. minutiflora* 6
- 6b. Flowers over 4 cm long.
- 7a. Stems pubescent all round ; lacking distinct hairy lines, running down from the petioles ... *E. royleanum* 10
- 7b. Stems not pubescent all round, $\pm$ with distinct pubescent lines from the petiole.
- 8a. Leaves mostly sub-coriaceous, narrowly lanceolate or lanceolate ... *E. cylindricum* 3
- 8b. Leaves usually broader, rarely sub-coriaceous.
- 9a. Underground stems, rhizomatous ; scales, dead leaves or turions absent.
- 10a. Seeds with conspicuous pellucid beak ... *E. stracheyanum* 12
- 10b. Seeds without chalazal beak.
- 11a. Stigma clavate ; leaves sessile ... *E. leiophyllum* 7
- 11b. Stigma capitate ; leaves petioled *E. ammurensense* subsp. *laetus* 2
- 9b. Underground stems with dense tufts of scales, leaves or turions *E. sikkimensis* subsp. *ludlowianum* 11

1. *Epilobium angustifolium* L. Sp. Pl. 347. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 582. 1879.

Glabrous herbs, 1.20 m high ; leaves sessile, scattered ; flowers purple ; fruits pubescent.

Fl. & Fr. : June - August.

Niti, Rimkhim. 2500 - 4000 m (Duthie). Lit.

2. *E. ammurensense* subsp. *laetus* (Wall. ex Hausskn.) Raven Stat. nov. in Bull. Brit. Mus. Nat. Hist. 2 : 367. 1955 - 62. *E. tetragonum* non L. Sensu Hook. f. Fl. Brit. Ind. 2 : 586. 1879, *p.p.*

Crisp pubescent on 4 - angles, 30 - 90 cm high ; leaves in the middle opposite, oblong narrow elliptic $\pm$ glabrous ; flowers purple.

Fl. & Fr. : October.

Hemkund on way. 3600 m (24370).

3. ***Epilobium cylindricum*** D. Don Prodr. Fl. Nep. 222. 1825. *E. roseum* var. *Cylindricum* (D. Don) Cl. in Hook. f. Fl. Brit. Ind. 2 : 585. 1879.

Pubescent herbs ; stem erect, 30 – 90 cm tall ; leaves sessile, 2.5 – 6.5 cm long, glabrous ; flowers pale – pink.

Fl. & Fr. : June – September.

Bhyundar valley, Gaurikund, Trijuginarayan. 2500 – 4000 m (24327).

4. ***E. hirsutum*** L. Sp. Pl. 347. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 583. 1879.

Densely hairy herbs ; leaves opposite, lanceolate 2.5 – 7 cm ; teeth small, sharp ; flowers pink.

Fl. & Fr. : August – October.

Trisula. 1500 m (42289).

5. ***E. latifolium*** L. Sp. Pl. 1 : 347. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 583. 1879.

Glabrous or pubescent herbs, $\pm$ 30 cm high ; leaves oblong ; flowers bright red.

Fl. & Fr. : August – October.

Bhyundar valley, Kedarnath. 3500 – 4500 m (29555).

6. ***E. minutiflorum*** Hausskn. in Oesterr. Bot. Zeitschr. 29 : 55. 1879. *E. palustre* non L. sensu Hook. f. Fl. Brit. Ind. 2 : 585. 1879, *p.p.*

Herbs upto 20 – 25 cm high ; leaves serrulate ; flowers small,

Fl. & Fr. : June – August.

Loptel. 4550 m (Duthie). Lit.

7. ***E. leiophyllum*** Hausskn. in Oestr. Bot. Zeitschr. 29 : 52. 1879. *E. organifolium* non Lam. Sensus Hook. f. Fl. Brit. Ind. 2 : 586. 1879, *p.p.*

Very variable herbs ; stems round with lines of hairs ; leaves opposite sessile, ovate – oblong.

Fl. & Fr. : October.

Bhyundar valley, Vasudhara. 3500 – 3800 m (24337).

8. ***E. palustre*** L. Sp. Pl. 1 : 348. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 585. 1879.

Glabrous herbs ; stems round ; leaves narrowly oblong, glabrous, entire.

Fl. & Fr. : August - September.

Bhyundar valley, Laptel, Rambara, Gaurikund. 1650 - 3000 m (42007).

9. ***Epilobium parviflorum*** Schreb. *Spicil Fl. Lips.* 146. 155. 1771. *E. parviflorum* var. *vestitum* Cl. in Hook. f. *Fl. Brit. Ind.* 2 : 584. 1879.

Slender pubescent herbs ; leaves ovate - lanceolate, sessile ; flowers pink.

Fl. & Fr. : June - August.

Near Joshimath. 1800 - 2500 m (Duthie). Lit.

10. ***E. royleanum*** Hausskn. in Oesters. *Bot. Zeitschr.* 29 : 55. 1879. *E. roseum* var. *indicum* Cl. in Hook. f. *Fl. Brit. Ind.* 2 : 584. 1879.

Erect pubescent herbs ; leaves thin flaccid sessile ; flowers pale pink.

Fl. & Fr. : August - September.

Anusuyia Devi area, Rudranath. 1750 - 3500 m (42029).

11. ***E. sikkimense*** subsp. ***ludlowianum*** Raven Bull. *Brit. Mus. (Nat. Hist.) Bot.* 2 : 374. 1956 - 1962.

Herbs with coriaceous spatulate brown scales, underground ; leaves narrowly ovate, glabrous.

Fl. & Fr. : August.

Kedarnath. 3600 - 3900 m (38722).

12. ***E. stracheyanum*** Hausskn. *Monogr. Epil.* 214, t. 3. fig. 37. 1884. Rhizomatus branched herbs ; leaves lanceolate, serrulate ; decurrent lines of hairs from the petiole present.

Fl. & Fr. : June - August.

Niti. 3500 m (Raven). Lit.

3. OENOTHERA

Oenothera rosea Ait. *Hort. Kew* (ed. 1) 2 : 3, 1789 ; *Munz. Ann. Miss. Bot. Gard.* 66 : 214, 1959.

Fl. & Fr. : April – September.

Small herbs ; leaves lanceolate, acuminate ; flowers pink.

Nandprayag towards Rudraprayag. 800 m (26743).

4. TRAPA L.

Trapa quadrispinosa Roxb. Fl. Ind. 1 : 451. 1820. *T. natans auct.* non L. Sensus Hook. f. Fl. Brit. Ind. 2 : 590. 1879.

Aquatic herbs ; leaves floating, anterior margins dentate ; flowers white ; fruits obovoid, angles with spines.

Fl. & Fr. : September – October.

Deorii Tal. 2600 m (8773).

64. CUCURBITACEAE

1a. Female flowers usually solitary, never paniced.

2a. Anther-cells conduplicate or sigmoid.

3a. Corolla divided nearly to the base into 5 petals.

4a. Petals fimbriate at the margin ... *Trichosanthes* 7

4b. Petals entire.

5a. Calyx tube of the male flowers elongate ; anthers $\pm$ included in the tube.

6a. Seeds many horizontal.

7a. Tendrils rarely divided ; fruits small ... *Gymnopetalum* 3

7b. Tendrils divided ; fruits large ; petiole with 2 gland at the apex ... *Lagenaria* 10

6b. Seeds 12 - 18, pendulous ... *Herpetospermum* 5

5b. Calyx of male flowers short, anthers usually exerted.

- 8a. Stamens inserted near the mouth of the calyx tube ; anthers hardly cohering.
- 9a. Male flowers (partly) in racemes ; fruits opening by a stopple ... *Luffa* 11
- 9b. Flower all solitary ; fruits fleshy very indehiscent ... *Benincasa* 8
- 8b. Stamens inserted below the mouth of the calyx - tube ; anthers $\pm$ cohering ... *Momordica* 12
- 3b. Corolla campanulate, divided half way down or thereabout ; tendrils divided ; flowers yellow ... *Cucurbita* 9
- 2b. Anther-cells straight.
- 10a. Male and female pedicels 1 - flowered ; clustered ... *Diplocyclos* 1
- 10b. Male flowers corymbose or subumbellate or racemed... *Melothria* 6
- 1b. Flowers small, the females in panicles or many flowered racemed.
- 11a. Fruits trigonous, obovoid ; tendrils bifid ... *Gomphogyne* 2
- 11b. Fruits pea-like ; tendrils simple ... *Gymnostemma* 4

1. DIPLOCYCLOS Post & Kuntz.

Diplocyclos palmatus (L.) Jeffrey in kew Bull. 15 : 352. 1962. *Bryonia palmata* L. Sp. Pl. 1012. 1753. *Bryonia laciniosa* auct. non L. Senu Hook. f. Fl. Brit. Ind. 2 : 622. 1879.

Slender $\pm$ scabrous, scandents ; tendrils bifid ; leaves deeply palmately 5 - lobed, scabrous above ; flowers greenish - yellow ; fruits spherical yellowish - green, 6 - striped.

Fl. & Fr. : September - October.

Soragrh (Agastamuni), Chatwapipal. 1000 m (6343).

2. GOMPHOGYNE Griff.

Gomphogyne cissiformis Griff. Pl. Contor. 26, adnot, t. 4. 1837 ; Hook. f. Fl. Brit. Ind. 2 : 632. 1879.

Weak scandent herbs ; tendrils simple, often bifid ; leaves 5 – 7 lanceolate, serrate, glabrous ; flowers minute green ; fruits top – shaped, longitudinal costated ; seeds 1 – 3.

Fl. & Fr. : August – October.

Bhyundar valley, Loharjung, Pandukeswar, Kedarnath. 2000 – 3000 m (30830).

3. GYMNOPETALUM Arn.

Gymnometalum weightii Arn. in Hook. Journ. Bot. 3 : 278. 1841. *G. tubeflorum* Gogn. in DC. Monog. Phan. 3 : 88. 1881 ; Hook. f. Fl. Brit. Ind. 2 : 611. 1879.

Slender, sulcate, shortly villose hirsute spreading herbs ; tendrils bifid ; leaves 5 – angular or lobed, entire ; flowers yellowish – white ; fruits red oblong ; seeds compressed dark.

Fl. & Fr. :

Pandukeswar. 2200 m (Chakraborty). Lit.

4. GYMNOSTEMMA Bl.

Gymnostemma pentaphylla (Thunb.) Makino in Bot. Mag. Tokyo 16 : 179. 1902. *Vitis pentaphylla* Thunb. 1784. *G. pedata* Bl. Bijdr. 23. 1825 ; Hook. f. Fl. Brit. Ind. 2 : 633. 1879.

Slender branched sulcate climbers ; tendrils bifid ; leaves ovate – oblong or lanceolate ; flowers minute greenish – white ; fruits globose, seeds 1 – 3.

Fl. & Fr. : August.

Pindar Valley (Garhwal). 1400 m (Chakraborty) Lit.

5. *HERPETOSPERMUM* Wall.

Herpetospermum pedunculosum (Ser.) Baill. Hist. Pl. 8 : 445. 1886.
Bryonia pedunculosa Ser. in DC. Prodr. 3 : 306. 1828. *H. caudigerum*
 Wall. ex Cl ; Hook. f. Fl. Brit. Ind. 2 : 613. 1879.

Slender angular $\pm$ subglabrous climber ; tendrils elongate ; leaves narrowly caudate acuminate ; flowers yellow ; fruits broadly oblong thinly hairy.

Fl. & Fr. : August. – September.

Badrinath, Bhyundar valley, Loharjung. 1800 – 2800 m (29660).

6. *MELOTHRIA* L.

1a. $\pm$ stout climbers ; fruits short peduncled, ovoid, bright red ... *M. heterophylla* 1

1b. Slender climbers ; fruits on a capillary long peduncles, ellipsoid,
 white ... *M. indica* 2

1. ***Melothria heterophylla*** (Lour.) Cogn. in DC. Monog. Phan. 3 : 618. 1881. *Solena heterophylla* Lour. Fl. Cochinch. edit. 1 : 514. 1790. *Zehneria umbellata* var. *nepalensis* (Ser.) Cl. in Fl. Brit. Ind. 2 : 625. 1879. 'Cwal – Kakri'

Large perennial scandents ; tendrils branched ; leaves 3 – 7 lobed, variable ; flowers white ; petals fringed ; fruits subspherical turgid, smooth ; seeds emarginate.

Fl. & Fr. : June – November.

Bhyundar valley, Govindghat, Trijuginarayan. 1500 – 2500 m (47999).

2. ***M. indica*** Lour. Fl. Cochinch. 35. 1790. *Bryonia tenella* Roxb. Fl. Ind. ed. 2, 3 : 725. 1832 ; Hook. f. Fl. Brit. Ind. 2 : 626. 1879. excl. syn. *Melothria regelii* Naudin.

Slender $\pm$ glabrous twiners ; tendrils filiform simple ; leaves ovate – deltoid or cordiform ; flowers white ; fruits brownish ovoid.

Fl. & Fr. : September – October.

Trisula. 1300 m (42285).

7. TRICHOSANTHES L.

- | | | |
|---|-----|--------------------------|
| 1a. Bracts of male raceme sheathing the flowers from a broad base ;
tendrils usually 3 - fid ; seeds in green pulp | ... | <i>T. tricuspidata</i> 3 |
| 1b. Bracts of male racemes not sheathing ; tendrils 2 - fid ; seeds in
red pulp. | | |
| 2a. Fruits ovoid - conical | ... | <i>T. cucumerina</i> 2 |
| 2b. Fruits elongate - cylindric | ... | <i>T. anguina</i> 1 |

1. *Trichosanthes anguina* L. Sp. Pl. ed. 1 : 1008. 1753 ; f. Fl. Brit. Ind. 5 : 610. 1879.

Slender puberulous foetid climbers ; tendrils 2 – 3 fid ; leaves orbicular – reniform deeply 5 – lobed ; flowers white.

Cultivated throughout during rainy season in the area.

2. *T. cucumerina* L. Sp. Pl. 1 : 1008. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 609. 1879.

Extensive hairy annual scandent ; tendril 2 – fid ; leaves orbicular – reniform 5 – 7, lobed ; flowers white ; fruits ovoid conical.

Fl. & Fr. : August – October.

Below Karanprayag (Alaknanda valley). 800 m (Chakroborty).
Lit.

3. *T. tricuspidata* Lour. Fl. Cochinch. 589. 1790. *T. bracteata* (Lam.) Voigt Cat. Hort. Calc. 58. 1845. *Modecca bracteata* Lam. Encl. Meth Bot. 4 : 210. 1796. *T. palmata* Roxb. Fl. Ind. 3 : 704. 1832 ; Hook. f. Fl. Brit. Ind. 2 : 606. 1879. 'Ilaru'.

Slender, branched climbers, ± glabrous ; tendrils 3 – fid ; leaves broadly ovate or orbicular ; flowers white ; fruits red globose thick.

Fl. & Fr. : May – August.

Gohna, Lobha, Mondal Okhimath. 1200 – 2000 m (43984).

8. BENINCASA Savi

Benincasa hispida (Thunb.) Cogn. in DC. Monogr. Phan. 3. 513. 1881. *Cucurbita hispida* Thunb. Fl. Jap. 322. 1872. *B. cerifera* Savi, Bibl. Ital. 9 : 158. t. c. 1818 ; Hook, f. Fl. Briti. Ind. 2 : 616. 1879.

Large softy hairy climbers ; tendrils 2 – 3 fid ; probract opposite the tendril at the base of the petiole ; leaves palmately 5 – lobed ; flowers yellow ; fruits fleshy, succulent, hispid, white bloomed.

Cultivated in lower valleys.

9. CUCURBITA L.

- | | | |
|---|-----|--------------------|
| 1a. Fruiting peduncles stout corky, straited, not grooved | ... | <i>C. maxima</i> 1 |
| 1b. Fruiting peduncles woody, strongly grooved | ... | <i>C. pepo</i> 2 |

1. **Cucurbita maxima** Duches. Lam. Encl. 1. 2 : 151. 1786 ; Hook. f. Fl. Brit. Ind. 2 : 622. 1876.

Large prostrate hairy grooved herbs ; tendrils 2 – 6 fid ; leaves reniform with 5 rounded shallow lobes ; flowers yellow, campanulate.

Commonly cultivated.

2. *C. pepo* L. Sp. Pl. ed. 1 : 1010. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 622. 1879.

Prostrate sulcate scabrous annuals ; tendrils branched ; leaves deeply 5 – lobed with broad sinus, cordate ; flowers yellow.

Cultivated upto 2000 m.

10. LAGENARIA Seringe

Lagenaria Siceraria (Molina) Standl. in Publ. Field Mus. Bot. Ser. 3, 3(n. 279) : 435. 1930 *L. leucantha* (Duches.) Rusby. Mem. Torr. Bot. Club. 61 : 43. 1896. *Cucurbita leucantha* Duches. in Lem. Encycl. 2 : 150. 1786. *L. vulgaris* Ser. in Mem. S. Phys. Hist. Nat. Geneve 3(1) : 25, t. 2. 1825 ; Hook. f. Fl. Brit. Ind. 2 : 613. 1879.

Large trailing $\pm$ foetid, hairy annuals ; tendrils bifid ; leaves suborbicular, cordate ; flowers white.

Commonly cultivated in the area. 800 – 2000 m.

11. LUFFA Cav.

Luffa acutangula (L.) Roxb. Fl. Ind. 3 : 712. 1832. *Cucumis acutangula* L. Sp. Pl. 1011. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 615. 1879.

Extensive glabrous climbers ; tendrils trifid ; leaves rounded 5 – 7 angled, both sides glabrous ; flowers yellow.

Cultivated throughout in the area.

12. MOMORDICA L.

Momordica charantia L. Sp. Pl. ed. 1 : 1009. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 616. 1879.

Puberulous much branched prostrate or scabrous climbers ; tendrils simple ; leaves reniform pedately 5 – 7 lobed, deeply green, pubescent ; flowers yellow.

Cultivated in the lower valley.

65. BEGONIACEAE

BEGONIA L.

Begonia picta Sm. Exot. Bot. 2 : 81, t. 101. 1805 ; Hook. f. Fl. Brit. Ind. 2 : 638. 1879.

Succulent perennials with tuberous rootstock ; stems pubescent ; leaves hairy above, pubescent beneath ; flowers pale – pink uni-sexual ; capsules pubescent with unequal wings.

Fl. & Fr. : June – October.

Nigol valley, Phata, Soragarh. (Agastamuni). 600 – 1500 m (23623).

66. DATISCACEAE

DATISCA L.

Datisca cannabina L. Sp. Pl. 1037. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 656. 1879.

Stout branching herbs ; leaves pinnate ; flowers dioecious ; style 3, deeply divided.

Fl. & Fr. : August – October.

Occurs in the hills. 1000 – 1500 m (Osmastom). Lit.

67. CACTACEAE

OPUNTIA P. Miller

Opuntia monacantha (Willd.) Haw. Suppl. Pl. Succ. 81. 1819. *Cactus monacanthos* Willd. Enum. Pl. Berol. Suppl. 33. 1813. *Opuntia dillenii* auct non Haw. sensu Hook. f. Fl. Brit. Ind. 2 : 657 1879, *p.p.*

Branched shrubs upto 2 – 3 m high ; joints green oblanceolate ; areoles with 1 – 3 spines only ; flowers yellow tinged with red.

Planted along the hedges in the area or sometimes run wild upto 1500 m (Osmaston). Lit.

68. MOLLUGINACEAE

MOLLUGO L.

Mollugo Pentaphylla L. Sp. Pl. 89. 1753. *M. stricta* L. Sp. Pl. ed. 2 ; 131. 1762 ; Hook. f. Fl. Brit. Ind. 2 : 663. 1879.

Slender branched glabrous herbs; leaves whorled narrowly lanceolate entire of dull brown texture ; flowers orange or pink ; fruits globose membranous, many seeded.

Fl. & Fr. : July – September.

Nandprayag, Langasu across Alaknanada. 1500 m (71947).

69. APIACEAE

1a. Umbels simple or irregularly compound.

2a. Low creeping herbs ; leaves undivided.

3a. Petals acute ; secondary ridges 0 ; pericarp not thickened ...

Hydrocotyle 11

3b. Petals obtuse ; secondary ridges distinct ; pericarp much thickened ...

Centella 5

2b. Slender to stout erect herbs ; leaves compound ...

Sanicula 16

1b. Umbels compound.

4a. Secondary ridges of the fruits inconspicuous.

5a. Fruits terete or laterally compressed ; obscurely winged or at least constricted.

6a. Fruits glabrous.

- 7a. Carpels in outline ovate or oblong, distinctly narrowed upwards.
- 8a. Carpels concave on the inner face.
- 9a. Bracteoles simple, linear ... *Vicatia* 22
- 9b. Bracteoles lobed as pinnatifid.
- 10a. Fruits ovate ; ridges slender ... *Chamaesciadium* 7
- 10b. Fruits prismatic to ellipsoid ; ribs inflated, rugose ... *Trachydium* 20
- 8b. Carpels plane on the inner face.
- 11a. Root tuberous ... *Acromema* 1
- 11b. Root fusiform or normal taproot.
- 12a. Fruits prominently ridged or winged $\pm$ corky ... *Bupleurum* 4
- 12b. Fruits smooth ; ridges filiform, evident to obsolete without corky thickenings.
- 13a. Fruits oblong ; ridges thin ... *Carum* 24
- 13b. Fruits ovate or ovate-oblong or ovoid ... *Pimpinella* 14
- 6b. Fruits various pubescent.
- 14a. Vittae 3 at intervals ... *Pimpinella* 14
- 14b. Vittae solitary at intervals.
- 15a. Upper branches leafless ; ridges slender, obtuse ... *Eriocycla* 9
- 15b. Upper branches leafy ; ridges slender acute ... *Trachyspermum* 21
- 7b. Carpels elongate, linear to lanceolate.
- 16a. Fruits attenuate at base ... *Osmorrhiza* 13
- 16b. Fruits oblong, narrowed upwards.
- 17a. Fruits glabrous, distinctly ridged ... *Chaerophyllum* 6
- 17b. Fruits hispid, obscurely ridged ... *Anthriscus* 3
- 5b. Fruits $\pm$ dorsally compressed or strongly dorsally flattened ; some or all the ridges winged.
- 18a. Ridges of the fruit $\pm$ distinct ; not winged ... *Sesell* 18
- 18b. Fruit ridges $\pm$ winged.

- 19a. Fruits with all the ridges equally or unequally winged.
- 20a. Plants caespitose and cushion-forming, sub-acaulescent.
- 21a. Bracts bipinnate ... *Cortia* 8
- 21b. Bracts entire ... *Selinum* 17
- 20b. Plants erect, caulescent, slender to stout.
- 22a. Fruit ridges subequal, hollow, corrugated ; commissure face grooved ... *Pleurospermum* 15
- 22b. Fruit ridges neither hollow nor corrugated, unusually lateral broader ; commissure face plano-concave to grooved.
- 23a. Bracts and bracteoles scarious margined ... *Pleurospermum* 15
- 23b. Bracts and bracteoles, not scarious margined.
- 24a. Dorsal and lateral intervals 2-3 vittate ; bracts and bracteoles entire or rarely divided ; leaflets larger ... *Ligusticum* 12
- 24b. Dorsal intervals 1-vittate ; laterals 1-3 vittate ; bracts and bracteoles entire or pinnatifid ; ultimate segments of leaves linear or larger ... *Selinum* 17
- 19b. Fruits with dorsal ridges filiform to obsolete ; lateral ridges broadly winged.
- 25a. Ovary and fruit pubescent ; petals dimorphic ... *Heracleum* 10
- 25b. Ovary and fruit glabrous ; petals homomorphic.
- 26a. Lateral wings thin ; mericarps not closely appressed ... *Angelica* 2
- 26b. Lateral wings thick ; mericarps closely appressed ... *Anethum* 23
- 4b. Secondary ridges of the fruit prominent.
- 27a. Fruits glabrous, globose ; bracts 0 ... *Coriandrum* 25
- 27b. Fruits hirsute or setose.
- 28a. Bracts pinnate ; seeds plane on the inner face ... *Daucus* 26
- 28b. Bracts linear or 0 ; seeds grooved on the inner face ... *Torilis* 19

1. *ACRONEMA* (Wall.) Falc. ex Edgew.

Acronema tenerum (DC.) Edgew. Trans. Linn. Soc. 20 : 51. 1851.
Heliosciadium tenerum DC. Prodr. 4 : 105. 1830. *Pimpinella tenera* (DC.)
 Cl. in Hook. f. Fl. Brit. Ind. 2 : 686. 1879.

Root tuberous ; stem upto 20 cm high ; lower cauline leaves pinnate ;
 fruits glabrous.

Fl. & Fr. : August – October.

Bhuna, Ghangaria. 2500 – 5000 m (29618).

2. *ANGELICA* L.

- | | | |
|---|-----|--------------------------|
| 1a. Dorsal and lateral fruit ridges subequally thin winged | ... | <i>A. glauca</i> 2 |
| 1b. Dorsal ridges narrower than the laterals, filiform to round-corky | ... | <i>A. archangelica</i> 1 |

Angelica archangelica L. Sp. Pl. 250. 1753. *A. archangelica* var. *himalaica* (Cl.) Krishna and Badhwa Journ. Sci. Inds. Res. 11 (Suppl.) 251. 1952. *Archangelica officinalis* var. *himalaica* Cl. in Hook. f. Fl. Brit. Ind. 2 : 707. 1879.

Perennial herbs, 1.5 – 3 m high ; leaves 30 – 90 cm ovate ; flowers white.

Fl. & Fr. : August – October.

Bhyundar valley. 3000 – 4000 m (24387).

2. *A. glauca* Edgew. Trans. Linn. Soc. 2: 53. 1851 ; Hook. f. Fl. Brit. Ind. 2 : 706. 1879.

Root aromatic ; tall perennials, 1 – 4 m high ; leaves large ; flowers white or purple.

Fl. & Fr. : August – October.

Hemkund on way, Kuwari. 2500 – 3000 m (4217).

3. ANTHRISCUS Hoffm.

Anthriscus nemorosa Spreng. Pl. Umb. Propr. 27. 1813 ; Hook. f. Fl. Brit. Ind. 2 : 692. 1879.

Erect glabrous herbs ; leaves 2 or 3 pinnate ; flowers white ; fruits black, glabrous.

Fl. & Fr. : May – June.

Bhyundar valley. 2500 m 3500 m (Smythe). Lit.

4. BUPLEURUM L.

- 1a. Leaf base narrowed and distinctly petioled ... *B. lanceolatum* 7
- 1b. Leaf base broad or narrow, amplexicaule.
- 2a. Fruit ridges subalate or broadly alate.
- 3a. Stems many from the base ; low herbs ... *B. dalhousieanum* 6
- 3b. Stems solitary and simple at the base ... *B. himalayense* 6
- 2b. Fruit ridges slender to acute or rarely thick corky but winged.
- 4a. Bracts and bracteoles ovate or elliptic, usually foliaceous.
- 5a. Leaf base narrowed.
- 6a. Leaves punctate ; vittae 1 at intervals ... *B. hamiltonii* 1
- 6b. Leaves not punctate ; vittae 3 at intervals ... *B. candollii* 5
- 5b. Leaf base broadly cordately amplexicaule ... *B. candollii* 1
- 4b. Bracts and bracteoles linear or linear lanceolate.
- 7a. Stems simple or branching, stout ; leaves broadly white cartilaginous margined ; secondary veins obscure *B. falcatum* var. *marginatum* 3
- 7b. Stems slender branching from the base ; leaves narrowly white margined ; veins prominent below.
B. falcatum var. *marginatum* forma *stenophylla* 4

1. **Bupleurum candollii** Wall. ex DC. Prodr. 4 : 131. 1830 ; Hook. f. Fl. Brit. Ind. 2 : 674. 1879.

Perennial herbs ; leaves 8 cm broad ; flowers yellow.

Fl. & Fr. : July – October.

Govindghat, Hanumanchatti, Vidni Bugyal. 2500 4000 m (24596).

2. **B. dalhousieanum** (Cl.) K. Pol. Act. Hort. Petrop. 30. 165. 1915. *B. longicaule* Wall ex DC. var. *dalhousieana* Cl. in Hook. f. Fl. Brit. Ind. 2 : 677. 1879.

Perennial herbs ; 10 - 30 cm high ; upper leaves ovate lanceolate ; flowers yellow.

Fl. & Fr. : September – October.

Kedarnath. 2500 – 4000 m (35909).

3. **B. falcatum** L. var. **marginatum** (Wall. ex DC.) Cl. in Hook. f. Fl. Brit. Ind. 2 : 676. 1879.

Perennial glaucous herbs, .30 – 1.20 m high ; leaves linear margins cartilaginous, $\pm$ curved.

Fl. & Fr. : August – October.

Bhyundar valley, Malari, Niti. 1800 – 4000 m (29328).

4. **B. falcatum** L. var. **marginatum** (Wall. ex DC.) Cl. f. **stenophylla** (Wolff.) P. K. Mukh. Comb. et Stat. Nov. *B. falcatum* L. subsp. *marginatum* (Wall. ex DC.) Wolff var. *stenophylla* Wolff in Engl. Pflnar. 43 : 133. 1910.

Stems thick simple and solitary at base, 40 cm – 1 m tall ; lower leaves 0.5 – 1 cm broad ; flowers yellow.

Fl. & Fr. : June.

Sutul Ramni at 2000 m (10159).

5. **B. hamiltonii** Balak. Journ. Bul. not. Hist. Soc. 63 : 328. 1967. *B. tenue* Buch. – Ham. ex D. Don, Prodr. Fl. Nep. 182. 1825 ; non Salisb. 1796. Hook. f. Fl. Brit. Ind. 2 : 677. 1879.

Herbs with flexuous stems, 30 – 90 cm high ; leaves sessile, narrowly oblong, margins thin.

Fl. & Fr. : May – October.

Anusuyia Devi, Bhyundar valley, Gwaldam. 3000 m (30813).

6. **Bupleurum himalayense** Klotz. in Klotz. et Garche, Bot. Ergeb. Prinz. Waldem. 146. t. 51. 186. *B. longicaule* Wall. ex DC. var. *himalayense* (Klotz.) Cl. in Hook. f. Fl. Brit. Ind. 2 : 677. 1879. p. p.

Herbs simple below, 20 – 25 cm tall ; upper leaves ovate, cordate, amplexicaule.

Fl. & Fr. : August – October.

Bhyundar valley, Kukinakhal. 2500 – 4000 m (24410).

7. **B. lanceolatum** Wall. ex DC. Prodr. 4 : 132. 1830 ; Hook. f. Fl. Brit. Ind. 2 : 674. 1879.

Herbs branched above, .30 – 1.50 m tall ; lower leaves ovate lanceolate, distinctly petioled.

Fl. & Fr. : June – Sept.

Bagrigar, Pandukeswar. 2000 – 3000 m (20923).

5. CENTELLA L.

Centella asiatica (L.) Urban in Mart. Fl. Bras. 11 : 287. t. 78. lf. 11. 1879. *Hydrocotyl asiatica* L. Sp. Pl. 234. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 669. 1879. '*Brahmi*'.

Glabrous slender creeping herbs ; leaves orbicular – reniform ; flowers pink.

Fl. & Fr. : April – October.

Chandrapuri, Narayankoti. upto 1000 m (35821).

6. CHAEROPHYLLUM L.

1a. Leaves 2 or 3 pinnate ; segments irregularly lobed and toothed.

2a. Stems and leaves hairy ; base of the stem clothed with long stiff hairs pointing downwards

...

C. villosum 3

- 2b. Stems and leaves glabrous or slightly hairy ... *C. reflexum* 2
 1b. Leaves 1 or 2 pinnate ; segments closely and irregularly toothed ; if pinnatifid the lobes nearly similar and the teeth regular... *C. acuminatum* 1

1. ***Chaerophyllum acuminatum*** Lindl. in Royle, Ill. Bot. Himal. 232. 1835 ; Hook. f. Fl. Brit. Ind. 2 : 691. 1879.

Herbs with pubescent stems, .60 – 1.20 m high ; leaves hairy or pubescent 1 or 2 – pinnate ; rays 4 – 12.

Fl. & Fr. : June – August.

Bhyundar valley. Ghangaria. 1800 – 3000 m (29604).

2. ***C. reflexum*** Lindl. in Royle, Ill. Bot. Himal. 232. 1835 ; Hook. f. Fl. Brit. Ind. 2 : 691. 1879.

Root tuberous ; herbs with $\pm$ pilose stems, 15 – 90 cm. high ; leaves ovate – lanceolate in outline, ternate pinnate ; barren flowers reflexed.

Fl. & Fr. : June – October.

Badrinath, Sutul – Bhuna. 1860 – 3000 m (10200).

3. ***C. villosum*** Wall. ex DC. Prodr. 4 : 225. 1830 ; Hook. f. Fl. Brit. Ind. 2 : 690. 1879.

Root thick fleshy spindled ; stems $\pm$ hairy, .45 – 1.00 m tall ; leaves large ovate in outline ; flowers white ; rays 3 – 6.

Fl. & Fr. : September – October.

Lohajung. 2200 m (30855).

7. CHAMAESCIADIUM H. Wolff.

Chamaesciadium garhwalicum (Wolff) Norman. Journ. Bot. 76. 232. 1938. *Trachydium garhwalicum* Wolff in Fedde Repert. 27 : 124. 1929.

Terete, simple glabrous herbs, 10 – 40 cm tall ; leaves pinnatisect broadly linear glabrous ; flowers yellowish – white.

Fl. & Fr. : August – October.

On way to Hemkund and Rudranath. 3000 – 5300 m (42107).

8. *CURTIA* DC.

Curtia depressa (Don) Norman in Journ. Bot. 75. 96. 1937. *Athamanta depressa* D. Don, Prodr. Fl. Nep. 184. 1825. *C. lindleyi* DC. Prodr. 4 : 187. 1830 ; Hook. f. Fl. Brit. Ind. 2 : 701. 1879.

Caespitose subglabrous herbs, 0. 15 cm high ; leaves mostly radical pinnate compound.

Fl. & Fr. : August – September.

Ghangaria. 3500 – 5000 m (29523).

9. *ERIOCYCLA* Lindl.

Eriocycla caespitosa (Edgew.) Wolff in Pflanz. 90 : 316 & 366. 1927. *Petrosiadium caespitosum* Edgew. in Trans. Linn. Soc. 20 : 51. 1846. *Pimpinella caespitosa* (Edgew.) Cl. in Hook. f. Fl. Brit. Ind. 2 : 689. 1879.

Tufted pubescent herbs from the woody base, 6 – 25 cm high ; flowers yellowish – white ; fruits villous when young.

Fl. & Fr. : July – August.

Way to Gothing and Niti. 3000 – 4000 m (566113).

10. *HERACLEUM* L.

- | | |
|--|-----------------------|
| 1a. Leaves pinnately divided ; fruits elliptic or orbicular, brownish | <i>H. brunonis</i> 1 |
| 1b. Leaves bipinnately, ternately or ternate-pinnately divided ; fruits whitish or brownish. | |
| 2a. Fruits whitish ; leaves bipinnate with ovate pinnatifid leaflets ... | <i>H. thomsonii</i> 3 |
| 2b. Fruits brownish ; leaves ternate or ternate pinnately divided ... | <i>H. lanatum</i> 2 |

1. *Heracleum brunonis* (DC.) Cl. in Hook. f. Fl. Brit. Ind. 2 : 713. 1879. *Tordyliopsis brunonis* DC. Prodr. 4 : 199. 1830.

Pubescent herbs with terete stems, 30 – 70 cm high ; leaves long petioled, oblong pinnate ; fruits brownish, elliptic.

Fl. & Fr. : September – October.

Kedarnath glacier. 3000 – 5000 m (8683).

2. *H. lanatum* Michx. Fl. Bor. Amer. 1 : 166. 1830. *H. candicans* DC. Prodr. 4 : 192. 1830 ; Hook. f. Fl. Brit. Ind. 2 : 714. 1879.

Sparsely pubescent herbs, .30 – 2 m tall ; leaves ternate – pinnately compound ; flowers yellow ; fruits orbicular to ovate $\pm$ pubescent.

Fl. & Fr. April – July.

Alli, Gohn, Kanol. 1900 m (14846).

3. *H. thomsonii* Cl. in Hook. f. Fl. Brit. Ind. 2 : 711. 1879 ; Hiroe, Umbel. Asia. 191. 1956.

Grey pubescent herbs, 15 – 20 cm high ; leaves bipinnately compound ; flowers white ; fruits elliptic pubescent white.

Fl. & Fr. : July – August.

Way to Bampa, Malari. 3500 – 5500 m (55925).

11. HYDROCOTYLE L.

- Hydrocotyle nepalensis* Hook. Exot. Fl. 1 : t. 30. 1823. *H. javanica* auct. non Thunb. Sensus Hook. f. Fl. Brit. Ind. 2 : 667. 1879.

$\pm$ Hairy procumbent to erect herbs with slender stems ; leaves orbicular reniform ; flowers yellow – green ; fruits blackish – brown.

Fl. & Fr. : August – September.

Bayong, Mondal. 3000 m (41925).

12. LIGUSTICUM L.

Ligusticum elatum (Edgew.) Cl. in Hook. f. Fl. Brit. Ind. 2 : 698, 1879. *Cortia elata* Edgew. Trans. Linn. Soc. 20 : 55. 1857.

Glabrous herbs ; leaves 1 - 2 pinnate ; flowers white ; fruits glabrous, ovate.

Fl. & Fr. : August - October.

Brahmtal, Dunagiri. 1500 - 3000 m (31056).

13. OSMORRHIZA DC.

Osmorrhiza aristata (Thunb.) Rydb. in Bot. Surv. Nebraska 3 : 37. 1894. var. 1894 *laxa* (Lindl.) Const. & Shan. Univ. Calif. Publ. Bot. 23. 130. 1948. *O. laxa* Lindl. in Royle (1839). *O. claytoni* non Michx. Sensus Hook. f. Fl. Brit. Ind. 2 : 690. 1879.

Glabrous herbs, .30 - 1 m tall ; leaves 2 - pinnate bristly pubescent, deltoid to orbicular ; flowers white ; fruits cylindric, to minutely bristly.

Fl. & Fr. : June - July.

Bhyundar valley, 4000 m (39119).

14. PIMPINELLA L.

- | | | |
|--|-----|--------------------------|
| 1a. Leaves 2 - pinnate ; rays 5 - 10 ; fruits glabrous | ... | <i>P. acuminata</i> 1 |
| 1b. Leaves 1 - pinnate ; rays 10 - 20 ; fruits pubescent | ... | <i>P. diversifolia</i> 2 |

1. **Pimpinella acuminata** (Edgew.) Cl. in Hook. f. Fl. Brit. Ind. 2 : 686. 1879. *Reutera acuminata* Edgew. in Trans. Linn. Soc. Bot. 20 : 52. 1846.

Glabrous herbs ; .60 – 1.5 m high ; leaves 2 – pinnate, pubescent on both surfaces ; flowers yellow – green.

Fl. & Fr. : August – October.

Anusuya Devi, Bhyundar, valley, Pandukeswar. 1800 – 2700 m. (42052).

2. ***Pimpinella diversifolia*** DC. Prodr. 4 : 122. 1830 ; Hook. f. Fl. Brit. Ind. 2 : 688. 1879.

Hairy or pubescent herbs, .60 – 1.5 m high ; leaves 1 – pinnate ; flowers white.

Fl. & Fr. : June – October.

Bhyundar valley, Mondai, Wan. 3550 m (29661).

15. PLEUROSPERMUM Hoffm.

1a. Leaves pinnate or sub-pinnate.

2a. Bracteoles entire ; fruit epicarp not lax or glistening ... *P. candollii* 3

2b. Bracteoles variously divided ; fruit epicarp lax, glistening ... *P. stellatum* 5

1b. Leaves ternate or ternate pinnate or ternately decompand.

3a. Ultimate segments large, ovate - lanceolate, serrate or pinnately incised, not linear oblong ... *P. angelicoides* 1

3b. Ultimate segments linear - oblong to setaceous.

4a. Commissure face grooved ; commissural vittae 4 - 6 ... *P. densiflorum* 4

4b. Commissure face plane ; commissural vittae 2. ... *P. brunonis* 2

1. ***Pleurospermum angelicoides*** (DC.) Cl. in Hook. f. Fl. Brit. Ind. 2 : 703. 1879. *Hymnolaena angelicoides* DC. Prodr. 4 : 245. 1830. *Pterocyclus angelicoides* (DC.) Klotz. Bot. Reise Pr. Waldem. 150. t. 47. 1862.

Glabrous braching herbs, .90 – 2 m tall ; leaves bipinnate ; pinnae, ovate – oblong or elliptic, dentate or serrate ; flowers white ; fruits elliptic oblong.

Fl. & Fr. : August – October.

Bhyundar valley, Rambara. 2500 – 4000 m (24387).

2. *Pleurospermum brunonis* (DC.) Cl. in Hook. f. *Fl. Brit. Ind.* 2 : 706. 1879. *Hymenolaena brunonis* DC. *Prodr.* 4 : 246. 1830.

Glabrous herbs with terete stems, 10 – 25 cm high ; leaves biternate pinnately compound; leaflets pinnate incised ; flowers white ; fruits elliptic.

Fl. & Fr. : September – October.

Garhwal (Falconer), Patharnachini. 3800 m (30935).

3. *P. candollii* (DC.) Cl. in Hook. f. *Fl. Brit. Ind.* 2 : 703. 1879. *Hymenolaena candollii* DC. *Prodr.* 4 : 245. 1830.

Glabrous herbs with fistular stems, 10 – 35 cm tall ; leaflets ovate, toothed or pinnatifid ; flowers white ; fruits ellipsoid.

Fl. & Fr. : September – October.

Badrinath. 3000 – 5000 m (31754).

4. *P. densiflorum* (Lindl.) Cl. in Hook. f. *Fl. Brit. Ind.* 2 : 706. 1879. *Hymenidium densiflorum* Lindl. in Royle *Ill. Bot, Himal.* 233. 1835.

Glabrous slender herbs, 10 – 35 cm high ; leaves biternately decompound ; segments linear – lanceolate, membranous ; fruits ellipsoid.

Fl. & Fr. : August – October.

Bhyundar valley, Dunagiri on way, Malari. 3000 – 4000 m (24384).

5. *P. stellatum* (Don) Cl. in Hook. f. *Fl. Brit. Ind.* 2 : 704. 1879. *Selinum stellatum* D. Don, *Prodr. Fl. Nep.* 185. 1825.

Glabrous herbs, 3 – 30 cm high, leaves pinnately divided ; leaflets, ovate, pinnatifid ; flowers white.

Fl. & Fr. : July – August.

Dunagiri on way to glacier. 3000 – 4000 m (54147).

16. *SANICULA* L.

Sanicula elata Buch. – Ham. ex D. Don, *Prodr. Fl. Nep.* 183. 1825. *S. europaea auct* non L. sensu Hook. f. *Fl. Brit. Ind.* 2 : 670. 1879.

Slender herbs, branched above, .15 – 1 m high ; upper leaves ternate or 3 – partite ; flowers white or yellowish – green ; fruits globose – ovoid bristly.

Fl. & Fr. : October.

Khoplu Tal, Pangarbasa. 2000 – 3500 m (51116).

17. SELINUM L.

- | | | |
|---|-----|--------------------------|
| 1a. Fruits little dorsally compressed ; ridges subequally winged | ... | <i>S. striatum</i> 3 |
| 1b. Fruits dorsally much compressed to flattened ; ridges all or only laterals winged. | | |
| 2a. Leaves bipinnate to tripinnatisect ; leaflets ovate-lanceolate serrate | ... | <i>S. vaginatum</i> 4 |
| 2b. Leaves ternately decompose ; leaflets or ultimate segments linear - lanceolate or elliptic, entire. | | |
| 3a. Ultimate leaf segments elliptic - ovate, serrate | ... | <i>S. elatum</i> 1 |
| 3b. Ultimate leaf segments linear - lanceolate, entire or apically lobed. | | |
| 4a. Ridges all distinctly subequally winged | ... | <i>S. candollii</i> 2 |
| 4b. Lateral ridges usually broadly winged ; dorsal slender | ... | <i>S. wallichianum</i> 5 |

1. *Selinum elatum* (Edgew.) Hiroe, Umbel. Asia. 154. 1958. *S. tenuifolium* Wall. ex Cl. var. *elata* (Edgew.) Cl. in Hook. f. Fl. Brit. Ind. 2 : 700. 1879.

Tall. Pubescent herbs with fistular stems ; leaves ternately decompose ; fruits elliptic - subquadrate, dorsely compressed.

Fl. & Fr. : August – October.

Bhyundar valley. 3800 m (29607).

2. *S. candollii* DC. Prodr. 4 : 165. 1830 ; Cl. in Hook. f. Fl. Brit. Ind. 2 : 700. 1879.

Perennial herbs with fistular stems, $\pm$ 90 cm high ; leaves ternate decompose ; flowers white ; fruits elliptic, glabrous.

Fl. & Fr. : September – October.

Brahmtal at 3800 m (31055).

3. *Selinum striatum* Wall. ex Cl. in Hook. f. Fl. Brit. Ind. 2 : 699. 1879. *Lescopitum striatum* Wall. Cat. 583. 1828 nom nud.

Perennial herbs with terete stems, .30 – 1 m high ; leaves ternately decompose, glabrous ; flowers white ; fruits ovoid – orbicular, glabrous.

Fl. & Fr. : September – October.

Anusuya Devi, Kailashinayak. 1550 – 2000 m (30912).

4. *S. vaginatum* (Edgew.) Cl. in Hook. f. Fl. Brit. Ind. 2 : 700. 1879. *Cortia vaginata* Edgew. Trans. Linn. Soc. 20 : 58. 1851.

Perennial glabrous herbs with fistular stems, .20 – 1 m high ; leaves bipinnate to tripinnatisect ; flowers white ; fruits oblong.

Fl. & Fr. : August – October.

Bhyundar valley, Baradioldunga, Rambara. 2000 – 4500 m (35882).

5. *S. wallichianum* (DC.) Raizada et Saxena Ind. For. 92 : 323. 1966. *Peucedanum wallichianum* DC. Prodr. 4 : 181. 1830. *S. tenuifolium* Wall. ex DC. Prodr. 4 : 181. 1830 ; Hook. f. Fl. Brit. Ind. 2 : 700. 1879, non Salisb.

Branching pubescent herbs with fistular stems, .60 – 1.5 m high ; leaves biternately decompose ; flowers white ; fruits elliptic, ovoid.

Fl. & Fr. : August – October.

Bhyundar valley, Ghangaria, Kedarnath. 2000 – 4000 m (29533).

18. SESELI L.

Seseli trilobum (Edgew.) Cl. in Hook. f. Fl. Brit. Ind. 2 : 694. 1879. *Scaphospermum trilobum* Edgew. in Trans. Linn. Soc. 20 : 58. 1846.

Pubescent to villose herbs, .60 – 1 m high ; leaves biternately compound ; flowers pubescent ; fruits ovate, pubescent.

Fl. & Fr. : June – August.

Niti between 3300 – 3600 m (Duthie). Lit.

19. TORILIS L.

Torilis japonica (Houtt.) DC. Prodr. 4 : 219. 1830. *Caucalis japonica* Houtt. Nat. Hist. 2. 8 : 42. t. 45. 1777. *C. anthriscus* (L.) Huds. Fl. angl. 99. 1762 ; Hook. f. Fl. Brit. Ind. 2 : 718. 1879.

Finely adpressed bristly pubescent herbs, .30 – 1 m high ; leaves ternate – pinnate ; flowers purplish white.

Fl. & Fr. : June – October.

Bhyundar valley, Gohna. 2500 – 3000 m (29329).

20. TRACHYDIUM L.

Trachydium roylei Lindl. in Royle, Ill. Bot. Himal. 232. 1835 ; Hook. f. Fl. Brit. Ind. 2 : 672. 1879.

Caespitose fistular glabrous herbs, 0 – .3 m high ; leaves mostly radical, 2 sub – 3 pinnate, membranous ; flowers white or pink ; fruits ellipsoid, often tubercled.

Fl. & Fr. : June – September.

Chopta, Rishiganga valley, 3000 – 4000 m (44130).

21. TRACHYSPERMUM Link nom. cons.

Trachyspermum falconeri (Cl.) Wolff in Engl. Pflanz. 90 : 90. 1929. *Carum falconeri* Cl. in Hook. f. Fl. Brit. Ind. 2 : 683. 1879.

Herbs, glabrous from the fusiform root, upto 1 m high ; leaves biternately compound ; flowers white ; fruits ovate densely hispid.

Fl. & Fr. : August – September.

Chccringa, Garhwal. 1500 – 2400 m (Falconer). Lit.

22. VICATIA DC.

- | | | |
|--|-----|-----------------------|
| 1a. Leaves pinnately compound ; segments short lobed ; calyx teeth prominent ; fruits ovate. | ... | <i>V. wolffiana</i> 2 |
| 1b. Leaves pinnately - decompound (bi-tripinnate); segments, small linear acute ; calyx teeth obsolete ; fruits ovate-oblong | ... | <i>V. conifolia</i> 1 |

1. *Vicatia conifolia* DC. Prodr. 4 : 243. 1830 ; Hook. f. Fl. Brit. Ind. 2 : 671. 1879.

Slender glabrous herbs, 10 – 40 cm high ; leaves ternate – pinnately compound or pinnatisect ; flowers purple ; fruits ovate – elliptic, glabrous.

Fl. & Fr. : May – August.

Amritaganga valley, Ghangaria, Tunghath. 2000 – 6000 m (39093).

2. *V. wolffiana* (Wolff ex Fedde) Norman Journ. Bot. 73 (934) : 229. 1940. *Tongoloa wolffiana* Wolff ex Fedde, Repert. 27 : 181. 1921.

Glabrous branched herbs, 10 – 30 cm high ; leaves pinnately compound, lobed or pinnatisect ; flowers purple ; fruits ovate glabrous.

Fl. & Fr. : April – May.

Bhuna. 4000 – 5000 m (37256).

23. ANETHUM L.

Anethum graveolens L. Sp. Pl. 263. 1753. *Peucedanum graveolens* (L.) Cl. in Fl. Brit. Ind. 2 : 709. 1879.

Glabrous herbs with terete stems, .30 – 1 m high ; leaves ternately decompose with filiform segments ; flowers yellow ; fruits elliptic oblong, glabrous.

Sutul cultivated. 2600 m (10177).

24. CARUM L.

Carum carvi L. Sp. Pl. 263. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 680. 1879.

Herbs with terete stems, upto 60 cm tall; lower leaves, long petioled, bipinnate ; upper leaves none ; flowers white ; fruits oblong.

Badrinath. 3500 m (2941).

25. CORIANDRUM L.

Coriandrum sativum L. Sp. Pl. 256. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 717. 1879.

Glabrous herbs, 20 – 70 cm high ; lower leaves palmatipartite ; upper leaves ternately decompose ; flowers white, dull purplish in the centre ; fruits elliptic – orbicular, glabrous.

Rudraprayag beyond up. Cultivated throughout. 6000 m (26785).

26. DAUCUS L.

Daucus carota L. Sp. Pl. 1 : 242. 1753 ; Hook. f. Fl. Brit. Ind. 2 : 718. 1879.

Glabrous or papillate hispid herbs from the fusiform root, .30 – 1 m high ; leaves pinnately decompose ; flowers white or dark red.

Cultivated below 3000 m.

70. ARALIACEAE

- 1a. Leaves simple, lobed or not ... *Hedera* 4
- 1b. Leaves compound.
 - 2a. Leaves digitate.
 - 3a. Stems usually armed with prickles.
 - 4a. Leaflets glabrous or with simple hairs ... *Acanthopanax* 2
 - 4b. Leaflets stellately hairy beneath ... *Brassaiposis* 3
 - 3b. Stems unarmed
 - 5a. Erect shrubs ; leaflets with secondary nerves deeply impressed above, stellately hairy beneath ... *Heptapleurum* 5
 - 5b. Climbers ; leaflets with secondary nerves not deeply impressed above, glabrous beneath ... *Schefflera* 7
 - 2b. Leaves pinnate.
 - 6a. Leaflets 3 - 5 ; Styles 5 combined ... *Pentapanax* 6
 - 6b. Leaflets 5 - 8 ; styles 2 - 5 free ... *Aralia* 1

1. ARALIA L.

Aralia cachemirica Dcne. in Jacq. Voy. 4 (Bot.) : 72, t. 81 1835 ; Hook. f, Fl. Brit. Ind. 2 : 722. 1879.

Tall pubescent shrubs ; leaves large ; leaflets 5 - 9 ; flowers white ; fruits black globose.

Fl. & Fr. : August - September.

Bhyunder valley. 2400 m (29631).

2. ACANTHOPANAX Dcne. & Planch.

Acanthopanax cissifolius (Griff. ex Seem.) Harms in Engl. Pflsam.

3(8) : 50. 1897. *Aralia cissifolia* Griff. ex Seem. in Journ. Bot. 6 : 134. 1868 ; Hook. f. Fl. Brit. Ind. 2 : 722. 1879.

Erect glabrous shrubs, often prickly ; leaflets simply serrate ; flowers greenish - yellow ; fruits glabrous,

Fl. & Fr. : May - August.

Throughout central and inner ranges, 2800 - 3500 m (Osmaston).
Lit.

3. BRASSAIOPSIS Dcne. & Planch.

Brassaiopsis aculeata (Buch - Ham. ex D. Don) Seem. in Journ. Bot. 2 : 293. 1864 ; Rev. Heder. 19. 1868 ; Hook. f. Fl. Brit. Ind. 2 : 738. 1879.

Prickly shrubs or small trees ; leaflets 5 - 9, densely stellate hairy ; flowers pale yellowish - green.

Fl. & Fr. : January - June.

Throughout the hills. 800 - 2000 m (Osmaston). Lit.

4. HEDERA L.

Hedera nepalensis Koch, Hort. Dendr. 284. 1853. *H. helix* non L. *Sensu* Hook. f. Fl. Brit. Ind. 2 : 739. 1879.

Evergreen climbers ; leaves variable, coriaceous glabrous ; flowers green ; fruits greenish - yellow or orange.

Fl. & Fr. : March - October.

Bhyundar valley, Vickie Tal. 1700 - 3000 m (24476).

5. HEPTAPLEURUM Gaertn.

Heptapleurum impressum Cl. in Hook. f. Fl. Brit. Ind. 2 : 728. 1879.

Large evergreen shrubs or small trees ; leaflets 6 – 11, stellately hairy beneath ; fruits globose, glabrous.

Fl. & Fr. : September – December.

Occurs throughout the central and inner ranges, 2500 – 3000 m (Osmaston). Lit.

6. PENTAPANAX Seem.

- | | |
|--------------------------------------|-------------------------------|
| 1a. Epiphytic ; leaflets entire | ... <i>P. parasiticus</i> 2 |
| 1b. Not epiphytic ; leaflets serrate | ... <i>P. leschenaultii</i> 1 |

1. **Pentapanax leschenaultii** (DC.) Seem. in Journ. Bot. 2 : 296. Cum fig. 1864. *Panax leschenaultii* DC. Prodr. 4 : 254. 1830 ; Hook. f. Fl. Brit. Ind. 2 : 724. 1879.

Deciduous shrubs ; leaflets 5, serrate ; fruits strongly ribbed.

Fl. & Fr. : July – September.

Throughout the central and inner ranges, 2500 – 3500 m (Osmaston). Lit.

2. **P. parasiticus** (Buch. Ham. ex D. Don) Seem. in Journ. Bot. 2 : 296. 1864. *Hedera parasiticus* Buch. Ham. ex D. Don. 1825 ; Hook. f. Fl. Brit. Ind. 2 : 724. 1879.

Fl. & Fr. : September – October.

Occurs throughout the hills. 1800 – 2800 m (Osmaston). Lit.

7. SCHEFFLERA J. R. & G. Foster.

Schefflera venulosa (Wt. & Arn.) Harms in Engl. Pflanzenfam. 3(8) : 39. 1894. *Paratropia venulosa* Wt. & Arn. Prodr. 377. 1834. *Heptapleurum venulosum* Seem. 1885 ; Hook. f. Fl. Brit. Ind. 2 : 729. 1879.

Evergreen climbers ; leaflets 3 – 8, glabrous beneath ; fruits globose yellow.

Fl. & Fr. : March – May.

Occurs throughout in the area. 600 – 2000 m (Osmaston). Lit.

71. ALANGIACEAE

ALANGIUM Lam. nom. cons.

Alangium chinense (Lour.) Harms. in Ber. Deuts. Bot. Ges. 15 : 24. 1897. *Stylidium Chinense* Lour. Fl. Cochinch. 221. 1790. *Marlea begoniaefolia* Roxb. Pl. Corom. 3 : 80. t. 283. 1819 ; Hook. f. Fl. Brit. Ind. 2 : 743. 1879.

Small deciduous trees ; leaves broadly ovate pubescent on both surfaces ; flowers white.

Fl. & Fr. : May – October.

Occurs throughout the hills. 1000 – 2000 m (Osmaston). Lit.

72. CORNACEAE

- | | | |
|--|-----|----------------------|
| 1a. Flowers cymose, without bracts | ... | <i>Cornus</i> 2 |
| 1b. Flowers connate in dense heads subtended by 4 - large white bracts | ... | <i>Benthamidia</i> 1 |

1. BENTHAMIDIA Spach

Benthamidia Capitata (Wall.) Hara in Journ. Arn. Arb. 29 : 115. 1948.
Cornus capitata Wall. in Roxb. Fl. Ind. 1 : 434. 1820 ; Hook. f. Fl. Brit.
 Ind. 2 : 745. 1879. 'Bhamor'.

Evergreen trees, 12 m high ; leaves opposite, oblong or elliptic,
 pale - glaucous beneath ; flowers yellowish - green in heads.

Fl. & Fr. : June - October.

Dawalikhal, Gohna. 1800 - 2500 m (10042).

2. CORNUS L.

1a. Leaves opposite.

2a. Leaves ovate, 5 - 10 cm broad ... *C. macrophylla* 2

2b. Leaves narrowly oblong, 2.5 - 3.6 cm broad ... *C. oblonga* 3

1b. Leaves alternate ... *C. controversa* 1

1. **Cornus controversa** Hemsl. in Kew Bull. 1909 : 331. 1909. [ex
 Prain in Bot. Mag. t 8261 in textu (June 1909) nom. nud.], *C. macrophylla*
auct. non Wall. Senu Fl. Brit. Ind. 2 : 744. 1879. *p. p.*

Small trees up to 16 m ; leaves alternate, glabrous ; flowers pure
 white ; fruits globose pubescent.

Fl. & Fr. : May - June.

Nawali Reserve of North Garhwal bordering Guruntoli Gadhera,
 2000 - 2500 m (Osmaston). Lit.

2. **C. macrophylla** Wall. in Roxb. Fl. Ind. 1 : 433. 1820 ; Hook. f.
 Brit. Ind. 2 : 744. 1879.

Deciduous trees upto 34 m ; leaves opposite, adpressed hairy on
 surfaces ; flowers cream - white, scented.

Fl. & Fr. : April - October.

Bhyundar valley, Loani, Mondal. 1500 - 2500 m (24598).

3. **Cornus oblonga** Wall. in Roxb. Fl. Ind. 1 : 432. 1820 ; Hook. f. Fl. Brit. Ind. 2 : 744. 1879.

Evergreen shrubs or small trees ; leaves opposite, oblong lanceolate, minutely adpressed hairy on both surfaces ; fruits ovoid, black with glaucous bloom.

Fl. & Fr. : April – October.

Mondal. 1500 - 2500 m (43979).

73. CAPRIFOLIACEAE

1a. Style short, 2 - 5 lobed.

2a. Leaves pinnate, often stipulate ... *Sambucus* 6

2b. Leaves undivided, very rarely stipulate or 0 ... *Viburnum* 5

1b. Style long ; stigma capitate.

3a. Tall hirsute herbs ; leaves prominently connate ... *Triosteum* 4

3b. Shrubs or small trees.

4a. Fruits 1- seeded ; flowers regular ... *Abelia* 1

4b. Fruits many seeded ; flowers often zygomorphic.

5a. Corolla - tube straight ; limb not lipped ... *Leycesteria* 2

5b. Corolla - tube oblique ; limb $\pm$ lipped ... *Lonicera* 3

1. ABELIA Br.

Abelia triflora R. Br. ex Wall. Pl. As. Rar. 1 : 14, t. 15. 1829.
Zabelia triflora (R. Br. ex Wall.) Makino. in Makinoa 9 : 175 1948 ; Hook. f. Fl. Brit. Ind. 3 : 9. 1880.

Shrubs or small trees, 2 - 4 m high ; leaves lanceolate or ovate - lanceolate, entire ; flowers white tinged with pink.

Fl. & Fr. : May – September.

Way to Bampa. Jumma area. 2000 - 3500 m (53866).

2. LEYCESTERIA Wall.

Leycesteria formosa Wall. in Roxb. Fl. Ind. 2 : 182. 1824 ; Hook. f. Fl. Brit. Ind. 3 : 16. 1880. 'Bhenkar'.

Deciduous shrubs ; leaves ovate, or ovate - lanceolate ; flowers pink - red.

Fl. & Fr. : April - July.

Bhyundar valley, Pangarbasa, Rambara. 2000 - 3000 m (42154).

3. LONICERA L.

1a. Leaves more than 2.5 cm long.

2a. Floral bracts broad, ovate, very conspicuous ... *L. hispida* 4

2b. Floral bracts linear or lanceolate, not conspicuous.

3a. Corolla white or yellow, usually tinged with pink.

4a. Corolla regular or nearly so. ... *L. angustifolia* 1

4b. Corolla 2 - lipped.

5a. Mature leaves glabrous or nearly so beneath ; lateral nerves 8 - 16 pairs ... *L. discolor* 3

5b. Mature leaves pubescent or tomentose beneath ; lateral nerves 5 - 9 pairs.

6a. Peduncle .125 cm long *L. quinquelocularis* 10

6b. Peduncle 2.5 - 5 cm long ... *L. webbiana* 14

3b. Corolla dull purple ... *L. purpurascens* 9

1b. Leaves less than 2.5 cm long (sometimes in *L. asperifolia* slightly exceeding 2.5 cm).

7a. Mature leaves glabrous or nearly so.

8a. Leaves linear ; width less than .375 cm ... *L. spinosa* 13

8b. Leaves not linear ; width .375 cm or more.

9a. Leaves very glaucous ... *L. semenovi* 12

9b. Leaves not glaucous.

- 10a. Corolla not gibbous at base ; berries red ... *L. myrtillus* 7
- 10b. Corolla gibbous at base ; berries bluish - black ... *L. obovata* 8
- 7b. Mature leaves pubescent or tomentose beneath.
- 11a. Leaves suborbicular, ovate or broadly elliptic.
- 12a. Leaves glandular and pubescent above ... *L. hypoleuca* 5
- 12b. Leaves clothed with bristly hairs above ... *L. asperifolia* 2
- 11b. Leaves oblong, lanceolate or narrowly elliptic.
- 13a. Leaves woolly tomentose beneath ... *L. rupicola* 11
- 13b. Leaves finely pubescent beneath ... *L. microphylla* 6

1. *Lonicera angustifolia* Wall. ex. DC. Prodr. 4 : 337. 1830 ; Hook. f. Fl. Brit. Ind. 3 : 13. 1880.

Deciduous shrubs, 1-2 m high ; leaves lanceolate $\pm$ pubescent ; flowers white tinged pink.

Fl. & Fr. : April - October.

Mongu area. 2500 - 3500 m (48047).

2. *L. asperifolia* (Dcne.) Hook. f. & Thoms. in Journ. Linn. Soc. 2 : 166. 1858. *xylosteum asperrimum* Dcne. in Jacq. Voy. Bot. 77, t. 85. 1844 ; Hook. f. Fl. Brit. Ind. 3 : 11. 1880.

Deciduous shrubs ; stems upto 1 m high ; leaves ovate, elliptic, lower surface hispid ; flowers yellow.

Fl. & Fr. : May - September.

Inner dry ranges bordering Tibet. 4000 - 4500 m (Osmaston). Lit.

3. *L. discolor* Lindl. in Bot. Reg. 30 : 32 in nota 1844. *L. orientalis* Lam. var. *discolor* Lindl. in Hook. f. Fl. Brit. Ind. 3 : 15. 1880.

Deciduous shrubs, upto 2 - 5 m high ; leaves, elliptic ovate or ovate - lanceolate, glabrous ; flowers pale - yellow tinged with pink.

Fl. & Fr. : May - October.

Central and inner ranges. 2500 - 3500 m (Osmaston). Lit.

4. *L. hispida* Pall. ex Willd. in Roem. & Schult. Syst. 5 : 258. 1819 ; Hook. f. Fl. Brit. Ind. 3 : 11. 1880.

Deciduous shrubs upto 1 m high ; leaves elliptic-ovate or lanceolate-oblong, pale long hairy beneath.

Fl. & Fr. : June – September.

Main Himalayan range and on the dry ranges. 3500 – 4500 m (Osmaston). Lit.

5. *Lonicera hypoleuca* Dcne. in Jacq. Voy. 4 (Bot) : 81. t. 89. 1835 ; Hook. f. Fl. Brit. Ind. 3 : 14. 1880.

Deciduous shrubs, 1 – 3 m high ; leaves broadly ovate – orbicular, glandular pubescent.

Fl. & Fr. : May – September.

Dhauli valley around Kosa and Malari. 3000 – 3500 m (Osmaston). Lit.

6. *L. microphylla* Willd. ex Roem. & Schult. Syst. 5 : 258. 1819 ; Hook. f. Fl. Brit. Ind. 3 : 15. 1880.

Deciduous shrubs, 1.30 m high ; leaves elliptic or oblong, finely pubescent beneath.

Fl. & Fr. : May – August.

Girithi valley, Malari, 4000 m (Osmaston). Lit.

7. *L. myrtillus* Hook. f. et Thoms in Journ. Linn. Soc. 2 : 168. 1858. *L. parvifolia* auct. non Edgew. Sensus Hook. f. Fl. Brit. Ind. 3 : 13. 1880.

Deciduous shrubs, 1 m high ; leaves elliptic or oblong ; flowers pale-yellow, tinged pink.

Fl. & Fr. : May – October.

Mana valley, Tungnath on way, Vasudhara. 3500 – 4000 m (24402).

8. *L. obovata* Royle ex Hook. f. & Thoms. in J.L.S. Lond. Bot. 2 : 169. 1858 ; Hook. f. Fl. Brit. Ind. 3 : 14. 1880. '*Darbags*' (Bhotia).

Deciduous shrubs, 15 – 60 cm high ; leaves obovate – elliptic upto 2.5 cm ; flowers greenish – yellow.

Fl. & Fr. : May – October.

Bhyundar valley, Kedarnath. 3500 – 4500 m (29587).

9. *Lonicera purpurascens* Walp. Rep. Bot. 2 : 449. 1843 ; Hook. f. Fl. Brit. Ind. 3 : 12. 1880. *Xylosteum purpurascens* Dcne. in Jacq. Voy. 4 (Bot.) : 79, 87. 1835.

Deciduous shrubs, 2 - 3 m high, pubescent ; leaves elliptic oblong or lanceolate, tomentose beneath ; flowers dull-purple, hairy within.

Fl. & Fr. : May - September.

Bhyundar valley, Mongo, Niti. 3500 - 4500 m (29593).

10. *L. quinquelocularis* Hardw. in Asia, Res. 6 : 351. 1799 ; Hook. f. Fl. Brit. Ind. 3 : 14. 1880. '*Badkukra*.'

Deciduous trees, 2 - 4 m high ; leaves ovate or broadly lanceolate, densely pubescent beneath ; flowers pale - white, densely pubescent outside.

Fl. & Fr. : April - October.

Mongu, Sitapur, Trijuginarayan. 1500 - 3500 m (43970).

11. *L. rupicola* Hook. f. & Thoms. in Journ. Linn. Soc. 2 : 168. 1858 ; Hook. f. Fl. Brit. Ind. 3 : 13. 1880.

Densely branched deciduous shrubs, 15 - 45 cm high ; leaves oblong or lanceolate, pale glaucous beneath, recurved ; flowers pink hairy without and within.

Fl. & Fr. : June - September.

Inner dry ranges bordering Tibet. 4000 - 4500 m (Osmaston). Lit.

12. *L. semenovii* Regel Acta Hort. Petrop. 5 : 608. 1878. *L. glauca* Hook. f. & Thoms. Journ. Linn. Soc. 2 : 166. 1858 ; Hook. f. Fl. Brit. Ind. 3 : 11. 1880. non Wall.

Deciduous shrubs with slender branches, 15 - 25 cm high ; leaves oblong or oblong lanceolate.

Fl. & Fr. : July - August.

Inner dry ranges bordering Tibet. 4000 - 4500 m (Osmaston). Lit.

13. *L. spinosa* (Jacq. ex Dcne.) Walp. Rep. Bot. 2 : 449. 1848. *Xylosteum spinosum* Jacqu. ex Dcne. l. c. 78. t. 86. 1835 ; Hook. f. Fl. Brit. Ind. 3 : 13. 1880.

Deciduous branched shrubs, 15 - 45 cm high ; leaves linear or oblong, glabrous, pale beneath ; flowers fragrant white tinged pink.

Fl. & Fr. : May – July.

Inner ranges bordering Tibet. 4000 – 4500 m (Osmaston). Lit.

14. *Lonicera webbiaana* Wall. ex DC. Prodr. 4 : 336. 1830. *L. alpigena* non L. sensu Fl. Brit. Ind. 3 : 15. 1880.

Deciduous shrubs, 6 m high ; leaves variable, glandular hairy beneath ; flowers pale – yellow, tinged pink, glandular hairy.

Fl. & Fr. : May – August.

Dhaulti valley North Garhwal. 2500 – 4500 m (Qsmaston). Lit.

4. TRIOSTEUM L.

Triosteum himalayanum Wall. in Roxb. Fl. Ind. ed. Carey 2 : 180. 1824. *T. hirsutum* non Roxb. sensu Hook. f. Fl. Brit. Ind. 3 : 8. 1880.

Undershrubs ; annual stems with spreading hairs ; leaves obovate – elliptic, sessile, connate ; flowers green with purple inside ; fruits trigonous hairy.

Fl. & Fr. : July – August.

Kaga area. 3000 – 3500 m (53920).

5. VIBURNUM L.

1a. Leaves entire or obscurely crenate.

2a. Corolla rotate or shortly campanulate, lobes spreading.

3a. Leaves ovate or broadly elliptic, tomentose beneath ... *V. cotinifolium* 1

3b. Leaves narrowly elliptic, glabrous and clothed beneath with pale - brown circular scales ... *V. punctatum* 7

2b. Corolla tubular, lobes very short erect or scarcely spreading ... *V. cylindricum* 2

1b. Leaves sharply toothed as serrate.

- 4a. Flowers in drooping pedunculate panicles, appearing after the leaves ; corolla tubular ... *V. erubescens* 3
- 4b. Flowers in erect umbellate or corymbose cymes.
- 5a. Flowers appearing before or with the leaves.
- 6a. Corolla rotate ; leaf bases usually cordate ... *V. nervosum* 6
- 6b. Corolla tubular ; leaf bases usually acute ... *V. grandiflorum* 4
- 5b. Flowers appearing after the leaves ; corolla rotate ... *V. mullaha* 5.

1. *Viburnum cotinifolium* D. Don, Prodr. Fl. Nep. 141. 1825 ; Hook. f. Fl. Brit. Ind. 3 : 3. 1880. '*Bansura, Genu.*'

Deciduous shrubs, 12 – 5 m high ; leaves ovate – elliptic, obscurely crenate, pale beneath; flowers white, tinged pink.

Fl. & Fr. : April – October.

Mongo, Gohna – Sutul, Tunganath. 1800 – 2800 m (47957).

2. *V. cylindricum* Buch. – Ham, ex D. Don, Proder. Fl. Nep. 142. 1825. *V. Coriaceum* Bl. Bijdr. 656. 1826 ; Hook. f. Fl. Brit. Ind. 3 : 5. 1880. '*Tita*'.

Evergreen shrubs 2 – 4 m high ; leaves oblong, entire, coriaceous ; flowers white, sweet scented.

Fl. & Fr. : June – October.

Mondal. 1500 – 2800 m (42004).

3. *V. erubescens* Wall. ex DC. Prodr. 4 : 329. 1830 ; Hook. f. Fl. Brit. Ind. 3 : 7. 1880.

Shrubs, 2 – 4 m high ; leaves elliptic – oblong, upper half sharply serrulate ; flowers creamy white tinged pink in drooping panicles ; fruits ellipsoid, glabrous red.

Fl. & Fr. : May – June.

Occurs throughout the Central and inner ranges. 1800 – 3000 m (Osmaston). Lit.

4. *V. grandiflorum* Wall. ex DC. Prodr. 4 : 329. 1830. *V. nervosum* auct. non D. Don Sensus. Hook. f. Fl. Brit. Ind. 3 : 8. 1880. '*Telanu or Thekla*'.

Deciduous shrubs, 7 m high ; leaves elliptic – oblong, serrulate ; flowers white tinged with pink.

Fl. & Fr. : March – August.

Bhyundar valley, Kukinakhal, Ramni. 2500 – 3500 m (47970).

5. *Viburnum mullaha* Buch. – Ham. ex D. Don, Prodr. Fl. Nep. 141. 1825. *V. stellulatum* Wall. ex DC. Prodr. 4 : 327. 1830 ; Hook. f. Fl. Brit. Ind. 3 : 4. 1880. *Maleo*'.

Deciduous shrubs, 2 – 7 m high ; leaves ovate or ovate – lanceolate, distantly serrate ; flowers white strongly scented.

Fl. & Fr. : June – October.

Mondal, Rambara – Gaurikund. 3500 m (10342).

6. *V. nervosum* D. Don, Prodr. Fl. Nep. 141. 1825, *V. cordifolium* Wall. ex DC. 4 : 327. 1830 ; Hook. f. Fl. Brit. Ind. 3 : 6. 1880.

Deciduous shrubs or small trees ; leaves ovate or elliptic, evenly serrulate, stellately hairy ; flowers before the leaves.

Fl. & Fr. : May – October.

Dudatoli. 3000 – 3500 m (Duthie). Lit.

7. *V. punctatum* Buch. – Ham. ex D. Don, Prodr. Fl. Nep. 142. 1825 ; Hook. f. Fl. Brit. Ind. 3 : 5. 1880.

Glabrous evergreen trees, 13m high ; leaves narrowly elliptic, entire, coriaceous.

Fl. & Fr. : May – October.

Central and inner ranges. 1800 – 2200 m (Osmaston). Lit.

6. *SAMBUCUS* L.

Sambucus nigra L. Sp. Pl. 269. 1753.

Large shrubs or small trees ; leaves pinnate ; leaflets serrate ; flowers white ; fruits black.

Planted. Kanol - Sutul. 2000 m (10352).

74. RUBIACEAE

1a. Trees or shrubs.

- 2a. Flowers in globose heads ; climbers with straight and curved tendrils ... *Uncaria* 17
- 2b. Flowers not in globose heads ; erect trees or shrubs.
 - 3a. Fruits capsular.
 - 4a. Usually epiphytic ... *Hymenopogon* 7
 - 4b. Non epiphytic.
 - 5a. Ovules solitary in each cells.
 - 6a. Flowers usually purplish, solitary or in peduncled clusters ... *Leptodermis* 9
 - 6b. Flowers blue in dense clusters arranged in large open panicles ... *Spermadietyon* 16
 - 5b. Ovules many in each cells.
 - 7a. Flowers white in pyramidal panicles ... *Wendlandia* 18
 - 7b. Flowers green in dense spiciform simple or branched racemes ... *Hymenodictyon* 6
 - 3b. Fruits indehiscent.
 - 8a. Flowers many in trichotomous cymes ... *Pavetta* 13
 - 8b. Flowers, solitary or fascicled 2 - 3 together.
 - 9a. Unarmed shrubs ; corolla tubular or funnel shaped; berries small .6 cm in diam, 4 - seeded ... *Randia* 14
 - 9b. Armed shrubs; corolla campanulate, very large, 1.9-3.8 cm in diam, many seeded ... *Xeromphis* 19

1b. Herbs.

- 10a. Ovules many in each cell.
 - 11a. Corolla 5 - lobed ; stigma capitate.
 - 12a. Leaves opposite ; flowers secund on branches of axillary or terminal cymes ... *Ophiorrhiza* 12
 - 12b. Leaves whorled ; flowers in terminal umbels ... *Argostemma* 1
 - 11b. Corolla 4 - lobed ; stigma 2 - lobed.
 - 13a. Seeds boat shaped. ... *Neanotis* 10

- 13b. Seeds angular.
- 14a. Calyx teeth contiguous ; fruits truncate at apex *Hedyotis* 5
- 14b. Calyx teeth not contiguous.
- 15a. Corolla divided half way or less than half down;
stigma overtopped by anthers ... *Kohautia* 8
- 15b. Corolla divided more than half way down ;
stigma not overtopped by anthers ... *Oldenlandia* 11
- 10b. Ovule solitary in each cell.
- 16a. Leaves opposite ; calyx teeth 4 ... *Borreria* 3
- 16b. Leaves whorled ; calyx teeth none.
- 17a. Corolla 5 - lobed ; fruits succulent ... *Rubia* 15
- 17b. Corolla 4 - lobed ; fruits dry.
- 18a. Corolla rotate ... *Galium* 4
- 18b. Corolla funnel - shaped ... *Asperula* 2

1. ARGOSTEMMA Wall.

Argostemma verticillatum Wall. in Roxb. Fl. Ind. 2 : 325. 1824 ;
Hook. f. Fl. Brit. Ind. 3 : 43. 1880.

Delicate slender erect herbs ; leaves 4, unequal, lanceolate, or ovate-lanceolate ; flowers white.

Fl. & Fr. : July - August.

Phata - Gaurikund. 1500 m (38631).

2. ASPERULA L.

Asperula oppositifolia subsp. **pseudo - cynanchica** Ehrend. in Ann. Naturhist. Mus. Wien 56 : 132, f. 49a, 51. 1948 ; *A. cynanchica* non L. *Sensu* Hook. f. Fl. Brit. Ind. 3 : 209. 1881.

Glabrous, erect herbs ; leaves small linear – oblong ; flowers pink – white ; fruits granulate.

Fl. & Fr. : June – August.

Niti. 3800 m (Duthie). Lit.

3. BORRERIA G. F. W. Mey. nom. Cons.

- | | | |
|--|-----|-------------------------|
| 1a. Annuals ; flower - clusters many flowered with flower bracts ;
corolla .3 cm long | ... | <i>B. pusilla</i> 2 |
| 1b. Perennials ; flower - clusters few flowered ; flower bracts none ;
corolla .8 - 1.5 cm long | ... | <i>B. articularis</i> 1 |

1. *Borreria articularis* (L. f.) F. N. Williams in Bull. Herb. Boiss. Ser. 2, 5 : 956. 1905. *Spermacoce articularis* L. f. Suppl. Pl. 119. 1781. *S. hispida* L. Sp. Pl. 102. 1753 ; Hook. f. Fl. Brit. Ind. 3 : 200. 1881.

Erect perennial herbs ; stems hispidly hairy on angles ; leaves lanceolate – oblong.

Fl. & Fr. : August.

Garthadhar. 1100 m (351, Kala & Gaur). Lit.

2. *B. pusilla* (Wall.) DC. Prodr. 4 : 543. 1830. *Spermacoce stricta* L. f. Suppl. Pl. 120. 1781 ; Hook. f. Fl. Brit. Ind. 3 : 200. 1881.

Erect annual herbs ; stems scabrid on angles ; leaves linear – lanceolate, glabrous.

Fl. & Fr. : August – September.

Jakhmolla, Soragarh. 600 – 1500 m (42244).

4. GALIUM L.

1a. Fruits covered with hooked bristles.

2a. Leaves 3 - nerved from the base . . . *G. elegans* 5

2b. Leaves laterally nerved.

3a. Leaves 6 or 8 in a whorl.

4a. Stems smooth glabrous ... *G. asperuloides* 4

4b. Stems prickly along the angles ... *G. aparine* 2

3b. Leaves 4 in a whorl ; stems hairy or bristly ... *G. hirtiflorum* 6

1b. Fruits smooth.

5a. Leaves bristly or minutely prickly, 1.2 - 2.5 cm long. ... *G. asperifolium* 3

5b. Leaves glabrous, less than .6 cm long ... *G. acutum* 1

1. *Galium acutum* Edgew. in Trans. Linn. Soc. 20 : 61. 1846 ; Hook. f. Fl. Brit. Ind. 3 : 208. 1881.

Prostrate herbs ; stems interlaced smooth ; leaves 6, less .6 cm long ; flowers white ; fruits smooth.

Fl. & Fr. : August - October.

Bhyundar valley, Rambara. 2500 - 4000 m (29568).

2. *G. aparine* L. Sp. Pl. 108. 1753 ; Hook. f. Fl. Brit. Ind. 3 : 205. 1881.

Trailing herbs ; stems prickly ; leaves 4, linear, bristly ; flowers white, tinged green ; fruits hooked bristly.

Fl. & Fr. : August - September.

Bhyundar valley, Ghangaria. 3000 - 4000 m (29578).

3. *G. asperifolium* Wall. in Roxb. Fl. Ind. 1 : 381. 1820. *G. mollugo* non L. sensu Hook. f. Fl. Brit. Ind. 3 : 207. 1881, '*Kuri*'.

Diffuse herbs ; stems minutely prickly ; leaves 6 - 8, linear ; flowers red ; fruits smooth.

Fl. & Fr. : June - September.

Bhyundar valley, Mondal. 1000 - 4000 m (6389).

4. *Galium asperuloides* Edgew. in Trans. Linn. Soc. 20 : 61. 1846. *G. triflorum* non Michx. sensu Hook. f. Fl. Brit. Ind. 3 : 205. 1881.

Erect herbs ; stems glabrous ; leaves 6 or 8, lanceolate ; flowers white, tinged yellow ; fruits hooked bristly.

Fl. & Fr. : May – June.

Bagrigad, Ghangaria, Trijuginarayan. 1800 – 3000 m (48106).

5. *G. elegans* Wall. ex Roxb. Fl. Ind. 1 : 382. 1820. *G. rotundifolium* non L. sensu Hook. f. Fl. Brit. Ind. 3 : 204. 1881. 'Kuri'.

Trailing herbs ; leaves 4, ovate, 3 – nerved from the base ; flowers white, tinged green or yellow.

Fl. & Fr. : July – August.

Batwalchari – Narayankoti. 1500 – 2500 m (41442).

6. *G. hirtiflorum* Requier ex DC. Prodr. 4 : 600. 1830 ; Hook. f. Fl. Brit. Ind. 3 : 206. 1881. 'Kuri'.

Trailing herbs ; stems hairy or bristly ; leaves 4, linear ; flowers minute red ; fruits hooked bristly.

Fl. & Fr. : July – August.

Bhyundar valley, wan. 2500 m (29375).

5. HEDYOTIS L.

- | | | |
|--|-----|-----------------------|
| 1a. Leaves narrowly linear ; cymes sessile capitate ; capsules
hirsute | ... | <i>H. pinifolia</i> 2 |
| 1b. Leaves elliptic lanceolate ; cymes dichotomous panicled ;
capsules smooth | ... | <i>H. corymbosa</i> 1 |

1. *Hedyotis corymbosa* (L.) Lam. Encycl. Meth. 1 : 272. 1792. *Oldenlandia corymbosa* L. Sp. Pl. 119. 1753 ; Hook. f. Fl. Brit. Ind. 3 : 64 1880.

Minutely bristly slender erect herbs ; leaves 1.2 cm, acute ; flowers white, solitary or 2 – 4 in a cyme.

Fl. & Fr. : August – October.

Way to Visnuprayag. 1500 m (71062).

2. **Hedyotis pinifolia** Wall. ex G. Don, Gen. Syst. 3 : 526. 1834 ; Hook. f. Fl. Brit. Ind. 3 : 60. 1880.

Slender erect scabrid herbs ; leaves linear acuminate, bristly; capsules hispid.

Fl. & Fr. : August – September.

Langasu, across Alaknanda. 800 m (71927).

6. HYMENODICTYON Wall. nom. cons.

- | | | |
|---|-----|-----------------------|
| 1a. Racemes paniced, erect ; leaves pubescent above | ... | <i>H. excelsum</i> 1 |
| 1b. Racemes simple (rarely branched), drooping ; leaves glabrous above. | ... | <i>H. flaccidum</i> 2 |

1. **Hymenodictyon excelsum** (Roxb.) Wall. in Roxb. Fl. Ind. ed. Carey 2 : 149. 1824. *Cinchona excelsa* Roxb. Pl. Corom. 2 : 4, t. 106. 1799; Hook. f. Fl. Brit. Ind. 3 : 35. 1880.

A medium sized or large deciduous trees ; leaves elliptic ovate or obovate, oblong, 10 – 25 cm long ; flowers green.

Fl. & Fr. : June – March.

Throughout the area. 600 – 1500 m (Osmaston). Lit.

2. **H. flaccidum** Wall. in Roxb. Fl. Ind. ed. Carey, 2 : 152. 1824 ; Hook. f. Fl. Brit. Ind. 3 : 36. 1880.

Deciduous shrubs or small trees ; leaves broadly elliptic, 15 – 25 cm long ; flowers greenish – yellow.

Fl. & Fr. : March – June.

Nandprayag. 1000 m (10386).

7. HYMENOPOGON Wall.

Hymenopogon parasiticus Wall. in Roxb. Fl. Ind. ed. Carey 2 : 157. 1824 ; Hook. f. Fl. Brit. Ind. 3 : 34. 1880.

Small epiphytic shrubs ; leaves oblanceolate, crowded towards the ends ; flowers creamy white ; capsules membranous.

Fl. & Fr. : May – June.

Bhararisain. 2000 m (68119).

8. KOHOUTIA Cham. & Schlecht

- | | | |
|---|-----|----------------------|
| 1a. Flowers subsessile ; corolla - lobes oblong ; capsules oblong or subglobose ; stipules bristly | ... | <i>K. coccinea</i> 1 |
| 1b. Flowers pedicelled ; corolla - lobes linear ; capsules obovoid or hemispheric ; stipules truncate | ... | <i>K. gracilis</i> 2 |

1. **Kohoutia coccinea** Royle, Ill. Bot. Himal. 241. t. 53. 1834 – 35. *Oldenlandia coccinea* (Royle) Hook. f. Fl. Brit. Ind. 3 : 69. 1880.

Herbs ; leaves linear – lanceolate with recurved margins ; flowers scarlet.

Fl. & Fr. : August – September.

Bhyundar valley, Nandkeshri, Phata. 1500 – 2000 m (31854).

2. **K. gracilis** (Wall.) DC. Prodr. 4 : 430. 1830. *Hedyotis gracilis* Wall. in Fl. Ind. ed. Carey & Wall. 1 : 371, 1820 ; Hook. f. Fl. Brit. Ind. 3 : 68. 1880.

Leaves with revolute margins ; flowers blue.

Fl. & Fr. : August – September.

Kothiysain. 1200 m (182, Kala & Gaur). Lit.

9. LEPTODERMIS Wall.

- 1a. Corolla glabrous outside ; stems up to 7 cm in diam ; bark pale - brown, fairly smooth ... *L. lanceolata* 2
- 1b. Corolla pubescent outside ; stems up to 2.5 cm in diam ; bark dark purplish - brown or blackish, slightly rough ... *L. kumaonensis* 1

1. *Leptodermis kumaonensis* Parker in Ind. For. 48, 576. 1922 ; Osmaston, Forest Fl. Kumaon, 290. 1978 (rep. ed.).

Deciduous shrubs ; leaves variable ; lateral nerves 6 - 10 pairs ; flowers white or purplish, solitary or 3 - 5 in clusters.

Fl. & Fr. : June - November.

Hanumanchatti, Kanol, Ramni. 2500 3500 m (10133).

2. *L. lanceolata* Wall. in Roxb. Fl. Ind. 2 : 191. 1824 ; Hook. f. Fl. Brit. Ind. 3 : 198. 1881. '*Padera*'.

Deciduous shrubs ; lateral nerves 4 - 6 pairs ; flowers purplish - pink before falling.

Fl. & Fr. : June - October.

Bhyundar valley, Mondal. 100 - 2000 m (41917).

10. NEANOTIS W. H. Lewis

- 1a. Stipules with long bristles ; flowers white ; seeds angular and pitted ... *N. hirsuta* 2
- 1b. Stipules with short lateral bristles ; flowers pale - purple ; seeds peltate, reticulate ... *N. calycina* 1

1. *Neanotis calycina* (Wall. ex Hook. f.) W. H. Lewis, Ann. Miss. Bot. Gdn. 53 : 37. 1966. *Anotis calycina* Wall. ex Hook. f. Fl. Brit. Ind. 3 : 73. 1880.

Erect annual herbs, 10 – 20 cm tall ; leaves membranous thinly adpressed hairy.

Fl. & Fr. : August – September.

Guptkashi – Phata Road, 1500 – 1800 m (65332).

2. ***Neanotis hirsuta*** (L. f.) W. H. Lewis, Ann. Miss. Gdn. 53 : 38. 1966. *Oldenlandia hirsuta* L. f. Suppl. 127. 1781. *Hedyotis Stipulata* Hook. f. Fl. Brit. Ind. 3 : 63 1880.

Diffuse herbs, rooting at the nodes, 30 – 60 cm tall ; leaves dark – brown when dry, scattered hairy.

Fl. & Fr. : August – September.

Trisula 1400 m (42274).

11. OLDENLANDIA L.

- | | | |
|---|-----|-------------------------|
| 1a. Leaves linear ; margins recurved ; peduncles short ; capsules didymous | ... | <i>O. diffusa</i> 2 |
| 1b. Leaves elliptic or elliptic lanceolate ; margins flat ; peduncles equalling the leaves ; capsules obovoid | ... | <i>O. crystallina</i> 1 |

Oldenlandia crystallina Roxb. Fl. Ind. ed. Carey 1 : 422. 1820 ; Hook. f. Fl. Brit. Ind. 3 : 65. 1880.

Diffuse herbs ; leaves 1.2 – 1.8 cm, acute ; flowers white ; capsules ribbed.

Fl. & Fr. : August – October.

Paduli, 950 m (450, Kala & Gaur). Lit.

2. ***O. diffusa*** (Willd.) Roxb. Fl. Ind. ed. Carey 1 : 444. 1820. *Hedyotis diffusa* Willd. Sp. Pl. 1 : 566. 1797 ; Hook. f. Fl. Brit. Ind. 3 : 65. 1880.

Leaves glabrous nerveless ; pedicels short, stout ; capsules glabrous.

Fl. & Fr. : July – September.

Kothiyalsain. 750 m (216, Kala & Gaur). Lit.

12. OPHIORRHIZA L.

Ophiorrhiza fasciculata D. Don, Prodr. Fl. Nep. 136. 1825 ; Hook. f. Fl. Brit. Ind. 3 : 83. 1880.

Erect branched herbs ; leaves elliptic – ovate or lanceolate, membranous ; flowers white, pubescent ; capsules pubescent.

Fl. & Fr. : August – September.

Narayankoti, Okhimath. 1000 – 1500 m (38770).

13. PAVETTA L.

- | | | |
|---|-----|-----------------------|
| 1a. Cymes and corolla glabrous | ... | <i>P. indica</i> 1 |
| 1b. Cymes and corolla pubescent tomentose | ... | <i>P. tomentosa</i> 2 |

1. **Pavetta indica** L. Sp. Pl. ed. 1, 1 : 110. 1753 ; Hook. f. Fl. Brit. Ind. 3 : 150. 1880.

Large shrubs ; leaves elliptic, obovate pubescent ; flowers white, fragrant ; fruits globose black, puberulous.

Fl. & Fr. : July – September.

Batwalchhari. 1200 m (6439).

2. **P. tomentosa** Roxb. ex Sm. in Rees Cyclop. 26. no. 2. 1819. *P. indica* L. var. *tomentosa* (Roxb.) Hook. f. Fl. Brit. Ind. 3 : 150. 1880.

Large shrubs ; inflorescence and leaves beneath pubescent ; Corymbs sublateral and long peduncled.

Fl. & Fr. : May July & January February.

Nandprayag. 900 m (10392).

14. RANDIA L.

Randia tetrasperma (Roxb.) Benth. & Hook. f. ex Brandis, For. Fl. 272. 1874. *Gardenia tetrasperma* Roxb. Fl. Ind. 2 : 555. 1824 ; Hook. f. Fl. Brit. Ind. 3 : 109. 1880. '*Bhotiya Ghingaru*'.

Stiff evergreen shrubs ; leaves very variable upto 5 cm long ; flowers cream yellow ; fruits .7 cm in diameter.

Fl. & Fr. : March – May.

Mondal, Sitapur. 1500 – 2000 m (41938).

15. RUBIA L.

Rubia manjith Roxb. ex Flem. in As. Res. 11 : 177. 1810. *R. cordifolia* var. *munjista* (Roxb.) Miq. in Ann. Mus. Ludg – Bat. 3 : 111. 1867. *R. Cordifolia* non L. sensu Hook. f. Fl. Brit. Ind. 3 : 202. 1881. *p.p.*

Deciduous climbers ; leaves ovate cordate ; flowers dark red or pinkish – brown ; fruits globose, dark purple.

Fl. & Fr. : July – October.

Bhyundar valley, Mondal. Wan. 1500 3000 m (30902).

16. SPERMADICTION ROXB.

Spermadiction suaveolens Roxb. Pl. Corom. 3 : 32, t. 236. 1815. *Hamiltonia suaveolens* Roxb. Fl. Ind. 2 : 223. 1824 ; Hook. f. Fl. Brit. Ind. 3 : 197. 1881. '*Padwa* or *Padera*'.

Erect deciduous shrubs ; leaves elliptic, oblong or ovate ; flowers blue ; capsules ovoid.

Fl. & Fr. : September – November.

Way to Jakhmolla, 1800 m (42228).

17. UNCARIA Schreb. nom. cons.

Uncaria scandens (Sm.) Hutch. in Sarg. Pl. Wilson 3 : 406. 1916. *Nauclea Scandens* Sm. in Rees Cyclop. 24 : *Nauclea* n. 9. 1819. *U. pilosa* Roxb. Fl. Ind. ed. 2, 1 : 520. 1832 ; Hook. f. Fl. Brit. Ind. 3 : 32. 1880.

Evergreen shrubs ; stems climbing by means of recurved hooks ; leaves ovate or elliptic ; flowers pale greenish – white ; capsules pyriform, pubescent.

Fl. & Fr. : June – October.

Way to Nandprayag. 1000 m (44245).

18. WENDLANDIA Bartl. ex DC. nom. Cons.

- | | | |
|--|-----|----------------------|
| 1a. Stipules recurved ; lateral nerves 12 - 20 pairs | ... | <i>W. exserta</i> 1 |
| 1b. Stipules erect ; lateral nerves 10 - 12 pairs | ... | <i>W. puberula</i> 2 |

1. **Wendlandia exserta** (Roxb.) DC. Prodr. 4 : 411. 1830. *Rondeltia exserta* Roxb. Fl. Ind. 2 : 135. 1824 ; Hook. f. Fl. Brit. Ind. 3 : 37. 1880.

Small evergreen trees ; leaves ovate lanceolate, grey tomentose or pubescent beneath ; capsules grey tomentose.

Fl. & Fr. : March – May.

Occurs throughout the area upto 1800 m (Osmaston). Lit.

2. **Wendlandia puberula** DC. Prodr. 4 : 412. 1830 ; Hook. f. Fl. Brit. Ind. 3 : 37. 1880.

Large evergreen shrubs or small trees ; leaves elliptic oblong, pubescent beneath ; capsules $\pm$ glabrous.

Fl. & Fr. : May - June.

Throughout the area. 800 - 1600 m (Osmaston). Lit.

19. XEROMPHIS Rafin

Xeromphis spinosa (Thunb.) Keay in Bull. Jard. Bot. Brux. 28 : 37. 1958. *Gardenia spinosa* Thunb. Diss. Gard. no. 7. 1780. *Randia dumatorum* (Retz.) Lam. Encycl. Suppl 2 : 829. 1812 ; Hook. f. Fl. Brit. Ind. 3 : 110. 1880. 'Maidul'.

Large deciduous armed shrubs or small trees ; leaves ovate or elliptic, fascicled, $\pm$ pubescent ; flowers solitary yellow ; fruits broadly ovoid yellow $\pm$ pubescent.

Fl. & Fr. : May - September.

Lungasu across Alaknanda, Trisula. 1200 - 1500 m (44239).

75. VALERIANACEAE

- | | | |
|---|-----|-----------------------|
| 1a. Stamens 4 ; corolla tubular - campanulate ; calyx limb 5 - lobed
enlarged in fruit | ... | <i>Nardostachys</i> 1 |
| 1b. Stamens 3 ; corolla funnel shaped ; calyx pappose in fruit | ... | <i>Valeriana</i> 2 |

1. NARDOSTACHYS DC.

Nardostachys grandiflora DC. Prodr. 4 : 624. 1830. *N. jatamansi* DC. Prodr. 4 : 624. 1830 ; Hook. f. Fl. Brit. Ind. 3 : 211. 1881. 'Masi'.

Perennial erect smelling herbs ; cauline leaves, sessile, oblong or subovate ; flowers rosy ; fruits obovate, compressed.

Fl. & Fr. : August – October.

Amritganga valley, Bhuna, Hemkund. 2500 – 4000 m (31046).

2. VALERIANA L.

1a. Leaves pinnate.

2a. Glabrous herbs ; fruits glabrous ... *V. dioica* 1

2b. Herbs, pubescent below ; fruits hairy ... *V. hardwickii* 2

1b. Leaves undivided.

3a. Radical leaves long petioled, cordate, ovate, toothed ;
fruits pilose ... *V. jatamansi* 3

3b. Radical leaves petioled, orbicular or elliptic obtuse ±
entire ; fruits glabrous ... *V. pyrolaefolia* 4

1. *Valeriana dioica* L. Sp. Pl. 31. 1753, Hook. f. Fl. Brit. Ind. 3 : 211. 1881.

Decumbent stoloniferous herbs ; radical leaves long petioled, ovate ; stem leaves pinnatifid ; flowers pale – pink ; fruits glabrous.

Fl. & Fr. : May – August.

Hemkund, way to Vasukital. 3800 m (29466).

2. *V. hardwickii* Wall. in Roxb. Fl. Ind. 1 : 166. 1820 ; Hook. f. Fl. Brit. Ind. 3 : 213. 1881. '*Shami*'.

Tall erect pubescent herbs ; stem leaves pinnate ; flowers white ; corymbs axillary.

Fl. & Fr. : July – September.

Anusuya area. Gwaldam, Kedarnath. 2000 – 4000 m (29409).

3. *V. jatamansi* Jones in As. Res. 2 : 405, f. 416. 1790. *V. wallichii* DC. Prodr. 4 : 640. 1830 ; Hook. f. Fl. Brit. Ind. 3 : 213. 1881.

Pubescent herbs ; stems decumbent; radical leaves stalked, persistent ; stem leaves smaller, stalked ; flowers white tinged purple.

Fl. & Fr. : March – June.

Braham Tal. Gohna, Okhimath. 2000 – 3000 m (27202).

4. **Valeriana pyrolaefolia** Dcne. in Jacq. Voy. Bot. 85, t. 93. 1844 ; Hook. f. Fl. Brit. Ind. 3 : 212. 1881.

Pubescent herbs ; rootstock thick ; stem leaves sessile ; flowers white tinged with pink.

Fl. & Fr. : May – June.

Khankhelia, Kukinakhel. 3000 – 3200 m (48083).

76. DIPSACACEAE

- | | | |
|---|-----|-----------------------|
| 1a. Leaves prickly ; flowers in axillary clusters | ... | <i>Morina</i> 2 |
| 1b. Leaves not prickly, | | |
| 2a. Flowers in terminal heads. | | |
| 3a. Flowers white ; corolla 4 - lobed | ... | <i>Dipsacus</i> 1 |
| 3b. Flowers purple ; corolla 5 - lobed | ... | <i>Scabiosa</i> 3 |
| 2b. Flowers small, scattered in 2 - 3 - chotomous cymes | ... | <i>Triplostegia</i> 4 |

1. DIPSACUS L.

Dipsacus inermis Wall. in Roxb. Fl. Ind. 1 : 367. 1820. var. **inermis** ; Hook. f. Fl. Brit. Ind. 3 : 217, 1881.

Tall erect stiff hairy herbs ; leaves ovate or lanceolate ; flowers numerous white in herbs ; corolla pubescent.

Fl. & Fr. : July – October.

Bhyundar valley, Gwaldam, Loharjng. 1800 – 2800 m (30839).

2. MORINA L.

- 1a. Flowers white or pink.
- 2a. Calyx - lobes entire ; corolla white or faintly tinged with pink ... *M. wallichii* 3
- 2b. Calyx - lobes notched ; corolla deep pink ... *M. longifolia* 2
- 1b. Flowers yellow ... *M. coulteriana* 1

1. *Morina coulteriana* Royle, Ill. Bot. Himal. 245. 1835 ; Hook. f. Fl. Brit. Ind. 3 : 216. 1881.

Erect herbs ; leaves narrowly oblong minutely sinuated, prickly ; calyx - lobes bifid ; Corolla - tube 1.2 - 1.8 cm.

Fl. & Fr. : June - August.

Bampa. 3000 m (Duthie). Lit.

2. *M. longifolia* Wall. ex DC. Prodr. 4 : 644. 1830 ; Hook. f. Fl. Brit. Ind. 3 : 216. 1881.

Tall erect herbs ; calyx - lobes notched ; corolla - tube 2.5 cm.

Fl. & Fr. : July - September.

Amritganga valley, Ghangaria, Kheoplatal. 3000 - 4000 m (24331).

3. *M. wallichii* Royle, Ill. Bot. Himal. 345, t. 55, fig. 1. 1835. *M. persica* non L. sensu Fl. Brit. Ind. 3 : 216. 1881.

Tall erect herbs ; leaves very prickly ; flowers white or faintly tinged with pink ; calyx - lobes obovate, entire ; corolla - tube 2.5 - 3.6 cm.

Fl. & Fr. : June - August.

Bhyundar valley. 2000 - 3000 m (Smythe). Lit.

3. SCABIOSA L.

Scabiosa speciosa Royle, Ill. Bot. Himal. 245. t. 55, fig. 2. 1839 ; Hook. f. Fl. Brit. Ind 3 : 219. 1881.

Erect perennial branched, pubescent herbs : leaves oblong $\pm$ pinnatifid ; flowers bright - mauve hairy.

Fl. & Fr. : ?

Garhwal. 2500 - 3500 m (F. B. I.). Lit.

4. *TRIPLOSTEGIA* Wall. ex DC.

Triplostegia glandulifera Wall. ex DC. Prodr. 4 : 642. 1830 ; Hook. f. Fl. Brit. Ind. 3 : 215. 1881.

Branched pubescent herbs ; leaves toothed or pinnatifid ; flowers small pale - blue ; achenes shortly beaked.

Fl. & Fr. : May - August.

Kukinakhal, Vedini bugyal. 3300 - 3500 m (30984).

77. ASTERACEAE

1a. Heads simple.

2a. Heads either tubular or ligulate ; one kind of flowers only.

3a. Heads tubular.

4a. Pappus of hairs or united scales or barbed bristles.

5a. Pappus of hairs.

6a. Flowers purple or red.

7a. Involucral bracts not spiny ; leaves not prickly.

8a. Receptacle naked.

9a. Involucral bracts in several series unique.

10a. Shrubs or small trees ... *Leucomeris* 42

- 10b. Herbs.
 - 11a. Stems naked ... *Vernonia* 62
 - 11b. Stems winged ... *Laggera* 38
- 9b. Involucral bracts in one series, equal ... *Emilia* 28
- 8b. Receptacle bristly.
 - 12a. Pappus feathery.
 - 13a. Pappus hairs 1 - seriate ... *Saussurea* 49
 - 13b. Pappus hairs many seriate ... *Jurinea* 36
 - 12b. Pappus minutely barbed ... *Serratula* 51
- 7b. Involucral bracts spiny.
 - 14a. Leaves not prickly or spiny ... *Arctium* 5
 - 14b. Leaves prickly.
 - 15a. Filaments of stamens glabrous.
 - 16a. Pappus hairs 1 - seriate ... *Cousinia* 20
 - 16b. Pappus hairs many seriate ... *Silybum* 53
 - 15b. Filaments of stamens hairy ... *Carduus* 13
- 6b. Flowers yellow or white,
 - 17a. Flowers yellow (sometimes white in *Cirsium*).
 - 18a. Involucral bracts spine tipped.
 - 19a. Spines short ; pappus feathery ... *Cirsium* 18
 - 19b. Spines long, needle - like ; pappus not feathery ... *Tricholepis* 60
 - 18b. Involucral bracts not spine tipped.
 - 20a. Involucral bracts green.
 - 21a. Style arms short.
 - 22a. Herbs.
 - 23a. Anther-cells tailed ... *Blumea* 10
 - 23b. Anther-cells not tailed ... *Conyza* 19

- 22 b. Shrubs ... *Inula* 35
- 21b. Style arms very long, thread - like ... *Gynura* 33
- 20b. Involucral bracts scarious.
 - 24a. Small cottony or woolly shrubs ; heads, solitary on slender peduncles ; anthers not tailed ... *Phagnalon* 45
 - 24b. Hoary or cottony herbs; heads corymbose or fascicled ; anther - cells tailed ... *Gnaphalium* 32
- 17b. Flowers white.
 - 25a. Woolly herbs ; heads many flowered.
 - 26a. Heads in terminal clusters ... *Leontopodium* 41
 - 26b. Heads in corymbs ... *Anaphalls* 4
 - 25b. Glabrous herbs ; heads 1 - 4 flowered ... *Ainsliaea* 3
- 5b. Pappus of distinct or united scales or barbed bristles.
 - 27a. Pappus a toothed ring ; flowers pale - blue ... *Ageratum* 2
 - 27b. Pappus of 2 - barbed bristles ; flowers yellow *Bidens* 8
- 4b. Pappus none.
 - 28a. Heads heterogamous ; if homogamous, then bi-sexual.
 - 29a. Leaves pinnately lobed or divided.
 - 30a. Heads globose.
 - 31a. Marginal flowers present.
 - 32a. Heads sessile ... *Centipeda* 15
 - 32b. Heads peduncled ... *Dichrocephala* 23
 - 31b. Marginal flowers 0 ... *Soliva* 55
 - 30b. Heads in large terminal panicles or corymbs.
 - 33a. Heads very small shining in large panicles ... *Artemisia* 6
 - 33b. Heads in flat corymbs ; leaves finely divided. ... *Tanacetum* 57

- 29b. Leaves not lobed or divided.
- 34a. Leaves lanceolate or orbicular ; heads 0.5 cm in diam.
- 35a. Leaves lanceolate ; achenes ending in a short glandular beak. ... *Carpesium* 14
- 35b. Leaves orbicular ; achenes club-shaped, covered with stalked glands ... *Adenocaulon* 1
- 34b. Leaves wedge - shaped ; heads 0.4 cm or less in diam ... *Artemisia* 6
- 28b. Heads homogamous, uni-sexual ... *Xanthium* 66
- 3b. Heads ligulate.
- 36a. Pappus of simple hairs.
- 37a. Flowers yellow.
- 38a. Achenes beaked.
- 39a. Achenes beak dilated at the top ; branching herbs; heads glandular black hairy ... *Dubyaea* 25
- 39b. Achenes beak not dilated at the top ; scapigerous herbs ... *Taraxacum* 58
- 38b. Achenes not beaked.
- 40a. Receptacle hairy or bristly.
- 41a. Stems naked ; receptacles covered with long hairs ... *Crepis* 22
- 41b. Stems leafy ; receptacle covered with short hairs ... *Hieracium* 34
- 40b. Receptacle naked.
- 42a. Juice white, milky.
- 43a. Stem leaves none or few, small and stalked ... *Youngia* 65
- 43b. Stem leaves numerous, large, amplexicaule ... *Sonchus* 56
- 42b. Juice yellow ; leaf margins beset with minute white teeth ... *Launaea* 39
- 37b. Flowers blue or white.
- 44a. Root simple ; heads erect ; achenes capillary beaked ... *Lactuca* 37

- 44b. Root tuberous ; heads pendulous or drooping ; achenes not capillary beaked.
- 45a. Achenes compressed ; ribs smooth ... *Cicerbita* 17
- 45b. Achenes subterete, 3 - 5 angled. ... *Prenanthes* 47
- 36b. Pappus of feathery hairs.
- 46a. Heads numerous, corymbose ; leaves sinuate toothed ... *Picris* 46
- 46b. Heads solitary, terminal ; leaves entire ... *Tragopogon* 59
- 2b. Heads of both ligulate and tubular flowers.
- 47a. Pappus of hairs or bristles or scales.
- 48a. Pappus of hairs only.
- 49a. Flowers yellow (ligule).
- 50a. Involucral bracts in several series unequal.
- 51a. Leaves stalked.
- 52a. Ligules minute ... *Conyza* 19
- 52b. Ligules conspicuous.
- 53a. Involucral bracts many seriate.
- 54a. Heads small in scorpioid cyme ... *Solidago* 54
- 54b. Heads large, solitary, corymbose or panicles ... *Inula* 35
- 53b. Involucral bracts 2 - seriate ; heads large, long-peduncled ... *Doronicum* 24
- 51b. Leaves sessile ; heads long stalked ... *Vicoa* 63
- 50b. Involucral bracts in 1 - series, equal, a few smaller at the base.
- 55a. Erect branched herbs ; heads solitary or in racemes, corymbs or panicles.
- 56a. Leaves variously divided or single without sheathing base ... *Senecio* 50

- 56b. Leaves broad, orbicular, reniform; cauline leaves with large sheaths ... *Ligularia* 43
- 55b. Scapigerous herbs, woolly ... *Cremanthodium* 21
- 49b. Flowers lilac or white (ligule).
- 57a. Scapigerous herbs.
- 58a. Involucral bracts woolly outside; pappus rough white ... *Gerbera* 31
- 58b. Involucral bracts glabrous outside; pappus smooth brown ... *Leibnitia* 40
- 57b. Escapigerous herbs.
- 59a. Ligules less than 1 cm long, very many in 2 - 3 series.
- 60a. Ligules minute; glandular herbs ... *Brachyaetis* 11
- 60b. Ligules as long or longer than pappus; eglandular herbs ... *Erigeron* 29
- 59b. Ligules longer than 1 cm; ray florets generally in 1 - series or sometimes absent ... *Aster* 7
- 48b. Pappus of bristles or scales.
- 61a. Receptacle naked.
- 62a. Pappus of 3 - 8 caducous bristles; heads small; achenes beaked ... *Rhynchospermum* 48
- 62b. Pappus of reddish - brownish flattened rigid bristles; heads large ... *Waltheria* 64
- 61b. Receptacle paleaceous.
- 63a. Pales flat not enclosing flowers.
- 64a. Leaves simple; involucral bracts free.
- 65a. Pappus of horn - like spines ... *Acanthospermum* 67
- 65b. Pappus of scales or hairs.
- 66a. Pappus of long plumose hairs ... *Tridax* 61
- 66b. Pappus of ciliate scales ... *Galinsoga* 30

- 63b. Pales not flat enclosing flowers or flower.
- 67a. Pales folded, each enclosing several flowers ... *Eclipta* 27
- 67b. Pales concave, each enclosing single flower ... *Blainvillea* 9
- 64b. Leaves compound.
- 68a. Leaves 3 - foliolate, pinna-tipartite ; involucral bracts connate at the base ... *Bidens* 8
- 68b. Leaves pinnate ; leaflets 7 - 15 acutely serrate; involucres cylindric ... *Tagetes* 67
- 47b. Pappus. none.
- 69a. Leaves ovate, lanceolate or triangular.
- 70a. Involucral bracts glandular ... *Siegesbeckia* 52
- 70b. Involucral bracts not glandular ... *Myriactis* 44
- 69b. Leaves pinnatisect ; segments linear ... *Chrysanthemum* 16
- 1b. Heads compound.
- 71a. Heads terminal ; leaves prickly ... *Echinops* 26
- 71b. Heads axillary ; leaves not prickly ... *Caesulia* 12

1. ADENOCAULON Hook.

Adenocaulon himalaicum Edgew. in Trnn. Linn. Soc. 20 : 64. 1846.
A. bicolor auct. non Hook. Sensus. Hook. f. Fl. Brit. Ind. 3 : 302. 1881.

Erect herbs ; stems and branches grey cottony hairy ; achenes covered with stalked glands.

Fl. & Fr. : August - September.

Zabrya (Tungnath). 3280. m (Semwal. & Gaur). Lit.

2. *AGERATUM* L.

- 1a. Corolla .25 cm long ; involucre bracts linear - setaceous,
densely hairy. ... *A. houstonianum* 2
- 1b. Corolla .15 cm long, involucre bracts linear, sharply acute -
acuminate, sparsely hairy ... *A. conyzoides* 1

1. *Ageratum conyzoides* L. Sp. Pl. ed. 1, 839. 1753 ; Hook. f. Fl. Brit. Ind. 3 : 243. 1881.

Hispidly hairy herbs ; leaves ovate crenate ; heads pale-blue or white ; achenes black.

Fl. & Fr. : May - September.

Bedubgad. 900 m (26850).

2. *A. houstonianum* Mill. Dict. ed. 8. n. 2. 1768 ; Robinson, Proc. Amer. Acad. Arts Sci. 49 : 454 - 483. 1913.

Annual herbs, sometimes rooting at the base ; leaves ovate - trinagular, thinly hairy ; heads violet ; achenes hairy.

Fl. & Fr. : April - October.

Gopeswar. 1350 m (72, Kala & Gaur). Lit.

3. *AINSLIAEA* DC.

- 1a. Leaf stalks not winged ; heads in small clusters ... *A. aptera* 1
- 1b. Leaf stalks winged ; heads in spikes. ... *atifolia* 2

1. *Ainsliaea aptera* DC. Prodr. 7 : 14. 1838 ; Hook. f. Fl. Brit. Ind. 3 : 388. 1881.

Tall erect herbs ; leaves ovate or orbicular ; heads greenish - white.

Fl. & Fr. : May – September.

Bhyundar valley, Kakinakhal. 2800 – 4000 m (37226).

2. *Ainsliaea latifolia* (D. Don) Sch. Bip in *Pöblichia* 18–19 : 169. 1861. *Liatris latifolia* D. Don, *Prodr. Fl. Nep.* 169. 1825. *A. pteropoda* DC. *Prodr.* 7 : 14. 1838 ; Hook. f. *Fl. Brit. Ind.* 3 : 388. 1881.

Tall erect tomentose herbs ; leaves silky ovate ; stalks winged ; heads purplish – white.

Fl. & Fr. : March – April.

Okhimath. 2000 m (27214).

4. ANAPHALIS DC.

1a. Involucral bracts acute, spreading in flowers.

2a. Heads 1.2 - 2.5 cm in diam.

3a. Leaves 1.2 - 5 cm long ; involucral bracts ovate - lanceolate.

4a. Lower leaves spatulate $\frac{1}{2}$ amplexicaule ... *A. cuneifolia* 4

4b. Lower leaves obovate - spatulate, contracted at the base ... *A. nepalensis* 6

3b. Leaves 5 - 10 cm long ; involucral bracts ovate - lanceolate acute ... *A. triplinervis* 8

2b. Heads .6 - .8 cm in diam.

5a. Root very stout, woody, twisted, divided into many short branches bearing linear spatulate leaves ; flowering stem scape like ; involucral bract with a broad brown claw ... *A. xylorrhiza* 10

5b. Root woody not twisted stems many ; involucral bracts white ... *A. royleana* 7

1b. Involucral bracts, obtuse, erect in flowers.

6a. Leaves lanceolate.

7a. Leaves thin, lower surface cinnamomum - red or grey... *A. margaritacea* 5

7b. Leaves thick ; lower surface white ... *A. adnata* 1

6b. Leaves linear.

- 8a. Leaves 3.8 - 5 cm. long.
 9a. Basal lobes long decurrent ; involucre bracts,
 elliptic - oblong, .2 - .25 cm long ... *A. busua* 2
 9b. Basal lobes narrow apiculate ; involucre bracts
 linear - oblong, .4 cm long ... *A. virgata* 9
 8b. Leaves 1.2 - 2.5 cm long ; basal lobes short ... *A. contorta* 3

1. *Anaphalis adnata* Wall. ex DC. Prodr. 6 : 274. 1838 ; Hook. f. Fl. Brit. Ind. 3 : 282. 1881.

Tall robust herbs ; leaves thick, broadly lanceolate or spatulate, white beneath.

Fl. & Fr. : September - October.

Bhyundar valley, Gauri - kund, Mondal. 1500 - 2000 m (41901).

2. *A. busua* (Buch. Ham. ex D. Don) DC. Prodr. 6 : 275. 1838. *Gnaphalium busua* Buch. - Ham. ex D. Don, Prodr. Fl. Nep. 173. 1825. *A. araneosa* DC. Prodr. 6 : 275. 1838 ; Hook. f. Fl. Brit. Ind. 3 : 283. 1881.

Tall herbs ; stems winged ; leaves linear, 3 - 5 cm long.

Fl. & Fr. : September - October.

Alkapuri base, Bhyundar valley. 1500 - 3500 m (30897).

3. *A. contorta* (D. Don) Hook. f. Fl. Brit. Ind. 3 : 284. 1881. var. *contorta*. *Antennaria contorta* D. Don in Bot. Reg. 7 : t. 605. 1821.

Decumbent branched herbs ; leaves crowded linear, 1 - 3 cm long.

Fl. & Fr. : August - October.

Amritganga and Bhyundar valleys, Gwaldam. 1800 - 3500 m (42209).

4. *A. cuneifolia* (DC) Hook. f. Fl. Brit. Ind. 3 : 280. 1881. *Antennaria triplinervis* var. *cuneifolia* DC. Prodr. 6 : 270. 1838.

Softly woolly or cottony herbs ; stems many ; leaves linear - oblong, or obovate oblong, 2.5 - 5 cm long.

Fl. & Fr. : August - October.

Bhyundar valley. 2500 m (33136).

5. *Anaphalis margaritacea* (L.) Benth. in Benth. & Hook. f. Gen. Pl. 2 : 303. 1873. *Gnaphalium margaritaceum* L. Sp. Pl. 850. 1753. *A. margaritacea* Benth & Hook. subsp. *angustior* Kitamura in Mem. Coll. Sc. Kyoto Imp. Univ. 13 : 243. 1937. *A. cinnamomea* Cl. Comp. Ind. 104. 1876 ; Hook. f. Fl. Brit. Ind. 3 : 281. 1881.

Robust leafy herbs ; leaves thin, narrowly lanceolate, grey tomentose beneath.

Fl. & Fr. : September -- October.

Bhyundar valley, Loharjung, Wan. 2500 – 2500 m (30848).

6. *A. nepalensis* (Spreng.) Hand. – Maz. Symb. Sin. 1099. 1936. *Helichrysium nepalensis* Spreng. Syst. Veg. 3 : 485. 1826. *A. nubigena* DC. Prodr. 6 : 272. 1838 ; Hook. f. Fl. Brit. Ind. 3 : 279. 1881.

Dwarf herbs, softly woolly or cottony ; stems simple ; leaves elliptic or lanceolate ; head solitary, rarely few.

Fl. & Fr. : July – August.

Malari, Gothing. 2500 – 4000 m (55938).

7. *A. royleana* DC. Prodr. 6 : 272. 1838 ; Hook. f. Fl. Brit. Ind. 3 : 280. 1881.

Herbs with woody root ; stems many ; leaves linear or linear oblong, woolly ; heads 1. 2 – 2 cm in diam.

Fl. & Fr. : September – October.

Bhyundar valley. Brahma Tal. 3000 – 4000 m (30893).

8. *A. triplinervis* (Sims) Cl. Comp. Ind. 105. 1876. *Antennaria triplinervis* Sims in Bot. Mag. 51 : t. 2465. 1824 ; Hook. f. Fl. Brit. Ind. 3 : 281. 1881.

Stems robust, unbranched ; leaves 3 – 5 nerved, broadly ovate, tipped black point.

Fl. & Fr. : August – October.

Anusuyia area, Gwaldam, Loharjung. 1500 3000 m (30914).

9. *A. virgata* Thoms. ex Cl. Comp. Ind. 107. 1876 ; Hook. f. Fl. Brit. Ind. 3 : 285. 1881.

Rootstock woody ; stems slender erect, many, woolly ; leaves linear ; invol. bracts linear – oblong.

Fl. & Fr. : June – July.

Mana and Vasudhara valleys. 3500 m (2855).

10. *Anaphalis xylorhiza* Sch. – Bip ex Hook. f. *Fl. Brit. Ind.* 3 : 281. 1881.

Root twisted ; stems many, spreading brown woolly ; leaves linear – spathulate.

Fl. & Fr. : August – October.

Way to Dunagiri glacier. 3600 m (54130).

5. *ARCTIUM* L.

Arctium lappa L. *Sp. Pl.* 816. 1753 ; Hook. f. *Fl. Brit. Ind.* 3 : 359. 1881.

Tall coarse herbs ; leaves ovate – cordate, cottony beneath ; heads purple ; achenes ribbed, hooked.

Fl. & Fr. : July – August.

Malari proper. 3000 m (55936).

6. *ARTEMISIA* L.

1a. Heads heterogamous.

2a. Receptacle naked.

3a. Disc flowers, bi-sexual, sterile.

4a. Leaves wedge - shaped, tips toothed or lobed ... *A. japonica* 4

4b. Leaves pinnately lobed or divided ; leaf segments thread - like.

5a. Heads, secund in slender paniced raceme ... *A. capillaris* 2

5b. Heads in spike clusters or solitary suberect ... *A. stricta* 9

3b. Ray and disc flowers, all fertile.

6a. Leaf segments and wing of rachis closely pinnatifid.

- 7a. Heads hemispheric, 6 - 10 flowered. ... *A. vestita* 10
- 7b. Heads broadly hemispheric, 12 - 20 flowered ... *A. gmelinii* 3
- 6b. Leaf segments entire ; wing of rachis entire.
- 8a. Rootstock not creeping, shrubs like ... *A. nilagarica* 7
- 8b. Rootstock creeping, herb like ... *A. roxburghiana* 8
- 2b. Receptacle covered with long hairs.
- 9a. Annual dwarf, hoary - tomentose herbs, 10 - 20 cm tall; leaves 1.2 cm long ... *A. macrocephala* 5
- 9b. Perennial, hairy - pubescent, very aromatic herbs, 30-90 cm. tall ; leaves 2.5 - 5 cm long ... *A. absinthium* 1
- 1b. Heads homogamous ; flowers all fertile ; stems, strict, woody or wiry ; heads reddish ... *A. maritima* 6

1. *Artemisia absinthium* L. Sp. Pl. 848. 1753 ; Hook. f. Fl. Brit. Ind. 3 : 328. 1881.

Aromatic silky hoary herbs ; leaves 2 - 3 pinnatifid ; heads brown - yellow.

Fl. & Fr. : September - October.

Near Bhyundar village. 2500 m (33128).

2. *A. capillaris* Thunb. Fl. Jap. 309. 1784. *A. scoparia* Waldst. & Kit. Pl. Hangar. 1 : 66. t. 65. 1802 ; Hook. f. Fl. Brit. Ind. 3 : 323. 1881. '*Jhyon*'.

Faintly scented, slender branched herbs ; leaves pinnatisect ; segments linear ; heads minute, green.

Fl. & Fr. : September - October.

Nandprayag, across Alaknanda. 800 m (71097).

3. *A. gmelinii* Web. ex Stechm. Dissert de Artem. 30. 1775. *A. sacrorum* Ledeb. in Mem. Acad. Petersb. 5 : 571. 1815 ; Hook. f. Fl. Brit. Ind. 3 : 326. 1881. '*Kala - purcha*'.

Erect hairy, undershrubs ; leaves long - petioled, pinnatisect ; heads pale - green.

Fl. & Fr. : August - September.

On way Geoldong. Malari. 3000 - 5000 m (55993).

4. *Artemisia japonica* Thunb. Fl. Jap. 310. 1784. *A. parviflora* Roxb. Fl. Ind. 3 : 420. 1832 ; Hook. f. Fl. Brit. Ind. 3 : 322. 1881. '*Kunza or pati*'.

Tall erect hairy or $\pm$ glabrous herbs ; leaves wedge - shaped ; heads greenish - white.

Fl. & Fr. : September - October.

Bhyundar valley. Chamoli, Jakhmolla. 1300 - 2600 m (18259).

5. *A. macrocephala* Jacq. ex Besser in Bull. Soc. Nat. Moscow 9 : 28. 1836 ; Hook. f. Fl. Brit. Ind. 3 : 329. 1881.

Dwarf hoary - tomentose herbs ; leaves 2 - pinnatisect ; segments linear ; heads pale - green.

Fl. & Fr. : August - September.

Geoldong proper. 5000 m (56278).

6. *A. maritima* L. Sp. Pl. 846. 1753 ; Hook. f. Fl. Brit. Ind. 3 : 223. 1881. '*Safed - purcha*'

Deciduous $\pm$ white woolly shrubs ; leaves 2 - pinnatisect ; segments linear ; heads yellowish.

Fl. & Fr. : June - October.

Malari. Vasudhara valley. 3800 m (2883).

7. *A. nilagirica* (Cl.) Pamp. in Novou. Giorn. Bot. Ital. n. s. 33 : 452. 1926. *A. vulgaris* var. *nilagirica* Cl. Comp. Ind. 162. 1876. *A. vulgaris* non L. sensu Hook. f. Fl. Brit. Ind. 3 : 325. 1881. '*Kunzu*'.

Erect subdeciduous shrubs ; upper leaves sessile, linear - lanceolate ; heads brownish - yellow.

Fl. & Fr. : August - October.

Way to Anusuyia, Bhyundar valley. 600 - 3000 m (10478).

8. *A. roxburghiana* Basser in Bull. Soc. Nat. Moscow 9 : 57. 1836. *A. glauca* Pall. in DC. Prodr. 6 : 97. 1837 ; Hook. f. Fl. Brit. Ind. 3 : 322. 1822.

Rootstock creeping ; stems simple ; leaves 2 - 3 pinnatifid ; heads purple.

Fl. & Fr. : August - September.

Bhyundar valley. 2700 m (29657).

9. *Artemisia stricta* Edgew. in Linn. Soc. 20 : 73. 1846 ; Hook. f. Fl. Brit. Ind. 3 : 323. 1881.

Laxly villous prostrate herbs ; radical leaves less divided ; heads small green.

Fl. & Fr. : August – September.

Gothing. 4200 m (56221).

10. *A. vestita* Wall. ex DC. Prodr. 6 : 106. 1837 ; Hook, f. Fl. Brit. Ind. 3 : 326. 1881.

Hoary pubescent tall herbs ; leaves fern – like, 2 – pinnate, white tomentose beneath.

Fl. & Fr. : September – October.

Bhyundar valley. Gaurikund. 2000 m (8751).

7. ASTER L.

- | | | |
|---|-----|------------------------------|
| 1a. Shrubs, deciduous, .60 - 1.2 m high | ... | <i>A. albescens</i> 1 |
| 1b. Herbs. | | |
| 2a. Dwarf, stoloniferous pubescent herbs | ... | <i>A. stracheyi</i> 4 |
| 2b. Erect non stoloniferous herbs. | | |
| 3a. Stems simple. | | |
| 4a. Slender erect herbs, 10 - 30 cm high ; involucre bracts linear, acute | ... | <i>A. tibeticus</i> 6 |
| 4b. Robust erect herbs, 30 - 45 cm high ; involucre bracts lanceolate leafy | ... | <i>A. diplostephloides</i> 2 |
| 3b. Stems corymbosely branched above. | | |
| 5a. Leaves on winged stalk | ... | <i>A. peduncularis</i> 3 |
| 5b. Leaves nearly sessile | ... | <i>A. thomsoni</i> 5 |

1. *Aster albescens* (DC.) Hand. – Maz. in Acta. Hort. Gotheb. 12 : 205. 1938. *Amphiraphis albescens* DC. Prodr. 5 : 343. 1836. *Microglosa*

albescens (DC.) Benth. ex Cl. Comp. Ind. 59. 1876 ; Hook. f. Fl. Brit. Ind. 3 : 257. 1881.

Stout shrubs ; leaves lanceolate, entire ; heads lilac ; achenes puberulus.

Fl. & Fr. : June – October.

Vasudhara. 3600. m (2885).

2. *Aster diplostephioides* (DC.) Cl. Comp. Ind. 45. 1876. *Heterochaete diplostephioides* DC. Prodr. 5 : 282. 1836 ; Hook. f. Fl. Brit. Ind. 3 : 251. 1881.

Robust, villous erect herbs ; leaves lanceolate or oblanceolate, entire ; heads solitary, purple ; pappus reddish.

Fl. & Fr. : August – October.

Bhyundar valley. 3000 – 3500 m (29566).

3. *A. peduncularis* Wall. ex Nees Gen. et. Sp. Ast. 24, 1832. subsp. *peduncularis* Griseb Notes, Royle, Bot. Gdn. Edinb. 76 – 165. 1964. *A. asperulus* Nees Aster. 281. 1832 ; Hook Fl. Brit. Ind. 3 : 352. 1881.

Erect branching herbs ; stems glabrous ; leaves ovate or lanceolate ; stalks winged ; heads light purple ; achenes hairy.

Fl. & Fr. : July – November.

Way to Jakhmolla, Phata. 1500 – 2500 m (42217).

4. *A. stracheyi* Hook. f. Fl. Brit. Ind. 3 : 250. 1881.

Small stoloniferous hairy herbs ; leaves obovate – spathulate or oblong ; heads violet.

Fl. & Fr. : August – September.

Ramni up 3500 m (44275).

5. *A. thomsonii* Cl. Comp. Ind. 48. 1876 ; Hook. f. Fl. Brit. Ind. 3 : 252. 1882.

Hairy herbs ; leaves $\pm$ sessile, ovate, toothed ; heads solitary.

Fl. & Fr. : August – September.

Garhwal. 3900 m (Rau). Lit.

6. *A. tibeticus* Hook. f. Fl. Brit. Ind. 3 : 285. 1881.

Slender erect, pubescent herbs ; cauline leaves, sessile, linear – oblong, obtuse ; heads solitary, rarely 2 – 3 ; achenes glabrescent.

Fl. & Fr. : August – September.

Laptal. 5000 m (Duthie). Lit.

8. BIDENS L.

- | | | |
|--|-----|------------------------|
| 1a. Heads discoid ; leaves digitately 3 - lobed ; pappus of usually two bristles | ... | <i>B. tripartita</i> 2 |
| 1b. Heads radiate ; leaves 1 - pinnate ; pappus of usually three barbed bristles | ... | <i>B. pilosa</i> 1 |

1. *Bidens pilosa* L. Sp. Pl. 832. 1753 ; Cl. Comp. Ind. 140. 1876 ; Hook. f. Fl. Brit. Ind. 3 : 309. 1881.

Erect herbs ; leaves 1-pinnate ; heads radiate ; ligules white.

Fl. & Fr. : September – October.

Bhyundar valley, Mondal. Soragarh, 600 – 2500 m (24534).

2. *B. tripartita* L. Sp. Pl. ed. 1, 831. 1753 ; Hook. f. Fl. Brit. Ind. 3 : 309. 1881.

Erect herbs ; leaves digitately 3 – 5 lobes ; heads white – yellow.

Fl. & Fr. : August – October.

Wan. 2300 m (30878).

9. BLAINVILLEA Cass.

Blainvillea acmella (L.) Philipson in Blumea 6 : 350. 1950. *verbesina acmella* L. Sp. Pl. 901. 1753. *B. latifolia* (L. f.) DC. in Wt. Contrb. Bot. Ind. 135. 1876 ; Hook. f. Fl. Brit. Ind. 305. 1881.

Roughly pubescent herbs ; lower leaves opposite, upper leaves alternate ; heads yellow or white ; achenes 3-angled.

Fl. & Fr. : August.

Chamoli - Chamnau. 900 m (261, Kala & Gaur). Lit.

10. BLUMEA DC.

- | | | |
|--|-----|-----------------------|
| 1 a. Receptacles densely short hairy around the pits ; heads peduncled | ... | <i>B. laciniata</i> 2 |
| 1b. Receptacles glabrous ; if hairy, then the plants shrubby. | | |
| 2a. Pappus pale red on drying | ... | <i>B. aromatica</i> 1 |
| 2b. Pappus - hairs white or dirty white. | ... | <i>B. mollis</i> 3 |

1. **Blumea aromatica** DC. Prodr. 5 : 446. 1836 ; Hook. f. Fl. Brit. India 3 : 270. 1881.

Herbs or undershrubs ; stems woody at base, viscid tomentose ; leaves obovate to elliptic - lanceolate ; corolla yellow.

Fl. & Fr. : January - February.

Nigol valley on way. 1600 m (63720).

2. **B. laciniata** (Wall. ex Roxb.) DC. Prodr. 5 : 436. 1836. *Conyza laciniata* Wall. ex Roxb. Fl. Ind. 3 : 427. 1832 ; Hook. f. Fl. Brit. Ind. 3 : 264. 1881.

Stout erect pubescent herbs ; leaves large membranous, lyrate ; heads yellow ; achenes ribbed silky.

Fl. & Fr. : April.

Rudraprayag. 600 m (26758).

3. **B. mollis** (Don) Merr. in Philip. Jour. Sci. Bot. 5 : 395. 1910. *Erigeron molle* D. Don, Prodr. Fl. Nep. 172. 1825, *B. wightiana* DC. in Wt. Contnb. 1836 Hook. f. Fl. Brit. Ind. 3 : 261. 1881.

Softly glandular hairy herbs ; leaves ovate – linear, lobed ; heads discoid pale – yellow.

Fl. & Fr. : April.

Rudraprayag environs. 600 m (26784).

11. BRACHYACTIS Ledeb.

- | | | |
|---|-----|-----------------------|
| 1a. Leaves oblong - lanceolate or ovate serrate ; upper sessile, $\frac{1}{2}$ amplexicaule ; lower long petioled | ... | <i>B. anomalum</i> 1 |
| 1b. Leaves obovate toothed narrowed into the petiole. | | |
| 2a. Stems glandular hirsute ; heads subsecund, .8 cm in diam ; involucre bracts oblong - lanceolate acute | ... | <i>B. roylei</i> 3 |
| 2b. Stems glandular pubescent ; heads not subsecund, 1.2 cm in diam ; involucre bracts oblong, mucronate subacute | ... | <i>B. pubescens</i> 2 |

1. *Brachyactis anomalum* (DC.) Kitamura in Fl. E. Himal. 3 : 113. 1975. *Erigeron anomalum* DC. Prodr. 5 : 293. 1836. *B. menthadora* Benth. in Hook. Ic. Pl. 12 : t. 1106. 1872 ; Hook f. Fl. Brit. Ind. 3 : 253. 1881.

Tall erect glandular – pubescent herbs ; cauline leaves decurrent ; heads pale – blue ; achenes – glabrous.

Fl. & Fr. : August – October.

Bhyundar valley. Kukinakhal. 3500 – 4000 m (35889).

2. *B. pubescens* (DC.) Aitch. & Cl. in Journ. Linn. Soc. 18 : 68. 1880. excl. spec. *Conyza pubescens* DC. Prodr. 5 : 381. 1836. *B. robusta* Benth. in Hook. Ic. Pl. 12 : 6 Sub. t. 1106. 1872 ; Hook. f. Fl. Brit. Ind. 3 : 254. 1881.

Decumbent robust herbs ; leaves obovate, toothed ; heads with yellow disc florets.

Fl. & Fr. : September. – October.

Bhyundar valley. 3800 m (24414).

3. *B. roylei* (DC.) Wendelbo in Nytt. Mag. Bot. 1 : 62. 1952.

Conyza roylei DC. Prodr. 5 : 381. 1836. *B. umbrosa* Benth. in Hook. Ic. 1872 ; Hook. f. Fl. Brit. Ind. 3 : 253. 1881.

Glandular hirsute herbs ; stems branched from the base ; heads pale-white.

Fl. & Fr. : August – September.

Malari. 3000 m (55994).

12. CAESULIA Roxb.

Caesulia axillaris Roxb. Corom. 1 : 64. t. 93. 1798 ; Hook. f. Fl. Brit. Ind. 3 : 291. 1881.

Stout, glabrous, prostrate or suberect herbs ; leaves sessile, acuminate at both ends ; heads sessile, axillary, brownish – white.

Fl. & Fr. : August – September.

Langasu, across Alaknanda. 800 m (71951).

13. CARDUUS L.

Carduus edelbergii Rech. f. Sym. Afghan. 2 : 175. 1955. *C. nutans* non L. sensu Hook. f. Fl. Brit. Ind. 3 : 361. 1881.

Robust erect rough herbs ; stems grooved, winged ; leaves pinnately lobed ; heads crimson.

Fl. & Fr. : August – September.

Malari, Mana. 3000 – 3500 m (10557).

14. CARPESIUM L.

- 1a. Heads 1.2 - 2.5 cm in diam, solitary, terminal, nodding ... *C. nepalensis* 2
 1b. Heads not more than 1.2 cm in diam, numerous, axillary ... *C. abrotanoides* 1

1. *Carpesium abrotanoides* L. Sp. Pl. 860. 1753 ; Hook. f. Fl. Brit. Ind. 3 : 301. 1881.

Tall erect herbs ; leaves sessile, lanceolate ; heads numerous yellow ;

Fl. & Fr. : August – September.

Nizmolla, 800 – 2000 m (70910).

2. *C. nepalensis* Less. in Linnaea 234. 1831. *C. cernuum* non L. sensu Hook. f. Fl. Brit. Ind. 3 : 301. 1881

Tall erect pubescent herbs ; leaves lanceolate ; heads solitary yellow ; invol. bracts leaf like.

Fl. & Fr. : August – October.

Bhyundar valley, Mondal. 1500 – 2500 m (41910).

15. CENTIPEDA L.

Centipeda minima (L.) A. Br. & Aschers. Ind. Sem. Hort. Berol. App. 6. 1867. *Artemisia minima* L. Sp. Pl. 249. 1753. *C. orbicularis* Lour. 1790 ; Hook. f. Fl. Brit. Ind. 3 : 317. 1881. 'Nakchik.'

Densely leafy much branched prostrate herbs ; leaves spatulate – oblong, rounded or obtuse ; heads greenish – white.

Fl. & Fr. : August – September.

Gopeswar College Campus, 1350 m (239, Kala & Gaur). Lit.

16. CHRYSANTHEMUM L.

Chrysanthemum nubigenum (DC.) Hand - Maz. Symb. sin. 7 : 1113. 1936. *Tanacetum nubigenum* DC. Prodr. 6 : 130. 1830 ; Hook. f. Fl. Brit. 3 : 318. 1881.

Tufted hoary herbs ; heads orange - yellow ; invol. bracts woolly.

Fl. & Fr. : September - October.

Bhyundar valley, Vasudhara. 3500 m (10538).

17. CICERBITA Wallr.

1a. Leaves membranous.

2a. Stems prostrate or tufted much branched ; outer involucrel bracts lanceolate ... *C. macrorhiza* 3

2b. Stems short, stout, erect ; outer involucrel bracts linear or 0 ... *C. lessertiana* 2

1b. Leaves not membranous ; stems tall leafy ; heads panicle racemes ... *C. cyanea* 1

1. *C. cyanea* (D. Don) Beauv. in Bull. Soc. Bot. Genev. Ser. 2, 2 : 132. 1910. *Sonchus cyanus* D. Don, Prodr. Fl. Nep. 164. 1825. *Lactuca hastata* DC. Prodr. 7 : 139. 1838 ; Hook. f. Fl. Brit. Ind. 3 : 407. 1881.

Tall robust herbs ; leaves variable smooth, pinnately lobed ; heads dark blue ; achene beak half as long as the body.

Fl. & Fr. : September - October.

Bhyundar Valley, near Tungnath. 2500 - 4000 m (24245).

2. *C. lessertiana* DC. Prodr. 7 : 251. 1838. *Lactuca lessertiana* (Wall. ex DC.) Cl. Comp. Ind. 270. 1876 ; Hook. f. Fl. Brit. Ind. 3 : 408. 1881.

Perennial glabrous herbs ; stems stout, short or 0 ; leaves narrowly oblanceolate, entire ; heads blue, invol. bracts blackish hairy.

Fl. & Fr. : September – October.

Bhyundar valley. 3800 m (24359)

3. *Cicerbita macrorhiza* (Royle) Beauv. in Bull. Soc. Bot. Genev. ser. 2, 2 : 134. 1910. *Mulgedium macrorhizum* Royle, Ill. Bot. Himal. 251. t. 61, 1835. *Lactuca macrorhiza* (Royle) Hook. f. Fl. Brit. Ind. 3 : 408. 1881.

Glabrous prostrate herbs ; leaves thin pinnately lobed ; heads grey blue ; achenes black when ripe.

Fl. & Fr. : August – October.

Bhyundar valley, Brahmtal. 2500 – 4000 m (24285).

18. *CIRSIIUM* Mill.

- | | | |
|---|-----|-----------------------|
| 1a. Involucral bracts all spinulose ; inner not dilated at the tip ;
corolla 2.5 cm long | ... | <i>C. verutum</i> 1 |
| 1b. Inner involucral bracts with dilated tips ; corolla 1.6 cm long.. | | <i>C. wallichii</i> 2 |

1. *Cirsium verutum* (D. Don) Spreng. Syst. Veg. 3 : 370. 1826. *Cnicus verutus* D. Don, Prodr. Fl. Nep. 167. 1825. *C. argyracanthus* (DC.) Cl. comp. Ind. 218. 1876 ; Hook. f. Fl. Brit. Ind. 3. 362. 1881.

Erect robust, rough herbs ; leaf margins uniformly spiny ; flowers pale – yellow or white ; pappus white.

Fl. & Fr. : September – October.

Brahm Tal, Vediti Bugyal. 3500 – 4000 m (30910).

2. *C. wallichii* DC. Prodr. 6 : 643. 1837. *Cnicus wallichii* (DC.) Cl. Comp. Ind. 219. 1876 ; Hook. f. Fl. Brit. Ind. 3 : 363. 1881. 'Kandelya'.

Robust branched herbs ; leaf margins not uniform spiny ; flowers dull - yellow.

Fl. & Fr. : May – October.

Birhi – Gohna, Kanara – Mohan Khal. 1500 – 3000 m (10030).

19. CONYZA Lees.

- 1a. Heads discoid, hairy in close corymbs ... *C. japonica* 4
- 1b. Heads minutely radiate or radiate in large corymbs or panicles.
- 2a. Heads very small, .3 cm in diam ... *C. stricta* 5
- 2b. Heads .4 - 1.5 cm in diam.
- 3a. Herbs not viscid.
- 4a. Leaves lanceolate; ligules scarcely exceeding the pappus; involucre glabrous or nearly so ... *C. canadensis* 2
- 4b. Leaves linear; ligules slightly exceeding the pappus; involucre usually hirsute ... *C. bonariensis* 1
- 3b. Herbs viscid; leaves elliptic - oblong ... *C. leucantha* 3

1. *Conyza bonariensis* (L.) Cronquist in Bull. Torr. Bot. Club. 70 : 632. 1943. *Erigeron bonariensis* L. Sp. Pl. 863. 1753. *E. linifolius* Willd. Sp. Pl. 3 : 1955. 1803; Hook. f. Fl. Brit. Ind. 3 : 254. 1881.

Sparsely hairy much branched herbs; leaves crowded, sessile, linear; heads small pale - purple or white.

Fl. & Fr. : April - September.

Loharjung. 2300 m (30888).

2. *C. canadensis* (L.) Cronquist in Bull. Torr. Bot. Club. 70 : 632. 1943. *Erigeron canadensis* L. Sp. Pl. 863. 1753; Hook. f. Fl. Brit. Ind. 3 : 254. 1881.

Erect slender branching herbs; leaves narrow linear or linear lanceolate; heads yellow.

Fl. & Fr. : May - October.

Trijuginarayan. 2000 m (48002).

3. *C. leucantha* (D. Don) Ludlow & Raven in Kew Bull. 1963 : 71. 1963. *Erigeron leucanthum* Buch. Ham. ex D. Don, Prodr. Fl. Nep. 171. 1825. *C. Viscidula* Wall ex DC. Prodr. 5 : 383. 1836; Hook. f. Fl. Brit. Ind. 3 : 258. 1881.

Branched herbs, ± 1 m tall ; leaves narrowed at both ends ; achenes thinly hairy.

Fl. & Fr. : August - September.

Gopeswar, 1350 m (217, Kala & Gaur). Lit.

4. *Conyza japonica* (Thunb.) Less. ex DC. Prodr. 5 : 289. 1836.
Enigeron japonicum Thunb. Fl. Jap. 312. 1784 ; Hook. f. Fl. Brit. Ind. 3 : 258. 1881.

Softly hairy tufted herbs ; leaves crowded ; heads pale - yellow.

Fl. & Fr. : March. - October.

Mondal, 1650 m (43927).

5. *C. stricta* Willd. Sp. Pl. 3 : 1922. 1803 ; Hook. f. Fl. Brit. Ind. 3 : 258. 1881.

Hoary pubescent leafy branched herbs ; leaves pinnately lobed ; heads minutely radiate.

Fl. & Fr. : August - October.

Bhyundar valley, Mondal, Phata, 1500 - 2500 m (41905).

20. COUSINIA Cass.

Cousinia thomsonii Cl. Comp. Ind. 213. 1876 ; Hook. f. Fl. Brit. Ind. 3 : 360. 1881.

Stout erect cottony herbs ; leaves pinnatifid, white cottony beneath ; heads pink ; achenes glabrous.

Fl. & Fr. : July - August.

Geoldong, way to Niti, 3800 - 5000 m (56269).

21. CREMANTHODIUM Benth.

1a. Herbs, 10 - 15 cm high ; radical leaves oblong or sub orbicular ; heads erect

...

C. nanum 3

1b. Herbs, 15 - 25 cm high ; heads nodding.

2a. Radical leaves reniform ... *C. decaisnei* 2

2b. Radical leaves oblanceolate obovate ... *C. arnicoides* 1
forma *maximowiczii*

1. *Cremanthodium arnicoides* forma *maximowiczii* R. Good, Journ. Linn. Soc. 48 : 293. 1929. *Senecio arnicoides* var. *frigida* Hook. f. Fl. Brit. Ind. 3 : 351. 1881.

Dwarf, stout herbs ; radical leaves coriaceous ; heads solitary.

Fl. & Fr. : June - August.

Niti, Rajhoti, 4500 - 5000 m (Duthie). Lit.

2. *C. decaisnei* Cl. Comp. Ind. 168. 1876 ; Hook. f. Fl. Brit. Ind. 3 : 331. 1881.

Short scapigerous herbs ; radical leaves reniform, coriaceous, white tomentose beneath ; heads yellow.

Fl. & Fr. : June - October.

Bhyundar valley. 2500 - 3000 m (Smythe). Lit.

3. *C. nanum* (Dcne.) W. W. Sm. in Notes Roy. Bot. Gdn. Edinb. 14 : 118. 1924. *Ligularia nana* Dcne. in Jacq. Voy. 4 (Bot.) : 91. t. 99. 1844. *Werneria nana* (Dcne.) Benth. in Benth. & Hook. f. Gen. Pl. 2 : 451. 1873; Hook. f. Fl. Brit. Ind. 3 : 357. 1881.

Stout herbs ; radical leaves broadly oblong or orbicular, entire ; heads solitary, yellow.

Fl. & Fr. : June - August.

Chorhoti, Rajhoti. 5000 - 5500 m (Duthie). Lit.

22. CREPIS L.

Crepis sancta (L.) Bab. in Univ. Calif. Publ. Bot. 19 : 403. 1941. *Hieracium Sanctum* L. cent. Pl. 2 : 30. 1756. *Pterotheca falconeri* Hook. f. in Fl. Brit. Ind. 3 : 399. 1882.

Erect herbs ; stems slender, glandular upwards ; radical leaves pinnatifid ; Spathulate or obovate ; achenes red.

Fl. & Fr. : May – August.

Wan. 2500 m (37219).

23. DICHROCEPHALA L' Herit. ex DC.

Dichrocephala integrifolia (L. f.) Kuntz. Rev. Gen. Pl. 333. 1891. *Hippia integrifolia* L. f. Suppl. Pl. 389. 1781. *D. latifolia* DC. in Wt. Contrib. bot. Ind. 11. 1834 ; Hook. f. Fl. Brit. Ind. 3 : 245. 1881.

Erect branching herbs ; leaves pinnatifid ; heads white-yellow.

Fl. & Fr. : April – June.

Dhotidhar, Masoli. 1700 – 2000 m (44221).

24. DORONICUM L.

Doronicum roylei DC. Prodr. 6 : 321. 1838 ; Hook. f. Fl. Brit. Ind. 3 : 332. 1881.

Tall erect hairy or villous herbs ; leaves broadly ovate ; heads glandular pubescent, yellow.

Fl. & Fr. : June – October.

Amritganga valley, Baradeoldunga. 3000 – 4000 m (42130).

25. DUBYAEA DC.

Dubyaea hispida DC. Prodr. 7. 247. 1838. *Hieracium hispidum* D. Don, Prodr. Fl. Nep. 165. 1825, nom. illegit. non Forssk. 1755. *Lactuca dubyaea* Cl. 1876 ; Hook. f. Fl. Brit. Ind. 3 : 409. 1881.

Perennial robust hispid herbs ; leaves hastate or ovate - oblong, petiole winged ; heads black - glandular hairy, yellow,

Fl. & Fr. : August - October.

Rhyundar valley. Kedarnath. 3500 - 4500 m (29592).

26. ECHINOPS L.

Echinops cornigerus DC. Prodr. 6 : 525. 1838 ; Hook. f. Fl. Brit. Ind. 3 : 358. 1881.

Tall erect branched herbs ; leaves pinnatifid, segments spiny ; invol. bracts many, hairy.

Fl. & Fr. : September - October.

Gaurikund. 2200 m (8734).

27. ECLIPTA L.

Eclipta prostrata (L.) L. Mant. Pl. 2 : 286. 1771. *Verbesina prostrata* L. Sp. Pl. 902. 1753. *E. alba* (L.) Hassk. Fl. Jav. Rav. 528. 1848 ; Hook. f. Fl. Brit. Ind. 3 : 304. 1882.

Prostrate, decumbent ascending herbs ; leaves sessile, ovate - lanceolate, elliptic - oblong ; heads white.

Fl. & Fr. : September - October.

Gopeswar. 1350 m (406, Kala & Gaur). Lit.

28. EMILIA Cass.

Emilia sonchifolia (L.) DC, in Wt. Contrib. 24. 1884. *Cacalia Sonchifolia* L. Sp. Pl. 835. 1753 ; Hook. f. Fl. Brit. Ind. 3 : 336. 1881.

Erect glabrous or scabrid herbs ; lower leaves lyrate pinnatifid : heads purple.

Fl. & Fr. : April – May.

Birhi. 1000 m (27221).

29. ERIGERON L.

- 1a. Heads yellowish - green ... *E. floribundus* 2
- 1b. Heads purple or violet - blue.
- 2a. Heads 2.5 - 5 cm in diam ; ligules far exceeding the pappus ... *E. multiradiatus* 3
- 2b. Heads less than 1.5 cm in diam. ; ligules slightly exceeding the pappus ... *E. alpinus* 1

1. **Erigeron alpinus** L. Sp. Pl. 264. 1753 ; Hook. f. Fl. Brit. Ind. 3 : 255. 1882.

Erect hairy or glabrate herbs ; cauline leaves obovate or oblong ; heads subsolitary hispid ; invol. bracts subulate – lanceolate.

Fl. & Fr. : July – September.

Bhyundar valley, Punh village, Vasudhara. 1800 – 3000 m (24556).

2. **E. floribundus** (H. B. K.) Sch. – Bip. Bull. Soc. Bot. Fr. 12 : 81. 1865. *Conyza floribunda* H. B. K. Nov. Gen. Sp. 4 : 73. 1820.

Erect herbs ; heads yellowish – green.

Fl. & Fr. : September – October.

Loharjung. 2300 m (30888), Tungnath. 3700 m (37973).

3. **E. multiradiatus** (Lindl. ex DC.) Cl. Comp. Ind. 56. 1876. *Stenactis multiradiata* Lindl. ex DC. Prodr 5 : 299. 1836 ; Hook. f. Fl. Brit. Ind. 3 : 256. 1881.

Erect herbs ; stems hairy ; leaves sessile, ovate – lanceolate ; heads long stalked, purple.

Fl. & Fr. : August – September.

Bhyundar valley, Bhuna. 2500 – 3500 m (29529).

30. GALINSOGA Ruiz & Pavon

Galinsoga parviflora Cav. Icon. Descr. Pl. 3 : 41, t. 281. 1795; Hook. f. Fl. Brit. Ind. 3 : 311. 1881.

Erect weak herbs ; leaves opposite, ovate – lanceolate ; heads white – yellow.

Fl. & Fr. : May – October.

Bhyundar valley. 2500 m (23633).

31. GERBERA L.

- | | | |
|---|-----|-----------------------|
| 1a. Heads 3 cm in diam ; invol. bracts 4 - 5 seriate | ... | <i>G. gossypina</i> 1 |
| 1b. Heads .7 - 1.3 cm in diam involucral bracts 2 - 3 seriate | ... | <i>G. pusilla</i> 2 |

1. **Gerbera gossypina** (Royle) Beauv. Bull. Soc. Bot. Gen. Ser. 2, 2 : 40. 1910. *Chaptalia gossypina* Royle, Ill. Bot. Himal. 251. t. 59. f. 2. 1835. *G. lanuginosa* (DC.) Sch. – Bip in Flora (Regensb.) 27 : 180. 1844 ; Hook. f. Fl. Brit. Ind. 3 : 390. 1881. 'Kapasi'.

Scapigerous large herbs ; leaves lanceolate 6 – 15 cm long.

Fl. & Fr. : June – August.

Bhyundar valley, Mondal area. 1500 – 2500 m (44185).

2. **G. pusilla** (Wall. ex DC.) Goel et Bhattacharyya in Journ. Jap. Bot. 57 (4) : 114 – 117. 1982. *Oreoseris pusilla* Wall. ex DC. Prodr 7 : 17.

1838. *G. lanuginosa* (Wall. ex DC). Sch - Bip. var. *pusilla* (Wall. ex DC.) Hook. f. Fl. Brit. Ind. 3 : 390. 1881.

Scapigerous small herbs ; leaves oblong obovate, 1 - 4 cm long including petiole.

Fl. & Fr. : May - June.

Badrinath valley 3400 m (2878).

32. GNAPHALIUM L.

- | | | |
|---|-----|------------------------|
| 1a. Heads in leafy spikes ; pappus hairs connate at the base | ... | <i>G. purpureum</i> 3 |
| 1b. Heads in corymbose leafless culsters ; pappus hairs free at the base. | | |
| 2a. Leaves spatulate, both surfaces woolly | ... | <i>G. affine</i> 1 |
| 2b. Leaves linear, upper surface green, glabrous, lower woolly | ... | <i>G. hypoleucum</i> 2 |

1. **Gnaphalium affine** D. Don, Prodr. Fl. Nep. 173. 1825. *G. luteoalbum* var. *multiceps* (Wall. ex DC.) Hook. f. Fl. Brit. Ind. 3 : 288. 1881.

Tufted branched herbs ; leaves spatulate, woolly ; heads golden - yellow.

Fl. & Fr. : May - October.

Agastamuni, Bhyundar valley. 1500 - 2500 m (44009).

2. **G. hypoleucum** DC. in Wt. Contrb. 21. 1834 ; Hook. f. Fl. Brit. Ind. 3 : 288. 1881.

Robust pubescent - woolly much branched herbs ; leaves linear, glabrous above.

Fl. & Fr. : May - September.

Soragarh. 600 m (6306).

3. **G. purpureum** L. Sp. Pl. 854, 1753 ; Hook. f. Fl. Brit. Ind. 3 : 289. 1881.

Rootstock stout ; stems many ; leaves spathulate, tips broadly rounded ; pappus hairs cohering at the base.

Fl. & Fr. : April – May.

Kanara – Mohankhal. 2100 m (27248).

33. GYNURA Cass.

Gynura Cusimbua (Don) S. Moore in Journ. Bot. 1 : 212. 1912. *Cacalia cusimbua* D. Don, Prodr. Fl. Nep. 179. 1825. *Gynura angulosa* Wall. ex DC. Prodr. 6 : 298. 1838 ; Hook. f. Fl. Brit. Ind. 3 : 344. 1881.

Tall glabrous branched herbs ; leaves obovate, oblanceolate or oblong, sessile, auricled ; heads yellow.

Fl. & Fr. : September – October.

Trijuginaryan. 2500 m (8754).

34. HIERACIUM L.

Hieracium umbellatum L. Sp. Pl. 804. 1753 ; Hook. f. Fl. Brit. Ind. 3 : 400. 1881.

Erect glabrous herbs ; leaves narrowly lanceolate ; heads yellow ; invol. bracts with curved tips.

Fl. & Fr. : August – September

Dunagiri. 3400 m (54117).

35. INULA L.

- 1a. Heads discoid, 1.8 cm in diam, sometimes with a few very short ligules ... *I. cappa* 1
- 1b. Heads radiate.
- 2a. Herbs perennial.
- 3a. Heads 5 - 7 cm in diam, ligule, narrow, long ; achenes $\pm$ glabrous ... *I. grandiflora* 3
- 3b. Heads 1.8 - 2.5 cm. in diam ; ligule short and broad ; achenes silky hairy ... *I. nervosa* 4
- 2b. Shrubs.
- 4a. Lateral nerves 8 - 12 pairs ; heads 1 - 1.25 cm in diam ... *I. cuspidata* 2
- 4b. Lateral nerves 4 - 6 pairs ; heads 2.5 - 3 cm in diam. ... *I. rubricaulis* 5

1. *Inula cappa* (Buch - Ham. ex D. Don) DC. Prodr. 5 : 469. 1836. *Conyza cappa* Buch. Ham. ex D. Don, Prodr. Fl. Nep. 176. 1825 ; Hook. f. Fl. Brit. Ind. 3 : 295. 1881. 'Tamagari'.

Silky tomentose shrubs ; leaves thick, oblong - lanceolate ; achenes silky.

Fl. & Fr. : March - October.

Bhyundar valley, Nandkeshri, Tungnath. 1200 - 20000 m (18247).

2. *I. cuspidata* (DC.) Cl. in Comp. Ind. 125. 1876. *Amphiraphis cuspidata* DC. Prodr. 5 : 343. 1836 ; Hook. f. Fl. Brit. Ind. 3 : 296. 1881.

Shrubs ; branches slender ; leaves elliptic - lanceolate ; heads yellow, .8 cm in diam.

Fl. & Fr. : April - October.

Bhyundar valley, Guarikund - Phata. 1500 - 3000 m (42041).

3. *I. grandiflora* Willd. Sp. Pl. 3 : 2096. 1800 ; Hook. f. Fl. Brit. Ind. 3 : 294. 1881.

Bristly hairy erect herbs ; leaves sessile, lanceolate, glandular toothed ; heads solitary yellow.

Fl. & Fr. : August – September.

Bhyundar valley, Gaurikund – Rambara. 2500 – 3500 m (35856).

4. *Inula nervosa* Wall. ex DC. Prodr. 5 : 471. 1836 ; Hook. f. Fl. Brit. Ind. 3 : 293. 1881.

Glandular – pubescent herbs ; leaves membranous, elliptic lanceolate ; heads greenish – yellow.

Fl. & Fr. : September – October.

Mandoli. 2500 m (30832).

5. *I. rubricaulis* (DC.) Cl. Comp. Ind. 120. 1876 : *Amphiraphis rubricaulis* DC. Prodr. 5 : 343. 1836 ; Hook f. Fl. Brit. Ind. 3 : 296. 1882.

Glabrous shrubs ; branches slender ; heads yellow, 1.7 cm in diam.

Fl. & Fr. : March – June.

Occurs throughout the hills. 800 – 2000 m (Osmaston). Lit.

36. JURINEA Cass.

1a. Heads 2.5 - 3.8 cm in diam ; achene angles ending in spines ;
pappus white ... *I. ceratocarpa* 2

1b. Heads 1.6 - 2.5 cm in diam ; achene angles tubercled ; pappus
brown ... *I. dolmaiea* 2

1. *Jurinea ceratocarpa* (Dcne.) Benth. in Gem. Pl. 2 : 474. 1873.
Saussurea ceratocarpa Dcne. in Jacq. Voy Ind. 93, t. 101, 1844 ; Hook. f.
Fl. Brit. Ind. 3 : 378. 1881.

Stems 0 – 60 cm ; leaves 5 – 15 cm long ; pappus white ; achenes
rough brown.

Fl. & Fr. : July – August.

Gothing proper. 4000 m (56231).

2. *Jurinea dolomiaea* Boiss. Fl. Or. Suppl. 311. 1888. *J. macrocephala* (Royle) Cl. Comp. Ind. 237. 1876 ; Hook. f. Fl. Brit. Ind. 3 : 378. 1881. non DC. 'Dhoop'.

Stems 0 ; leaves 15 - 45 cm long ; pappus brown ; achenes ashy grey.

Fl. & Fr. : August - October.

Amritganga valley. 4000 m (42150).

37. LACTUCA L.

- | | | |
|--|-----|---------------------------|
| 1a. Stems 15 - 45 cm tall ; flowers pale-blue ; beak twice as long as its achenes | ... | <i>L. dissecta</i> 1 |
| 1b. Stems more 90 cm tall ; flowers blue - purple ; beak not longer than its achenes | ... | <i>L. dolichophylla</i> 2 |

1. *Lactuca dissecta* D. Don, Prodr. Fl. Nep. 164. 1825 ; Hook. f. Fl. Brit. Ind. 3 : 405. 1881.

Tufted glabrous erect herbs ; leaves pinnatifid ; heads pale - blue ; achenes 3 - ribbed.

Fl. & Fr. : April - August.

Mandoli. 2100 m (37209).

2. *L. dolichophylla* Kitamura in Fl. E. Himal. 341. 1966. *L. longifolia* DC. Prodr. 7 : 135. 1838 ; Hook. f. Fl. Brit. Ind. 3 : 405. 1881.

Tall erect branched herbs ; leaves entire, amplexicaule ; heads blue - purple.

Fl. & Fr. : August - October.

Bhyundar valley, Phata - Trijuginaryan. 2000 - 3000 m (33159).

38. LAGGERA Sch. - Bip.

- 1a. Stem wings entire ... *L. alata* 1
 1b. Stem wings lobed, pinnatifid ... *L. pterodonta* 2

1. *Laggera alata* (D. Don) Sch. - Bip. ex Oliv. Trans. Linn. Soc. 29 : 94. 1873. *Erigeron alatum* D. Don, Prodr. Fl. Nep. 171. 1825 ; Hook. f. Fl. Brit. Ind. 3 : 271. 1881.

Tall glandular - pubescent herbs ; stems winged with the decurrent leaf bases ; heads purple.

Fl. & Fr. : October.

Batwalchari. 1000 m (6471).

2. *L. pterodonta* (DC.) Sch. - Bip. ex Oliv. Trans. Linn. Soc. 29 : 94. 1873. *Blumea pterodonta* DC. in Wt. Contrib. 16. 1834 ; Hook. f. Fl. Brit. Ind. 3 : 271. 1881.

Much branched, strongly aromatic, viscid herbs ; stem wings dentate ; achenes long hairy.

Fl. & Fr. : January - February.

Nigol valley on way. 1600 m (63720).

39. LAUNAEA Cass.

Launaea procumbens (Roxb.) Ramayya & Rajgopal in Kew Bull. 23 (3) : 465. 1969. *Prenanthes procumbens* Roxb. Fl. Ind. 3 : 404. 1832. *L. nudicaulis* non (L.) Hook. f. sensu Burkill in Rec. Bot. Surv. Ind. 4 : 117. 1910.

Perennial herbs ; juice yellow ; heads yellow ; achenes as long as the pappus.

Fl. & Fr. : April - May.

Chandrapuri. 900 (26869).

40. LEIBNITZIA Cass.

Leibnitzia nepalensis (Kuntz.) Kitamura in Journ. Jap. Bot. 14 : 297. 1938. *Cleistanthium nepalense* Kuntz. in Bot. Zeit. 9 : 350. 1851. *Gerbera kunzeana* A. Br. & Aschers in App. Fl. Nov. H. Berol. 1871 : 3. 1871 ; Hook. f. Fl. Brit. Ind. 3 : 390. 1881.

Herbs, 10 – 20 cm ; Heads cylindric ; invol. bracts glabrous outside ; pappus smooth, brown ; achenes hairy.

Fl. & Fr. : September – October.

Amritganga valley. 3500 m (42136).

41. LEONTOPODIUM R. Br.

- 1a. Densely tufted woolly herbs ; flowering stems densely leafy ;
outermost involucre bracts densely pale-white woolly ... *L. himalayanum* 1
- 1b. Rootstock thick ; stoloniferous woolly herbs ; flowering stems
almost naked or with 1 or few leaves ; outermost involucre leaves
grey-white ... *L. jacotianum* 2

1. **Leontopodium himalayanum** DC. Prodr. 6 : 276. 1838. *L. alpinum* non Cass. sensu Hook. f. Fl. Brit. Ind. 3 : 279. 1881, *p. p.*

Perennial woolly herbs ; leaves sessile, entire ; heads white with leaf-like bracts at the base.

Fl. & Fr. : August – October.

Bhyundar valley, Kedarnath. 3500 m (24274).

2. **L. jacotianum** Beauv. in Bull. Bot. Geneve Ser. 2, 1 : 190. 373. 1909 ; Kitamura in Fl. Nep. Himal. 262. 1955.

Small, matted, stoloniferous woolly herbs.

Fl. & Fr. : June – October.

Bhyundar valley, 3500–4000 m (Smythe). Lit.

42. LEUCOMERIS Don

Leucomeris spectabilis D. Don, Prodr. Fl. Nep. 170. 1825 ; Hook. f. Fl. Brit. Ind. 3 : 386. 1881.

Shrubs ; branches stout, grooved ; leaves elliptic, densely velvety tomentose beneath ; pappus pale.

Fl. & Fr. : April. – June.

Bhuna-Gohna. 1500 m (10023).

43. LIGULARIA Cass.

- | | | |
|--|-----|---------------------------|
| 1a. Heads many, corymbose or in corymbose racemes ; involucrel bracts 8, connate below | ... | <i>L. amplexicaulis</i> 2 |
| 1b. Heads in simple or rarely branched racemes or solitary. | | |
| 2a. Involucrel bracts 8 - 10, free at the base ; pappus reddish | ... | <i>L. sibirica</i> 3 |
| 2b. Involucrel bracts 14 - 16, connate to the base ; pappus white | ... | <i>L. arnicoides</i> 2 |

1. **Ligularia amplexicaulis** DC. Prodr. 6 : 314. 1838. *L. Corymbosa* DC. Prodr. 6 : 314. 1838. *Senecio amplexicaulis* Wall. ex Cl. Comp. Ind. 204. 1876 ; Hook. f. Fl. Brit. Ind. 3 : 348. 1881.

Tall glabrous thick herbs ; leaves large reniform ; petiole winged ; heads yellow.

Fl. & Fr. : August – October.

Amritganga valley, Hemkund on way. 3500-4000 m (42099).

2. **L. arnicoides** DC. Prodr. 6 : 314. 1834. *Senecio arnicoides* (Royle) Cl. in Comp. Ind. 207. 1876 non Hook. et. Arn. 1841 ; Hook. f. Fl. Brit. Ind. 3 : 351. 1881.

Leaves oblong, ovate or elliptic ; cauline leaves sessile amplexicaule.

Fl. & Fr. : August – October.

Dunagiri on way, Gothing, Kedarnath. 2500-4000 m (56179).

Ligularia sibirica Cass. in Dic. Sci. Nat. 26. 401. 1823. *Senecio ligularia* Hook. f. Fl. Brit. Ind. 3 : 349. 1881, *p.p.*

Leaves cordate-sagitate or reniform ; pappus reddish.

Fl. & Fr. : August.

Hemkund on way. 3500 m (29530).

44. MYRIACTIS Less.

Myriactis nepalensis Less. in Linnaea 6 : 128. t. 2F. 1831. *M. walli-chii* Less. in Linnaea 6 : 129. 1831 ; Hook. f. Fl. Brit. Ind. 3 : 247. 1881.

Branched pubescent herbs; leaves ovate or lanceolate; stalks winged; heads white yellow.

Fl. & Fr. : August – October.

Bhyundar valley. Bhuna, Gwaldam. 1700–3800 m (30814).

45. PHAGNALON Cass.

Phagnalon niveum Edgew. in Trans. Linn. Soc. 20 : 68. 1846 ; Hook. f. Fl. Brit. Ind. 3 : 288. 1881.

White cottony slender shrubs ; leaves obovate, elliptic or oblong, white cottony beneath ; heads yellow.

Fl. & Fr. : August. – September.

Way to Dunagiri. 2600 m (54057).

46. PICRIS L.

Picris hieracioides L. Subsp. **Kaimaensis** Kitamura in Act. Phytotax. Geobot. 8 : 127. 1939. *P. hieracioides* non L. sensu Hook. f. Fl. Brit. Ind. 3 : 393. 1881.

Erect herbs, rough with stiff, hooked hairs ; leaves narrowly lanceolate ; invol. bracts black hairy ; heads yellow ; achene transversely wrinkled.

Fl. & Fr. : August – September.

Jumma area, Malari. 2500–3000 m (55924).

47. PRENANTHES L.

1a. Stems upto 1.8 m tall ; heads many, paniced.

2a. Leaves deltoid, very membranous ; achenes narrow towards both ends ... *P. sikkimensis* 2

2b. Leaves polymorphous ; achenes slightly contracted at the tip ... *P. brunoniana* 1

1b. Stems upto 45 cm tall ; heads few solitary, long stalked ; leaves triangular ... *P. violaeifolia* 1

1. **Prenanthes brunoniana** Wall. ex DC. Prodr. 7 : 195. 1881. *Cicerbeta brunoniana* (Wall. ex Cl.) Tuisl ex Reich. f. in Fl. Iranica, 122 : 182. 1977. *Lactuca brunoniana* Cl. Comp. Ind. 266. 1876 ; Hook. f. Fl. Brit Ind. 3 : 411. 1881.

Smooth or rough tall erect herbs ; leaves various ; flowers purple or white.

Fl. & Fr. : August – September.

Bhuna, Bhyundar valley. 3000–3500 m (33122).

2. **P. sikkimensis** Hook. f. Fl. Brit. Ind. 3 : 412. 1881.

Tall erect herbs ; stems very slender ; leaves membranous glabrous ; heads purple ; achenes large fusiform.

Fl. & Fr. : September – October.

Bhyundar valley, Pandukeswar. 1800–2500 m (10421).

3. ***Prenanthes violaeifolia*** Dcne. in Jacq. Voy. 4 (Bot.) : 100, t. 108. 1844. *Cicerbita violaeifolia* (Dcne.) Beauv. in Bull. Soc. Bot. Geneve Ser. 2, 2 : 122. 1910 ; Hook. f. Fl. Brit. Ind. 3 : 412. 1881.

Tall robust herbs ; leaves variable smooth, pinnately lobed ; heads dark-blue ; achene beak about half as long as the body.

Fl. & Fr. : August – October.

Brahma Tal, Laxmiban, Tungnath. 2800–3500 m (10499).

48. **RHYNCHOSPERMUM** Reinwardt.

Rhynchospermum verticillatum Reinwardt. in Syll. Pl. Nov. Ratisbon 2 : 8. 1826 ; Hook. f. Fl. Brit. Ind. 3 : 248. 1881.

Tall pubescent erect herbs ; leaves lanceolate, long pointed ; heads white – yellow.

Fl. & Fr. : July – October.

Phata. 1700 m (35844).

49. **SAUSSUREA** DC.

1a. Woolly or cottony herbs ; stems 0 or simple, branched above ; achenes truncate or crowned with a cup or rim

2a. Heads $\pm$ enclosed in the inflated, bladdery membranous veined uppermost leaves.

3a. Stems 15 - 45 cm tall ; pappus brown ... *S. obvallata* 15

3b. Stems 7 - 15 cm very stout ; pappus white ... *S. bracteata* 5

- 2b. Heads not enclosed in the inflated bladdery uppermost leaves.
- 4a. Heads solitary or few.
- 5a. Stems very short or obsolete.
- 6a. Heads sessile or subsessile amongst the leaves ; leaves glabrous or sparsely hairy beneath.
- 7a. Herbs with stems ; leaf margins entire ; bracts densely hairy at tips ... *S. Sudhanshui* 19
- 7b. Stemless herbs ; leaf margins toothed ; bracts scarious ... *S. atkinsonii* 3
- 6b. Heads on an erect elongate quite simple or leafy peduncles, 2.5 - 15 cm long; leaves pinnatifid white beneath.
- 8a. Achenes glabrous ... *S. taraxacifolia* 20
- 8b. Achenes muricate ... *S. leontodontoides* 14
- 5b. Stems elongate, 15 - 45 cm.
- 9a. Leaves lanceolate ; heads tomentose, 3.6 - 5 cm in diam; anther tails woolly ... *S. roylei* 17
- 9b. Leaves linear ; heads silky, 2.5 - 3.6 cm in diam ; anther tails fimbriate ... *S. graminifolia* 11
- 4b. Heads in dense or numerous branched corymbs or clustered.
- 10a. Heads subglobose in sessile axillary or terminal clusters; outer pappus feathery ... *S. lappa* 13
- 10b. Heads corymbose or numerous in branched corymbos.
- 11a. Simple leafy herbs, outer pappus bristles few or many, scabrid ... *S. piptathera* 16
- 11b. Tall leafy herbs, corymbosely branched above; pappus very slender ; outer bristles 0.
- 12a. Heads erect or suberect ; receptacle bristles long.
- 13a. Leaves lyrate - pinnatifid ; achenes 5 - angled.
- 14a. Achenes muricate ... *S. heteromalla* 12
- 14b. Achenes glabrous smooth ... *S. abnormis* 1
- 13b. Leaves entire or subpinnatifid ; achenes 4 - angled ... *S. albescens* 2
- 12b. Heads inclined, nodding ; receptacle bristles very long.

- 15a. Leaves $\pm$ membranous, serrulate toothed or lyrate - pinnatifid.
 - 16a. Involucral bracts, glabrous, ciliate ; pappus brown ... *S. auriculata* 4
 - 16b. Involucral bracts hoary ; pappus white ... *S. deltoidea* 7
 - 15b. Leaves uniform, thick, oblong, or oblong-lanceolate, finely toothed ; involucral bracts glabrous, dark brown ; pappus pale - white ... *S. fastuosa* 8
- 1b. Densely woolly herbs ; stems simple, clavate ; heads often concealed by woolly floral leaves ; achenes crowned by the hardened disc.
 - 17a. Stems prominent ; leaves sessile linear, pinnatifid or remotely toothed.
 - 18a. Stems, 15 - 30 cm tall ; heads concealed ; involucral bracts linear - oblong ... *S. gossypiphora* 10
 - 18b. Stems, 10 - 15 cm tall ; heads exposed ; involucral bracts lanceolate ... *S. simpsoniana* 11
 - 17b. Dwarf densely tufted herbs ; stems 0 or very short ; leaves obovate - lanceolate, entire obscurely toothed.
 - 19a. Pappus and involucral hairs brown - black ; stems elongate ... *S. gnaphaloides* 9
 - 19b. Pappus and involucral hairs dirty - white ; stems $\pm$ 0 ... *S. chthonocephala* 6

1. *Saussurea abnormis* Lipsch, in Bot. Journ. U.R.S.S. 56 : 826. 1971. *S. neglecta* Ludlow in Bull. Brit. Mus. (Nat. Hist.) Bot. 5 : 279, t. 33A, f. 4, 1976.

Rootstock long thick ; herbs erect ; leaves variable, broadly ovate - deltoid, with unequal bases, under surface white cotony ; heads 2.5 - 3 cm diam, pinkish - purple.

Fl. & Fr. : July - August.

Niti village along Dhaul. River. 3800 m (56137). Rare.

2. *S. albescens* (DC.) Sch. - Bip. in Linnaea 19 : 330. 1846. *Aplotaxis albescens* DC. Prodr. 6 : 540. 1838 ; Hook. f. Fl. Brit. Ind. 3 : 374. 1881.

Tall erect herbs ; stems slender cottony ; leaves narrowly lanceolate $\pm$ pinnately lobed ; heads pale - red, 5 - 6 flowered.

Fl. & Fr. : September - October.

Bhyundar valley, Kedarnath - Rambara. 2800 - 3500 m (33120).

3. *Saussurea atkinsoni* Cl. Comp. Ind. 226. 1876 ; Hook. f. Fl. Brit. Ind. 3 : 367. 1881.

Glabrous herbs ; stems 0 ; leaves 3 - 5, petioled or sessile, broadly ovate or elliptic membranous toothed ; pappus brown.

Fl. & Fr. : August - October.

Garhwal. 3000 - 4500 m (Falconer). Lit.

4. *S. auriculata* (DC.) Sch. - Bip. in Linnaea 19 : 331. 1846. *Aplotaxis auriculata* DC. Prodr. 6 : 541. 1838. *S. hypoleuca* Hook. f. Fl. Brit. Ind. 3 : 374. 1881.

Tall erect herbs ; stem leaves pinnately lobed ; heads solitary, globose, dark purple.

Fl. & Fr. : September - October.

Amritganga and Bhyundar valleys. 3000 - 4000 m (42129).

5. *S. bracteata* Dcne. in Jacq. Voy. Inde 94, Pl. 102. 1844 ; Hook. f. Fl. Brit. Ind. 3 : 366. 1881.

Dwarf puberulous herbs ; leaves linear - lanceolate ; heads solitary, large subsilky ; invol. bracts black.

Fl. & Fr. : July - September.

Mana ridge. 4500 - 5500 m (Som Dev. s. n.).

6. *S. chthonocephala* Barnm. in Fedde Rep. Beih. 108. 59. 1839. *S. glacialis* Herder, Bull. Soc. Nat. Mosc. 40 : 144. 1867.

Small woolly perennials ; stems $\pm$ 0 ; heads pale - pink ; pappus brown.

Fl. & Fr. : September - October.

Roopkund. 4800 m (30957).

7. *S. deltoidea* (DC.) Sch. - Bip. in Linnaea 19 : 331. 1846. *Aplotaxis deltoidea* DC. Prodr. 6 : 541. 1838 ; Hook. f. Fl. Brit. Ind. 3 : 374. 1881.

Tall erect herbs ; leaves very large, white beneath ; heads very broad nodding ; invol. bracts hoary, purple margined.

Fl. & Fr. : July – August.

Niri. 2000 – 3500 m (Duthie). Lit.

8. *Saussurea fastuosa* (Dcne.) Sch. – Bip. in *Linnaea* 19 : 331. 1846. *Aplotaxis fastuosa* Dcne. in Jacq. *Voy. Bot.* 97. t. 105. 1844. *S. denticulata* Wall. ex cl. comp. Ind. 234. 1876 ; Hook. f. *Fl. Brit. Ind.* 3 : 375 ; non Ledeb.

Tall erect herbs, branched above ; leaves uniform, sessile ; heads solitary and terminal, dark brown ; pappus pale – brown.

Fl. & Fr. : September – October.

Bhyundar valley. 3000 – 3500 m (24275).

9. *S. gnaphalodes* (Royle ex DC.) Sch. – Bip. in *Linnaea* 19 : 331. 1846. *Aplotaxis gnaphalodes* Royle ex DC. *Prodr.* 6 : 542. 1838. *S. sorocephala* (Schrenk) Sch. Bip. in *Linnaea* 19 : 331. 1846 ; Hook. f. *Fl. Brit. Ind.* 3 : 377. 1881.

Dwarf, densely tufted, woolly herbs ; leaves obovate, lanceolate, silky ; heads dirty brown ; pappus black.

Fl. & Fr. : August – September.

Bhyundar valley. 3500 – 4500 m (Smythe). Lit.

10. *S. gossypiphora* D. Don, *Prodr. Fl. Nep.* 168. 1825 ; Hook. f. *Brit. Ind.* 3 : 376. 1881. '*Hiyun Kauni*'.

Densely woolly herbs ; stems hollow ; leaves linear ; heads many sessile, white, odorous.

Fl. & Fr. : August – October.

Hemkund on way. Kailu vinayak. 4000 – 4500 m (30941).

11. *S. graminifolia* Wall. ex DC. 6 : 536. 1838 ; Hook. f. *Fl. Brit. Ind.* 3 : 370. 1881.

Very stout, densely silky woolly herbs ; leaves slender, narrowly linear ; heads solitary.

Fl. & Fr. : September – October.

Patharnachni. 3700 m (30928).

12. **Saussurea heteromalla** (D. Don) Hand. - Maz. Symb. Sin. 7 : 1152. 1936. *Carduus heteromallus* D. Don, Prodr. Fl. Nep. 166. 1825. *S. candidaus* (DC.) Sch. Bip. in Linnaea 19 : 330. 1846 ; Hook. f. Fl. Brit. Ind. 3 : 373. 1881.

Erect herbs ; stems cottony ; leaves cottony beneath ; heads pale - red.

Fl. & Fr. : April. - June.

Gohna, Okhimath, Masoli. 1200 - 1800 m (44188).

13. **S. lappa** (Dcne.) Sch. - Bip. in Linnaea 19 : 331. 1846. *Aplotaxis lappa* Dcne. in Jacq. voy. Bot. 96, t. 104. 1844 ; Hook. f. Fl. Brit. Ind. 3 : 376. 1881.

Large and tall herbs ; radical leaves triangular with lobed winged petiole ; heads dark purple.

Fl. & Fr. : July - August.

North of Bampa, 3800 m (56102).

14. **S. leontodontoides** (DC.) Sch. - Bip. in Linnaea 19 : 330. 1846 var. **leontodontoides**. *Aplotaxis leontodontoides* DC. Prodr. 6 : 539. 1938. *S. Kunthiana* Cl. Comp. Ind. 225. 1876 ; Hook. f. Fl. Brit. Ind. 3 : 369. 1881.

Dwarf herbs ; stems 0 ; leaves spreading, linear elongate, pinnatifid ; heads deep purple ; achenes muricate.

Fl. & Fr. : August. - October.

Amritganga & Bhyundar valleys. 3500 - 4500 m (2943).

15. **S. obvallata** (DC.) Edgew. in Trans Linn. Soc. 20 : 76. Aug. 1846 (Sch. - Bip. Sept. 1846). *Aplotaxis obvallata* DC. Prodr. 6 : 541. 1838 ; Hook. f. Fl. Brit. Ind. 3 : 365. 1881. '*Brahm - Kamal*'.

Stout erect herbs ; radical leaves obovate ; heads purplish - blue enclosed within papery leaves.

Fl. & Fr. : August - October.

Way to Hemkund, hill above Kedarnath. 4000 - 5000 m (33143).

16. **S. piptathera** Edgew. in Trans. Linn. Soc. 20 : 76. 1846 ; Hook. f. Fl. Brit. Ind. 3 : 372. 1881.

Tall erect herbs ; leaves obovate - oblong, cottony beneath ; heads brownish - violet.

Fl. & Fr. : August – October.

Bhyundar valley, 3800 m (29444).

17. *Saussurea roylei* (DC.) Sch. – Bip. in *Linnaea* 19 : 330. 1846. *Aplotaxis roylei* DC. Prodr. 6 : 538. 1838 ; Hook. f. *Fl. Brit. Ind.* 3 : 370. 1881.

Stout erect herbs ; radical leaves 7 – 15 cm, petioled ; achenes 0.6 cm long, smooth.

Fl. & Fr. : September – October.

Garhwal, 4000 m (Rau), Lit.

18. *S. Simpsoniana* (Field & Gardn.) Lipsch. in *Novit. Syst.* 319. 1964. *Aplotaxis Simpsoniana* Field & Gardn, *Sent. Pl.* t. 26. Cum descr. 1844. *S. sacra* Edgew. in *Trans. Linn. Soc. Bot.* 20 : 76. 1846 ; Hook. f. *Fl. Brit. Ind.* 3 : 376. 1881. '*Phenkamal*'.

Small densely woolly herbs ; heads exposed, sometimes pink woolly ; achenes very small warted or wrinkled.

Fl. & Fr. : August – September.

Hemkund on way, hill above Kedarnath, 4000 – 5000 m (33146).

19. *S. Sudhanshui* Hazra *Indian Forester* 109 (2) : 77 – 79. 1983. Herbs 3 – 6 cm high, densely tufted, sometimes forming Cushions ; leaves Linear – lanceolate, revolute at apex ; flowers purple.

Fl. & Fr. : August – September.

Dharansi, sarsaupatal, 4800 m (73466, Hazra). Lit.

20. *S. taraxacifolia* Wall. ex DC. Prodr. 6 : 532. 1838 ; Hook. f. *Fl. Brit. Ind.* 3 : 368. 1881.

Small herbs ; stems cottony ; radical leaves pinnatifid ; heads solitary, dark purple.

Fl. & Fr. : September – October.

Hills above Kedarnath, 3500 – 4000 m (35910).

50. *SENECIO* L.

- 1a. Anther-cells obtuse at base not produced downwards into tails.

- 2a. Heads 4 - 10 flowered ... *S. graciliflorus* 5
- 2b. Heads many flowered.
 - 3a. Leaves ovate or spatulate ... *S. nudicaulis* 8
 - 3b. Leaves pinnately lobed.
 - 4a. Tall robust herbs ; leaf bases $\pm$ auricled ; lobes broad.
 - 5a. Pappus white *S. chrysanthemoides* 2
 - 5b. Pappus red ... *S. diversifolius* 3
 - 4b. Annual dwarf herbs ; leaf bases dilated ; lobes linear ... *S. pedunculatus* 9
- 1b. Anther - cells tailed ; tails contiguous or connate.
 - 6a. Climbing leafy shrubs or undershrubs ; heads in rounded corymbs ... *S. scandens* 11
 - 6b. Erect herbs or shrubs.
 - 7a. Heads in panicked racemes or thyrsoid panicles.
 - 8a. Leaf - stalks winged ... *S. alatus* 1
 - 8b. Leaf - stalks naked,
 - 9a. Leaves deltoid, suddenly contracted into a broad cuneate petiole ... *S. levengii* 7
 - 9b. Leaves cordate or subreniforms angled or lobed ; petiole not auricled ; bulbils present sometimes in the axil of peduncles ... *S. duthlei* 4
 - 7b. Heads in axillary and terminal corymbs.
 - 10a. Nerves beneath with red tomentum ; lingules 4-5, short ; achenes glabrous ... *S. rufinervis* 10
 - 10b. Nerves beneath not red tomentum ; lingules 5 - 7 ; achenes pubescent ... *S. kunthianus* 6

1. *Senecio alatus* Wall. ex DC. Prodr. 6 : 368. 1838 ; Hook. f. Fl. Brit. Ind. 3 : 353. 1881.

Tall thick, hairy herbs ; leaves pubescent, ovate ; petiole winged ; heads cylindric, yellow.

Fl. & Fr. : August - October.

Amritganga and Bhyundar valleys Gaurikund. 2000 – 3500 m (8736).

2. *Senecio chrysanthemoides* DC. Prodr. 6 : 365. 1838 ; Hook. f. Fl. Brit. Ind. 3 : 339. 1881.

Tall glabrous herbs ; leaves pinnately lobed ; heads many flowered.

Fl. & Fr. : August – October.

Amritganga and Bhyundar valleys. 2000 – 4000 m (24446).

3. *S. diversifolius* Wall. ex DC. Prodr. 6 : 366. 1838 ; Hook. f. Fl. Brit. Ind. 3 : 340. 1881.

Robust glabrous herbs ; leaves auricled at the base, pinnatifid ; heads broad ; pappus red.

Fl. & Fr. : July – October.

Bhyundar valley, 2500 – 3500 m (Smythe). Lit.

4. *S. duthiei* M. A. Rau in High. Alt. Flowering Plants 135. 1975. *S. quinquelobus* Hook. f. non. *S. quinquelobus* DC. Prodr. 6 : 404. 1838 ; Hook. f. Fl. Brit. Ind. 3 : 353. 1881.

Tall flexuous erect herbs ; leaves cordate or sub reniform, lobed ; bulbils on terminal bracteate peduncle.

Fl. & Fr. : August.

Hemkund on way, Rambara. 3000 – 3600 m (29586).

5. *S. graciliflorus* DC. Prodr. 6 : 365. 1838 ; Hook. f. Fl. Brit. Ind. 3 : 338. 1881.

Tall glabrous herbs ; leaves large pinnatifid, membranous ; heads yellow, few flowered.

Fl. & Fr. : August – October.

Amritganga and Bhyundar valleys. 2500 – 3500 m (42137).

6. *S. kunthianus* Wall. ex DC. Prodr. 6 : 369. 1838 ; Hook. f. Fl. Brit. Ind. 3 : 354. 1881.

Stout, erect red glandular herbs ; leaves ovate or elliptic – lanceolate, white tomentose beneath.

Fl. & Fr. : August – October.

Bhyundar valley, Mana – Gashtoli. 300 – 4000 m (24257).

7. *Senecio levingii* Cl. Comp. Ind. 301. 1876 ; Hook. f. Fl. Brit. Ind. 3 : 353. 1881.

Tall leafy glabrous herbs ; leaves deltoid, glabrous ; heads greenish – pellow.

Fl. & Fr. : August – October.

Amritganga valley, Hemkund on way. 3500 – 4000 m (42132).

8. *S. nudicaulis* Buch. – Ham. ex D. Don, Prodr. Fl. Nep. 178. 1825 ; Hook. f. Fl. Brit. Ind. 3 : 340. 1882.

Glabrous erect herbs ; laves ovate or spathulate, purple tomentose beneath ; heads yellow, many flowered.

Fl. & Fr. : May – July.

Masoli, 1700 m (44200).

9. *S. pedunculatus* Edgew. in Trans. Linn. Soc. 21 : 74. 1846 ; Hook. f. Fl. Brit. Ind. 3 : 342. 1881.

Dwarf much branched glabrous herbs ; leaves pinnatifid ; achenes glabrous.

Fl. & Fr. : August – September.

Malari, Gothing. 2500 – 4000 m (56223).

10. *S. rufinervis* DC. Prodr. 6 : 369. 1838 ; Hook. f. Fl. Brit. Ind. 3 : 355. 1887.

Large branched herbs ; leaves ovate, white tomentose beneath ; heads yellow, few flowered.

Fl. & Fr. : July – October.

Amritganga and Bhyundar valleys. 2500 – 4000 m (42065),

11. *S. scandens* Buch – Ham. ex D. Don, Prodr. Fl. Nepal. 178. 1825 ; Hook. f. Fl. Brit. Ind. 3 : 352. 1881.

Scandent glabrous branched herbs ; leaves hastate or ovate – hastate membranous ; heads pretty yellow.

Fl. & Fr. : September – November.

Pandukeswar – Govindghat. 1800 – 2500 m (33221).

51. *SERRATULA* L.

Serratula pallida DC. Prodr. 6 : 670. 1838 ; Hook. f. Fl. Brit. Ind. 3 : 379. 1881.

Rough erect herbs ; radical leaves broadly ovate - oblong or pinnately lobed ; heads purple.

Fl. & Fr. : May - July.

Ghona - Ramni, Loharjung, 1500 - 2500 m (37204).

52. *SIEGESBECKIA* L.

Siegesbeckia orientalis L. Sp. Pl. ed. 1. 900. 1753 ; Hook. f. Fl. Brit. Ind. 3 : 304. 1881. '*Gobariya*'.

Erect crisped hairy herbs ; leaves opposite, ovate ; heads yellow - white ; bracts spatulate, glandular pubescent.

Fl. & Fr. : June - October.

Agastamuni, Bhyundar valley. 1000 - 2500 m (30803).

53. *SILYBUM* Gaertn.

Silybum marianum Gaertn. Fruct. & Sem. 2 : 378, t. 168. 1802 ; Hook. f. Fl. Brit. Ind. 3 : 364. 1881.

Large thistle like herbs ; leaves large with strong spines : heads rose-purple ; invol. bracts with large spines.

Fl. & Fr. : July - August.

Way to Kuwari. 2800 m (68246).

54. **SOLIDAGO L.**

Solidago virga aurea L. Sp. Pl. 880. 1753 ; Hook. f. Fl. Brit. Ind. 3 : 245. 1881.

Stout glabrous or pubescent herbs ; panicles axillary, long leafy ; heads yellow.

Fl. & Fr. : May. – October.

Anusuya area, Bhyundar valley. 1570 – 3500 m (33115).

55. **SOLIVA Ruiz et Pavon**

Soliva anthemifolia (Juss.) R. Br. in Trans. Linn. Soc. 12 : 102. 1818. *Gymnostylus anthemifolia* Juss. in Ann. Mus. Paris 4 : 262, t. 61, f. 1. 1804.

Flat diffuse herbs ; heads greenish, sessile, enclosed within leaf sheaths.

Fl. & Fr. : March – April.

Post graduate college Campus, Gopeswar. 2000 m (Kala, Sn.). Lit.

56. **SONCHUS L.**

- | | | |
|--|-----|---|
| 1a. Basal lobes of stem-leaves acute | ... | <i>S. oleraceus</i> 2 |
| 1b. Basal lobes of stem - leaves rounded | | <i>S. arvensis</i> f. <i>brachyotus</i> 1 |

1. **Sonchus arvensis** f. **brachyotus** (DC.) Krip. Fl. URSS 29 : 253. 1964. *S. brachyotus* DC. Prodr. 7 : 186. 1838. *S. arvensis* non L. Sensus Hook. f. Fl. Brit. Ind. 3 : 414, 1881. 'Saddhi'.

Tall erect herbs ; glandular – hairy upwards ; radical leaves pinnatifid, thin ; heads 2.5 – 5 cm in diam.

Fl. & Fr. : March – June.

Govindghat, Rudraprayag area. 600 m (26746).

2. *Sonchus oleraceus* L. Sp. Pl. ed. 1, 794. 1753 ; Hook. f. Fl. Brit. Ind. 3 : 414. 1881. '*Dodya*'.

Tall erect herbs ; leaves thin lanceolate ; heads 1.8 – 2.5 cm in diam.

Fl. & Fr. : March – May.

Mandoli. 2100 m (37207).

57. TANACETUM L.

- | | | |
|--|-----|-------------------------|
| 1a. Radical leaves 12 - 25 cm long, 2 - pinnatisect ; heads .8 - 1.2 cm in diam | ... | <i>T. longifolium</i> 1 |
| 1b. Radical leaves 2.5 - 7.5 cm long, palmately pinnatisect ; heads .5 - .6 cm in diam | ... | <i>T. tomentosum</i> 2 |

1. *Tanacetum longifolium* Wall. ex DC. Prodr. 6 : 130. 1838, *p.p.* ; non Thunb. Hook. f. Fl. Brit. Ind. 3 : 320. 1881.

Erect hairy herbs ; radical leaves 15 – 45 cm long ; heads bright yellow ; invol. bract hairy.

Fl. & Fr. : August – October.

Way to Tungnath, Vasuki Tal. Wan – Vediti. 3500 – 4000 m (42108).

2. *T. tomentosum* DC. Prodr. 6 : 130. 1838. *T. senecionis* Gay in DC. Prodr. 6 : 129. 1838 ; Hook. f. Fl. Brit. Ind. 3 : 319. 1881.

Rootstock woody ; tomentose or woolly herbs ; leaves palmately pinnatisect ; heads brown – yellow.

Fl. & Fr. : August - September.

Geoldong, Gothing. 3800 - 5000 m (56158).

58. TARAXACUM Weber.

Taraxacum officinale *auct.?* an Weber Senu Hook. f. Fl. Brit. Ind. 3: 401. 1881. var. *Parvulum* Hook. f. Fl. Brit. Ind. 3: 401. 1881. '*Kan - fulya*'.

Perennial herbs ; juice milky ; leaves glabrous narrowly oblong, pinnatifid ; achenes glabrous.

Fl. & Fr. : January - June.

Anusuyia area, Bhyundar valley, Kanol. 1500 - 3000 m (26894).

59. TRAGOPOGON L.

Tragopogon gracilis D. Don in Mem. Wern. Soc. 3: 414. 1821, "*gracile*" ; Hook. f. Fl. Brit. Ind. 3: 417. 1881.

Tufted, erect herbs ; leaves narrow entire ; heads solitary yellow ; achenes slender, ribbed, minutely prickly on the upper half.

Fl. & Fr. : April - June.

Amritganga valley, Pipalkoti. 1700 - 3000 m (44179).

60. TRICHOLEPIS DC.

Tricholepis elongata DC. Prodr. 6: 563. 1838 ; Hook. f. Fl. Brit. Ind. 3: 380. 1881.

Tall loosely branched herbs ; leaves variable scaberulous ; heads white ; pappus copious pale - brown shining.

Fl. & Fr. : September.

Rudranath, Gaurikund. 2000 m (8591).

61. TRIDAX L.

Tridax procumbens L. Sp. Pl. ed. 1, 900, 1753 ; Hook. f. Fl. Brit. Ind. 3 : 311. 1881.

Perennial, procumbent, hirsute herbs ; leaves pinnatisect ; heads pale - yellow ; achenes brown.

Fl. & Fr. : April.

Paduli, Rudraprayag. 600 m (26767).

62. VERNONIA Schreb.

- | | | |
|--|-----|-----------------------|
| 1a. Heads 1.2 - 2.5 cm in diam ; pappus yellowish or reddish | ... | <i>V. squarrosa</i> 2 |
| 1b. Heads .8 cm in diam ; pappus dirty white | ... | <i>V. cinerea</i> 1 |

1. **V. cinerea** (L.) Less. in Linnaea 4 : 291. 1829. *Conyza Cinerea* L. Sp. Pl. 862. 1753 ; Hook. f. Fl. Brit. Ind. 3 : 233. 1881. "*Kalgira*".

Erect hoary pubescent herbs ; leaves ovate or lanceolate, membranous ; heads purple ; pappus dirty white.

Fl. & Fr. : April - December.

Birhi, Masoli. 1000 - 2000 m (44195).

2. **V. squarrosa** (D. Don) Less. in Linnaea 6 : 627. 1831. *Acilepis squarrosa* D. Don, Prodr. Fl. Nep. 169. 1825. *V. teres* Wall. ex DC. Prodr. 5 : 15. 1836 ; Hook. f. Fl. Brit. Ind. 3 : 229. 1881.

Pubescent or tomentous erect herbs ; leaves hard, elliptic or obovate ; achenes silky ; pappus yellowish or reddish.

Fl. & Fr. : September - October.

Trijugarayan - Gauri Kund. 1800 m (8575).

63. VICOA Cass.

Vicoa indica (L.) DC. in Wt. Contrib. Bot. Ind. 10. 1834. *Inula indica* L. Sp. Pl. 2, 1236. 1763. *V. auriculata* Cass. 1829 ; Hook. f. Fl. Brit. Ind. 3 : 297. 1881.

Roughly pubescent herbs ; stems usually red ; leaves narrowly lanceolate ; heads orange - yellow.

Fl. & Fr. : April - October.

Langasu across Alaknanda, Rudraprayag. 600 - 800 m (71929).

64. WALDHEIMIA Kar. & Kir.

- | | | |
|--|-----|-----------------------|
| 1a. Glabrous or sparsely woolly, densely tufted herbs ; leaves cuneiform 3 - fid ; achenes glandular | ... | <i>W. glabra</i> 1 |
| 1b. Laxly tufted, white woolly herbs ; leaves pinnatifid ; achenes glabrous | ... | <i>W. tomentosa</i> 2 |

1. **Waldheimia glabra** (Dcne.) Regel. in Act. Hort. Petrop. 6 : 309. 1879. *Allardia glabra* Dcne. in Jacq. Voy. Bot. 87, t. 95. 96. 1844 ; Hook. f. Fl. Brit. Ind. 3 : 313. 1881.

Densely tufted, strongly scented herbs ; leaves cuneiform, 3 - fid ; heads white - purple ; achenes glandular.

Fl. & Fr. : September - October.

Bhyundar valley. 3500 - 4500 m (Smythe). Lit.

2. **W. tomentosa** (Dcne.) Regel in Act. Hort. Petrop. 6 : 310. 1879. *Allardia tomentosa* Dcne. in Jacq. Voy. Bot. 87, t. 95. 1844 ; Hook. f. Fl. Brit. Ind. 3 : 313. 1881.

Loosely tufted branched, elongate, white woolly herbs ; leaves oblong, 1 - 2 pinnatifid ; achenes glabrous.

Fl. & Fr. : September – October.

Bhyundar valley, 3500 – 4500m (Smythe) Lit.

65. YOUNGIA Cass.

- | | | |
|---|-----|----------------------|
| 1a. Heads .8 - 1.2 cm in diam ; achenes pale, longer than the pappus | ... | <i>Y. glauca</i> 1 |
| 1b. Heads .4 - .6 cm in diam ; achenes narrowly fusiform, red - brown, equalling or shorter than the pappus | ... | <i>Y. japonica</i> 2 |

1. *Youngia glauca* Edgew. in Trans. Linn. Soc. 20 : 79. 1846. *Crepis glauca* Benth. Gen. Pl. 2 : 515. 1873 ; Hook. f. Fl. Brit. Ind. 3 : 394. 1881.

Densely branched herbs ; radical leaves few, obovate – spatulate ; cauline leaves sessile, linear, entire.

Fl. & Fr. : August – September.

Gothing, Niti. 3800 m (56153).

2. *Y. japonica* (L.) DC. Prodr. 7 : 194. 1838. *Prenanthes japonica* L. Mant. 107. 1767. *Crepis japonica* (L.) Benth. Fl. Hongk. 194. 1861 ; Hook. f. Fl. Brit. Ind. 3 : 395. 1881.

Tufted glabrous herbs ; radical leaves pinnatifid ; achenes not beaked.

Fl. & Fr. : March – May.

Gopeswar, Gwaldam. 1300 m (35150).

66. XANTHIUM L.

Xanthium strumarium L. Sp. Pl. 987. 1753 ; Hook. f. Fl. Brit. Ind. 3 : 303. 1881. '*Gokhurya*'

Aromatic robust herbs ; leaves ovate – triangular, angled or lobed ; achenes obovoid, thick, enclosed in the hardened involucral.

Fl. & Fr. : September – October.

Gopewar ascending to 1600 m (466, Kala & Gaur). Lit.

67. ACANTHOSPERMUM Schrank

Acanthospermum hispidum DC. Prodr. 5 : 522. 1836 ; Kitamura in Fl. E. Himal. 329. 1966.

Erect hairy herbs ; heads yellow ; achenes hairy angles spiny.

Fl. & Fr. : September – October.

Way to Trisula. 1500 m (42261).

68. TAGETES L.

Tagetes minuta L. Sp. Pl. 887. 1753 ; Burkill in Rec. Bot. Surv. Ind. 4 : 117. 1910.

Tall erect herbs ; heads cylindric pale – yellow.

Fl. & Fr. : September – November.

Joshimath. 2000 m (71069).

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