

## A FURTHER CONTRIBUTION TO THE FLORA OF JAMMU AND KASHMIR STATE

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## ABSTRACT

The paper describes the salient features of the vegetation of the Siwalik range, the Chenab valley, the high uplands of Batote, Kistawar and Bhadrawah of Jammu province, the Pir Panjal range, Lolab valley and the mountain spurs of north-eastern portion of Kashmir province. A systematic census of 687 species of which 660 are Angiosperms, 6 are Gymnosperms and 21 are Pteridophytes is included in the paper.

Among plants of interest collected were two endemic species, viz., *Viola falconeri* Hook. f. & Thoms and *Hedysarum cachemirianum* Benth., seven new records, viz., *Onopordon acanthium* L., *Callianthemum rutaefolium* C. A. Mey., *Enhydra fluctuans* Lour., *Merendera persica* Boiss., *Luzula pallescens* (Wg.) Bess., *Asperula odorata* L., and *Conium maculatum* L. and new areas of distribution for *Thesium himalense* Royle, *Hippuris vulgaris* L., *Menyanthes trifoliata* L., and *Lathraea squamaria* L. which are previously unrecorded in the published literature on the flora of this area.

## INTRODUCTION

Kashmir has been visited by many Botanists from the days of Jacquemont (1801-1832) with the primary purpose of collection of plants. Their rich collection has been deposited in several herbaria of the world. However, apart from general observations on their itinerary and collection, there is no published catalogue of their collection in any of the scientific journals. Recently the writer visited several parts of Jammu and Kashmir State with a view to prepare a systematic census of the flora. During the first visit in the year 1956, the writer spent most of the time in collecting plants at several places in the vale of Kashmir, an account of which together with the systematic list is under publication (Rao 1960). During the years 1958 and 1959, the writer extended his studies into a number of new areas of the State which were not visited during the year 1956. Collections were made in the months of September during 1958 and May to July in the year 1959. The collection includes two endemic species *Viola falconeri* and *Hedysarum cachemirianum*, seven new records, viz., *Onopordon acanthium*, *Callianthemum rutaefolium*, *Enhydra fluctuans*, *Luzula pallescens*, *Asperula odorata*, *Merendera persica*, *Conium maculatum* and new areas of distribution for *Thesium himalense*, *Hippuris vulgaris*, *Menyanthes trifoliata* and *Lathraea squamaria*. The total number of species of which specimens were collected is 687, of which 660 are Angiosperms, 6 Gymnosperms and 21 Pteridophytes. These are enumerated in the systematic list of the paper.

The vegetation in and around Jammu province resembles the flora of adjacent sub-montane districts of the Punjab State. The province consists of a fringe of flat arid land bordering the Punjab districts, gradually rising by a succession of ranges of broken ground and low hills which form continuation of the Siwalik range.

These are largely composed of sand and lime stones and lead to the high uplands bounded by the mountains of Himalayan range, the Pir Panjal, beyond which lie the vale of Kashmir, Baltistan and Ladakh. The vegetation of Jammu province can be divided naturally into three distinct belts, each of which exhibits its own type of vegetation influenced by altitude, climate and rainfall.

1. The flat semi-arid land influenced by South-West monsoon supporting scrub-forests.

2. The Siwalik range of low hills and broken spurs with scrub-forests at low levels and mixed vegetation at higher elevations.

3. The higher uplands with predominant temperate flora.

The semi-arid level land cut up by innumerable ravines is situated between 300 to 400 m. and forms a continuation of the warmer parts of Punjab and supports scrub-forests dominated by *Acacia* spp., *Toona* and *Grewia*. The scrub-forests are very much exploited causing soil erosion leading at certain places to bleak and barren ravines. The ravine flora is chiefly represented by *Saccharum munja*, *Ipomoea carica*, *Carthamus oxyacantha* and *Artemisia scoparia*. Being a warmer tract, this part of the land supports Mango (*Mangifera indica*) and Shisham (*Dalbergia sissoo*) wherever the soil is moderately fertile. During rainy months the low lying areas give rise to a number of jheels supporting a good number of aquatic plants. *Sagittaria guayanensis*, a white flowered aquatic herb was found growing in abundance along with *Limnanthemum cristatum* in these jheels.

The Siwalik range of Jammu was explored in and around Udhampur. The area ranges from 650 to 1400 m. consisting mostly of low hills covered with scrub forests at the lower reaches followed by Chir at higher elevations (Fig. 8). The scrub forest is chiefly composed of species of *Indigofera*, *Cassia*, *Adhatoda*, *Dodonaea*, *Nerium*, *Zizyphus*, along with *Acacia modesta* and

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*Dalbergia sissoo*. With the rise in elevation one could see the abundance of *Wendlandia exserta*, a medium sized tree with a flush of white flowered large racemes along with *Bauhinia vahlii* a huge climber with big white flowers. The flora is of a more temperate character than of the plains. Some of the herbs commonly met with are the species of *Ranunculus*, *Clematis*, *Gerbera*, *Androsace* and *Dipsacus*. The mountain tops and slopes are covered with *Pinus roxburghii* sometimes mixed up with *Quercus ilex*, *Q. incana* and *Parrottia jacquemontiana*.

Gradually the flora becomes very interesting as one proceeds along the spurs of mountain districts to the higher uplands of Kud, Sannasar, Batote on the Western side and Bhadrawah and Kistawar on the Eastern side. The areas around Kud, Patani Top (Fig. 6), Sannasar and Batote were next explored. The mountain ridges are dominated by Chir pines gradually followed by *Cedrus* at higher elevations. In open and cleared forest areas species of *Rosa*, *Viburnum*, *Dipsacus*, *Prinsepia*, *Sarcococca* and *Indigofera* are found in abundance. The mountains slopes are covered with *Viburnum nervosum*, *Rhus cotinus* and *Quercus ilex*. Patani Top, a small plateau at an altitude of nearly 2400 m. between Kud and Batote exhibits plants of temperate region. The spurs and ridges are covered with *Cedrus* and pines. During the march from Patani Top to Sannasar one could see on the gentle mountain spurs the shrubby growth of *Berberis*, *Spiraea*, *Prinsepia*, *Elsholtzia*, *Viburnum* and *Quercus ilex*. The mountain ridges form huge hemispherical mounds supporting lovely meadows wherein *Poa*, *Juncus*, *Cynodon*, *Potentilla*, *Pedicularis*, *Geum*, *Geranium*, *Paranassia* and *Pilea umbrosa* are prominent. The meadows are heavily grazed and are free from plants of tree habit. At Sannasar the cup-shaped meadow holds a small lake of sparkling water devoid of any vegetation. The edges of the lakelet are fringed with species of *Polygonum*, *Erianthus*, *Oplismenus*, *Poa*, *Cynodon*, *Muhlenbergia*, *Veronica*, *Mazus*, *Medicago* and *Ranunculus*. Bordering the beautiful meadows there are thick forests of pines mixed with many broad leaved species.

The Chenab valley area in and around Batote, Doda and Thathri were explored. The valley is abounding in rich vegetation of mixed type. Conifers are confined to mountain tops and gentle slopes towards the valley have *Olea cuspidata*, *Quercus ilex* and *Pinus roxburghii*. Besides the shrubby vegetation forms a conspicuous feature on the slopes. The chief of them are species of *Rubus*, *Indigofera*, *Berberis*, *Sageretia*, *Daphne*, *Sarcococca*, *Prinsepia*, *Bosia* and *Punica*. The banks of Chenab exhibit an abundance of herbs like *Crotalaria*, *Scutellaria*, *Artemisia*, *Swertia*, *Acalypha*, *Lespedeza*, *Fragaria*, *Ajuga*, *Rumex*, *Polygala*, *Bupleurum* and *Polygonum*. An interesting find of this area is *Periploca hydespadii*, a wiry twining climber commonly hanging from trees or boulders.

The exploration of Chenab valley was followed by a march towards Kistawar from Thathri. The path closely

follows the Chenab river upto 12 miles. The banks of Chenab exhibit the same features as found elsewhere. The main feature of the flora is the abundance of *Pinus excelsa* and *Cedrus deodara* on the mountains. Another feature is the occurrence of *Arceuthobium minutissimum*, locally known as 'Armi', parasitising the branches of *Pinus excelsa*. The 'armi' attack is so heavy that one could see the decay and death of the valuable timber yielding tree covering a wide range of this area. Due to heavy infection of 'armi' the pine branches are very much fasciated, distorted and stunted. Wherever there is 'armi' attack, it is followed by infection of *Fomes pini* a red ring rot fungus which attacks the heartwood rendering the tree unfit for commercial exploitation (Fig. 7).

The noteworthy feature of the 'armi' attack is the invasion of broad leaved species from the adjacent areas especially *Quercus ilex* after the decay and death of pines. The infection is so heavy at certain places that pines are beaten back by *Quercus ilex*, an economically unimportant tree. The displacement of pines by *Quercus ilex* is a cause of much concern to the State. The mountain slopes and banks of Chenab river support rich herbaceous and shrubby vegetation. The interesting plants of this region are *Withania somnifera*, *Capparis spinosa* and *Daphne oleoides*.

Kistawar, a plateau at an altitude of 1800 m. is surrounded on all sides by massive spurs with peaks ranging from 4000 to 4500 m. with heavy winter snowfall. The vegetation is dominated by very good deodara trees at higher elevations closely followed by pines especially in the dry inner valleys *Pinus gerardiana*, from which edible seeds are collected for export. The mountain slopes are very rich with reference to plants of medicinal importance. The plants of common occurrence are *Atropa acuminata*, *Carum carvi*, *Phytolacca acinosa* (Fig. 4), *Artemisia brevifolia* and *Skimmia laureola*. The other herbaceous plants are species of *Aconitum*, *Actaea* (Fig. 3), *Podophyllum*, *Salvia*, *Lamium*, *Lychnis*, *Origanum* and *Urtica*. The Kistawar plateau is surrounded by good saffron yielding areas. Buckwheat and barley are also grown in abundance. The higher cold part of the land is extensively used to grow apple, pear, etc.

The eastern portion of Chenab valley with number of mountains forms the district of Bhadrawah. The mountains and spurs form the Balesh range with peaks from 4000 to 5000 m. Bhadrawah valley situated at an altitude of 2000 m. is surrounded by Kalish mountains range. *Cedrus* and pines are the dominating elements at higher elevations (Fig. 2). Under the conifers, the other plants of common occurrence are *Viburnum*, *Berberis* and *Quercus ilex*. The broad leaved species, *Carpinus*, *Euonymus*, *Salix*, *Lonicera*, *Aesculus*, *Fraxinus* and *Juglans* are fairly mixed up with pines at lower elevations. Next, the areas on the way to Balesh range of mountains were explored. The first stage of the trek was towards Jai, involving a steep ascent upto 2000 m. The path closely follows Dodu nala passing through steep

hills covered with *Cedrus* and pines, followed by shrubby vegetation chiefly represented by *Viburnum*, *Parrottia*, *Crataegus* and *Spirea*. The common sight as one approaches Jai valley is the predominance of 'Armi' attack on pines and the invasion of secondary associations of *Viburnum*, *Spirea*, *Quercus ilex* or *Parrottia* into the pine zones. Under the shade of conifers one could see *Sauromatum guttatum* with its multi-coloured spathe, vigorously growing *Phytolacca acinosa*, white flowered *Caltha palustris*, *Anemone obtusiloba* with flowers varying in colour from white to deep blue, *Dioscorea deltoidea* and *Osmunda claytoniana*.

The Jai valley surrounded by mountains of considerable height exhibits flora of mixed type at lower heights. The common broad leaved species are *Quercus*, *Populus*, *Rhus*, *Acer* and *Prunus*. The mountain tops are huge mounds of temperate meadows dominated by members of Ranunculaceae, Cruciferae and Compositae. At 2500 m. *Lysimachia prolifera* and *Callianthemum cachemirianum* form a rich carpet interspersed with *Thermopsis barbata*. Still higher up one could see, especially near the areas where the snow is receding, beautiful *Primula rosea*, small white flowered *Valeriana dioica*, deep blue flowered *Gentiana carinata* and clumps of yellow flowered *Corydalis govaniana*. Another interesting collection here was that of *Viburnum cotinifolium*, a woody shrub with fragrant white flowers with rosy tinge.

The path of Kansar-Gonda of the Balesh range is a steep ascent all along the temperate margs and soon descends down gently into a glen supported by rich *Cedrus*, *Pinus*, *Picea* and *Taxus* dominating the forest flora. The rich herbaceous plants are represented by *Podophyllum emodi*, *Actaea spicata*, *Phytolacca acinosa* and white flowered ground orchid *Cephalanthera ensifolia*. *Saxifraga* and *Wulfenia* along with ferns are commonly seen growing in the rocky crevices. *Euphorbia wallichiana* forms a conspicuous feature of the landscape especially in the glens. The glens support mixed type of flora and as one approaches the Balesh range one could see the dominance of *Rhododendron arboreum* almost to the exclusion of other plants. It is of interest to record that *Rhododendron arboreum* is found only in the eastern part of Jammu province and the vale of Kashmir is completely free from this species. The other herbs of interest in this range are *Saussurea lappa* and *Atropa acuminata* found growing in abundance at various heights.

Next comes the Pir Panjal of the Himalayan range of mountains. It is an extensive range of about 180 miles long and a width of 25 to 35 miles and forms the southern boundary of the vale of Kashmir and the northern boundary of Jammu province. This portion lying between the Jhelum and Chenab is formed by the mass of mountainous spurs running down from Muzaffarabad on the Jhelum to near Kistawar on the Chenab. The range is cut up by number of ravines, valleys, green beautiful extensive alpine meadows, lovely cold water lakes and swampy lagoons or fresh warm water lakes. The Pir Panjal flora was explored at

Banihal, Kungwattan, Kaunsarnag, Gulmarg, Apharwat, Yusmarg and Desu areas.

The vegetation in and around Banihal range of mountains is chiefly influenced by altitude and climatic conditions of the adjacent regions. Situated as a boundary between the vale of Kashmir where the temperate plants predominate and the Jammu province where deciduous and mixed type of plants grow under the influence of monsoon, the spurs and ravines exhibit different features in plant distribution. The differences are very marked and the dominating associations of one side is almost absent or sparsely represented on the other side of the mountain range (Fig. 5). The Banihal valley situated at an altitude of 1600 m. is surrounded by mountain spurs on the Pir Panjal range. The valley flora is chiefly represented by marshy plants like *Sium*, *Epilobium*, *Cyperus*, *Monochoria*, *Eriocaulon*, *Scirpus*, *Polygonum*, *Potamogeton* and *Alisma* and the exposed dry areas support *Eryngium billardii*, *Cichorium intybus*, *Hibiscus trionum* and *Chenopodium blitum*. The Banihal range from the valley is a steep ascent upto Pir Pass and exhibits a wide distribution of shrubby vegetation. It is of interest to record that plants of tree habit especially Conifers are not widely distributed on the gentle slopes but they are chiefly confined to sheltered grooves or wind protected spurs and the plants of shrubby growth habit are alone able to grow upto 3000 m. The gregarious shrubs of this range are *Plectranthus rugosus* and *Indigofera gerardiana*, mixed up with *Elsholtzia fruticosa*, *Strobilanthes atropurpureus*, *Artemisia vulgaris*, white flowered *Rosa macrophylla* and yellow flowered *Berberis*. The noteworthy herbs at this altitude are *Saussurea albescens*, *Salvia moorcroftiana*, *Origanum vulgare* and *Morina coulteriana*. Beyond 2500 m. and upto 3000 m. the herbaceous elements are chiefly represented by *Phlomis cashmeriana*, *Senecio chrysanthemoides*, *Orobancha epithymum*, *Dipsacus inermis*, *Salvia glutinosa*, *Allium stracheyi*, *Sedum ewersii* and *Polygonum alpinum*. The ascent above 3000 m. to the Pir Pass is one of great botanical interest. The sub-alpine herbs are widely represented on the ridges and green mountain tops. Due to severe wind action the area is practically devoid of trees and only stunted shrubs of *Salix* and *Viburnum* are found. During the months of August and September the common alpine herbs of the area are the deep blue flowered *Gentiana kurroo*, dull blue flowered *Aconitum heterophyllum*, the beautiful big yellow heads of *Inula royleana* associated with *Scabiosa speciosa*, *Anemone rivularis*, *Senecio chrysanthemoides*, *Achillea millefolium*, *Tanacetum longifolium* and *Anaphalis contorta*. The gentle slopes are covered with *Wulfenia amherstiana*, *Solidago virga-aurea*, *Parnassia ovata*, *Podophyllum emodi*, *Polygonum amplexicaule*, *P. alpinum*, *Lactuca longifolium* and *Bupleurum juncundum*. In the spring season the ridge presents handsome graceful yellow coloured flowers of *Morina coulteriana* followed by species of *Gentiana*, *Nepeta*, *Aster*, *Pedicularis*, *Primula*, *Euphrasia* and *Astragalus*. During this season at lower altitudes *Phlomis cashmeriana* and

*Salvia moorcroftiana* along with *Dianthus* and *Sedum* form the conspicuous herbs.

Next the path along the descent to the vale of Kashmir was explored. The mountain spurs at Banihal towards the valley of Kashmir are mostly covered with plants which are scarcely represented on the slopes facing the Banihal valley. At lower altitudes the dominating shrub is *Parrottia jacquemontiana* followed by *Viburnum nervosum* interspersed with *Juglans* and *Aesculus* trees. The spread and distribution of *Plectranthus rugosus* on this side of Banihal is very much limited. In the spring the spurs are found blooming with species of *Anemone*, *Fritillaria*, *Parnassia*, *Paeonia*, *Podophyllum*, *Actaea*, *Cimicifuga*, *Dictamnus* and *Onosma*. A new find of this part of Banihal is *Thesium himalense*, a small parasitic herb growing in abundance near Upper Munda. This parasitic herb is previously reported to occur in the Chenab valley, Sonamarg, Baltistan and Gilgit. At still higher elevations approaching the Banihal ridge one could see many temperate herbs of varied colours. During the months of August and September between 2000 m. and 3000 m. the herbaceous flora is represented by *Cimicifuga foetida*, *Circaea alpina*, *Actaea spicata*, *Delphinium coeruleum*, *Lavatera cashmeriana* and species of *Impatiens*. The wind protected grooves display *Cedrus* mixed with the blue pine or firs. It is not uncommon to see the presence of *Betula* in various distorted forms at higher elevations especially above the conifer belt in the grooves.

The Pir Panjal flora was explored on the path from Kungwattan to Kaunsarnag lake. From Shopyian the path passes through thick *Cedrus* shade to Aharbal where there is a splendid cataract of the Visho river flowing from Kaunsarnag spurs. The vegetation round about Shopyian and Sedau is rich in *Pinus excelsa*, *Picea morinda* and *Cedrus deodara*. The pines are heavily infected with 'armi', *Picea* with leaf tip disease as a result of which it is not uncommon to find tree trunks either distorted or exhibiting candelabra type of growth. Aharbal situated on the banks of Visho river is densely clothed with rich flora and green margins at higher elevations. The common herbs are *Podophyllum*, *Rubus*, *Veronica*, *Caltha*, *Tulipa*, *Sedum*, *Actaea*, *Onosma*, *Epimedium* and *Geranium*. An endemic rare find of this area is *Viola falconeri*, "a remarkable species resembling *V. acuminata* of Siberia and Manchuria, but with much larger flowers and gland dotted leaves" (Hooker, FBI. I: 185). This species is previously reported to occur at Sindh valley near Baltal. Another interesting find is the collection of *Merendera persica* in fruiting stage, a species not previously reported as occurring in the Pir Panjal range of Kashmir State. The shrubs are the species of *Viburnum*, *Urtica*, *Crataegus* and *Plectranthus*. *Sambucus ebulus* and *Ferula jaeschkeana* cover a good portion of the gentle slopes and valleys which are open and warmer. At a higher elevation *Indigofera* and *Syringa* are the dominating shrubs closely followed by *Viburnum nervosum*. The sciophytic vegetation under *Cedrus* shade includes *Aquilegia vulgaris*, *Polemonium*

*coeruleum*, *Prenanthes violaeifolia* and *Adoxa moschatellina*. From Aharbal the path is of gentle ascent through thick pine and *Cedrus* forests mixed with the broad leaved species of *Acer*, *Juglans* and *Populus*. Kungwattan situated on a green open wide plateau at 2650 m. forms an extensive meadow right below Pir Panjal range of mountains. The turf is composed of *Poa*, *Plantago*, *Veronica*, *Arabis*, *Capsella*, *Gagea*, *Callianthemum*, *Alchemilla*, *Astragalus*, *Carex*, *Ranunculus* and *Iris kumaonensis*. Moist areas are covered with *Caltha palustris*, *Achillea millefolium*, *Sambucus ebulus*, *Urtica dioica* and *Rumex nepalensis* in association with *Callianthemum rutaefolium*, a common European species. As far as I have been able to find out this is the only record of the occurrence of this European species in Kashmir.

The path to Kaunsarnag lake is a gentle steep ascent through mountain spurs, valleys and margins. The *Cedrus* belt extends upto an altitude of 3000 m. and supports the usual shady plants as found elsewhere. The graceful shady herbs are the species of *Viola*, *Sedum*, *Corydalis*, *Cortusa*, *Trillium*, *Podophyllum* and *Actaea*. At slightly higher elevations where the slopes are exposed and warmer, one could see *Osmunda claytoniana*, *Fritillaria roylei*, *Androsace sarmentosa*, *Adoxa moschatellina* followed by *Iris kumaonensis* and species of *Primula*, *Caltha* and *Thymus*. In and above 3500 m. the vegetation is very much stunted and the areas are completely exposed to cold icy winds. The flora is chiefly represented by shrubby species of *Lonicera*, *Viburnum*, *Berberis* and *Juniperus*. The wind protected valleys are covered with rich growth of decumbent *Betula* forests. Near the snow line at 4000 m. (Fig. 1) the areas are covered with many graceful alpine herbs. As the snow recedes the newly exposed areas become covered with a carpet of golden yellow flowered *Adonis chrysocyathus*, *Trollius acaulis*, *Gentiana carinata*, *Pedicularis versicolor*, *Potentilla argrophylla* and the handsome nodding grass, *Hierochloa laxa* along with *Lysimachia prolifera*, *Callianthemum cachmerianum*, *Gagea lutea* and *Allium govanianum*. The mountain tops exhibit lovely margins devoid of plants of tree habit. The ground flora is chiefly composed of prostrate woody *Cotoneaster* and *Salix* mixed up with *Lagotis glauca*, *Hierochloa laxa* and *Rhododendron hypenanthum*. The rocky crevices support species of *Arenaria*, *Saxifraga* and *Sedum*. Beyond 4000 m. the path to the lake was completely devoid of vegetation during the months of June-July as it was still snow bound and the lake situated in the top of Kaunserni Kuthar at 4400 m. was completely frozen and surrounded on all sides with dizzy peaks of Pir Panjal range (Fig. 1).

Below Pir Panjal range there are number of lovely meadows covered with rich nutritive grass and sub-alpine herbs of varied colours. The meadows at Yusmarg and Khillanmarg were explored. Surrounded on all sides by thick *Cedrus* and fir forests at Yusmarg there is a lovely turf chiefly composed of species of *Poa*, *Alchemilla*, *Plantago* and *Trifolium*. However, in the

turf at Khillanmarg situated at a higher elevation, the flora is chiefly represented by tufts of *Euphorbia wallichiana* and *Osmunda claytoniana* followed up by numerous sub-alpine herbs as already recorded (1960, Rao). The fir forest in between Gulmarg and Khillanmarg was explored once again. A few species which were not previously collected from this area, *Cypripedium cordigerum* (Fig. 10), a shady ground orchid with shoe-shaped white flowers and *Fritillaria roylei*, a bulbous herb with greenish yellow tessellated dull purple nodding flowers were collected.

The next phase of the present survey was conducted in the Lolab valley, situated in the north west of Kashmir province. The valley is 20 miles long and 8 miles wide having a number of pretty meadows with gentle rising pine and *Cedrus* covered hills all round. The valley flora was explored at Chandigam, Dorus, Sogum, Kupwara, Vernow and Dardpur. The valley is under extensive cultivation. Rice, maize and wheat are the main crops with many apple and walnut yielding trees. The marshy areas and ponds are rich in aquatic plants. The gentle slopes of the valley exhibit *Cedrus deodara* and *Pinus excelsa* and they extend right upto the top of the surrounding mountains. Amidst the conifers throughout the valley one could collect number of medicinal plants like *Atropa acuminata*, *Phytolacca acinosa*, *Podophyllum emodi* and *Dioscorea deltoidea*. Mixed with the conifers are the broad leaved species of *Fraxinus*, *Juglans*, *Aesculus*, *Celtis*, *Acer*, *Prunus*, *Lonicera* and *Populus* growing in abundance especially at the fringes of the valley.

The north east of the vale of Kashmir was explored especially near Thajwas. The moraine flora consisted of species of *Cotoneaster*, *Luzula*, *Orchis*, *Primula*, *Equisetum*, *Gagea*, *Stellaria*, *Ranunculus*, *Polygonum* and *Pedicularis*. The shrubby vegetation along the slopes of the surrounding mountains is composed of *Viburnum*, *Lonicera* and *Sambucus*. The plants of tree habit apart from the firs, *Cedrus* and *Betula* are *Acer*, *Prunus* and *Juglans*. The surrounding mountains range upto 5000 m and the spurs exhibit very rich temperate vegetation. Some of the interesting herbs are *Cephalanthera ensifolia*, *Thesium himalense*, *Hierochloa laxa*, *Polemonium coeruleum* and *Saussurea lappa*. The tree belt includes firs, *Taxus*, *Pinus*, *Picea*, *Betula* along with *Acer*, *Syringa* and *Juglans*. At higher elevations the only stunted shrubs are those of *Betula* and *Juniperus*. The open margs are sometimes covered with a rich carpet of *Gagea lutea*, *Anemone obtusiloba* and *Ranunculus hyperboreus* almost to the exclusion of other alpine herbs. The interesting collections round about Thajwas spurs are those of *Eremerus himalaicus*, a stately tall herb with white flowered stout racemes growing on the steep slopes and *Dictamnus alba*, a member of Rutaceae with white flowers tinged with pinkish markings growing in the rocky crevices.

The mountain spurs of north-eastern portion of Kashmir province run nearly due south with peaks ranging from 4000 to 5000 m. and form a boundary

between the vale of Kashmir and Wardwan valley. The flora of this region at Tulin lake and Fur-fazal was explored. The path to Tulin lake situated at an altitude of 3800 m. is a very steep ascent through thick *Cedrus*, *Taxus* and *Abies* forests mixed with *Juglans*, *Prunus* and *Acer*. The conifers support rich herbaceous plants. A rare find of this area is *Lathraea squamaria*, a perennial parasitic plant with white aerial racemes and hidden white stem covered with thick fleshy white scales, attached to the roots of *Abies pindrow*. Its occurrence is previously reported only at Banihal of the Pir Panjal range at 2000 m. In the present case the parasite was found growing at 3000 m. in dingy dark place and again at this same height, the plant was collected in the same range on the way to Fur-fazal. Here it was found growing on *Prunus* roots. Other plants of interest in the area are *Cypripedium cordigerum* with its beautiful white shoe shaped flowers found growing in abundance and *Adoxa moschatellina* a succulent inodorous herb with small green 5-6 merous flowers, previously reported only in the Pir Panjal area. It was found growing in abundance upto 3200 m. Further ascent leads into a wide open valley surrounded on all sides by mountains. The valley is rich in sub-alpine plants. The conifers are replaced by stunted *Betula* or hemi-spherical mounds of Juniper shrub. The lake was free from vegetation but the gentle mountain slopes supported varied alpine herbs. In the same range the mountain spurs were explored from Batkote to Fur-fazal. This area is dominated by *Paeonia emodi* at lower elevations, followed up closely by *Sambucus ebulus* extending right upto 3200 m. The broad leaved species of the lower altitude are replaced by *Cedrus* and *Abies* at higher elevations. The slopes of the mountains are covered with *Aquilegia*, *Delphinium*, *Saussurea lappa* and *Artemisia*. The shrubs of this regions are *Spiraea lindleyana*, *Viburnum nervosum* and *Parrottia jacquemontiana*.

The far north-eastern portion of the vale of Kashmir leads into the Central Himalayan zone known as the Amarnath range of mountains. Beyond these mountains Astor, Baltistan and Ladakh areas are situated. The central zone of mountains is formed by number of spurs with open wide valleys supporting rich vegetation. The holy cave of Amarnath is situated in this area. The flora of this belt was studied at Chandanwari, Pissu Ghati, Sheshnag, Wavjan and its environs. A further exploration was not possible as the pass from Wavjan upto the cave of Amarnath was snow bound and there was no trace of any plant life on the way.

The first stage of exploration from Pahalgam is towards Chandanwari situated at 3000 m. The path closely follows the Lidder stream surrounded by gentle slopes of mountains. This area is forested by pines, firs and spruce but many of the pine trees are distorted due to heavy 'armi' infection. The open slopes are covered with *Ferula*, *Atropa*, *Verbascum*, *Eremerus* and *Cnicus*. The common shrubs are *Viburnum*, *Spiraea*, *Plectranthus*, *Urtica* and *Rosa*. Further up one could see species of *Sambucus*, *Lonicera* and *Syringa* occupying a great

portion of open slopes. Along with conifers, *Acer*, *Fraxinus* and *Juglans* are commonly found growing in abundance. The path leads into a flat valley surrounded on all sides by huge mountains clothed with conifers. The gentle slopes are covered with the snow white flowers of *Paeonia emodi* and still higher up the stately graceful white species of *Eremerus himalaicus* is found. The collection here included *Cuscuta approximata* parasitising *Thymus serpyllum* and the yellow-flowered *Scutellaria prostrata*.

The path from Chandanwari to Pissu Ghati and the Pissu hills was explored. The spurs are bleak in the wind exposed regions and in grooves they support good vegetation. Conifers are very scarcely found, whereas *Juglans*, *Prunus*, *Syringa* and *Acer* are interspersed in the grooves well protected from wind. An ascent upto 3500 m. leads into an open wide marg or flat land surrounded by huge mountains exhibiting *Betula* trees or the stunted hemispherical mounds of Junipers. The gentle slopes are clothed with beautiful sub-alpine herbs. At this altitude one could see *Morina coulteriana*, *Iris kumaonensis*, *Anemone polyanthes*, *Euphorbia pilosa*, *Nepeta linearis*, *Orchis latifolia*, *Taraxacum officinale* and *Verbascum thapsus*. Another interesting find is the abundance of golden yellow flowers of *Adonis chrysocyathus* all over the flat gentle path leading upto Seshnag. The path from Pissu Pass upto a small ridge of an ascent of 100 m. is flanked on one side by steep peaks and on the other side there is a gradual slope towards the river valley. The riverine side supports *Betula* and *Juniperus* followed by regions of perpetual snow. The mountain slopes are covered with *Euphorbia pilosa*, *Lonicera parviflora*, *Polemonium coeruleum*, *Geranium wallichianum*, *Callianthemum cachemirianum* and *Androsace sarmentosa*.

An ascent to 3800 m. leads into a green meadow completely devoid of shrubby vegetation. The newly exposed areas where the snow had just melted presented graceful herbs like *Primula rosea*, *Trollius acaulis*, *Leontopodium alpinum* and *Potentilla desertorum*. In the rocky crevices one could see species of *Sedum*, *Saxifraga*, *Ranunculus*, *Anemone*, *Thalictrum* and *Anaphalis*. A further march leads into the Seshnag area. The lake situated at an altitude of 4000 m. is flanked on all sides by mountains rising upto 5500 m. The lake is free from plant life whereas the lacustral edge and slopes are covered with graceful alpine herbs. The woody species are *Cotoneaster*, *Salix* and *Juniperus* mixed up with *Lonicera parviflora*, *Iris kumaonensis*, *Orchis latifolia*, *Equisetum arvense*, *Primula denticulata* and *Adonis chrysocyathus*. The path to Wavjan is further one mile away from Seshnag lake. This area also exhibits the same features as seen near Sheshnag areas. Towards further north of Wavjan the whole area was buried under unmelted snow and no trace of vegetation was seen.

Collections were also made along the banks of Wullar lake. A feature of special interest is the occurrence of *Onopordon acanthium*, a robust thistle with pinkish spherical heads and triangular spiny wings on the stem.

This species is said to be common in Europe and its spread as far as Kurram valley in Afghanistan is recorded. However, its further spread into the vale of Kashmir is a new record.

The vale of Kashmir abounds in swampy areas supporting the growth of many aquatic herbs. Swampy areas in and around Shopyian, Nilnag, Sopore, Manasbal, Kulgam, Aharbal, Hirpur and Srinagar were explored. An interesting find was the occurrence of *Menyanthes trifoliata*, a perennial aquatic herb with white flowers growing luxuriantly in a dingy dark pond along with species of *Carex* in between Shopyian and Hirpur Pine belt. This species is previously collected from Harwan area in the vale of Kashmir. A rare new record is the collection of *Enhydra fluctuans* along the muddy sides of Dal and Nagin lakes of Srinagar. The occurrence of this species in the marshy tracts of Srinagar is of special interest in view of its reported occurrence in Burma, Assam, Bengal and of late in Uttar Pradesh. Another common marshy plant is *Sparganium ramosum*, a rooted Typha-like herb with male and female flowers all along the water logged path down Upper munda, Kulgam and Srinagar tracts. The open warm ditches were covered with species of *Potamogeton*, *Hydrilla*, *Spirogyra*, *Callitriche*, *Myriophyllum*, *Ranunculus aquatilis*, *Sagittaria sagittifolia*, *Butomus umbellatus* and *Najas major*.

Nelnag a warm water lake situated at 2000 m. is very rich in aquatic herbs. A noteworthy feature of the lake is the distribution of water plants from the lacustral edge to the middle of the lake in regular waves. Near the edges on partly exposed or watery habitat are found *Myriophyllum spicatum*, *Ranunculus aquatilis*, *Ceratophyllum demersum*, *Polygonum amplexicaule*, *Eleocharis*, *Alopecurus geniculatus*, *Alisma plantago* and *Sagittaria sagittifolia*. *Hippuris vulgaris*, a member of Halorrhagidaceae is a new find of this area. It was previously collected in the Guriyas and Ladakh areas and it has spread to many swampy areas of the vale of Kashmir. Its abundance was also noticed near Dal and Nagin lakes of Srinagar. Further away one could see species of *Potamogeton*, *Hydrilla*, *Najas*, *Callitriche*, *Utricularia*, *Lemna* and *Trapa*. This row is followed by another set of plants where the depth of water level is considerable, *Polygonum amphibium*, *Nymphaea alba* and species of *Carex*. Lastly one could see the existence of small 'floating islands' formed chiefly by the close growth of *Typha angustata* and *Cladium mariscus*, a tall stoloniferous sedge and whose interlacing root system binds them together.

The water course between Hirpur and Shopyian was also visited. The riverine bed shelters big boulders and groups of vigorously growing bushes of *Myricaria bracteata* followed up by prostrate species of *Astragalus*, *Erodium*, *Veronica* and *Cynanchum*.

Among other plants of interest collected were *Papaver dubium*, a red flowered herb in wheat fields near Pampore, *Scandix pecten-veneris*, a white flowered needle like fruited Umbelliferae near Nagam, blue, mauve,

white and yellow coloured species of *Iris* near Kulgam and Sopore, yellow flowered stout rhizomatic herb, *Ranunculus lingua* (Fig. 19) and a creeping white or lilac flowered *Cymbalaria muralis* near Srinagar and white flowered *Peganum harmala* locally called 'Isband' on dry slopy soil of Hari Parbat.

#### *Ecological observations on the flora of Margs.*

The fine grassy meadows met within the vale of Kashmir are locally known as the Margs. Kashmir abounds with many such margs situated at various altitudes. The margs are of three distinct types, viz., temperate margs, sub-alpine margs and alpine margs.

The temperate margs range from 2000-2500 m. and are formed on the flat plateaux especially at the foot-hills of mountains. The extensive lovely meadows contain many nutritive herbs and grasses. The turf is chiefly composed of species of *Poa*, *Carex*, *Alchemilla*, *Trifolium*, *Thlaspi*, *Potentilla*, *Plantago*, *Spergula*, *Veronica*, *Scirpus*, *Capsella*, *Eleocharis* and *Ranunculus*.

The sub-alpine margs are found in between 2500 to 3000 m. especially on the ridges and inner dry valleys of the mountain ranges. The meadows are extensive and slopy and often exhibit plants of stunted bushy habit besides a rich carpet of grasses and sedges in association with lovely sub-alpine herbs. It is a common sight to see the growth of *Osmunda claytoniana*, *Berberis vulgaris*, *Euphorbia wallichiana* in association with Juniper bushes. The turf is composed of species of *Poa*, *Astragalus*, *Alchemilla*, *Plantago*, *Barbarea*, *Cardamine*, *Anemone*, *Viola* and *Cerastium*.

The alpine pastures are generally situated above 3200 m. upto snow line. They form a distinct belt beholding hundreds of handsome herbs nestling sometimes in accessible places or growing under the shady thickets of Junipers. The meadows are composed of species of *Arenaria*, *Gypsophila*, *Lagotis*, *Gagea*, *Draba*, *Primula*, *Callianthemum*, *Anemone*, *Ranunculus*, *Leontopodium*, *Aster*, *Senecio*, *Stellaria*, *Poa*, *Hierochloa*, *Carex*, *Kobresia* and *Avena*.

The alpine meadows are heavily grazed by sheep and goats. This has resulted in the growth and spread of number of useless and obnoxious plants which are non-edible and poisonous to the livestock. It is not uncommon to see extensive patches of *Iris kumaonensis*, *Adonis chrysocyathus*, *Juniperus recurva*, *Trollius acaulis*, *Euphorbia wallichiana* and the poisonous grass *Stipa siberica* growing in abundance almost to the exclusion of other nutritive alpine herbs. The unregulated and uncontrolled grazing and felling are once again responsible for the destruction of *Betula* areas, where no chance is given for the seedlings to regenerate due to grazing by sheep and goats and felling of old trees for fuel purposes. The displacement of *Betula* areas is a cause of much concern to the State because it leads to soil exposure and erosion. One could also see due to heavy grazing, the deleterious effects on the quality of pasture lands by the spread of obnoxious, useless and poisonous plants.

#### RANUNCULACEAE

*Clematis montana* Buch.-Ham. FBI. 1:2.

A climber with attractive white flowers.

Kansar, T. A. Rao, No. 9158, Alt. 2500 m.

Jammu Siwalik, Pir Panjal range.

*C. grata* Wall. FBI. 1:3.

A furrowed climber with white and cream coloured, attractive, slightly fragrant flowers.

Jammu, T. A. Rao, Nos. 7301, 7790, 7913, Alt. 300 m.

Kistawar, Bhadrawah.

*C. connata* DC. FBI. 1:6.

A woody climber with white or cream coloured flowers in panicles.

Jammu, T. A. Rao, Nos. 7418, 7569, 7695, Alt. 300 m.

Kud, Sannasar, Banihal.

*Anemone obtusiloba* Don FBI. 1:8.

An erect herb with pale blue flowers.

Banihal, T. A. Rao, Nos. 7662, 9067, 9102, 9223, 9224, Alt. 2800 m.

Bhadrawah, Jai, Sedu.

*A. rivularis* Buch.-Ham. FBI. 1:9.

A pubescent herb with white flowers.

Banihal ridge, T. A. Rao, No. 7719, Alt. 2800 m.

*A. tetrasepala* Royle FBI. 1:10.

A tall herb with woody rootstock, white flowers and achenes with a short sharply incurved beak.

Apharwat, T. A. Rao, Nos. 9632, 9715, 9779, 9557, Alt. 3000 m.

Pir Panjal range, Zoipal.

*Thalictrum cultratum* Wall. FBI. 1:11.

An erect herb with yellowish sepals and purplish stamens.

Chandanwari, T. A. Rao, Nos. 9691, 9832, Alt. 3000 m.

*T. foliolosum* DC. FBI. 1:14.

A tall herb with pale green flowers.

Kupwara, T. A. Rao, No. 9458, Alt. 1800 m.

*Callianthemum cachemirianum* Camb. FBI. 1:14.

A densely tufted herb with white flowers.

Jai, T. A. Rao, Nos. 9114, 9319, 9725, Alt. 2400 m.

Kaunsarnag, Pissu Ghati, Zoipal.

*C. rutaefolium* C. A. Mey.

A tufted herb in fruiting stage. A new record.

Kungwattan, T. A. Rao, No. 9282, Alt. 3000 m.

*Adonis chrysocyathus* Hook. f. & Thoms. FBI. 1:15.

A tufted perennial herb with golden yellow flowers, having numerous petals and achenes in dense heads.

Apharwat, T. A. Rao, Nos. 9627, 9631, 9714, Alt. 2800-3800 m.

Khilanmarg, Zoipal, Seshnag.

*Ranunculus trichophyllus* Chaix.

Syn. *Ranunculus aquatilis* L. var. *trichophyllus* Hook & Thoms. FBI. 1:16.

Local name: HILL ; TOHLUB.

An aquatic slender herb with small white flowers, and achenes in globular heads.

- Kulgam, *T. A. Rao*, Nos. 9213, 9381, 9382, 9414, 9470, Alt. 2000 m.  
Shopyian, Nilnag lake, Lolab valley.
- R. lingua* L. FBI. 1:16.  
An aquatic robust herb with large yellow flowers.  
Srinagar, *T. A. Rao*, No. 9579, Alt. 1735 m.
- R. hyperboreus* Rotl. FBI. 1:18.  
A small herb with yellow flowers.  
Zojpal marg, *T. A. Rao*, No. 9716, Alt. 3800 m.
- R. hirtellus* Royle FBI. 1:18.  
An erect herb with yellow flowers.  
Banihal ridge, *T. A. Rao*, Nos. 7703, 9111, 9231, 9288, Alt. 2800 m.  
Pir Panjal range.
- R. sceleratus* L. FBI. 1:19.  
A semi aquatic annual herb with yellow flowers.  
Nilnag lake, *T. A. Rao*, No. 9402, Alt. 2000 m.
- R. diffusus* DC. FBI. 1:19.  
A decumbent herb with yellow flowers.  
Sedau, *T. A. Rao*, Nos. 9094, 9227, Alt. 1700 m.  
Vale of Kashmir.
- R. laetus* Wall. FBI. 1:19.  
A perennial erect herb with big yellow flowers.  
Patani top, *T. A. Rao*, Nos. 7417, 7848, 9002, 9225, 9366, 9535, Alt. 2200 m.  
Sannasar, Hirpur, Kistawar.
- R. muricatus* L. FBI. 1:20.  
A herb in fruiting stage; achenes in globose heads.  
Srinagar, *T. A. Rao*, No. 9584, Alt. 2000 m.  
Lolab valley.
- Caltha palustris* var. *alba* (Jacq ex Comb) Hook. P. & T.  
An aquatic herb with white flowers.  
Jai, *T. A. Rao*, Nos. 9063, 9124, Alt. 2300 m.  
Bhadrawah, Pir Panjal, Lolab valley, Desu.
- Trollius acaulis* Lindl. FBI. 1:22.  
A stout small herb with golden-yellow flowers; near melting snow.  
Kaunsarnag, *T. A. Rao*, Nos. 9335, 9717, Alt. 3800 m.  
Pissu ghati, Zojpal, Seshnag.
- Aquilegia vulgaris* Wall. FBI. 1:24.  
A robust herb with white to blue pendent flowers.  
Chandanwari, *T. A. Rao*, Nos. 9458, 9692, 9773, 9775, 9823, Alt. 3000 m.  
Desu, Lolab valley.
- A. pubiflora* Wall. FBI. 1:24.  
A white flowered herb.  
Jai valley, *T. A. Rao*, Nos. 9252, 9680, 9694, Alt. 2300 m.  
Aharbal, Chandanwari, Pahalgam.
- Delphinium incanum* Royle FBI. 1:25.  
A tall herb with bright blue flowers.  
Banihal, *T. A. Rao*, No. 7626, Alt. 2300 m.  
Pir Panjal range.
- D. denudatum* Wall. FBI. 1:25.  
A tall herb with sky blue flowers.  
Gund, *T. A. Rao*, No. 9577, Alt. 2400 m.
- Aconitum laeve* Royle FBI. 1:28.  
A tall herb, with buds only.  
*T. A. Rao*, Nos. 7841, 9729, Alt. 3000 m.  
Pissu Ghati.
- A. heterophyllum* Wall. FBI. 1:29.  
Local name: ATEES.  
An erect herb having pale blue flowers with dark purple veins. Root used as a febrifuge and tonic.  
Banihal ridge, *T. A. Rao*, No. 7681, Alt. 2800 m.  
Pir Panjal range.
- Actaea spicata* L. FBI. 1:29.  
An erect perennial herb with white flowers on terminal racemes.  
Banihal, *T. A. Rao*, Nos. 7827, 9103, 9107, 9255, 9281, 9561, 9730, Alt. 2000-2800 m.  
Kungwattan, Pir Panjal range, Lolab valley, Thajwas, Desu.
- Cimicifuga foetida* L. FBI. 1:30.  
A perennial herb with long slender racemes having small yellow flowers and big follicles.  
Banihal, *T. A. Rao*, Nos. 7616, 7658, Alt. 2300 m.  
Pir Panjal.
- Paeonia emodi* Wall. FBI. 1:30.  
Local name: NAMEKH; MID.  
An erect perennial herb with showy snow white flowers.  
Upper Munda, *T. A. Rao*, Nos. 7617, 9180, 9690, Alt. 2400-3200 m.  
Banihal, Batkote, Chandanwari, Pahalgam.

## BERBERIDACEAE

- Berberis pseudoumbellata* Parker.  
Syn. *B. vulgaris* Wall. FBI. 1:109.  
A shrub with yellow flowers.  
Banihal ridge, *T. A. Rao*, Nos. 7760, 9327, 9616, Alt. 2800 m.  
Kaunsarnag.
- B. aristata* DC. FBI. 1:110.  
A shrub with yellow flowers.  
Bhadrawah, *T. A. Rao*, No. 9071, Alt. 2000 m.  
Jai valley.
- B. ceratophylla* Don.  
Syn. *B. lycium* Royle FBI. 1:110.  
A shrub with yellow flowers.  
Patani top-Sannasar, *T. A. Rao*, Nos. 7486, 9020, 9513, Alt. 2000-2300 m.  
Pir Panjal range, Balesh range.
- B. umbellata* Wall. FBI. 1:110.  
An erect shrub in fruits.  
Batkote, *T. A. Rao*, No. 9759, Alt. 2000 m.
- Epimedium elatum* Morr. & Dcne. FBI. 1:112.  
A shady slender herb, rootstock creeping and flowers yellowish.  
Aharbal, *T. A. Rao*, Nos. 9259, 9452, 9610, 9634, 9834, Alt. 2000-2800 m.  
Pir Panjal range, Lolab valley.

*Podophyllum emodi* Wall. FBI. 1:112.

An erect herb with solitary pink or white flowers.  
Resins from roots are medicinal.

Banihal top, T. A. Rao, Nos. 7673, 9141, 9301, Alt. 2400-3800 m.

Pir Panjal range, Lolab valley, Pissu Ghati, Zojpal.

## NYMPHAEACEAE

*Nymphaea alba* L. FBI. 1:114.

Local name: BUMPASH.

An aquatic herb with white flowers.

Nilnag lake, T. A. Rao, Nos. 9403, 9489, 9504, Alt. 2000 m.

Wullar, Dal, Nagin, Mansbal.

*Euryale ferox* Salisb. FBI. 1:115.

A prickly aquatic herb with big floating leaves, which are green above and red or purple beneath. Flowers green outside and bright red inside. Fruit with persistent sepals. Seeds roasted and sold in the bazar.

Dal lake, T. A. Rao, No. 7728, Alt. 1700 m.

*Nelumbo nucifera* Gaertn.

Syn. *N. speciosum* Willd. FBI. 1:116.

An aquatic herb with creeping big rootstock and flowers of rose, red, white and yellow shades.

Dal lake, T. A. Rao, Nos. 7729, 9515, 9602, Alt. 1700 m.

Wullar, Nagin, Mansbal, Near Pampore.

## PAPAVERACEAE

*Papaver dubium* L. FBI. 1:117.

An erect herb with big red flowers. Petals have a black mark at the base.

Pampore, T. A. Rao, No. 9385, Alt. 2000 m.

Lolab valley, Sindh valley.

## FUMARIACEAE

*Corydalis diphylla* Wall. FBI. 1:122.

A shady herb with brick red or orange coloured flowers.

Kaunsarnag, T. A. Rao, Nos. 9305, 9568, Alt. 3800 m.

Pir Panjal range, Pissu Ghati, Thajwas.

*C. govaniana* Wall. FBI. 1:124.

A tufted herb with woody rootstock and bright yellow flowers.

Bhadrawah, T. A. Rao, Nos. 9123, 9307, 9657, Alt. 2400-3800 m.

Balesh range, Kaunsarnag, Tulian lake valley.

*C. ramosa* Wall. FBI. 1:125.

A procumbent herb with yellow flowers.

Banihal top, T. A. Rao, No. 7668, Alt. 2800 m.

Pir Panjal range.

*C. cornuta* Royle FBI. 1:126.

A procumbent herb with yellow flowers having purple tips.

Banihal top, T. A. Rao, Nos. 7668, 7829, Alt. 2800 m.

Pir Panjal range.

## CRUCIFERAE

*Nasturtium palustre* DC. FBI. 1:133.

A semi aquatic herb with white to yellow flowers.

Kistawar, T. A. Rao, Nos. 7876, 9284, 9374, 9532, Alt. 2000 m.

Kungwatan, Shopyan.

*Barbarea vulgaris* R. Br. FBI. 1:134.

Yellow flowered herb.

Kungwattan, T. A. Rao, Nos. 9290, 9292, Alt. 3000 m.

*Turritis glabra* L.

Syn. *Arabis glabra* Crantz. FBI. 1:135.

An erect herb with white flowers.

Chandigam, T. A. Rao, Nos. 9463, 9743, Alt. 2000 m.

Lolab valley, Pir Panjal range.

*Arabis pterosperma* Edgew. FBI. 1:136.

Syn. *A. alpine* L. FBI. 1:135.

An erect herb in buds.

Chandanwari, T. A. Rao, Nos. 7762, 9700, Alt. 3000 m.

*A. amplexicaulis* Edgew. FBI. 1:136.

An erect herb with white flowers.

Aharbal, T. A. Rao, Nos. 9195, 9241, 9544, Alt. 1800 m.

Thajwas.

*A. tibetica* Hook. f. & Thoms. FBI. 1:136.

A perennial much branched erect herb with white flowers.

Banihal ridge, T. A. Rao, No. 7678, Alt. 2800 m.

*Cardamine impatiens* L. FBI. 1:138.

An erect herb with small white flowers in moist areas.

Kungwattan, T. A. Rao, No. 9288, Alt. 3000 m.

*C. macrophylla* Willd. FBI. 1:139.

Local name: CHHACHHI.

White flowered herb near running water.

Kansar, T. A. Rao, Nos. 9126, 9157, 9302, Alt. 2300 m.

Pir Panjal range, Balesh range, Tulian lake valley.

*C. flexuosa* Witt.

White flowered herb on slopy soil.

Bhadrawah, T. A. Rao, No. 9053, Alt. 2400 m.

Jai valley.

*Draba glacialis* Adams. FBI. 1:142.

White or cream coloured flowers; hairy herb.

Kaunsarnag, T. A. Rao, No. 9343, Alt. 3200 m.

*Erysimum hieracifolium* L. FBI. 1:153.

A hairy (star shaped or forked) herb with orange yellow flowers.

Kistawar, T. A. Rao, Nos. 7782, 7898, 9271, Alt. 200 m.

Pir Panjal range.

*Brassica juncea* Hook. f. & Thoms. FBI. 1:157.

A herb with yellow flowers.

Chenab valley, T. A. Rao, No. 7391, Alt. 1200 m.

*Capsella bursa-pastoris* Moench FBI. 1:159.

A weed of cultivation; A herb in pods.

Jai valley, T. A. Rao, No. 9140, Alt. 2400 m.

*Thlaspi arvense* L. FBI. 1:162.

An erect herb with orbicular fruits.

A weed of cultivation.

Sedau, T. A. Rao, No. 9361, Alt. 1700 m.

*T. calaminare* Laj & Court.

Syn. *T. alpestre* L. FBI. 1:162.

A semi erect herb with pods.

Jai valley, T. A. Rao, Nos. 9054, 9090, Alt. 2500 m.

Bhadrawah.

*Senebiera pinnatifida* DC.

An annual herb with fruits.

Srinagar, T. A. Rao, No. 9585, Alt. 1735 m.

## CAPPARIDACEAE

*Capparis spinosa* L. FBI. 1:173.

A shrub in rocky crevices with white flowers and purple filaments.

Thatri, T. A. Rao, No. 7768, Alt. 900 m.

Chenab valley.

## VIOLACEAE

*Viola biflora* L. FBI. 1:182.

A small decumbent herb with one or two yellow coloured flowers on the same stalk.

Jai valley, T. A. Rao, Nos. 9092, 9303, 9558, 9643, 9670, Alt. 2000-3400 m.

Pir Panjal range, Thajwas.

*V. caespitosa* D. Don

Syn. *V. patrinii* DC. FBI. 1:183.

A small tufted herb with lilac or purple flowers.

Jai valley, T. A. Rao, Nos. 9081, Alt. 2500 m.

Pir Panjal range.

*V. canescens* Wall.

Syn. *V. serpens* var. *canescens* Wall. FBI. 1:184.

A running pubescent herb with fimbriated stipule and lilac flowers.

Jai Hills, T. A. Rao, Nos. 9105, 9640, Alt. 2800 m.

Apharwat. ...

*V. serpens* Wall. FBI. 1:184.

A herb with lilac flowers.

Jai, T. A. Rao, Nos. 9084, 9105, 9277, 9640, Alt. 3000 m.

Apharwat, Balesh range.

*V. falconeri* Hook. f. & Thoms. FBI. 1:185.

A blue flowered herb near boulders. Flowers with spur and the throat with white markings. An endemic form and a very rare find. "A very remarkable species, resembling *V. acuminata* Led of Siberia and Manchuria, but with much larger flowers and gland dotted leaves." (FBI. 1:185).

Aharbal, T. A. Rao, No. 9243, Alt. 2000 m.

## POLYGALACEAE

*Polygala abyssinica* Fresen. FBI. 1:202.

A perennial erect herb with a woody rootstock; Racemes with purple coloured flowers.

Patani top & Sannasar, T. A. Rao, Nos. 7459, 7819, 9037, Alt. 1000-2000 m.

Chenab valley.

*Polygala sibirica* L. FBI. 1:205.

A herb with blue flowered racemes.

Banihal, T. A. Rao, No. 9175, 9512, Alt. 2000 m.

Mansbal, Pir Panjal range.

## CARYOPHYLLACEAE

*Dianthus jacquemontii* Edgew. FBI. 1:214.

A semi erect herb with white flowers; in rocky crevices.

Sopore, T. A. Rao, Nos. 9424, 9861, Alt. 2000 m.

Banihal range.

*D. crinitus* Smith FBI. 1:215.

A suffruticose herb with white flowers.

Banihal, T. A. Rao, No. 7652, Alt. 2000 m.

*Gypsophila cerastioides* D. Don FBI. 1:217.

A herb with white flowers having purple blue streaks at the base of petals.

Kaunsarnag, T. A. Rao, Nos. 9080, 9324, 9671, Alt. 3800 m.

Tulian lake valley.

*Silene venosa* (Gibb.) OS.

Syn. *S. inflata* Smith FBI. 1:218.

Local name: VATKRAM.

An erect perennial herb with white flowers.

Banihal valley, T. A. Rao, Nos. 7595, 7603, 9150, 9193, 9760, 9810, Alt. 1700 m.

*Cucubalus bacciferus* L. FBI. 1:222.

A weak hairy (curly white hairs) perennial with drooping yellow green flowers.

Banihal, T. A. Rao, Nos. 7623, 9684, 9739, Alt. 2000 m.

Batkote, Lolab valley, Pahalgam.

*Lychnis coronaria* Lam. FBI. 1:222.

Local name: ANGARDA.

A silky white woolly herb with red-purple flowers. Lolab valley, T. A. Rao, Nos. 9429, 9788, Alt. 2000-3000 m.

Batkote, Fur-fazal.

*L. fimbriata* Wall. FBI. 1:225.

A glandular hairy plant with cream white flowers.

Banihal, T. A. Rao, Nos. 7642, 7651, Alt. 2000 m. Pir Panjal range.

*L. indica* Benth. FBI. 1:225.

A weak herb with white flowers.

Sannasar, T. A. Rao, No. 7472, Alt. 2100 m.

*Cerastium trigynum* Vill. FBI. 1:227.

A semi erect white flowered herb.

Kungwattan, T. A. Rao, Nos. 9328, 9664, Alt. 3000 m.

*C. vulgatum* L. FBI. 1:228.

A semi erect herb with white flowers.

Banihal, T. A. Rao, Nos. 7594, 7709, 9232, 9668, Alt. 2400 m.

Tulian lake valley.

*Malachium aquaticum* (L.) Rahb.

Syn. *Stellaria aquatica* Scop. FBI. 1:229.

A white flowered decumbent herb.

Sannasar, *T. A. Rao*, Nos. 7440, 9060, 9291, Alt. 2000 m.

Patani top, Kungwattan.  
Chenab valley.

*S. media* L. FBI. 1:230.

A procumbent herb with white flowers in cymes.  
Batote and Ramban, *T. A. Rao*, No. 7440, 7883, 9060, 9232, 9740, Alt. 1200 m.

Chenab valley.

*S. monosperma* Ham.

Syn. *S. crispata* Wall. FBI. 1:229.

A decumbent herb with white flowers.

Desu, *T. A. Rao*, No. 9846, Alt. 2000 m.

*S. bulbosa* Wulf FBI. 1:231.

A small herb with globose tubers, white flowers on long capillary stalks. "A very peculiar and interesting little plant in respect of structure and distribution confined to Carinthia and Transylvania in Europe and to Siberia and the Himalayas in Asia." (FBI. 1:231)

Kungwattan, *T. A. Rao*, No. 9315, Alt. 3000 m.

*Arenaria foliosa* Royle FBI. 1:236.

A perennial herb with white flowers.

Sonamarg hills, *T. A. Rao*, No. 9574, Alt. 3000 m.

*A. kashmirica* Edgew. FBI. 1:236.

A tufted herb with white flowers.

Pissu Ghati, *T. A. Rao*, Nos. 9704, 9726, Alt. 3200 m.

*A. serpyllifolia* L. FBI. 1:239.

A branching herb with small flowers.

Shopyian, *T. A. Rao*, No. 9378, Alt. 2000 m.

*A. neelgerrensis* Wight & Arn. FBI. 1:239.

A semi-erect herb with white flowers.

Sannasar, *T. A. Rao*, Nos. 7625, 7679, 9397, Alt. 2400 m.

Banihal ridge.

*Sagina procumbens* L. FBI. 1:242.

A small tufted perennial herb in buds.

Sannasar, *T. A. Rao*, Nos. 7425, 9061, 9287, Alt. 3000 m.

Patani top.

## TAMARICACEAE

*Myricaria bracteata* Royle

Syn. *M. germanica* Desv. FBI. 1:250.

A bushy shrub with pinkish-red flowers in lateral or terminal spikes.

Hirpur, *T. A. Rao*, Nos. 9364, 9738, Alt. 2000 m.  
Lidder stream, Sindh stream.

## HYPERICACEAE

*Hypericum cernuum* Roxb. FBI. 1:253.

A pendent shrub with yellow flowers and fruits.

Bhadrawah, *T. A. Rao*, No. 9164, Alt. 2000 m.

*H. perforatum* L. FBI. 1:255.

An erect or semi-erect perennial herb with yellow flowers.

Kistawar hills, *T. A. Rao*, Nos. 7802, 9169, Alt. 1800-2000 m.

## MALVACEAE

*Lavatera kashmiriana* Camb. FBI. 1:319.

A robust downy herb with large pink coloured flowers.

Banihal, *T. A. Rao*, No. 7641, Alt. 2000 m. An endemic species.

Pir Panjal range, Sindh valley, Lidder valley.

*Malva rotundifolia* L. FBI. 1:320.

A semi erect herb with pale blue to pale violet flowers.

Banihal ridge, *T. A. Rao*, Nos. 7753, 7811, 9110, Alt. 3000 m.

Pir Panjal range, Balesh range.

*Hibiscus trionum* L. FBI. 1:334.

An annual herb with yellow flowers having a dark purple centre.

Banihal valley, *T. A. Rao*, Nos. 7526, 7528, 7804, Alt. 1800 m.

Pir Panjal range.

## TILIACEAE

*Grewia disperma* Rottler

Syn. *G. laevigata* Vahl FBI. 1:389.

A medium sized tree with fruits.

Jammu, *T. A. Rao*, No. 7323, Alt. 300 m.

Siwalik range.

*Triumfetta bartramia* L.

Syn. *T. rhomboidea* Jacq. FBI. 1:395.

A herb with small pale pink flowers.

Jammu, *T. A. Rao*, No. 7326, Alt. 380-1650 m.

Siwalik range.

*Corchorus aestuans* L. FBI. 1:398.

Syn. *C. acutangulus* Lam. FBI. 1:398.

A shrub with fruits.

Jammu, *T. A. Rao*, No. 7313, Alt. 300 m.

Siwalik range.

## GERANIACEAE

*Geranium wallichianum* Sw. FBI. 1:430.

Local name: LALJHARI.

A perennial hairy plant with blue purple to red purple flowers.

Batote, *T. A. Rao*, Nos. 7332, 7412, 7434, 9187, 9830, Alt. 2000 m.

Chenab valley, Pir Panjal range.

*G. nepalense* Sw. FBI. 1:430.

A much branched herb with pink or purple coloured flowers.

Banihal valley, *T. A. Rao*, Nos. 7462, 7609, 9186, 9467, 9474, Alt. 1800 m.

Pir Panjal range.

*G. robertianum* L. FBI. 1:432.

An erect foetid herb with small flowers streaked red.

Batkote, *T. A. Rao*, No. 9746, Alt. 2600 m.

*Erodium cicutarium* Leman FBI. 1:434.

A prostrate herb with pale pink flowers.

Jai valley, *T. A. Rao*, Nos. 9046, 9211, 9368, Alt. 2200 m.

Upper Munda.

- Impatiens brachycentra* Kar. & Kir. FBI. 1:481.  
An erect herb with white flowers.  
Nilnag area, *T. A. Rao*, No. 9415, Alt. 2000 m.

## RUTACEAE

- Peganum harmala* L. FBI. 1:486.  
Local name: ISBAND.  
A bushy perennial rooted herb with annual stem and branches bearing white flowers. A red dye is obtained from the seeds and also the alkaloids, harmaline & harmine. 'The genus is perhaps better placed in Zygophyllaceae.' Hari parbat, *T. A. Rao*, No. 9578, Alt. 1800 m.
- Dictamnus albus* L. FBI. 1:487.  
An aromatic glandular herb with pinkish white showy flowers disposed on a terminal raceme.  
Banihal, *T. A. Rao*, Nos. 9181, 9571, Alt. 2200 m. Sonamarg.
- Skimmia laureola* Sieb. & Zucc.  
Local name: NER.  
An aromatic shrub with cream or white flowers and red fleshy drupes. Skimmia oil is used in perfumery and soap making.  
Kistawar hills, *T. A. Rao*, Nos. 7828, 9612, Alt. 2000-3000 m.  
Gulmarg, Pir Panjal range.

## MELIACEAE

- Melia azaderach* L. FBI. 1:544.  
A big tree with fruits.  
Chenab valley, *T. A. Rao*, No. 7344, Alt. 1200 m.
- Cedrela serrata* Royle FBI. 1:568.  
A medium sized tree with white flowers.  
Chenab valley, *T. A. Rao*, No. 9166, Alt. 1300 m.

## CELASTRACEAE

- Euonymus hamiltonianus* Wall. FBI. 1:612.  
Local name: CHHUL. GURJAR. SHAKKI.  
A medium sized tree with green flowers.  
Chandigam, *T. A. Rao*, Nos. 9256, 9466, 9809, 9793, Alt. 2000 m.  
Lolab valley, Desu Rakh, Daksum.

## RHAMNACEAE

- Zizyphus vulgaris* Lam. FBI. 1:633.  
A stunted tree with green flowers.  
Wular banks, *T. A. Rao*, Nos. 9163, 9506, Alt. 1750 m.  
Bhadrawah.
- Z. nummularia* (Burm. f.) Wight & Arn.  
Syn. *Z. rotundifolia* Lam. FBI. 1:632.  
Local name: BER.  
A medium sized tree.  
Jammu, *T. A. Rao*, No. 7319, Alt. 300 m.  
Jammu siwaliks.
- Rhamnus dahuricus* Pall. FBI. 1:639.  
A branching shrub or tree with green flowers.  
Kistawar hills, *T. A. Rao*, No. 7888, Alt. 1800 m.

- Sageretia theezans* Brongn. FBI. 1:641.  
A shrub with flowers in short axillary panicles.  
Leaves used as a substitute for Tea. Fruit is edible.  
Chenab valley, *T. A. Rao*, Nos. 7335, 7799, 7770, Alt. 1200 m.

## SAPINDACEAE

- Acer caesium* Wall. FBI. 1:695.  
A big sized tree with flowers in corymbs.  
Aharbal, *T. A. Rao*, Nos. 9273, 9537, Alt. 2000-2600 m.  
Thajwas, Pir Panjal range, Balesh range.
- Aesculus indica* Hiern. FBI. 1:675.  
Local name: BAN-AKHROT.  
A medium sized tree with white flowers (yellow patches on petals). The leaves are lopped for winter fodder.  
Upper Munda, *T. A. Rao*, No. 772, 9209, Alt. 2000 m.  
Pir Panjal range, Lolab valley.
- Dodonaea viscosa* L. FBI. 1:695.  
Local name: SANTHA.  
An evergreen shrub with winged fruits.  
Udhampur, *T. A. Rao*, No. 9011, Alt. 200 m.  
Jammu siwaliks.

## LEGUMINOSAE

- Thermopsis barbata* Royle FBI. 2:62.  
A woolly herb with deep pink or purple flowers.  
Jai hills, *T. A. Rao*, No. 9116, Alt. 3800 m.
- Crotalaria albida* Heyne FBI. 2:71.  
A herb with yellow flowers.  
Batote, *T. A. Rao*, No. 7327, Alt. 1700 m.  
Chenab valley.
- Trifolium pratense* L. FBI. 2:86.  
An erect herb with red flowers in heads. A forage clover.  
Banihal ridge, *T. A. Rao*, Nos. 7763, 9238, 9519, Alt. 2000 m.  
Pir Panjal range, Balesh range.
- T. repens* L. FBI. 2:86.  
A creeping herb with white flowered heads.  
Banihal, *T. A. Rao*, No. 7585, Alt. 2000 m.
- Melilotus alba* Lam. FBI. 2:89.  
An erect herb with white flowers.  
Batkote, *T. A. Rao*, No. 9765, Alt. 2000 m.
- Medicago lupulina* L. FBI. 2:90.  
A prostrate herb with small yellow flowers.  
Srinagar, *T. A. Rao*, Nos. 7714, 7846, 7868, 9005, Alt. 1800 m.  
Jammu siwaliks.
- Lotus corniculatus* L. FBI. 2:91.  
A semi erect herb with golden yellow flowers.  
Kistawar, *T. A. Rao*, Nos. 7793, 7858, 9050, 9134, 9197, Alt. 2000 m.

*Indigofera gerardiana* Wall. FBI. 2:100.

A shrub with pink flowers.

Chenab valley, *T. A. Rao*, Nos. 7381, 7386, 7911, 9137, Alt. 1000-2000 m.

Balesh range.

*I. gerardiana* Wall. var. *heterantha* Wall. FBI. 2:100.

A shrub with pink to purple flower.

Chenab valley, *T. A. Rao*, Nos. 7378, 7386, Alt. 1000 m.

*I. atropurpurea* Buch.-Ham. FBI. 2:101.

A shrub with pink flowers.

Batote and Ramban, *T. A. Rao*, Nos. 7490, 9268, Alt. 2000-1000 m.

Chenab valley, Aharbal.

*I. hebetata* Benth. FBI. 2:101.

A shrub with violet flowers.

Jammu siwaliks, *T. A. Rao*, Nos. 7490, 7630, Alt. 1700 m.

*Astragalus leucocephalus* Grah. FBI. 2:128.

A semi erect herb with cream to white flowered heads.

Sopore, *T. A. Rao*, No. 9425, Alt. 1700 m.

*A. chlorostachys* Lind. FBI. 2:128.

An erect herb with pods.

Banihal range, *T. A. Rao*, Nos. 7608, 7834, Alt. 2000 m.

Kistawar.

*A. ciliolatus* Benth. FBI. 2:129.

A yellow flowered semi erect herb.

Banihal range, *T. A. Rao*, Nos. 7583, 7655, Alt. 2400 m.

*A. rhizanthus* Royle FBI. 2:131.

Cream coloured flowers with a blue tint. A plant of tufted habit.

Seshnag, *T. A. Rao*, No. 9712, Alt. 3800 m.

*A. royleanus* Bunge

Syn. *A. candolleanus* Royle FBI. 2:132.

Semi-erect; yellow flowers.

Jai valley, *T. A. Rao*, Nos. 9082, 9644, Alt. 2400-3800 m.

Pissu Ghati.

*A. daltonianus* Bunge

Syn. *A. polycanthus* Royle FBI. 2:134.

A stunted shrub with yellow flowers.

Hirpur, *T. A. Rao*, No. 9367, Alt. 1700 m.

*Oxytropis thomsoni* Benth. FBI. 2:138.

A purple flowered herb.

Upper Munda, *T. A. Rao*, No. 9199, Alt. 2000 m. Banihal range.

*Lespedeza sericea* Miq. FBI. 2:142.

A herb with white flowers having purple or pink mark.

Banihal, *T. A. Rao*, Nos. 7535, 7787, 7857, Alt. 2400 m.

Pir Panjal range.

*L. gerardiana* Grah. FBI. 2:142.

A herb with cream-coloured flowers.

Batote, *T. A. Rao*, No. 7342, Alt. 1700 m. Chenab valley.

*Hedysarum cachemirianum* Benth. FBI. 2:146.

Lovely pink to red coloured herb. An endemic species.

Thajwas, *T. A. Rao*, No. 9552, Alt. 3800 m.

*Aeschynomene indica* L. FBI. 2:151.

A suffruticose annual herb with yellow flowers.

Banihal valley, *T. A. Rao*, Nos. 7500, 7928, Alt. 1800 m.

*Desmodium laxiflorum* DC. FBI. 2:164.

A shrub with 3 foliate leaves and axillary racemes.

Batote and Ramban, *T. A. Rao*, No. 7493, Alt. 1700-1000 m.

Chenab valley.

*D. tiliaefolium* Don FBI. 2:168.

A shrub with pink flowers.

Batote, *T. A. Rao*, Nos. 7380, 7572, 7865, 7915, Alt. 1700 m.

Chenab valley.

*Vicia rigidula* Royle FBI. 2:178.

A reddish flowered climber with fruits.

Upper Munda, *T. A. Rao*, No. 7645, Alt. 2350 m.

*V. sepium* L. FBI. 2:179.

A climber with reddish flowers.

Sonamarg hills, *T. A. Rao*, No. 9576, Alt. 3200 m.

*Lathyrus pratensis* L. FBI. 2:180.

White to cream coloured slender climber.

Desu Rakh, *T. A. Rao*, No. 9812, Alt. 3000 m.

*L. luteus* Baker FBI. 2:180.

Yellow to pink flowered shrub.

Banihal range, *T. A. Rao*, Nos. 9204, 9250, 9617, 9703, 9780, Alt. 2000-3000 m.

Pir Panjal range, Thajwas.

*L. altaicus* Led. FBI. 2:180.

Deep blue to purple flowers.

Aharbal, *T. A. Rao*, No. 9278, Alt. 1800-3800 m. Kungwattan, Pissu Ghati.

*Atylosia scarabaeoides* Benth. FBI. 2:215.

A trailer with grey hairy pods.

Jammu, *T. A. Rao*, No. 7303, Alt. 300 m. Jammu siwaliks.

*Dalbergia sissoo* Roxb. FBI. 2:231.

Local name: SHISHAM, TAHLI.

A medium sized tree with fruits.

Thathri, *T. A. Rao*, No. 7774, Alt. 680 m. Chenab valley.

*D. lanceolaria* L. FBI. 2:252.

A small tree with white flowers.

Desu, *T. A. Rao*, No. 9798, Alt. 2800 m.

*Cassia fistula* L. FBI. 2:261.

A tree with yellow flowers.

Udhampur, *T. A. Rao*, No. 9012, Alt. 400 m. Jammu siwaliks.

*C. tora* L. FBI. 2:263.

A herb with yellow flowers.

Jammu, *T. A. Rao*, No. 7324, Alt. 300 m. Jammu siwaliks.

- Bauhinia vahlii* Wight & Arn. FBI. 2:279.  
A large climber with white flowers.  
Jammu siwaliks, *T. A. Rao*, No. 9010, Alt. 1000-1800 m.
- Mimosa rubicaulis* Lam. FBI. 2:291.  
A small tree with small hooked prickly branches.  
Jammu, *T. A. Rao*, No. 7309, Alt. 300 m.  
Jammu siwaliks.
- Acacia catechu* Willd. FBI. 2:295.  
A tree with fruits and pendent white flowered spike.  
Jammu, *T. A. Rao*, No. 7315, Alt. 300 m.  
Jammu siwaliks.
- A. intsia* Willd. FBI. 2:297.  
A small tree with rose white flowers.  
Jammu, *T. A. Rao*, No. 7309, Alt. 300 m.  
Jammu siwaliks.
- Robinia pseudocacia* L.  
A tree with white flowers ; Introduced.  
Kansar, *T. A. Rao*, No. 9154, Alt. 2000 m.

## ROSACEAE

- Prunus amygdalus* Baill. FBI. 2:313.  
The cultivated almond tree.  
Nagam, *T. A. Rao*, Nos. 7388, Alt. 1800 m.
- P. cornuta* Wall.  
Syn. *Prunus padus* L. FBI. 2:315.  
A medium sized tree with fruits and galls.  
Chenab valley, *T. A. Rao*, Nos. 7364, 7862, 9113, 9194, 9621, Alt. 2000-3400 m.  
Pir Panjal range.
- Prinsepia utilis* Royle FBI. 2:323.  
A thorny shrub with purple fruits subtended by the withered calyx.  
Bhadrawah, *T. A. Rao*, No. 7921, Alt. 2000 m.
- Spiraea vestita* Wall. FBI. 2:323.  
An erect herb with white flowers in clusters.  
Banihal range, *T. A. Rao*, Nos. 7643, 9847, Alt. Desu Rakh, Pir Panjal range. 2400 m.
- S. lindleyana* Wall.  
Syn. *S. sorbifolia* L. FBI. 2:324.  
A bushy shrub with white flowers.  
Kistawar, *T. A. Rao*, Nos. 7842, 9019, 9766, Alt. 2000 m.  
Batkote.
- S. bella* Sims FBI. 2:324.  
A shrub with white or pale pinkish flowers.  
Pahalgam/Tulian lake, *T. A. Rao*, No. 9667, Alt. 3000 m.
- S. canescens* D. Don FBI. 2:325.  
A woody shrub with small white umbels.  
Bhadrawah, *T. A. Rao*, Nos. 9021, 9753, 9794, Alt. 2000 m.
- S. gracilis* Maxim.  
A shrub with white flowers.  
Kistawar, *T. A. Rao*, No. 7877, Alt. 2000 m.
- S. vacciniifolia* D. Don FBI. 2:325.  
A shrub with flowers in dense corymbs.  
Kud, *T. A. Rao*, No. 7325, Alt. 1800 m.  
Jammu siwaliks.
- Rubus niveus* Wall. FBI. 2:335.  
Local name: CHANJ.  
A bushy shrub with buds.  
Jai valley, *T. A. Rao*, No. 9130, Alt. 2500 m.
- R. niveus* Wall. FBI. 2:335.  
A shrub with edible fruits.  
Daksum, *T. A. Rao*, Nos. 9791, 9457, Alt. 2800 m.  
Pir Panjal range.
- R. fruticosus* L. FBI. 2:337.  
A shrub with white flowers.  
Bhadrawah, *T. A. Rao*, Nos. 7912, 9510, 9582, Alt. 1735 m.  
Srinagar.
- R. pungens* Camb. FBI. 2:341.  
A shrub with white flowers and red fruits.  
Banihal, *T. A. Rao*, Nos. 9202, 9264, 9842, Alt. 2800 m.  
Desu Rakh.
- Geum urbanum* L. FBI. 2:342.  
A perennial herb with a woody rootstock and globose heads of densely hairy achenes.  
Patani top, *T. A. Rao*, Nos. 7436, 9207, 9394, 9464, Alt. 2000-3000 m.  
Sannasar, Lolab valley, Pir Panjal range.
- G. elatum* Wall. FBI. 2:343.  
A perennial herb with pinnately cut radical leaves and yellow flowers.  
Khilanmarg, *T. A. Rao*, No. 9626, Alt. 3800 m.
- Fragaria indica* Andr. FBI. 2:343.  
A runner with red fruits and yellow flowers.  
Batote, *T. A. Rao*, Nos. 7345, 9028, Alt. 1700 m.
- F. vesca* L. FBI. 2:344.  
A white flowered herb.  
Banihal range, *T. A. Rao*, Nos. 7600, 7699, 9051, Alt. 2400 m.  
Pir Panjal range, Balesh range.
- Sibbaldia parviflora* Willd.  
Syn. *Potentilla sibbaldi* Haler. FBI. 2:345.  
A branched herb with yellow flowers.  
Patani top, *T. A. Rao*, Nos. 7467, 9285, 9546, 9625, Alt. 2300 m.  
Sannasar, Thajwas.
- Potentilla fragarioides* L. FBI. 2:350.  
A prostrate herb with lemon yellow flowers.  
Bhadrawah, *T. A. Rao*, No. 9038, Alt. 2000 m.
- P. desertorum* Bunge FBI. 2:355.  
A hairy herb with yellow flowers.  
Seshnag, *T. A. Rao*, No. 9720, Alt. 4000 m.
- P. nepalensis* Hook. FBI. 2:355.  
A erect or semi-erect herb with crimson red or yellow flowers.  
Patani top, *T. A. Rao*, Nos. 7452, 7463, 7715, 7468, 9075, 9439, 9825, Alt. 2300 m.
- P. reptans* L. FBI. 2:356.  
A running herb with axillary solitary naked yellow flowers.  
Kulgam, *T. A. Rao*, No. 9219, Alt. 1700 m.

- Potentilla argrophylla* Wall. FBI. 2:356.  
An erect or decumbent herb with silky white hairs and yellow or orange coloured flowers.  
Banihal ridge, T. A. Rao, Nos. 7717, 9339, 9721, 9782, 9817, Alt. 2600 m.  
Pir Panjal range, Batkote.
- P. gelida* C. A. Mey. FBI. 2:357.  
A hairy herb with yellow flowers.  
Khilanmarg, T. A. Rao, No. 9624, Alt. 3800 m.
- P. monanthes* Lindl. FBI. 2:358.  
A prostrate herb with axillary yellow flowers.  
Tulian lake valley, T. A. Rao, No. 9654, Alt. 3800 m.
- P. kleiniana* Wight & Arn. 2:359.  
A prostrate herb with yellow flowers.  
Kulgam, T. A. Rao, Nos. 9088, 9219, 9741, Alt. 1700 m.
- Alchemilla vulgaris* L. FBI. 2:360.  
A prostrate hairy herb with small green flowers.  
Kungwatan, T. A. Rao, Nos. 9294, 9396, 9821, Alt. 3000 m.  
Pir Panjal range.
- Agrimonia eupatorium* L. FBI. 2:361.  
An erect herb with small yellow flowers.  
Banihal ridge, T. A. Rao, Nos. 7684, 7899, 9820, Alt. 2000-3000 m.  
Desu, Pir Panjal range.
- Rosa macrophylla* Lindl. FBI. 2:366.  
A prickly shrub with white or pale red flowers.  
Chandigam, T. A. Rao, No. 9444, Alt. 2000 m.
- R. webbiana* Wall. FBI. 2:366.  
A shrub with red flowers of 1½ inches diameter.  
Kistawar, T. A. Rao, Nos. 7803, 7874, 9733, Alt. 3000 m.  
Chandanwari.
- R. sericea* Lindl. FBI. 2:367.  
A prickly shrub with white flowers.  
Shopyain, T. A. Rao, No. 9384, Alt. 1800 m.
- R. moschata* Mill. FBI. 2:367.  
A prickly shrub with pink to white flowers.  
Batote, T. A. Rao, Nos. 7328, 7875, 9444, Alt. 1800 m.  
Pir Panjal range, Lolab valley.
- Pyrus lanata* Don FBI. 2:375.  
A shrub with fruits; white felted leaves.  
Apaharwat, T. A. Rao, No. 9647, Alt. 3200 m.
- Pyracantha crenulata* (Roxb.) Roem.  
Syn. *Crataegus oxyacantha* L. FBI. 2:383.  
Local name: PANDAR.  
A small tree with edible fruits.  
Jai, T. A. Rao, No. 9048, 9818, Alt. 2300 m.  
Bhadrawah.
- Cotoneaster bacillaris* Wall. FBI. 2:384.  
A small tree with fruits.  
Kistawar, T. A. Rao, No. 7864, Alt. 2000 m.
- C. rosea* Edgew. FBI. 2:385  
A shrub with white flowers.  
Desu, T. A. Rao, Nos. 9811, 9844, Alt. 3000 m.

- Cotoneaster nummularia* Fisch. & Mey. FBI. 2:386.  
A shrub with white flowers. Leaves whitish underneath.  
Aharbal, T. A. Rao, No. 9247, Alt. 2000 m.
- C. microphylla* Wall. FBI. 2:387.  
A prostrate woody shrub.  
Jai hills, T. A. Rao, No. 9115, Alt. 2400 m.

## SAXIFRAGACEAE

- Saxifraga siberica* L. FBI. 2:390.  
An erect weak herb with white flowers.  
Tulian lake valley, T. A. Rao, No. 9675, Alt. 3800 m.
- Bergenia ligulata* Engl.  
Syn. *Saxifraga ligulata* Wall. FBI. 2:398.  
A stout herb on rocks with fruits.  
Jai valley, T. A. Rao, Nos. 9129, 9203, Alt. 2000 m.  
Pir Panjal range, Balesh range.
- S. stracheyi* Hook. f. & Thoms. FBI. 2:398.  
A stout herb with hairy calyx and white flowers.  
Kungwatan, Kaunsarnag, T. A. Rao, Nos. 9349, 9639, Alt. 3000-4100 m.
- Parnassia nubicola* Wall. FBI. 2:402.  
A glabrous perennial herb with solitary white flowers.  
Sannasar, T. A. Rao, No. 7411, Alt. 2000 m.  
Patani top.
- P. ovata* Ledeb. FBI. 2:403.  
A small sized herb with solitary white flowers.  
Banihal ridge, T. A. Rao, No. 7659, Alt. 3000 m.
- Deutzia* sp. R. Br.  
A cultivated shrub with fruits.  
Srinagar, T. A. Rao, No. 9418, Alt. 1800 m.
- Ribes rubrum* L. FBI. 2:411.  
A shrub in fruiting stage.  
Daksum, T. A. Rao, No. 9841, Alt. 3000 m.

## CRASSULACEAE

- Sedum rhodiola* DC. FBI. 2:417.  
A perennial herb with yellow flowers grouped together in dense heads.  
Kistawar, T. A. Rao, No. 7832, Alt. 2800 m.  
Nagin Siru, Pissu Ghati.
- Sedum ewersii* Ledeb. FBI. 2:421.  
A perennial herb with fleshy bluish green round leaves with rose pink or purple flowers.  
Banihal range, T. A. Rao, Nos. 7577, 7718, 7854, Alt. 2800 m.  
Pir Panjal range.
- S. multicaule* Wall. FBI. 2:422.  
A glabrous herb with yellow stalkless flowers.  
Sannasar, T. A. Rao, No. 7403, Alt. 2000 m.
- S. adenotrichum* Wall. FBI. 2:420.  
A hairy herb with white flowers striped with pink marks.  
Bhadrawah, T. A. Rao, Nos. 9033, 9160, 9857, Alt. 2000-3000 m.  
Kansar, Pir Panjal range.

## HAMAMELIDACEAE

*Parrotia jacquemontiana* Decne. FBI. 2:426.

Local name: HATAB.

A shrub with white flowers.

Banihal range, *T. A. Rao*, Nos. 7639, 9064, 9188, Alt. 2400 m.

Jai, Pir Panjal range, Balesh range.

## HALORRHAGIDACEAE

*Hirppuris vulgaris* L. FBI. 2:432.

New Record. An aquatic plant with whorled leaves.

Flowers in the axil of leaves.

Nilnag lake, *T. A. Rao*, No. 9413, Alt. 2000 m.

Srinagar, in the swampy areas.

*Myriophyllum spicatum* L. FBI. 2:433.

An aquatic herb with spikes.

Dal lake, *T. A. Rao*, Nos. 773, 7740, Alt. 1800 m.

Srinagar swampy regions.

*Callitriche verna* L. FBI. 2:434.

A tender aquatic herb in stagnant water with fruits.

Shopyan, *T. A. Rao*, No. 9379, Alt. 2000 m.

## LYTHRACEAE

*Rotala densiflora* (Roth) Koehne

Syn. *Ammannia pentandra* Roxb. FBI. 2:568.

An erect herb with small red flowers.

Banihal valley, *T. A. Rao*, No. 7510, Alt. 2000 m.

*Punica granatum* L. FBI. 2:581.

Local name: ANAR.

A shrub with deep red flowers.

Chenab valley, *T. A. Rao*, No. 9167, Alt. 1300 m.

*Lythrum salicaria* L.

An erect herb with pinkish red flowers.

Dal lake, *T. A. Rao*, No. 7732, Alt. 1800 m.

Srinagar swampy areas.

## ONAGRACEAE

*Epilobium hirsutum* L. FBI. 2:583.

A herb with soft white hairs and purple flowers.

Banihal range, *T. A. Rao*, Nos. 7581, 7781, 7872, Alt. 2400 m.

*E. roseum* Schreb. FBI. 2:584.

A perennial herb with mauve coloured flowers.

Sannasar, *T. A. Rao*, Nos. 7469, 7613, 7886, 7907, 7910, 9764, Alt. 2000 m.

Pir Panjal range, Balesh range.

*E. cylindricum* D. Don. FBI. 2:585.

An erect pubescent herb with pale pink flowers.

Banihal valley, *T. A. Rao*, No. 7499, Alt. 2000 m.

*Circaea cordata* Royle FBI. 2:589.

A perennial herb with white flowers and two-celled ovary.

Banihal range, *T. A. Rao*, No. 7618, Alt. 2200 m.

*C. alpina* L. FBI. 2:589.

A perennial herb with white flowers and one-celled ovary.

Sannasar, *T. A. Rao*, No. 7437, Alt. 2000 m.

*Trapa natans* L. FBI. 2:590.

A floating aquatic herb.

Dal lake, *T. A. Rao*, Nos. 7730, 9490, Alt. 1800 m.

Wullar lake, Nilnag lake.

## FICOIDEAE

*Mollugo pentaphylla* L. FBI. 2:663.

A small herb with white flowers.

Chenab valley, *T. A. Rao*, No. 7349, Alt. 1200 m.

## UMBELLIFERAE

*Eryngium billardieri* Delaroche. FBI. 2:670.

Local name: DUDHALI.

An erect herb with a spinous toothed leaves.

Banihal valley, *T. A. Rao*, Nos. 7511, 9443, Alt. 1850 m.

Vale of Kashmir, Lolab valley.

*Sanicula europaea* L. var. *elata* Ham. FBI. 2:670.

A semi erect herb with white flowers.

Batote/Fur-fazal, *T. A. Rao*, Nos. 9776, 9843, Alt. 3000 m.

*Vicatia coniiifolia* DC. FBI. 2:671.

A yellow flowered herb in shade.

Kungwattan, *T. A. Rao*, No. 9316, Alt. 3000 m.

Pir Panjal range.

*Bupleurum jucundum* Kurz FBI. 2:675.

A decumbent herb with round or egg shaped stem-clasping leaves.

Banihal ridge, *T. A. Rao*, Nos. 7677, 9815, Alt. 3000 m.

Pir Panjal range.

*B. falcatum* L. FBI. 2:676.

A bluish green herb with linear leaves having thick margins.

Chenab valley, *T. A. Rao*, Nos. 7382, 7542, 7602, 9813, Alt. 1000-2800 m.

Pir Panjal range.

*B. falcatum* L. var. *marginatum* Wall. FBI. 2:676.

A herb with yellow flowers.

Upper Munda, *T. A. Rao*, Nos. 7727, 7818, Alt. 2200 m.

*B. longicaule* Wall. FBI. 2:677.

An erect herb with dark blue flowers in umbels.

Banihal ridge, *T. A. Rao*, Nos. 7675, 7676, Alt. 3000 m.

*B. tenue* D. Don. FBI. 2:677.

A semi erect herb with yellow flowers.

Patani top, *T. A. Rao*, No. 7450, Alt. 2300 m.

*Apium graveolens* L. FBI. 2:679.

An erect herb with white flowers.

Srinagar, *T. A. Rao*, No. 9606, Alt. 1800 m.

*Carum carvi* L. FBI. 2:680.

A branching herb with flowers.

Kungwattan, *T. A. Rao*, No. 9355, Alt. 3000 m.

*C. bubocastanum* G. D. J. Koch. FBI. 2:681.

Local name: ZIRA.

A branching herb with fruits.

Desu, *T. A. Rao*, No. 9806, Alt. 2800 m.

- Sium latijugum* Clarke FBI. 2:683.  
A tall herb in moist soil with small flowers.  
Banihal valley, T. A. Rao, Nos. 7496, 9583, Alt. 2000 m.  
Vale of Kashmir.
- Osmorhiza claytoni* Clarke FBI. 2:690.  
A perennial herb with white flowers.  
Banihal, T. A. Rao, No. 9155, Alt. 2200 m.
- Chaerophyllum villosum* Wall. FBI. 2:690.  
An erect herb with fusiform root, hispid stem, sheath with white margin and white flowers.  
Tulian lake valley, T. A. Rao, No. 9662, Alt. 3600 m.
- C. reflexum* Lindl. FBI. 2:691.  
A herb with white flowers and fruits.  
Banihal ridge, T. A. Rao, Nos. 9671, 9814, Alt. 3000 m.  
Pir Panjal range.
- Scandix pecten-veneris* L. FBI. 2:692.  
An annual herb with white flowers in umbels and long beaked fruits.  
Nagam, T. A. Rao, No. 9386, Alt. 1750 m.  
Vale of Kashmir.
- Prangos pabularia* Lindl. FBI. 2:695.  
Local name: PALANGUS; KOMEL.  
A perennial herb, yellow flowers in umbels.  
Powdered root used as poultice. Fodder for sheep and goats but is said to produce cataract if given to ponies.  
Upper Munda, T. A. Rao, No. 9179, Alt. 2400 m.  
Pir Panjal range.
- Selinum tenuifolium* Wall. FBI. 2:700.  
An erect herb in fruiting stage.  
Banihal ridge, T. A. Rao, No. 7689, Alt. 3000 m.
- Angelica archangelica* L. var. *himalaica* Clarke.  
A robust perennial herb with compound umbellate white flowers, near streams. Essential oil is used as a flavouring agent in confectionery and in liquors.  
Desu Rakh, T. A. Rao, No. 9838, Alt. 3000-3400.  
Pir Panjal range.
- Ferula jaeschkeana* Vatke FBI. 2:708.  
Local name: A'PAT KANPHUR.  
A robust herb with large reddish fruits. The green resin is used as a condiment and as a household remedy in the treatment of flatulence.  
Aharbal, T. A. Rao, Nos. 9240, 9851, Alt. 2000-3000 m.  
Pir Panjal range.
- Heracleum candicans* Wall. FBI. 2:714.  
A stout umbellifer with white flowers.  
Banihal range, T. A. Rao, Nos. 7599, 7656, Alt. 2400 m.
- Caucalis latifolia* L. FBI. 2:719.  
A herb with white flowers and fruits with hooks.  
Nagam, T. A. Rao, No. 9389, Alt. 1800 m.
- Trollis japonicus* (Houtt) DC.  
Syn. *Caucalis anthriscus* (L.) Gmel.  
An erect herb with fruits.  
Kistawar, T. A. Rao, No. 7812, Alt. 2000 m.

*Conium maculatum* L.

- A tall herb with white flowers; occurs frequently near graves. The genus is not mentioned to occur in India. Its distribution is Europe and temperate Asia. A new record for Kashmir.  
Srinagar, T. A. Rao, No. 9607, Alt. 1730 m.

ARALIACEAE

*Hedera nepalensis* K. Koch

- A shrub with fruits, cultivated.  
Srinagar, T. A. Rao, Nos. 7743, 7744, Alt. 1800 m.

CAPRIFOLIACEAE

*Adoxa moschatellina* L. FBI. 3:2.

- A tender shady inodorous herb with green flowers. Falconer regarded this as a distinct species but its habit and other characters are identical with the European.

Kungwattan, T. A. Rao, Nos. 9304, 9330, 9787, Alt. 3000-4000 m.

Thajwas, Pir Panjal range, Seshnag, Zoipal.

*Sambucus ebulus* L. FBI. 3:2.

- A stout herb with white flowers in corymbs and red fruits.

Kistawar, T. A. Rao, Nos. 7836, 9221, Alt. 2000-3400 m.

Shopyian, Pir Panjal range.

*Viburnum cotinifolium* D. Don FBI. 3:3.

- A shrub with pale pink flowers and red fruits.  
Banihal ridge, T. A. Rao, Nos. 7750, 9144, 9636, 9695, Alt. 3000 m.

Pir Panjal range, Balesh range.

*V. nervosum* D. Don FBI. 3:8.

Local name: GUCH.

A shrub with edible black fruits.

Bhadrawah, Jai, T. A. Rao, No. 9056, Alt. 2400 m.

*V. foetens* Decne. FBI. 3:8.

- A shrub with fragrant white rosy flowers near melting snow.

Jai Hills, T. A. Rao, Nos. 9108, 9310, Alt. 3000 m.

Pir Panjal range, Balesh range.

*Lonicera purpurascens* Hook. f. & Thoms. FBI. 3:12.

A shrub with tan coloured flowers.

Apharwat, T. A. Rao, No. 9638, Alt. 3800 m.

*L. parvifolia* Edgew. FBI. 3:13.

A shrub with white flowers.

Kaunsarnag, T. A. Rao, Nos. 9326, 9665, Alt. 3800 m.

Tulian lake valley.

*L. quinquelocularis* Hardw. FBI. 3:14.

A shrub with white or cream coloured flowers.

Desu Rak, T. A. Rao, Nos. 7923, 9244, 9831, 9845, Alt. 2800 m.

Pir Panjal range.

*L. orientalis* Lam. FBI. 3:15.

Local name: PHOOT.

A shrub with nodding flowers.

Kansar, T. A. Rao, No. 9159, Alt. 2500 m.

## RUBIACEAE

*Wendlandia exserta* DC. FBI. 3:37.

A small sized tree with a flush of white flowered large racemes.

Udhampur-Kud, T. A. Rao, No. 9006, Alt. 1000 m. Jammu siwaliks.

*Rubia cordifolia* L. FBI. 3:202.

A climber with small flowers and fruits.

Kistawar, T. A. Rao, No. 7789, Alt. 2000 m.

*Galium rotundifolium* L. FBI. 3:204.

A trailer with cream coloured flowers.

Batote, T. A. Rao, Nos. 7374, 7917, Alt. 1800 m. Chenab valley.

*G. asperuloides* Edgew.

Syn. *G. triflorum* Michx. FBI. 3:205

A straggling perennial with flowers in cymes.

Bhadrawah, Jai, T. A. Rao, Nos. 9052, 9089, Alt. 2000 m.

*G. aparine* L. FBI. 3:205.

A trailer with small flowers.

Patani top, T. A. Rao, Nos. 7464, 9461, Alt. 2300 m.

*G. vestitum* D. Don FBI. 3:206.

A trailer with small flowers.

Patani top, T. A. Rao, Nos. 7464, 7879, Alt. 2300 m. Kistawar, Sannasar.

*G. verum* L. FBI. 3:208.

Yellow flowered prostrate herb on dry slopes.

Sopore, T. A. Rao, No. 9423, Alt. 1700 m.

*Asperula odorata* L.

A shady herb with white flowers. Hooked round fruits. A new record.

Batkote, Fur-fazal, T. A. Rao, No. 9770, Alt. 2000 m.

## VALERIANACEAE

*Valeriana dioica* L. FBI. 3:211.

A stoloniferous herb with small white or rose coloured flowers.

Kaunsarnag, T. A. Rao, Nos. 9117, 9300, 9333, Alt. 3000-4000 m.

*V. wallichii* DC. FBI. 3:213.

A hairy perennial herb.

Bhadrawah, Jai, T. A. Rao, No. 9055, 9079, 9539, 9220, 9560, 9835, Alt. 2300 m.

*V. hardwickii* Wall. FBI. 3:213.

A pubescent herb with white flowers.

Gulmarg, T. A. Rao, Nos. 7685, 9200, 9619, Alt. 3000 m.

## DIPSACACEAE

*Morina coulteriana* Royle FBI. 3:216.

A tall perennial herb with yellow flowers on a long interrupted spike.

Banihal ridge, T. A. Rao, No. 7597, Alt. 2400-3000 m.

*Dipsacus inermis* Wall. FBI. 3:217.

A tall herb with white flowered heads.

Batote, T. A. Rao, Nos. 7375, 7481, 7674, 7856, 7674, 9816, Alt. 1800-2400 m.

Pir Panjal range, Desu, Pahalgam.

*Scabiosa speciosa* Royle FBI. 3:219.

A tufted perennial with bright mauve coloured flowers.

Banihal ridge, T. A. Rao, Nos. 7651, 7713, Alt. 3000 m.

## COMPOSITAE

*Solidago virga-aurea* L. FBI. 3:245.

A tall perennial herb with golden yellow flowers, on a leafy panicle.

Kistawar, T. A. Rao, Nos. 7813, 7567, Alt. 2000 m.

*Myriactis wallichii* Lens. FBI. 3:247.

A moist loving herb with small heads.

Sannasar, T. A. Rao, Nos. 7426, 7820, Alt. 2000 m. Patani top.

*Aster thomsoni* Clarke FBI. 3:252.

An erect herb with blue ligulate and yellow disc florets.

Banihal ridge, T. A. Rao, Nos. 7683, 9785, Alt. 2800 m.

Batkote.

*A. asperulus* Nees FBI. 3:252.

An erect blue flowered herb.

Kistawar hills, T. A. Rao, No. 7860, Alt. 2000-3000 m.

*A. molliusculus* Wall. FBI. 3:251.

An erect herb with heads, blue to white.

Upper Munda, T. A. Rao, No. 9198, Alt. 2400 m.

*Aster* sp.

An erect herb with yellow flowers.

Batkote, T. A. Rao, No. 9785, Alt. 2000 m.

*Brachyactis robusta* Benth. FBI. 3:254.

A villous herb with white heads often one in every leafy axil.

Banihal, T. A. Rao, Nos. 7553, 7667, Alt. 2000-3000 m.

Pir Panjal range.

*Erigeron alpinus* L. FBI. 3:255.

An erect herb with blue heads.

Banihal, T. A. Rao, Nos. 7587, 7625, 9133, Alt. 2400 m.

*E. multicaulis* Wall. FBI. 3:255.

An erect herb with pale blue ligulate flowers and yellow disc flowers.

Banihal ridge, T. A. Rao, No. 7674, Alt. 2800 m. Pir Panjal range.

*Conyza stricta* Willd. FBI. 3:258.

An erect herb with small yellow heads.

Chenab valley, T. A. Rao, No. 7362, Alt. 1200 m.

*Filago germanica* L. FBI. 3:277.

A small woolly herb with flowers.

Jai valley, T. A. Rao, No. 9096, Alt. 2400 m.

- Leontopodium alpinum* Cass. FBI. 3:279.  
A herb with woolly heads.  
Jai valley, T. A. Rao, Nos. 9096, 9719, Alt. 2500 m.  
Pissu Ghati, Seshnag, Pir Panjal range.
- Anaphalis nubigena* DC. FBI. 3:279.  
A woolly herb with a single white head.  
Kaunsarnag, T. A. Rao, No. 9332, Alt. 3800 m.
- A. cuneifolia* Hook. f. FBI. 3:280.  
A small tomentose herb with many heads.  
Seshnag, T. A. Rao, No. 9722, Alt. 3900 m.
- A. adnata* DC. FBI. 3:282.  
An erect herb with white flowers and back of leaf with a white felt.  
Banihal ridge, T. A. Rao, Nos. 7682, 7837, Alt. 2800 m.
- A. araneosa* DC. FBI. 3:283.  
A hairy herb with white heads.  
Sannasar, T. A. Rao, No. 7424, 7591, 7839, Alt. 3000 m.  
Pir Panjal range.
- A. contorta* Hook. f. FBI. 3:284.  
A branching decumbent herb with small heads.  
Banihal ridge, T. A. Rao, No. 7716, Alt. 2800 m.
- Gnaphalium luteo-album* L. FBI. 3:288.  
A woolly herb with golden yellow heads.  
Bhadrawah, Jai, T. A. Rao, No. 8044, Alt. 2300 m.
- G. hypoleucum* DC. FBI. 3:288.  
A tall herb with acuminate leaves and broadly auricled base. Leaves woolly beneath.  
Sannasar, T. A. Rao, No. 7456, Alt. 2000 m.  
Patani top.
- G. stewartii* Clarke FBI. 3:289.  
A small woolly herb with small flower heads with rich brown or orange tint.  
Kungwattan, T. A. Rao, No. 9283, Alt. 3000 m.  
Pir Panjal range.
- Inula royleana* DC. FBI. 3:292.  
Local name: POSHKAR.  
A stout herb with big solitary heads of golden yellow colour. The root from its similarity to that of Kuth, is used to adulterate that article (Aitchison).  
Banihal top, T. A. Rao, No. 7692, Alt. 2800 m.  
Pir Panjal range.
- I. barbata* Wall.  
A yellow flowered herb.  
Kistawar hills, T. A. Rao, No. 7838, No. 7838, Alt. 2000-3000 m.
- Helinium cuspidata* (DC.) Clarke  
Syn. *Inula cuspidata* Clarke  
A herb with yellow heads.  
Chenab valley, T. A. Rao, No. 7377, Alt. 1200 m.
- Carpesium abrotanoides* L. FBI. 3:301.  
An erect herb with yellow flowers.  
Batote, T. A. Rao, No. 7401, Alt. 1800 m.
- Bidens biternata* (Lour.) M. & S.  
A tall herb with yellow flowers.  
Batote, T. A. Rao, No. 7354, Alt. 1800 m.
- Xanthium strumarium* L. FBI. 3:303.  
A shrub in fruits.  
Banihal valley, T. A. Rao, No. 7497, Alt. 1800 m.
- Siegesbeckia orientalis* L. FBI. 3:304.  
An erect herb with glandular bracts.  
Sannasar, T. A. Rao, Nos. 7451, 7565, 7889, Alt. 2400 m.
- Enhydra fluctuans* Lour. FBI. 3:304.  
A new record. A rooting semi-aquatic with yellow axillary and terminal head.  
Dal lake, T. A. Rao, No. 7742, Alt. 1900 m.
- Blainvillea latifolia* DC. FBI. 3:305.  
An erect herb with white heads.  
Jammu, T. A. Rao, No. 7317, Alt. 300 m.
- Galinsoga parviflora* Cav. FBI. 3:311.  
A tall herb with white heads.  
Banihal valley, T. A. Rao, No. 7525, Alt. 1850 m.
- Achillea millefolium* L. FBI. 3:312.  
Local name: MOMADRU-CHOPAMDIGA.  
An erect or semi erect herb with white flowered heads.  
Sannasar, T. A. Rao, Nos. 7453, 9669, 9757, Alt. 2000-3000 m.  
Tulian lake valley, Banihal ridge.
- Chrysanthemum leucanthemum* L.  
An erect herb with flowers; escape.  
(Cultivated).  
Gulmarg, T. A. Rao, No. 9614, Alt. 2800 m.
- C. cinerariaefolium* Vis.  
A herb with white flowers. Pyrethrum of commerce, cultivated.  
Lolab valley, T. A. Rao, Nos. 9128, 9431, Alt. 2500 m.  
Jai valley.
- Tanacetum longifolium* Wall. FBI. 3:320.  
Local name: AKARKARA.  
Erect herb with yellow heads.  
Banihal ridge, T. A. Rao, No. 7754, Alt. 3000 m.
- Artemisia parviflora* Roxb. FBI. 3:322.  
An odorous herb with small flowers.  
Banihal ridge, T. A. Rao, No. 7701, 7366, Alt. 2800 m.
- A. brevifolia* Wall. FBI. 3:324.  
A hoary shrub with reddish heads. Santonin is obtained from the plant.  
Kistawar, T. A. Rao, No. 7797, Alt. 2000 m.
- A. vulgaris* L. FBI. 3:325.  
A tall herb with greenish inflorescence.  
Batote, T. A. Rao, Nos. 7331, 7387, 7634, 7558, 7752, 7632, 7536, 7798, 9848, 9781, Alt. 1800 m.  
Jammu siwaliks, Chenab valley.
- A. vestita* Wall. FBI. 3:326.  
A hoary grooved branched shrub with finely divided leaves.  
Banihal range, T. A. Rao, Nos. 7536, 7798, 7918, Alt. 2400 m.
- A. sacrorum* Ledeb. FBI. 3:326.  
A shrubby herb with heads in racemes.  
Banihal range, T. A. Rao, No. 7563, Alt. 2400 m.

- Doronicum roylei* DC. FBI. 3:332.  
A perennial tall herb with yellow flowers. Used in preparing aromatic tonic.  
Desu, T. A. Rao, No. 9833, Alt. 3200 m.  
Pir Panjal range.
- Echinops cornigerus* DC. FBI. 3:358.  
A thistle like annual herb with big spinescent heads.  
Sannasar, T. A. Rao, No. 7488, Alt. 2000 m.
- Senecio chrysanthemoides* DC. FBI. 3:339.  
A robust herb with yellow flowers in spreading corymbs.  
Sannasar, T. A. Rao, Nos. 7409, 7507, 7536, 7869, 7905, 9656, 9792, Alt. 2200-3800 m.
- S. ligularia* Hook. f. FBI. 3:349.  
A robust herb with leaves more than 0.3 m long ; *Caltha*-like habit.  
Batkote, Fur-fazal, T. A. Rao, Nos. 9772, Alt. 1800 m.  
Desu, Pir Panjal areas.
- Carduus nutans* L. FBI. 3:361.  
A thistle with pink heads.  
Banihal range, T. A. Rao, Nos. 7610, 9236, Alt. 2400 m.  
Pir Panjal range.
- Cnicus falconeri* Hook. f. FBI. 3:363.  
Local name: JAANCH.  
A stout thistle with woolly heads.  
Sannasar, T. A. Rao, No. 7471, Alt. 2000 m.
- Saussurea candicans* Clarke FBI. 3:373.  
An erect herb with red-rose heads.  
Chenab valley, T. A. Rao, No. 7352, Alt. 1200 m.  
Batote.
- S. albescens* Hook. f. & Thoms. FBI. 3:374.  
A tall herb with read heads in corymbs.  
Banihal ridge, T. A. Rao, Nos. 7390, 7545, 7560, 7855, 7651, Alt. 2000-3000 m.  
Pir Panjal range.
- S. lappa* Clarke FBI. 3:376.  
A tall robust perennial herb with large leaves (sterile). The roots are used as a stimulant in cough, asthma, fever, dyspepsia and skin diseases. Locally used to preserve woollen goods.  
Thajwas, T. A. Rao, No. 9563, Alt. 3500 m.  
Pir Panjal range, Balesh range.
- Serratula pallida* DC. FBI. 3:379.  
A tall herb with purple or deep blue heads.  
Bhadrawah and Jai, T. A. Rao, Nos. 9069, 9138, Alt. 2000 m.
- Centaurea calcitrapa* L. FBI. 3:385.  
A herb with pink flowered heads.  
Banihal range, T. A. Rao, Nos. 7529, 7627, 7810, 9483, Alt. 1200-2400 m.  
Pir Panjal range, vale of Kashmir, Kistawar.
- Carthamus oxyacantha* Bieb. FBI. 3:386.  
A thistle with yellow flowers.  
Jammu, T. A. Rao, No. 9001, Alt. 300 m.  
"Perhaps the wild form of the safflower *C. tinctorius* Clarke".
- Ainsliaea aptera* DC. FBI. 3:388.  
A herb in shade, white flowered.  
Kistawar hills, T. A. Rao, Nos. 7900, 9104, 9073, Alt. 2000-3000 m.  
Pir Panjal range, Balesh range.
- Gerbera lanuginosa* Benth. FBI. 3:390.  
A white flowered herb.  
Sannasar, T. A. Rao, Nos. 7439, 9003, 9034, Alt. 2000 m.  
Bhadrawah, Jai.
- Cichorium intybus* L. FBI. 3:391.  
A perennial blue or sky blue flowered herb.  
Batote, T. A. Rao, Nos. 7329, 7534, 9822, Alt. 2000-3000 m.  
Vale of Kashmir.
- Lapsana communis* L. FBI. 3:392.  
Yellow flowered herb.  
Desu Rakh, T. A. Rao, No. 3000, Alt.
- Crepis sibirica* L. FBI. 3:394.  
An erect herb with yellow flowers.  
Banihal, T. A. Rao, Nos. 7592, 7686, Alt. 2800 m.  
Pir Panjal range.
- Hieracium crocatum* Fries FBI. 3:400.  
An erect herb with yellow flowers and black sepals.  
Upper munda, T. A. Rao, No. 7564, Alt. 2000 m.
- H. umbellatum* L. FBI. 3:400.  
An erect herb with yellow flowers.  
Banihal range, T. A. Rao, Nos. 9593, 7694, Alt. 2400 m.  
Pir Panjal range.
- Taraxacum officinale* Wigg. FBI. 3:401.  
Local name: HAND.  
A milky scapigerous herb with yellow flowers.  
Sannasar, T. A. Rao, Nos. 7465, Alt. 1000-3800 m.  
Pir Panjal range.
- Onopordon acanthium* L.  
New record. A stout thistle of 3 to 6 ft. tall with big spherical heads, pink flowers and yellow tipped spinescent bracts ; stem with broad triangular spiny wings.  
Wullar banks, T. A. Rao, No. 9508, Alt. 1750 m.
- Lactuca longifolia* DC. FBI. 3:405.  
An erect or semi erect herb with blue flowers.  
Banihal range, T. A. Rao, No. 7559, Alt. 2400 m.
- L. scariola* L. FBI. 4:404.  
A tall herb with pinkish heads.  
Sannasar, T. A. Rao, No. 7482, Alt. 2000 m.  
Patani top.
- Prenanthes violaefolia* Decne. FBI. 3:412.  
A tall slender herb with purple flowers.  
Sannasar, T. A. Rao, Nos. 7443, 7648, 7654, 7859, Alt. 2000 m.  
Pir Panjal range.
- Sonchus oleraceus* L. FBI. 3:414.  
An erect herb with white flowers.  
Banihal range, T. A. Rao, Nos. 7596, 9043, Alt. 2400 m.  
Bhadrawah, Jai.

*Tragopogon pratense* L. FBI. 3:418.

An erect grass like herb with muricate achenes.

Batote, *T. A. Rao*, Nos. 7374, 9471, Alt. 1800 m.

Pir Panjal range, Srinagar.

*Dimorphotheca pluvialis* Moench

White flowered herb. Cultigen.

Kistawar, *T. A. Rao*, No. 7795, Alt. 2000 m.

## CAMPANULACEAE

*Codonopsis rotundifolia* Benth. FBI. 3:432.

A twiner with large bell shaped, purple or grey coloured flowers.

Upper munda, *T. A. Rao*, No. 7646, Alt. 2400 m.

*C. ovata* Benth. FBI. 3:433.

A decumbent herb with sky blue flowers.

Sheshnag environs, *T. A. Rao*, No. 9724, Alt. 3800 m.

Pir Panjal range.

*Phyteuma thomsoni* Clarke FBI. 3:438.

A perennial herb with a thick root stock. Flowers blue or purple. The deep partite corolla and 2-celled ovary refer this plant to *phyteuma*, though the lax inflorescence is campanula-like.

Batkote and Fur-fazal, *T. A. Rao*, Nos. 9767, 9260, 9184, Alt. 2000-2600 m.

Aharbal, Pir Panjal range.

*Campanula ramulosa* Wall. FBI. 3:440.

An erect or semi erect herb with pale violet flowers ; reddish streaks inside.

Sannasar, *T. A. Rao*, Nos. 7459, 7466, 7537, 9025, 9511, 9858, Alt. 2000 m.

Manasbal, Bhadrawah.

*C. cashmiriana* Royle FBI. 3:441.

A hairy flexuose herb with bright blue flowers.

Banihal range, *T. A. Rao*, No. 7584, Alt. 2400 m.

Pir Panjal range.

## ERICACEAE

*Gaultheria trichophylla* Royle FBI. 3:457.

A wiry herb with bell shaped red flowers.

Apharwat, *T. A. Rao*, No. 9629, Alt. 3400 m.

Pir Panjal range.

*Cassiope fastigiata* D. Don FBI. 3: 459.

A tufted herb with bell shaped drooping flowers.

Kaunsarnag, *T. A. Rao*, No. 9346, Alt. 3800 m.

*Rhododendron arboreum* Sm. FBI. 3:465.

A small sized tree with crimson flowers.

Kansar, *T. A. Rao*, No. 9153, Alt. 2400 m.

Balesh range.

*R. hypenanthum* Balf.

Syn. *R. anthopogon* D. Don FBI. 3:472.

A small shrub with pale yellow flowers.

Kaunsarnag, *T. A. Rao*, No. 9345, Alt. 3800 m.

Jai hills, *T. A. Rao*, Nos. 9119, 9267, 9528, 9559, 9622, Alt. 2000-3400 m.

Pir Panjal ranges, Thajwas hills.

*P. involucrata* Wall. FBI. 3:488.

A moist herb with creamish or pinkish white flowers.

Pissu Ghati and Seshnag, *T. A. Rao*, No. 9709, Alt. 3000-4000 m.

*P. rosea* Royle FBI. 3:488.

A rose-red flowered herb near the stream bed.

Tulian lake valley, *T. A. Rao*, Nos. 9311, 9526, 9527, 9635, 9673, 9718, Alt. 3800 m.

*Androsace rotundifolia* Hardw. FBI. 3:496.

A perennial herb with yellow necked white flowers.

Banihal range, *T. A. Rao*, Nos. 7622, 9004, 9687, Alt. 1000-3000 m.

Jammu siwaliks, Chandanwari.

*A. sempervivoides* Jacq. FBI. 3:497.

A small herb with rose coloured flowers.

Tulian lake valley, *T. A. Rao*, No. 9652, Alt. 3600 m.

*Androsace mucronifolia* Watt

A small herb with small pink flowers ; leaves mucronate.

Kaunsarnag, *T. A. Rao*, No. 9340, 9628, Alt. 3800 m.

Kungwattan.

*A. sarmentosa* Wall. FBI. 3:498.

A stoloniferous herb with pale pink to rose coloured flowers.

Kaunsarnag, *T. A. Rao*, Nos. 9325, 9723, Alt. 3460 m.

Seshnag.

*A. villosa* L. FBI. 3:499.

A cushion forming herb with one or two white flowers for each plantlet.

Pissu Ghati, *T. A. Rao*, No. 9727, Alt. 3600 m.

*Cortusa matthioli* L. FBI. 3:501.

A perennial hairy herb with radical leaves and a long flower stalk bearing purple flowers.

Kungwattan, *T. A. Rao*, Nos. 9353, 9633, Alt. 3000 m.

Pir Panjal range.

*Lysimachia prolifera* Klatt FBI. 3:503.

A semi erect herb with white flowers, near melting snow, forming a carpet at higher elevations.

Jai hills, *T. A. Rao*, Nos. 9091, 9089, Alt. 3000 m.

*Anagallis arvensis* L. FBI. 3:506.

An erect herb with scarlet flowers.

Kistawar, *T. A. Rao*, No. 7814, 9183, Alt. 2000 m.

## STYRACEAE

*Symplocos crataegoides* Buch.-Ham. FBI. 3:573.

A small tree with fragrant white flowers.

Bhadrawah and Jai, *T. A. Rao*, No. 9066, Alt. 2400 m.

## PRIMULACEAE

*Primula denticulata* Sm. FBI. 3:485.

A stout herb with big radical leaves with capsules inside the calyx tube.

## OLEACEAE

- Jasminum humile* L. FBI. 3:602.  
A shrub with fruits.  
Sannasar, T. A. Rao, Nos. 7485, 7486, Alt. 2000 m.
- J. pubigerum* D. Don FBI. 3:602.  
A climber with fruits.  
Kistawar, T. A. Rao, No. 7878, Alt. 2000 m.
- J. officinale* L. FBI. 3:603.  
A climber with fruits.  
Bhadrawah, T. A. Rao, No. 7919, Alt. 2000 m.
- Syringa emodi* Wall. FBI. 3:605.  
A shrub with fragrant white flowers.  
Upper munda, T. A. Rao, Nos. 9190, 9245, 9263, 9357, Alt. 2000 m.  
Pir Panjal range.
- S. vulgaris* L.  
A small tree with fruits.  
Srinagar, T. A. Rao, No. 9420, Alt. 1800 m.
- Fraxinus excelsior* L. FBI. 3:606.  
A medium sized tree with winged fruits.  
Bhadrawah, T. A. Rao, Nos. 9018, 9447, 9749, Alt. 2600 m.  
Batkote, Lolab valley.
- Olea cuspidata* Wall. FBI. 3:611.  
A medium sized tree with white flowers. This was considered a variety of wild olive by Dr. R. R. Stewart.  
Chenab valley, T. A. Rao, No. 9014, Alt. 1200 m.
- Ligustrum lucidum* Ait. FBI. 3:615.  
A small tree with fruits, cultivated.  
Srinagar, T. A. Rao, No. 7745, Alt. 1800 m.

## APOCYNACEAE

- Nerium indicum* Mill.  
Syn. *N. odorum* Soland. FBI. 3:655.  
A shrub with fragrant rose-red coloured flowers.  
Udhampur and Kud, T. A. Rao, No. 9013, Alt. 800 m.  
Jammu siwaliks.

## ASCLEPIADACEAE

- Periploca hydaspidis* Falc. FBI. 4:12.  
A wiry climber on rocks with green flowers.  
Doda and Thathri, T. A. Rao, No. 7765, Alt. 1200 m.  
Chenab valley.
- Cynanchum vincetoxicum* Pers. FBI. 4:22.  
An erect herb with greenish flowers.  
Sannasar, T. A. Rao, Nos. 7430, 9100, 9624, Alt. 2500 m.  
Patani top, Jai valley.
- C. arnottianum* Wight FBI. 4:22.  
A herb with pinkish flowers growing on river bed.  
Hirpur, T. A. Rao, No. 9365, Alt. 2000 m.
- C. auriculatum* Royle FBI. 4:24.  
A climber with green flowers.  
Chandanwari, T. A. Rao, No. 9734, Alt. 3000 m.

*Marsdenia hamiltonii* Wight FBI. 4:36.

A climber with green flowers and white gynostegium.

Desu, T. A. Rao, No. 9853, Alt. 2800 m.

## GENTIANACEAE

- Erythraea ramosissima* Pers. FBI. 4:101.  
A small herb with white and red flowers.  
Sopore, T. A. Rao, No. 9428, Alt. 1700 m.
- Gentiana argentea* Royle FBI. 4:112.  
A small herb with silvery leaves and stalkless blue flowers crowded in heads.  
Bhadrawah and Jai, T. A. Rao, No. 9058, Alt. 2400 m.  
Balesh range.
- G. carinata* Griseb. FBI. 4:113.  
A small herb with pretty blue flowers.  
Banihal ridge, T. A. Rao, Nos. 7706, 9122, 9331, 9540, 9637, Alt. 3000 m.  
Pir Panjal range, Balesh range.
- G. kurroo* Royle FBI. 4:117.  
A perennial tufted herb with long blue flowers.  
Banihal ridge, T. A. Rao, No. 7693, Alt. 2800 m.
- Swertia purpurascens* Wall. FBI. 4:121.  
An erect herb with many purple flowered panicles.  
Banihal ridge, T. A. Rao, No. 7666, Alt. 3000 m.
- S. cordata* Wall. FBI. 4:123.  
An erect herb; leaves heart shaped and cream coloured flowers.  
Batote, T. A. Rao, Nos. 7336, 7415, 7438, 7866, Alt. 1200-2400 m.  
Chenab valley, Kistawar.
- Menyanthes trifoliata* L. FBI. 4:130.  
A rhizomatic perennial aquatic herb with white flowers. A rare find.  
Shopyian, T. A. Rao, No. 9372, Alt. 2000 m.
- Nymphoides peltatum* Kuntze  
Syn. *Limnanthemum nymphaeoides* Link. FBI. 4:131.  
An aquatic herb with yellow flowers.  
Kulgam, T. A. Rao, Nos. 9212, 9405, 9491, 9500, Alt. 1700 m.  
Nilnag, Swampy areas in the vale of Kashmir.

## POLEMONIACEAE

- Polemonium coeruleum* L. FBI. 4:133.  
A perennial herb with sky blue flowers forming a corymb.  
Kungwattan, T. A. Rao, Nos. 9309, 9556, 9693, Alt. 2000-3000 m.  
Chandanwari, Pir Panjal range, Thajwas.

## BORAGINACEAE

- Cynoglossum lanceolatum* Forsk. FBI. 4:156.  
An erect hispid herb with fruits.  
Chenab valley, T. A. Rao, No. 7373, Alt. 1200 m.

- Cynoglossum microglochin* Benth. FBI. 4:158.  
An erect hairy herb with nutlets having stout glochidia.  
Banihal, T. A. Rao, No. 7691, Alt. 3000 m.
- C. nervosum* Benth. FBI. 4:158.  
An erect hairy herb with purple flowers.  
Batkote, T. A. Rao, No. 9771, Alt. 1900 m.
- C. denticulatum* DC. FBI. 4:157.  
A blue flowered herb.  
Patani top, T. A. Rao, No. 7474, Alt. 2300 m.
- C. zeylanicum* (Vahl) Thunb. FBI. 4:157.  
An erect herb with blue flowers.  
Patani top, T. A. Rao, No. 7477, Alt. 2300 m.
- C. wallichii* Don FBI. 5:157.  
A large herb with blue flowers.  
Jai hills, T. A. Rao, No. 9106, Alt. 3000 m.
- Lindelofia spectabilis* Lehm. FBI. 4:159.  
A herb with purple flowers.  
Kungwattan, T. A. Rao, Nos. 7720, 9321, Alt. 3000 m.
- Adelocaryum anchusoides* (Lindl.) Brand.  
A tall herb with glochidia.  
Tulian lake valley, T. A. Rao, No. 9650, 9768, Alt. 3800 m.  
Pahalgam.
- Heliotropium strigosum* Willd. FBI. 4:151.  
A prostrate herb with white flowers.  
Jammu, T. A. Rao, No. 7305, Alt. 300 m.
- Paracaryum thomsoni* Clarke FBI. 4:161.  
An erect herb with blue flowers.  
Chandanwari, T. A. Rao, No. 9698, Alt. 3000 m.
- Mertensia moltkiioides* Clarke FBI. 4:170.  
A decumbent herb with deep blue or purple flowers.  
Jai valley, T. A. Rao, Nos. 9093, 9120, Alt. 2500 m.
- Moltkia parviflora* Clarke FBI. 4:171.  
A semi erect herb with white flowers growing in shade.  
Aharbal, T. A. Rao, No. 9270, Alt. 1800 m.
- Myosotis caespitosa* Schultz. FBI. 4:173.  
A blue flowered hairy herb.  
Srinagar, T. A. Rao, No. 9597, Alt. 1730 m.
- M. sylvatica* Hoffm. FBI. 4:173.  
An erect herb with blue flowers; nutlets smooth.  
Thajwas, T. A. Rao, No. 9547, Alt. 3000 m.
- M. laxa* Schum.  
An erect herb with blue flowers and yellow throat.  
Jai valley, T. A. Rao, No. 9087, Alt. 2500 m.
- Onosma hispidum* Wall. FBI. 4:178.  
A hairy herb with forked racemes bearing white or cream coloured flowers.  
Jai hills, Banihal, T. A. Rao, Nos. 9182, 9189, 9269, Alt. 2350 m.  
Pir Panjal range, Thajwas.

## CONVOLVULACEAE

- Ipomoea pestigridis* L. FBI. 4:204.  
A climber with fruits.  
Jammu, T. A. Rao, No. 7320, Alt. 300 m.  
Jammu siwaliks.
- Convolvulus arvensis* L. FBI. 4:219.  
A runner with white to pale rosy flowers.  
Upper munda, T. A. Rao, Nos. 7723, 9377, Alt. 2000 m.  
Pir Panjal range, Sedau.
- Cuscuta reflexa* Roxb. FBI. 4:225.  
A climbing parasite on *Urtica dioica* with white flowers and round capsules. Six stamens.  
Upper Munda, T. A. Rao, Nos. 7615, 7637, Alt. 2400 m.
- C. capitata* Roxb. FBI. 4:227.  
A climbing parasite on *Plectranthus rugosus* with white flowers.  
Banihal ridge, T. A. Rao, No. 7533, Alt. 2400 m.
- C. approximata* Babc.  
A wiry parasitic twiner on *Thymus serpyllum*.  
Chandanwari, T. A. Rao, No. 9731, Alt. 3000 m.

## SOLANACEAE

- Solanum nigrum* L. FBI. 4:299.  
A herb with white flowers and black fruits.  
Chenab valley, T. A. Rao, No. 7346, Alt. 1200-1700 m.
- Withania somnifera* Dunal FBI. 4:239.  
A herb with fruits.  
Chenab valley, T. A. Rao, No. 7766, Alt. 1000-2000 m.
- Atropa belladonna* L. FBI. 4:241.  
An exotic plant (cultivated). A robust herb with pale pink to brown coloured flowers.  
Vernow, T. A. Rao, No. 9471, Alt. 2000 m.  
Lolab valley.
- A. acuminata* Royle FBI. 4:241.  
A robust shady herb with cream coloured flowers.  
Kistawar, T. A. Rao, Nos. 7835, 9161, 9473, 9683, Alt. 2000-3000 m.  
Balesh range, Pir Panjal range, Lolab valley.
- Hyoscyamus niger* L. FBI. 4:244.  
A robust herb, corolla with dark purple veins.  
Jai valley, T. A. Rao, Nos. 9127, 9360, 9613, Alt. 2500 m.  
Gulmarg, Lolab valley, Lidder and Sindh valley.

## SCROPHULARIACEAE

- Verbascum thapsus* L. FBI. 4:250.  
A tall tomentose herb with yellow flowers on a long spike (white flowered spike on No. 9854).  
Sannasar, T. A. Rao, No. 7435, 9478, 9854, 9855, Alt. 2300 m.  
Pir Panjal range, Desu Rakh.
- Kickxia ramosissima* (Wall.) Janchen  
Syn. *Linaria ramosissima* Wall. FBI. 4:251.  
A wiry herb with small spurred flowers on walls.  
Chenab valley, T. A. Rao, No. 7392, Alt. 1200 m.

- Scrophularia calycina* Benth. FBI. 4:253.  
An erect herb with greenish-tan coloured flowers.  
Tulian lake valley, *T. A. Rao*, No. 9551, Alt. 3200 m.
- S. edgeworthii* Benth. FBI. 4:255.  
An erect herb with green flowers.  
Upper munda, *T. A. Rao*, No. 7649, Alt. 2400 m.  
Banihal range.
- S. polyantha* Royle FBI 4:255.  
An erect herb with green-tan flowers.  
Banihal valley, *T. A. Rao*, No. 7517, Alt. 1800 m.
- S. decomposita* Royle FBI. 4:256.  
A tall herb with green flowers.  
Kaunsarnag, *T. A. Rao*, Nos. 9306, 9702, 9309, Alt. 3800 m.  
Pissu ghati.
- S. dentata* Royle FBI. 4:256.  
A tall herb in fruiting stage.  
Banihal range, *T. A. Rao*, No. 7612, Alt. 2400 m.
- Mazus japonicus* (Thunb.) Kuntze  
Syn. *Mazus rugosus* Lour. FBI. 4:259.  
A prostrate herb with white flowers having yellow spot.  
Kulgam, *T. A. Rao*, No. 9220, Alt. 1700 m.
- M. surculosus* D. Don FBI. 4:260.  
A running herb with white to pale blue flowers.  
Sannasar, *T. A. Rao*, Nos. 7468, 9039, Alt. 2000 m.  
Patani top, Jai valley.
- Wulfenia amherstiana* Benth. FBI. 4:291.  
A herb with one sided spike ; with fruits.  
Banihal ridge, *T. A. Rao*, No. 7710, Alt. 2000 m.
- Veronica anagallis* L. FBI. 4:293.  
A moisture loving herb with small blue flowers.  
Banihal valley, *T. A. Rao*, Nos. 7501, 7904, Alt. 1800 m.
- V. beccabunga* L. FBI. 4:293.  
A moist loving herb with blue flowers.  
Bhadrawah, *T. A. Rao*, Nos. 9062, 9395, Alt. 2000 m.
- V. agrestis* L. FBI. 4:294.  
A semi erect herb with fruits.  
Kistawar, *T. A. Rao*, Nos. 7791, 9369, Alt. 2000 m.  
Hirpur.
- V. biloba* L. FBI. 4:294.  
A small moisture loving herb with blue flowers.  
Jai, *T. A. Rao*, No. 9139, Alt. 2300 m.  
Kansar.
- V. mellissaefolia* Poir.  
Syn. *V. laxa* Benth. FBI. 4:295.  
An erect herb with blue flowered spikes.  
Bhadrawah and Jai, *T. A. Rao*, No. 9057, Alt. 2300 m.
- V. serpyllifolia* L. FBI. 4:296.  
An erect herb with blue flowers and inversely heart-shaped capsules.  
Jai valley, *T. A. Rao*, No. 9099, Alt. 2500 m.
- Sopubia trifida* Buch.-Ham. FBI. 4:302.  
An erect herb with white to pale blue flowers.  
Jammu, *T. A. Rao*, Nos. 7397, 9575, Alt. 400-3000 m.  
Jammu siwaliks, Sonamarg hills.
- Euphrasia officinalis* L. FBI. 4:305.  
A small white flowered herb.  
Banihal ridge, *T. A. Rao*, Nos. 7662, 7826, 9799, Alt. 2800 m.  
Pir Panjal range, Desu Rakh.
- Pedicularis pectinata* Wall. FBI. 4:306.  
A herb with violet coloured flowers.  
Banihal ridge, *T. A. Rao*, No. 7675, Alt. 3000 m.
- P. gracilis* Wall. FBI. 4:307.  
A semi-erect herb with violet flowers.  
Sannasar, *T. A. Rao*, No. 7457, Alt. 2000 m.
- P. bicornuta* Koltz. FBI. 4:312.  
A herb with yellow flowers and in fruiting stage.  
Banihal ridge, *T. A. Rao*, Nos. 7688, 9677, Alt. 3000 m.  
Chandanwari, Kistawar.
- P. siphonantha* D. Don FBI. 4:313.  
A herb with pinkish red flowers.  
Banihal ridge, *T. A. Rao*, Nos. 7755, 9655, 9839, Alt. 2800 m.  
Pir Panjal range.
- P. versicolor* Wahlb. FBI. 4:316.  
A herb with yellow flowers.  
Kaunsarnag, *T. A. Rao*, No. 9247, Alt. 3800 m.
- Lathraea squamaria* L. FBI. 4:318.  
A leafless perennial fleshy herb parasitic on roots of *Prunus* or *Abies*. Rootstock branched and scaly ; flowers cream-white with pink or purple marks. Previously reported from Banihal range.  
On the way to Tulian lake valley, *T. A. Rao*, Nos. 9648, 9786, Alt. 3200 m.  
Batkote-Furfazal range.
- Digitalis purpurea* L.  
A robust erect herb with purple and white flowers cultivated.  
Kansar, *T. A. Rao*, Nos. 9151, 9152, Alt. 2300 m.
- D. lanata* Ehrh.  
An erect herb with white flowers having brown patches inside.  
Chandigam, *T. A. Rao*, Nos. 9446, 9472, Alt. 2200 m.  
Lolab valley.
- Cymbalaria muralis* Gaertn.  
A trailer or creeper with white or lilac flowers.  
Srinagar, *T. A. Rao*, No. 9862, Alt. 1735 m.

#### LENTIBULARIACEAE

- Utricularia flexuosa* Vahl FBI. 4:329.  
An insectivorous aquatic herb with black globose bladders, growing in ditches.  
Shopyian, *T. A. Rao*, No. 9380, Alt. 2000 m.  
Vale of Kashmir.

## OROBANCHACEAE

- Orobanche epithymum* DC. FBI. 4:325.  
A glandular pubescent parasitic herb with dirty brown to orange brown flowers.  
Kistawar, T. A. Rao, Nos. 7873, 9176, Alt. 2000 m.  
Pir Panjal range.

## ACANTHACEAE

- Strobilanthes atropurpureus* Nees FBI. 4:472.  
An erect shrub with deep blue flowers.  
Banihal, T. A. Rao, Nos. 7601, 7663, 7672, 9780, Alt. 2000 m.  
Pir Panjal range.  
*Dicliptera roxburghiana* Nees FBI. 4:553.  
A herb with rose to pale red or pink flowers.  
Bhadrawah, T. A. Rao, No. 9030, Alt. 2000 m.

## SELAGINEAE

- Lagotis glauca* Gaertn. FBI. 4:559.  
An alpine herb with deep blue flowers.  
Kaunsarnag, T. A. Rao, No. 9344, Alt. 3800 m.

## LABIATAE

- Ocimum basilicum* L. FBI. 4:608.  
An aromatic herb with white flowers.  
Kistawar, T. A. Rao, No. 7840, Alt. 2400 m.  
*Plectranthus coetsa* Buch.-Ham. FBI. 4:619.  
An aromatic shrub with lavender-blue coloured flowers.  
Bhadrawah, T. A. Rao, No. 7929, Alt. 1800 m.  
*P. rugosus* Wall. FBI. 4:620.  
A hoary shrub with white flowers having rose purple spots.  
Batote, T. A. Rao, Nos. 7334, 7494, 7773, Alt. 1200 m.  
Banihal range, Kistawar.  
*Elsholtzia flava* Benth. FBI. 4:642.  
An annual shrub with axillary and terminal spikes.  
Kistawar, T. A. Rao, No. 7777, Alt. 2400 m.  
*E. fruticosa* (Don) Rehd.  
Syn. *E. polystachya* Benth. FBI. 4:643.  
An annual shrub with long spikes bearing white flowers.  
Sannasar, and Banihal range, T. A. Rao, Nos. 7476, 7571, Alt. 2300 m.  
*E. cristata* Willd. FBI. 4:645.  
An aromatic robust herb with pink flowered spikes.  
Sannasar, T. A. Rao, Nos. 7420, 7751, 7635, 7895, Alt. 2300 m.  
*Mentha longifolia* Huds.  
Syn. *Mentha sylvestris* L. FBI. 4:647.  
An aromatic herb with flowers in spikes.  
Banihal range, T. A. Rao, Nos. 7519, 7573, 7780, 7894, Alt. 2000 m.  
*M. sylvestris* L. Var. FBI. 4:647.  
A shrub with tomentose spikes.  
Batkote, T. A. Rao, No. 9751, Alt. 2600 m.

- Mentha piperita* L. FBI. 4:647.  
An aromatic herb with flowers, a garden escape.  
Srinagar, T. A. Rao, No. 7741, Alt. 1800 m.  
*Lycopus europaeus* L. FBI. 4:648.  
An erect herb with white flowers.  
Srinagar, T. A. Rao, No. 7737, Alt. 1800 m.  
*Origanum vulgare* L. FBI. 4:648.  
An aromatic herb with purple flowers.  
Batote, T. A. Rao, Nos. 7400, 7543, 9518, Alt. 1200 m.  
Vale of Kashmir.  
*Thymus serpyllum* L. FBI. 4:649.  
A prostrate herb with purple flowers.  
Kistawar, T. A. Rao, Nos. 7794, 7871, 7611, 9148, 9070, Alt. 2400 m.  
*Micromeria biflora* Benth. FBI. 4:650.  
A prostrate herb with white flowers.  
Batote, T. A. Rao, No. 7399, Alt. 1200 m.  
*Calamintha clinopodium* Benth. FBI. 4:650.  
An aromatic herb with pale pink flowers.  
Batote, T. A. Rao, Nos. 7372, 7541, 9462, Alt. 1200 m.  
*C. umbrosa* Benth. FBI. 4:650.  
A semi-erect herb with flowers in globose whorls.  
Sannasar, T. A. Rao, No. 7447, Alt. 2300 m.  
*C. longicaulis* Benth. FBI. 4:651.  
A semi-erect herb with violet flowers in whorls.  
Kistawar, T. A. Rao, No. 7830, Alt. 2400 m.  
*Salvia glutinosa* L. FBI. 4:653.  
A perennial herb with yellow flowers having purple dots.  
Banihal range, T. A. Rao, Nos. 7628, 7887, Alt. 2000 m.  
*S. hians* Royle FBI. 4:653.  
A blue flowered herb.  
Batkote, T. A. Rao, No. 9783, Alt. 2600 m.  
*S. lanata* Roxb. FBI. 4:654.  
An erect herb with pale blue to deep blue flowers.  
Banihal, T. A. Rao, No. 9168, Alt. 2000 m.  
Pir Panjal range.  
*S. moorcroftiana* Wall. FBI. 4:654.  
Local name: KALIGARRI.  
A woolly herb with pale blue to rose coloured flowers.  
Batote, Bhadrawah, T. A. Rao, Nos. 9015, 9168, 9170, Alt. 2000 m.  
Pir Panjal range, Lolab valley; Desu Rakh.  
*Nepeta linearis* Royle FBI. 4:657.  
An erect or semi-erect herb with a stout rootstock and blue flowers on terminal spikes.  
Sannasar, T. A. Rao, Nos. 7416, 7787, 7892, 9192, Alt. 2000 m.  
Upper Munda.  
*N. connata* Royle FBI. 4:657.  
A tuberous herb with blue flowers in spikes.  
Upper munda, T. A. Rao, Nos. 7650, 7707, 7756, Alt. 2400 m.  
Pir Panjal range.

*Nepeta eriostachya* Benth. FBI. 4:657.

An erect herb with white flowers on a long spike.  
Banihal, T. A. Rao, No. 7629, Alt. 3000 m.

*N. elliptica* Royle FBI. 4:658.

A prostrate herb with flowers in spikes.  
Sannasar, T. A. Rao, Nos. 7441, 7505, 7896, Alt. 2000 m.

*N. spicata* Benth. FBI. 4:659.

An erect herb with blue or violet coloured spikes.  
Batote, T. A. Rao, Nos. 7416, 7724, 7893, Alt. 1500 m.

Pir Panjal range, Kistawar.

*N. raphanorrhiza* Benth. FBI. 4:659.

A semi erect herb with globose, black rootstock and spikes with purplish-blue flowers.

Sedau, T. A. Rao, No. 9228, Alt. 1700 m.

*N. erecta* Benth. FBI. 4:663.

An erect herb with deep blue flowers.

Nutlets brown and smooth.

Banihal range, T. A. Rao, Nos. 7561, 7846, 9615, 9778, 9783, Alt. 2600 m.

*Scutellaria prostrata* Jacq. FBI. 4:667.

A prostrate herb with yellow flowers.

Banihal range, T. A. Rao, Nos. 7605, 7708, 9732, Alt. 3000 m.

Chandanwari.

*S. grossa* Wall. FBI. 4:669.

A procumbent herb with purple flowers.

Batote, T. A. Rao, No. 7330, Alt. 1200 m.

Chenab valley.

*Prunella vulgaris* L. FBI. 4:670.

A perennial herb with cylindrical spikes bearing purple flowers.

Sannasar, T. A. Rao, Nos. 7461, 7423, 7606, 9672, Alt. 2300-3800 m.

Tulian lake valley.

*Marrubium vulgare* L. FBI. 4:671.

A herb with white flowers; in cultivated fields.

Nagam, T. A. Rao, No. 9391, Alt. 1750 m.

*Stachys sericea* Wall. FBI. 4:675.

An erect hairy herb with purple or pink flowers in axillary whorls.

Batote, T. A. Rao, No. 7379, 7442, 9237, 9682, 9752, Alt. 1200 m.

Pir Panjal range, Chandanwari.

*Leonurus cardiaca* L. FBI. 5:678.

A stout herb with pink flowers crowded in axillary whorls.

Banihal range, T. A. Rao, Nos. 7554, 7633, 9784, Alt. 2400 m.

Batkote.

*Lamium album* L. FBI. 4:679.

An erect herb with white flowers.

Upper munda, T. A. Rao, Nos. 7619, 7897, 9076, Alt. 2000 m.

*Phlomis spectabilis* Falc. FBI. 4:692.

A hoary herb with purple flowers.

Banihal, T. A. Rao, No. 9171, Alt. 2400 m.

Pir Panjal range.

*Phlomis cashmeriana* Royle FBI. 4:692.

A hairy robust herb with pale to deep blue-purple flowers.

Banihal, T. A. Rao, Nos. 7530, 9178, Alt. 2500 m.  
Pir Panjal range.

*P. bracteosa* Royle FBI. 4:693.

An erect hairy herb with blue-purple flowers in large axillary whorls.

Tulian lake valley, T. A. Rao, Nos. 9654, 9796, Alt. 3600 m.

Daksum.

*Ajuga bracteosa* Wall. FBI. 4:702.

A semi erect herb with flowers.

Kistawar, T. A. Rao, No. 7863, Alt. 2400 m.

*A. parviflora* Benth. FBI. 4:703.

A hairy herb with small blue flowers.

Batote, T. A. Rao, Nos. 7350, 9059, Alt. 1200 m.

Bhadrawah, Jai valley.

## PLANTAGINACEAE

*Plantago lanceolata* L. FBI. 4:706.

A small to big size leaved herb with scape.

Batote, T. A. Rao, Nos. 7383, 7422, 9136, 9224, 9426, Alt. 1200 m.

Pir Panjal range, Balesh range.

*P. tibetica* Hook.f. & Thoms. FBI. 4:706.

A scapigerous herb.

Doda, Thathri, T. A. Rao, Nos. 7761, 7721, Alt. 1000 m.

## ILLECEBRACEAE

*Herniaria hirsuta* L. FBI. 4:712.

A prostrate herb with minute pale green flowers in axillary clusters.

Lolab valley, T. A. Rao, No. 9433, Alt. 2000 m.

## AMARANTHACEAE

*Celosia argentea* L. FBI. 4:714.

A weed of cultivation. An annual herb with white flowers on a long spike.

Batote, T. A. Rao, No. 7341, Alt. 1200 m.

*Bosia amherstiana* Hook.f. FBI. 4:716.

A shrub with small green flowers in spikes.

Batote, Bhadrawah, T. A. Rao, Nos. 7767, 9017, Alt. 2000 m.

Chenab valley.

*Amaranthus gangeticus* L. FBI. 4:719.

A erect herb with small flowers in spiked clusters.

Batote, T. A. Rao, No. 7406, Alt. 1200 m.

*A. blitum* L. FBI. 4:721.

A semi erect herb with clustered flowers in axils.

Batote, T. A. Rao, Nos. 7393, 7551, 7847, 7337, Alt. 1200 m.

Chenab valley.

*Achyranthes bidentata* Blume FBI. 4:730.

An erect herb with spiked flowers.

Jammu, T. A. Rao, Nos. 7306, 7405, Alt. 300 m.

Jammu siwaliks.

*Alternanthera sessilis* R. Br. FBI. 4: 731.

A prostrate herb with white flowers in axillary heads.

Jammu, *T. A. Rao*, No. 7314, Alt. 300 m.

*Gomphrena celosioides* Mart.

A decumbent herb.

Jammu, *T. A. Rao*, No. 7307, Alt. 300 m.

#### CHENOPODIACEAE

*Chenopodium album* L. FBI. 5:3.

An erect or semi erect herb with small axillary flowers.

Chenab valley, *T. A. Rao*, No. 7506, Alt. 1850 m. Banihal valley.

*C. hybridum* L. FBI. 5:3.

An erect herb with axillary flowers; seeds minutely pitted.

Kistawar, *T. A. Rao*, No. 7870, Alt. 2400 m.

*C. murale* L. FBI. 5:4.

A foetid herb with slender spikes bearing greenish flowers.

Banihal valley, *T. A. Rao*, Nos. 7506, 7665, Alt. 2000 m.

*C. botrys* L. FBI. 5:4.

An aromatic herb with small axillary flowers.

Chenab valley, *T. A. Rao*, Nos. 7361, 7396, Alt. 1700 m.

*C. ambrosioides* L. FBI. 5:4.

An aromatic herb with small axillary flowers.

The oil from this plant does not contain ascaridole, the active constituent of the oil of *Chenopodium*.

Kistawar, *T. A. Rao*, No. 7775, Alt. 2000 m.

*C. blitum* Hook.f. FBI. 5:5.

An erect herb with flowers in clusters.

Banihal, *T. A. Rao*, Nos. 7562, 9109, 9679, Alt. 2000 m.

Pir Panjal range.

#### PHYTOLACCACEAE

*Phytolacca acinosa* Hook.f. non Roxb. FBI. 5:21.

A stout herbaceous plant with green flowers in big cylindrical cones.

Kistawar, *T. A. Rao*, Nos. 7851, 9146, 9451, 9745, Alt. 2000-3000 m.

Lolab valley, Pir Panjal range, Balesh range.

#### POLYGONACEAE

*Polygonum aviculare* L. FBI. 5:26.

A procumbent herb (sterile).

Banihal, *T. A. Rao*, Nos. 7415, 7588, Alt. 2800 m.

*P. tubulosum* Boiss. FBI. 5:27

A prostrate herb with small pink flowers.

Nagam, *T. A. Rao*, No. 9387, Alt. 1111 m.

*P. viviparum* L. FBI. 5:31.

An erect herb with woody rootstock and pink flowers in spiciform racemes. The lower flowers replaced by bulbils.

Thajwas, *T. A. Rao*, Nos. 9536, 9676, Alt. 3400 m. Tulian lake.

*Polygonum amplexicaule* D. Don FBI. 5: 32.

A perennial herb with a woody rootstock and flowers red to white in colour.

Banihal, *T. A. Rao*, No. No. Alt. 2800 m.

*P. glabrum* Willd. FBI. 5:34.

A moisture loving herb with pinkish fruits.

Patani top, *T. A. Rao*, Nos. 7445, 7484, 7522, 9604, Alt. 2300 m.

Banihal valley, Sannasar, Dal lake.

*P. amphibium* L. FBI. 5:34.

An aquatic floating herb with red aerial spikes.

Dal lake, *T. A. Rao*, Nos. 7748, 9598, 9407, 9514, Alt. 1700 m.

Nilnag, Wullar, Mansbal.

*P. minus* Huds. FBI. 5:36.

An amphiphyte with reddish fruits.

Srinagar, *T. A. Rao*, No. 9604, Alt. 1730 m.

*P. serrulatum* Lagasc. FBI. 5:38.

A prostrate or semi-erect herb with red to rosy flowers.

Chenab valley, *T. A. Rao*, No. 7389, Alt. 1200 m.

*P. alpinum* All. FBI. 5:49.

A shrub with white flowers. Young shoots are edible.

Upper munda, *T. A. Rao*, Nos. 7644, 9575, 9829, Alt. 2400 m.

Pir Panjal range.

*P. convolvulus* L. FBI. 5:53.

An annual climber with winged fruits.

Banihal, *T. A. Rao*, Nos. 7631, 7555, 7808, Alt. 2400 m.

Pir Panjal range.

*Fagopyrum esculentum* Moench FBI. 5:55.

A semi-erect herb with white flowers.

Banihal range, *T. A. Rao*, Nos. 7800, 7902, Alt. 2000 m.

Bhadrawah.

*F. tataricum* Gaertn. FBI. 5:55.

An erect herb with fruits.

Kistawar, *T. A. Rao*, No. 7805, Alt. 2000 m.

*F. cymosum* Meissn. FBI. 5:55.

A semi erect herb with white flowers.

Kistawar, *T. A. Rao*, Nos. 7570, 9042, Alt. 2400 m. Bhadrawah.

*Rheum emodi* Wall. FBI. 5:56.

Local name: CHUTIAL.

A decumbent herb in the rocky crevices with pale red flowers (in buds).

Pissu Ghati, *T. A. Rao*, No. 9728, Alt. 3800 m.

*Oxyria digyna* Hill FBI. 5:58.

A fleshy herb with flowers in paniced racemes.

Banihal valley, *T. A. Rao*, Nos. 7524, 7578, 9205, 9524, Alt. 2000 m.

Banihal, Pir Panjal range, Lolab valley.

*Rumex dentatus* L. FBI. 5:59.

An erect herb with irregularly toothed wings on the fruits.

Kistawar, *T. A. Rao*, Nos. 7861, 9440, Alt. 2000 m. Lolab valley.

*Rumex nepalensis* Spreng. FBI. 5:60.

An erect herb with small hooked fruits.

Batote, T. A. Rao, Nos. 7384, 7444, 9083, 9804, Alt. 1200 m.

Pir Panjal range, Balesh range.

*R. hastatus* D. Don FBI. 5:60.

Local name: KATAMBAL.

A tufted herb with winged fruits.

Batote, T. A. Rao, Nos. 7353, 9482, Alt. 1200 m  
Vale of Kashmir.

*R. acetosella* L. FBI. 5:61.

A semi-erect herb with sagittate leaves and joined pedicelled flowers.

Jai valley, T. A. Rao, Nos. 9149, 9678, 9800 m.  
Alt. 2200 m.

Pahalgam.

#### THYMELAEACEAE

*Wickstroemia canescens* Meissn. FBI. 5:195.

A small shrub with cream coloured flowers.

Batote, T. A. Rao, No. 7489, Alt. 1800 m.

Patani top, Sannasar.

*Daphne oleoides* Schreib. FBI. 5:193.

A shrub with white flowers.

Thathri and Kistawar. T. A. Rao, Nos. 7769, 7807,  
9016, 9210, Alt. 1000-2000 m.

Banihal, Chenab valley, Srinagar.

#### ELAEAGNACEAE

*Elaeagnus latifolia* L. FBI. 5:202.

A shrub in buds.

Batote, T. A. Rao, No. 9755, Alt. 2000 m.

#### LORANTHACEAE

*Arceuthobium minutissimum* Hook. f. FBI. 5:227.

Local name: ARMI.

A minute parasitic plant on *Pinus excelsa*.

Jai valley, T. A. Rao, No. 9072, Alt. 2400 m.

#### SANTALACEAE

*Thesium himalense* Royle FBI. 5:229.

An erect herb with white flowers. Previously reported from Thajwas only.

Upper munda, T. A. Rao, Nos. 9191, 9545, Alt. 2000-3000 m.

Thajwas.

#### EUPHORBIACEAE

*Euphorbia wallichii* Hook. f. FBI. 5:258.

A robust herb with large involucre: glands of involucre kidney-shaped.

Jai and Kansar, T. A. Rao, No. 9147, Alt. 2300 m.

*E. pilosa* L. FBI. 5:260.

A perennial herb with yellow-green bracts.

Style united half way up and seeds with smooth surface.

Banihal range, T. A. Rao, Nos. 7589, 9097, 9147,  
9196, 9350, 9649, Alt. 2400 m.

Kungwattan, Tulian lake valley, Jai valley.

*Euphorbia helioscopia* L. FBI. 5:262.

An annual herb with umbellate inflorescence, seeds finely net-veined.

Wullar banks, T. A. Rao, No. 9507, Alt. 1750 m.

*E. maddenii* Boiss. FBI. 5:263.

An annual herb with inversely spoon shaped leaves and slender horned glands.

Jai valley, T. A. Rao, Nos. 9085, 9856, Alt. 2500 m.  
Pir Panjal range.

*E. hypericifolia* L. FBI. 5:249.

An annual decumbent herb with green glands.

Batote, T. A. Rao, No. 7348, Alt. 1200 m.

*Sarcococca saligna* Muell.-Arg. FBI. 5:266.

A shrub with small yellow flowers.

Chenab valley, T. A. Rao, No. 7385, Alt. 1200 m.  
Batote.

*Andrachne cordifolia* Muell. FBI. 5:283.

A shrub with green flowers.

Kistawar, T. A. Rao, No. 7817, Alt. 1400 m.

*Glochidion velutinum* Wight FBI. 5:322.

A small sized tree. Schizocarpic fruits.

Batote and Ramban, T. A. Rao, No. 7491, Alt. 1200 m.

*Acalypha ciliata* Forsk. FBI. 5:417.

An erect annual herb with spikes bearing hispid green flowers.

Chenab valley, T. A. Rao, No. 7339, Alt. 1200 m.  
Batote.

#### URTICACEAE

*Celtis australis* L. FBI. 5:482.

Local name: BRAMJI.

A tree with sub-globose drupes.

Srinagar, T. A. Rao, Nos. 7747, 9435, Alt. 1735 m.

Chandigam, Lolab valley.

*Cannabis sativa* L. FBI. 5:487.

An erect annual herb with axillary green flowers.

Banihal valley, T. A. Rao, No. 7527, Alt. 1800 m.

*Ficus palmata* Forsk. FBI. 5:530.

A small sized tree with fruits.

Kistawar, T. A. Rao, No. 7792, Alt. 1800 m.

*Urtica dioica* L. FBI. 5:548.

An erect herb with stinging hairs and flowers in loose panicles.

Nagin Siru, T. A. Rao, Nos. 7867, 9696, Alt. 1000-3000 m.

Kistawar, Chenab valley, Chandanwari.

*U. parviflora* Roxb. FBI. 5:548.

An erect herb with stinging hairs and green flowers in panicles.

Chenab valley, T. A. Rao, No. 7778, Alt. 1200 m.  
Thathri, Kistawar.

*Girardinia heterophylla* Decne. FBI. 5:550.

A stout herb with stinging hairs and flowers in panicles.

Batote, T. A. Rao, No. 7369, Alt. 1800 m.

*Pilea umbrosa* Wedd. FBI. 5:556.

A herb in shade with flowers in cymes.

Patani top, *T. A. Rao*, Nos. 7432, 7433, Alt. 2000 m.  
Sannasar.

*Oreocnide frutescens* Miq.

Syn. *Villebrunea frutescens* Blume FBI. 5:590.

A small tree with leaves having cross nerves and flowers in clusters.

Jammu, *T. A. Rao*, No. 7322, Alt. 300 m.

Jammu siwaliks.

## JUGLANDACEAE

*Juglans regia* L. FBI. 5:395.

A deciduous tree with male flowers in spikes. A fruit bearing tree.

Lolab valley, *T. A. Rao*, No. 9442, Alt. 2000 m.

## CUPULIFERAE

*Betula utilis* D. Don FBI. 5:599.

A decumbent tree with flowers in spikes.

Kungwattan, *T. A. Rao*, No. 9352, Alt. 3800 m.

Pir Panjal range.

*Alnus nepalensis* D. Don FBI. 5:600.

A deciduous tree with flowers in spikes.

Chenab valley, *T. A. Rao*, No. 7402, Alt. 1200-1800 m.

Batote.

*Quercus semecarpifolia* Sm. FBI. 5:601.

A large tree with rusty tomentose leaves.

Jai, *T. A. Rao*, No. 9141, Alt. 2300 m.

*Q. ilex* L. FBI. 5:602.

A small tree with acorns.

Kistawar, *T. A. Rao*, No. 7801, Alt. 2000 m.

*Castanea sativa* Mill.

A cultivated tree with flowers in spikes.

Srinagar, *T. A. Rao*, No. 9416, Alt. 1800 m.

## SALICACEAE

*Salix acmophylla* Boiss. FBI. 5:628.

A medium sized tree with fruits in catkins: capsules on short pedicels.

Sedau, *T. A. Rao*, No. 9358, Alt. 1700 m.

*S. alba* L. FBI. 5:629.

A medium sized tree with witches broom.

Wullar lake, *T. A. Rao*, No. 9492, Alt. 1800 m.

*S. caprea* L. FBI. 5:629.

A stunted shrub with woolly male catkins.

Apharwat, *T. A. Rao*, No. 9634, Alt. 3800 m.

*S. elegans* Wall. FBI. 5:630.

A shrub with yellow flowered spikes.

Banihal ridge, *T. A. Rao*, Nos. 7664, 9206, 9318, 9641, 9642, 9538, 9701, Alt. 3000 m.

Pir Panjal range, Pissu Ghati, Thajwas.

## CERATOPHYLLACEAE

*Ceratophyllum demersum* L. FBI. 5:639.

A submerged aquatic with capillary leaves.

Dal Lake, *T. A. Rao*, Nos. 7740, 9411, Alt. 1700 m.  
Nilnag lake.

## CONIFERAE

*Juniperus communis* L. FBI. 5:646.

A stunted shrub with male cones.

Thajwas, *T. A. Rao*, No. 9543, Alt. 3800 m.

*Taxus baccata* L. FBI. 5:648.

Local name: BURMI.

A tree with red arillated fruits. The plant is valued for its brick red wood.

Kistawar, *T. A. Rao*, No. 7831, Alt. 3000 m.

*Pinus excelsa* Wall. FBI. 5:651.

A tall tree with cones.

Bhadrawah, *T. A. Rao*, No. 7916, Alt. 1800 m.

*Picea smithiana* (Wall.) Boiss.

Syn. *Picea morinda* Link. FBI. 5:653.

Local name: KACHAL; TOS.

A tall conical tree with cones.

Bhadrawah and Jai, *T. A. Rao*, Nos. 9078, 9101, 9156, Alt. 2600 m.

Pir Panjal range, Balesh range.

*Cedrus deodara* Roxb. FBI. 5:653.

A tall tree with cones.

Thajwas, *T. A. Rao*, No. 9541, Alt. 3200 m.

*Abies webbiana* Lindl. FBI. 5:654.

A tall black tree with cones.

Thajwas mountains, *T. A. Rao*, No. 9542, Alt. 3200 m.

## HYDROCHARIDEAE

*Hydrocharis morsus-ranae* L. FBI. 5:662.

A floating stoloniferous herb with white flowers.

Dal lake, *T. A. Rao*, No. 7734, Alt. 1800.

## ORCHIDACEAE

*Spiranthes sinensis* (Pers) Ames

Syn. *Spiranthes australis* Lindl. FBI. 6:102.

A ground orchid with white or pink flowers on a spiral slender spikes; on the muddy banks.

Dal Lake, *T. A. Rao*, No. 9589, Alt. 1900 m.

Srinagar.

*Neottia listeroides* Lindl. FBI. 6:103.

An erect pale green herb with fruits.

Banihal ridge, *T. A. Rao*, No. 7890, Alt. 2800 m.

*Cephalanthera ensifolia* Rich. FBI. 6:125.

A ground orchid with white flowers.

Hirpur, *T. A. Rao*, Nos. 9145, 9371, 9545, Alt. 2300 m.

Jai, Kansar, Lolab valley.

*Epipactis royleana* Lindl. FBI. 6:126.

A ground orchid with greenish yellow flowers.

Pahalgam, *T. A. Rao*, No. 9681, Alt. 2250 m.

*Orchis latifolia* L. FBI. 6:127.

A ground orchid with pink flowers and divided tubers.

Desu, *T. A. Rao*, Nos. 9525, 9708, 9850, Alt. 2800 m.

Zojpal, Seshnag.

*Cypripedium cordigerum* D. Don FBI. 6:170.

An erect ground orchid with solitary white showy flowers; lip is inflated to form an oblong pouch.

Gulmarg, T. A. Rao, Nos. 9611, 9666, Alt. 2800-3800 m.

Khillanmarg, Tulian lake valley.

## IRIDACEAE

*Iris ensata* Thunb. FBI. 6:272.

A perennial herb with blue or lilac flowers.

Sopore, T. A. Rao, Nos. 9422, 9434, Alt. 1700 m.

Vale of Kashmir, near graveyards and wild.

*I. spuria* L. FBI. 6:272.

A perennial herb with bright lilac flowers; leaves long and strongly streaked (cultivated).

Srinagar, T. A. Rao, No. 9580, Alt. 1735 m.

*I. aurea* Lindl. FBI. 6:273.

An erect herb with yellow flowers (cultivated).

Srinagar, T. A. Rao, No. 9581, Alt. 1735 m.

*I. deflexa* Kn. & Weste. FBI. 6:275.

A tufted herb with pale blue flowers.

Kulgam, T. A. Rao, No. 9217, Alt. 1700 m.

*I. kumaonensis* Wall. FBI. 6:274.

A perennial herb with bright lilac flowers.

Kungwattan, T. A. Rao, No. 9279, Alt. 3000-4000 m.

Pir Panjal range, Thajwas, Seshnag.

*I. clarkei* Baker FBI. 6:275.

A tall herb with blue or purple flowers.

Kulgam, T. A. Rao, No. 9216, Alt. 1700 m.

*I. kashmirianum* Baker FBI. 6:275.

A tufted herb with lilac or deep blue flowers.

Kulgam, T. A. Rao, Nos. 9215, 9363, 9362, Alt. 1700 m.

## DIOSCOREACEAE

*Dioscorea deltoidea* Wall. FBI. 6:291.

Local name: KINISH; KRISHN.

A perennial with drawn out tuberous root and alternate leaves. It is used locally for washing wool and hair and for killing lice.

Jai valley, T. A. Rao, Nos. 9095, 9294, 9454, 9758, Alt. 2600 m.

Pir Panjal range, Lolab valley, Balesh range.

*D. sativa* L. FBI. 6:295.

A climber with male flowers.

Desu, T. A. Rao, No. 9836, Alt. 3000 m.  
Srinagar.

## LILIACEAE

*Smilax vaginata* Decne. FBI. 6:305.

A shady perennial with creeping rootstock; leaves almost round or ovate and no tendrils.

Jai, T. A. Rao, No. 9165, Alt. 2300 m.

Bhadrawah.

*Smilax elegans* Wall. FBI. 6:305.

A climber in fruiting stage.

Jai valley, T. A. Rao, No. 9162, Alt. 2300 m.

Balesh range.

*Asparagus filicinus* Buch.-Ham. FBI. 6:314.

White flowered.

Aharbal, T. A. Rao, No. 2000, Alt. 2000 m.

*A. officinalis* L.

A straggling climber with fruits.

Sonnerwari, T. A. Rao, No. 9499, Alt. 1750 m.

*Polygonatum multiflorum* All. FBI. 6:319.

A semi erect herb with white flowers in whorls.

Aharbal, T. A. Rao, Nos. 9261, 9459, Alt. 2000 m.

Lolab valley.

*P. verticillatum* All. FBI. 6:321.

A tall erect herb with greenish white flowers in whorls.

Banihal ridge, T. A. Rao, Nos. 7759, 9620, 9257, 9849, Alt. 3000 m.

Pir Panjal range.

*Eremurus himalaicus* Baker FBI. 6:332.

A stately herb with white flowered tall racemes.

Sonnamarg Hills, T. A. Rao, Nos. 9570, 9686, Alt. 3000 m.

Chandanwari.

*Allium stracheyi* Baker FBI. 6:340.

A bulbous herb with pale yellow flowers in heads.

Banihal ridge, T. A. Rao, Nos. 7712, 7853, Alt. 3000 m.

*A. govanianum* Wall. FBI. 6:344.

An alpine herb with white star shaped flowers.

Kaunsarnag, T. A. Rao, No. 9342, Alt. 3800 m.  
Pir Panjal range.

*Fritillaria roylei* Hook. f. FBI. 6:353.

A bulbous herb with yellowish green, chequered with dull purple, nodding flowers.

Kungwattan, T. A. Rao, Nos. 9322, 9608, Alt. 2800 m.

Pir Panjal range.

*F. imperialis* L. FBI. 6:353.

A bulbous herb with brick red showy flowers.

Banihal ridge, T. A. Rao, Nos. 9201, 9208, Alt. 2000-3000 m.

Facing the vale of Kashmir.

*Tulipa stellata* Hook. FBI. 6:355.

A bulbous herb with terminal fruit

Aharbal, T. A. Rao, No. 9239, Alt. 2000 m.

*Gagea lutea* Schult. FBI. 6:355.

A bulbous grass like herb with yellow flowers.

Kaunsarnag, T. A. Rao, Nos. 9308, 9531, Alt. 3200 m.

Pir Panjal range, Tulian lake valley, Thajwas moraine.

*G. persica* Boiss. FBI. 6:355.

A small bulbous herb with white flowered corymbs.

Kungwattan, T. A. Rao, No. 9296, Alt. 3000 m.

*Merendera persica* Boiss. FBI. 6:357.

A bulbous herb with fruits only. A new record.

Aharbal, T. A. Rao, No. 9239 (b), Alt. 2000 m.

*Gloriosa superba* L. FBI. 6:358.

A climber with leaf tendrils and large axillary flowers.

Jammu, *T. A. Rao*, Nos. 7302, 7924, 9564, Alt. 300 m.

Jammu siwaliks.

*Trillium govanianum* Wall. FBI. 6:361.

An erect herb with a solitary stalked flowers, perianth dark purple.

Aharbal, *T. A. Rao*, Nos. 9262, 9564, 9314, Alt. 2000-4000 m.

Pir Panjal range, Lolab valley, Desu Rakh.

#### PONTEDERIACEAE

*Monochoria vaginalis* Presl FBI. 6:363.

A small herb in rice fields with nodding blue flowers.

Banihal valley, *T. A. Rao*, No. 7505, Alt. 1650 m.

#### COMMELINACEAE

*Commelina benghalensis* L. FBI. 6:370, 374.

A creeping herb with blue flowers.

Jammu, *T. A. Rao*, Nos. 7321, 7394, Alt. 3000 m.

Jammu siwaliks.

#### JUNCACEAE

*Juncus glaucus* Ehrh. FBI. 6:393.

A hard rush with flowers in cymes; moist habitat.

Banihal, *T. A. Rao*, Nos. 9173, 9761, Alt. 2600 m.

Batkote.

*J. lampocarpus* Ehrh. FBI. 6:395.

A rush in water.

Nilnag lake, *T. A. Rao*, Nos. 9409, 9505, Alt. 2000 m.

*J. membranaceus* Royle FBI. 6:397.

Grass like rush with white flowers near streams.

Chandanwari, *T. A. Rao*, No. 9697, Alt. 2800 m.

*J. himalensis* Klotz. & Garcke FBI. 6:398.

A rush with flowers.

Tulian lake, *T. A. Rao*, No. 9663, Alt. 3800 m.

*Luzula pallescens* (Wg) Bess.

A rush with flowers. A new record.

Yus marg, *T. A. Rao*, Nos. 9393, 9646, 9825, Alt. 3400 m.

Apharwat.

#### TYPHACEAE

*Typha angustata* Chaub. & Bory. FBI. 6:489.

A marsh herb with cylindrical spikes, often forking.

Dal Lake, *T. A. Rao*, No. 9603, Alt. 1730 m.

*Sparganium ramosum* Huds. FBI. 6:490.

An aquatic rooted tall herb with male and female flowers.

Kulgam, *T. A. Rao*, No. 9218, Alt. 1700 m.

Swampy places in the vale of Kashmir.

#### ARACEAE

*Arisaema walliachianum* Hook. f. FBI. 6:500.

An erect tuberous herb with a solitary leaf consisting of 3-leaflets.

Jai, *T. A. Rao*, Nos. 9142, 9392, Alt. 2300 m.

Kansar.

*A. tortuosum* Schott FBI. 6:502.

A tuberous herb with spathe.

Patani top, *T. A. Rao*, Nos. 7419, 7924, Alt. 2300 m.

Uplands of Bhadrawah and Kashmir.

*A. jacquemontii* Blume FBI. 5:505.

A tuberous herb with spathe.

Patani Top, *T. A. Rao*, Nos. 7431, 9609, Alt. 2300 m.

Sannasar, Jai, Bhadrawah.

*Sauromatum guttatum* Schott FBI. 6:508.

A herb with a multicoloured spathe.

Bhadrawah and Jai, *T. A. Rao*, No. 9031, Alt. 2000 m.

Balesh range.

*Arum jacquemontii* Blume FBI. 6:509.

A tuberous shady herb with red berries.

Chandigam, *T. A. Rao*, No. 9445, Alt. 2000 m.

#### ALISMACEAE

*Alisma plantago* L. FBI. 6:559.

A rooted aquatic with small white flowers.

Banihal valley, *T. A. Rao*, Nos. 7503, 7513, 7738, 9399, Alt. 1000-2000 m.

Swampy regions in the vale of Kashmir.

*Sagittaria sagittifolia* L. FBI. 6:561.

An aquatic rooted herb with aerial sagittate leaves and flowers.

Srinagar, *T. A. Rao*, No. 9605, Alt. 1700 m.

*S. guayanensis* H. B. & K. FBI. 6:561.

An aquatic rooted herb with white flowers.

Jammu, *T. A. Rao*, No. 7312, Alt. 300 m.

Jammu-siwaliks.

*Butomus umbellatus* L. FBI. 6:562.

An erect aquatic herb forming white, pink tinged umbellate flowers.

Sopore, *T. A. Rao*, No. 9480, Alt. 1700 m.

Swamps of the vale of Kashmir.

#### NAIADACEAE

*Potamogeton indicus* Roxb. FBI. 6:565.

An aquatic with green flowers on a spike.

Nilnag lake, *T. A. Rao*, Nos. 9214, 9404, 9487, Alt. 2000 m.

Wullar, Kulgam.

*P. natans* L. FBI. 6:565.

An aquatic with a creeping stem and flowers in spikes.

Mansbal lake, *T. A. Rao*, No. 9517, Alt. 2000 m.

*P. crispus* L. FBI. 6:566.

An aquatic herb with a compressed stem; with flowered spikes.

Banihal valley, *T. A. Rao*, No. 7502, Alt. 1850 m.

*Potamogeton lucens* L. FBI. 6:567.

A stout aquatic with large shining leaves and flowering spikes.

Nagin lake, *T. A. Rao*, Nos. 9410, 9488, 9601, Alt. 1800 m.

Dal, Wullar, Mansbal lakes.

*P. pectinatus* L. FBI. 6:567.

A filiform aquatic with green small flowers in spikes.

Shopyian, *T. A. Rao*, Nos. 9382, 9486, Alt. 2000 m. Wullar Lake.

*Najas graminea* Del. FBI. 6:569.

A submerged filiform growth form with achenes.

Jammu, *T. A. Rao*, No. 7308, Alt. 300 m.

## ERIOCAULACEAE

*Eriocaulon sieboldianum* Sieb. FBI. 6:577.

A small moisture loving herb with heads.

Banihal valley, *T. A. Rao*, No. 7509, Alt. 1650.

## CYPERACEAE

*Kyllinga squamulata* Vahl FBI. 6:589.

A tufted annual with green head.

Chenab valley, *T. A. Rao*, No. 7388, Alt. 1200 m.

*Cyperus flavidus* Retz. FBI. 6:600.

An annual with umbellate inflorescence.

Srinagar, *T. A. Rao*, No. 7746, Alt. 1800 m.

*C. niveus* Retz. FBI. 6:601.

A woody rhizomatic perennial with umbellate inflorescence.

Bhadrawah, *T. A. Rao*, Nos. 9045, Alt. 2000 m.

Jai valley.

*C. iria* L. FBI. 6:606.

An annual with umbellate and corymbose inflorescence.

Banihal valley, *T. A. Rao*, Nos. 7518, 7902, Alt. 1800 m.

*C. pilosus* Vahl FBI. 6:595, 609.

A stoloniferous perennial with umbellate inflorescence reduced to one head.

Srinagar, *T. A. Rao*, No. 7736, Alt. 1800 m.

*C. pygmaeus* Rottb. FBI. 6:596.

An annual with inflorescence reduced to one head.

Dal lake bunds, *T. A. Rao*, No. 9599, Alt. 1800 m.

*Eleocharis palustris* R. Br. FBI. 6:628.

An erect sedge with spikes.

Shopyian, *T. A. Rao*, Nos. 9373, 9421, Alt. 2000 m.

Vale of Srinagar.

*Fimbristylis dichotoma* Vahl FBI. 6:635.

An annual with umbels.

Srinagar, *T. A. Rao*, No. 9600, Alt. 1760 m.

*Scirpus lacustris* L. FBI. 6:658.

A sedge with rusty brown spikelets and smooth white to brown nuts.

Upper munda, *T. A. Rao*, Nos. 7725, 9406, 9502, 9594, Alt. 2200 m.

Dal lake, Nilnag lake.

*Eriophorum comosum* Wall. FBI. 6:664.

A tufted annual with umbellate inflorescence.

Jammu, *T. A. Rao*, Nos. 7304, 7316, Alt. 350 m.

Chenab valley.

*Cladium mariscus* R. Br. FBI. 6:673.

A tall stoloniferous sedge in association with *Typha* forming a major component of floating island.

Nilnag lake, *T. A. Rao*, No. 9398, Alt. 2000 m.

*Kobresia royleana* Boeck. FBI. 6:698.

A small sedge with purple or brown spikes.

Pissu ghati, *T. A. Rao*, No. 9710, Alt. 3200 m.

Seshnag.

*Carex muricata* L. FBI. 6:703.

A tufted sedge with spikes.

Aharbal, *T. A. Rao*, Nos. 9253, 9460, Alt. 1900 m.

Chandigam, Lolab valley.

*C. muricata* L. var. *foliosa* D. Don FBI. 6:703.

A tufted sedge with spikes.

Thajwas moraine, *T. A. Rao*, No. 9521, Alt. 3500 m.

*C. muricata* L. var. *indica* Boott FBI. 6:703.

A tufted sedge with spikes.

Chandigam, *T. A. Rao*, Nos. 587, 9441, Alt. 2000 m.

*C. atrata* L. FBI. 6:731.

A stoloniferous sedge with spikes.

Thajwas, *T. A. Rao*, No. 9566, Alt. 3800 m.

*C. setigera* Don FBI. 6:743.

A rhizomatous sedge with spikes.

Jai valley, *T. A. Rao*, No. 9132, Alt. 2400 m.

*C. wallichiana* Presc. FBI. 6:747.

A tall sedge with hairy urticles.

Wullar lake, *T. A. Rao*, No. 9503, Alt. 1900 m.

## GRAMINEAE

*Echinochloa colonum* (L.) Link

Syn. *Panicum colonum* L. FBI. 7:32.

An annual with contracted racemes; decumbent habit. A good fodder grass.

Banihal valley, *T. A. Rao*, Nos. 7524, 9595, Alt. 1730 m.

Srinagar.

*Oplismenus compositus* (L.) Beauv. FBI. 7:66.

A weak grass; decumbent habit; spikes long. A shade loving grass. It is not liked by cattle.

Sannasar, *T. A. Rao*, No. 7446, Alt. 1800 m.

Jammu siwaliks.

*Setaria glauca* (L.) Beauv. FBI. 7:78.

Syn. *Panicum glaucum* L.

An erect annual grass with a cylindric false spike.

Glume IV, transversely rugose. It is a good fodder grass and seeds are sometimes used as a food.

Chenab valley, *T. A. Rao*, Nos. 7338, 7355, 7808, 7520, 7930, Alt. 1200 m.

*S. viridis* (L.) Beauv. FBI. 7:80.

An erect annual with a cylindric spike. Glume IV nearly smooth. The grass ascends upto 3500 m.

Kistawar hills, *T. A. Rao*, No. 7785, Alt. 2000 m.

*Pennisetum flaccidum* Griseb. FBI. 7:84.

A perennial tufted grass with long spikes having spikelets surrounded by involucre of sub-sessile, free naked bristles.

Chenab valley, T. A. Rao, Nos. 7347, 7351, 9479, Alt. 1200 m.

*P. orientale* Rich. FBI. 7:86.

A perennial grass with long hairy spikes having spikelets surrounded by unbranched plumose purplish bristles.

Hari Parbat, T. A. Rao, No. 9587, Alt. 1800 m. Srinagar.

*Erianthus fulvus* Nees FBI. 7:123.

A tall coarse grass with silky panicle.

Sannasar, T. A. Rao, No. 7483, Alt. 1900 m. Jammu siwaliks.

*Arthraxon lanceolatus* Hochst. FBI. 7:143.

A tall grass with small spikes; margins ciliate in spikelets.

Upper munda, T. A. Rao, No. 7638, Alt. 2000 m.

*A. lancifolius* (Trin.) Hochst.

Syn. *A. microphyllous* Hochst. FBI. 7:147.

A slender grass with spikes.

Bhadrawah, T. A. Rao, No. 7906, Alt. 1900 m.

*Apluda mutica* L.

Syn. *Apluda aristata* L. FBI. 7:150.

A grass in hedges.

Chenab valley, T. A. Rao, No. 7363, Alt. 1200 m.

*Cymbopogon distans* (Nees) Wats.

Syn. *Andropogon distans* Nees. FBI. 7:207.

Aromatic grass with large reddish long deflexed spikes and long spikelets.

Chenab valley, T. A. Rao, No. 7639, Alt. 1200 m.

*C. schoenanthus* (L.) Spreng.

Syn. *Andropogon jwarancusa* Sub sp. *laniger* (Desf.) Hook. f. FBI. 7:203.

A grass of dry habitat. Its value as a fodder is grass is uncertain. Tall grass with spikes.

Chenab valley, T. A. Rao, No. No. Alt. 1200 m.

*Themeda anathera* (Ness) Hack.

Syn. *Anthistiria anathera* Ness FBI. 7:215.

A perennial grass with panicles; spikelets hispid. Chenab valley, T. A. Rao, Nos. 7764, 9032, Alt. 500-1200 m.

Balesh range.

*Dichanthium annulatum* (Forsk.) Stapf.

Syn. *Andropogon annulatus* Forsk. FBI. 7:196.

An excellent fodder grass. A tufted grass with sub-digitately fascicled spikes.

Udhampur, T. A. Rao, No. 9909, Alt. 400 m.

Jammu siwaliks, valley of Kashmir.

*Bothriochloa ischaemum* (L.) Keng

Syn. *Andropogon ischaemum* L. FBI. 7:171.

An erect grass with spikes.

Banihal, T. A. Rao, Nos. 7540, 9481, Alt. 1700 m. Watlab.

*Hierochloa laxa* R. Br. FBI. 7:222.

A handsome nodding perennial grass with spikes.

Kaunsarnag, T. A. Rao, Nos. 9338, 9555, 9661, Alt. 3800 m.

Thajwas, Tulian lake valley.

*Aristida cyanantha* Nees ex Steud. FBI. 7:225.

A perennial grass with dark purple spikelets.

Kistawar, T. A. Rao, No. 7786, Alt. 1200 m.

*A. adscensionis* L. FBI. 7:224.

A tufted grass with purplish spikelets.

Batote, T. A. Rao, No. 7395, Alt. 1700 m.

Chenab valley.

*Stipa siberica* Lam. FBI. 7:231.

Local name: GUMAI; GOGU.

A tufted perennial poisonous grass with panicles. The grass is avoided by grazing animals in Kashmir.

Banihal, T. A. Rao, Nos. 7539, 7711, Alt. 2200 m.

Vale of Kashmir, Pahalgam, Sonamarg.

*Oryzopsis munroi* Stapf FBI. 7:234.

A tall grass with branching filiform panicles.

Chenab valley, T. A. Rao, Nos. 7356, 7549, 7748, 7823, Alt. 1200 m.

Banihal, Srinagar, Kistawar hills.

*Phleum alpinum* L. FBI. 7:236.

A perennial with ovoid green or purple single panicle.

Banihal ridge, T. A. Rao, Nos. 7749, 9313, 9351, Alt. 2600 m.

Zojpal, Tulian lake valley, Kaunsarnag.

*Alopecurus arundinaceus* Poir. FBI. 7:238.

A creeping grass with green cylindrical panicles having silky spikelets.

Desu, T. A. Rao, No. 9840, Alt. 3200 m.

*A. geniculatus* L. FBI. 7:239.

A semi aquatic grass with geniculate stem having greenish yellow panicle.

Shopyian, T. A. Rao, No. 9375, Alt. 1800 m.

*Sporobolus arabicus* Boiss. FBI. 7:1800 m.

A perennial tall grass with panicles.

Upper Munda, T. A. Rao, Nos. 7647, 7680, Alt. 2200 m.

Banihal ridge.

*Polypogon fugax* Nees FBI. 7:245.

An annual with densely crowded spikelets.

Bhadrawah, T. A. Rao, Nos. 9041, 9590, Alt. 1900 m.

*Agrostis canina* L. FBI. 7:255.

A slender grass with pale green or purple panicle having capillary branches.

Desu, T. A. Rao, No. 9828, Alt. 2800 m.

*Muhlenbergia sylvatica* Torr. & Gr. FBI. 7:259.

A slender grass with panicle.

Sannasar, T. A. Rao, Nos. 7460, 7927, Alt. 1800 m. Bhadrawah.

*Trisetum spicatum* (L.) Richt.

Syn. *Avena subspicata* L. FBI. 7:278.

A tufted grass, pubescent with yellowish green panicle.

Banihal ridge, T. A. Rao, No. 7757, Alt. 2800 m.

*Cynodon dactylon* (L.) Pers. FBI. 7:288.

Local name: DOOB.

A prostrate commonest grass of world wide distribution. It is used medicinally as a diuretic and sedative in cystitis and other diseases. It is a good packing lawn grass as it can withstand trampling to some extent.

Chandigam, T. A. Rao, No. 9438, Alt. 1900 m.

Lolab valley, Vale of Kashmir.

*Arundo donax* L. FBI. 7:302.

A perennial hygrophilous, tall grass with an underground creeping rhizome.

Chenab valley, T. A. Rao, No. 7404, Alt. 1200 m.

Jammu siwaliks.

*Koeleria cristata* Pers. FBI. 7:308.

A tufted stoloniferous grass with panicle.

Desu, T. A. Rao, No. 9827, Alt. 2800 m.

*Melica nutans* L. FBI. 7:330.

A perennial with racemiferous panicles.

Aharbal, T. A. Rao, No. 9249, Alt. 1800 m.

Pir Panjal range.

*Dactylis glomerata* L. FBI. 7:335.

An erect perennial with inclined panicles.

Banihal, T. A. Rao, Nos. 7552, 9024, 9465, 9748, Alt. 2000 m.

Pir Panjal range.

*Poa bulbosa* L. FBI. 7:338.

A bulbous grass exhibiting viviparous state.

Sedau, T. A. Rao, No. 9226, Alt. 1700 m.

*P. annua* L. FBI. 7: 345.

A stoloniferous slender grass with geniculate habit.

Banihal, T. A. Rao, No. 7595, Alt. 1800 m.

*P. alpina* L. FBI. 7: 338.

A tufted perennial with distichous surculi.

Thajwas moraine, T. A. Rao, No. 9522, Alt. 3500 m.

*Eremopoa persica* Trin. var. *songarica* (Schrenk) Roshev.

Syn. *Poa persica* Trin. var. *songarica* (Schrenk) Hook. f. FBI. 7:337.

A slender erect grass with contracted panicle.

Aharbal, T. A. Rao, Nos. 9235, 9789, Alt. 2200 m.

Pir Panjal range.

*Hordeum murinum* L. FBI. 7:372.

An annual with a decumbent base and green spikes.

Mansbal, T. A. Rao, No. 9509, Alt. 2000 m.

#### FERNS

*Adiantum venustum* Don

A common fern in the shade of evergreen forests of the Vale of Kashmir and the uplands of Kistawar and Bhadrawah hills.

Higher altitudes, T. A. Rao, No. 7360, Alt. 2000-2500 m.

*Asplenium adiantum-nigrum* L.

A fern growing in Pine shade.

Kistawar, T. A. Rao, Nos. 7816, 9469, 9744, Alt. 1800 m.

Lolab valley, Pahalgam.

*Asplenium alternans* Wall.

A shady herb in rocky crevices.

Jai, T. A. Rao, No. 9036, Alt. 2000 m.

*A. fontanum* (L.) Bernh.

A common fern in shady rocky crevices.

Aharbal, T. A. Rao, 9275, Alt. 2000 m.

*A. schimperii* A. Br.

A fern of sunny habitat.

Patani top, T. A. Rao, No. 7455, Alt. 2500 m.

*A. thelypteroides* Michx.

A shady fern in Pine forest.

Kistawar, T. A. Rao, No. 7849, Alt. 2000 m.

*A. septentrionale* (L.) Hoffm.

A grass like tufted fern often in the sun.

Banihal, T. A. Rao, Nos. 9174, 9569, Alt. 2000 m.

Sonamarg.

*A. viride* Hudson

A small tufted fern in rocky crevices.

Banihal ridge, T. A. Rao, Nos. 7690, 9468, 9859, Alt. 2800 m.

Lolab valley.

*Ceterach dalhousiae* (Hook.) C. Chr.

A fern of dry habitat.

Kistawar hills, T. A. Rao, Nos. 7779, 7806, 7850, Alt. 2000 m.

*Cystopteris fragilis* Bersch.

A fern in rocky crevices.

Kungwatan, T. A. Rao, No. 9354, Alt. 3000 m.

*Dryopteris odontoloma* (Moore) C. Chr.

A large fern, very common in the forests.

Bhadrawah, T. A. Rao, No. 7914, Alt. 2000 m.

*D. mollis* (Jacq.) Hieron.

A fern in rocky crevices

Thathri, T. A. Rao, No. 7772, Alt. 1200 m.

*Gymnogramme javanica* Blume

A fern of dry habitat.

Chenab valley, T. A. Rao, Nos. 7413, 7427, Alt. 1700 m.

*Onychium japonicum* (Thunb.) Kuntze.

A shady fern with decumbent habit.

Chenab valley, T. A. Rao, Nos. 7370, 7454, Alt. 1700 m.

*Osmunda claytoniana* L.

An erect fern in groups on slopy soil ; gregarious.

Jai hills, T. A. Rao, Nos. 9068, 9550, Alt. 2600 m.

*Pteris cretica* L.

A gregarious fern of dry habitat.

Chenab valley, T. A. Rao, Nos. 7368, 9448, Alt. 1200 m.

Lolab valley.

*P. vittata* L.

Syn. *P. Longifolia* L.

A fern of dry habitat.

Chenab valley, T. A. Rao, No. 7771, Alt. 1200 m.

*Pteridium aquilinum* (L.) Kuhn

A tufted fern in open sunny habitat.

Banihal ridge, T. A. Rao, Nos. 7620, 7621, 9685, Alt. 2800 m.

Pahalgam, Lolab valley.

*Polypodium linearis* Thunb.

A fern in shade.

Batkote, T. A. Rao, No. 9777, Alt. 2600 m.

*Polystichum lonchitis* (L.) Roth.

A common fern in birch range, known as 'Christmas fern'.

Thajwas, T. A. Rao, No. 9553, Alt. 3300 m.

*Salvinia nutans* (L.) All.

A floating fern.

Dal lake, T. A. Rao, No. 7739, Alt. 1735 m.

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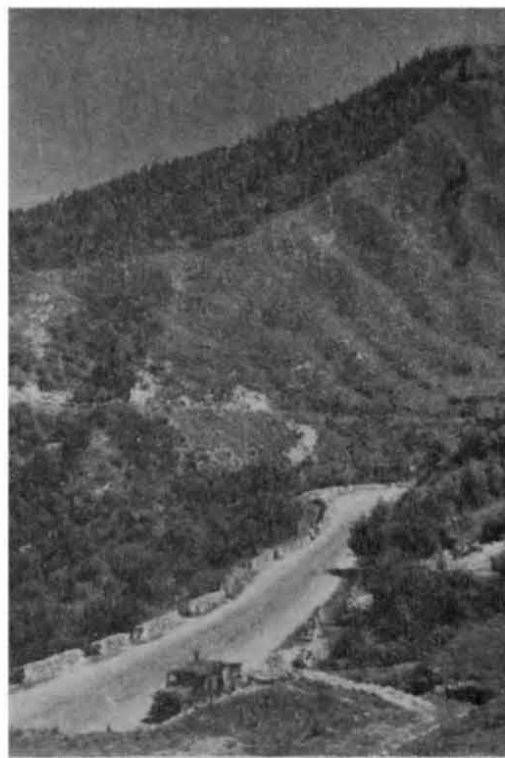
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## PLATE I

Fig. 1: Snow clad peaks on the way to Kaunsarnag lake. Fig. 2: Bhadrawah valley. Fig. 3: *Actaea spicata* L.  
Fig. 4: *Phytolacca acinosa* Roxb. Fig. 5: Banihal range view from Banihal valley. Fig. 6: Patani Top.



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## PLATE 2

Fig. 7: Candelabra growth of *Pinus excelsa* Wall. Fig. 8: The high upland near Batote. Note the presence of pure strand of *Pinus roxburghii* Sargent. on the flat mountain top. Fig. 9: The decay and death of *Pinus excelsa* trees due to 'Armi' attack—near Kistawar. Fig. 10: *Cypripedium cordigerum* Don.