

**BIODIVERSITY AND ETHNOBOTANICAL STUDY OF VASCULAR PLANTS
IN MANKIAL VALLEY, HINDUKUSH RANGE, PAKISTAN**



**BY
ASAD ULLAH**

**DEPARTMENT OF BOTANY, UNIVERSITY OF PESHAWAR
PESHAWAR, PAKISTAN
2002**

**BIODIVERSITY AND ETHNOBOTANICAL STUDY OF VASCULAR PLANTS
IN MANKIAL VALLEY, HINDUKUSH RANGE, PAKISTAN**

A dissertation submitted to the Department of Botany, University of Peshawar in
partial satisfaction of the requirement for the degree of

DOCTOR OF PHILOSOPHY

IN

BOTANY

BY

ASAD ULLAH

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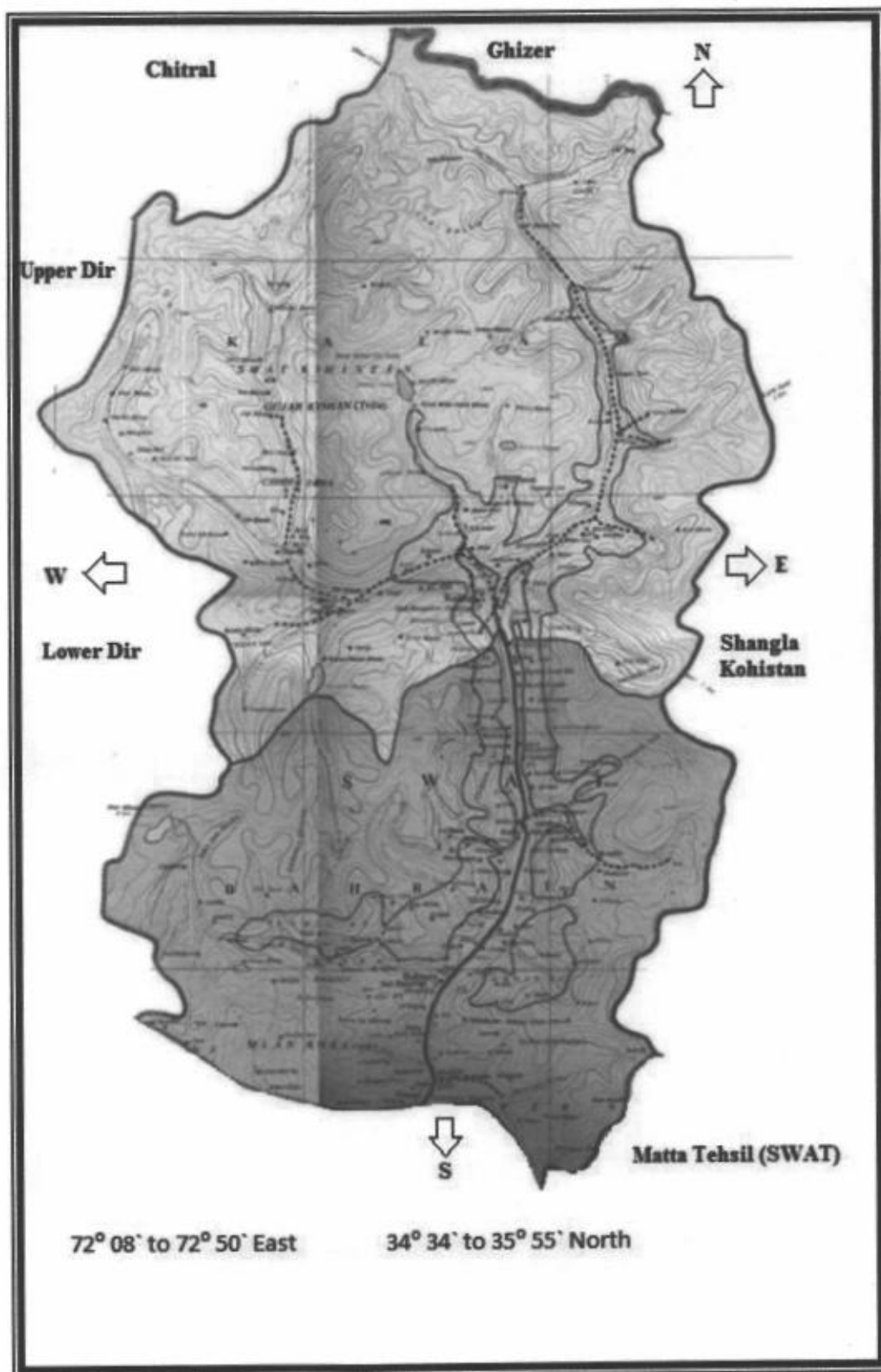
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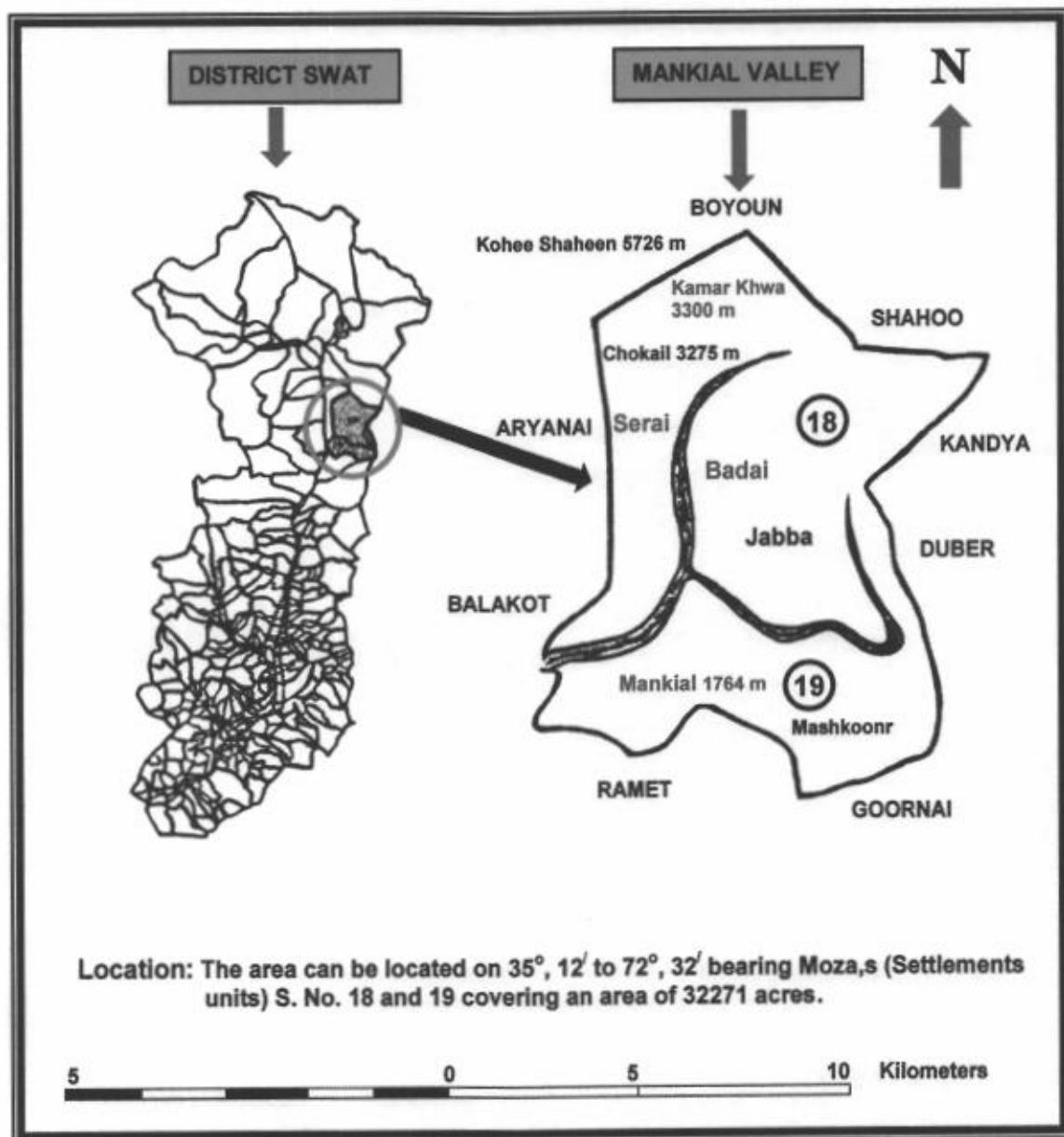
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2002

MAP OF RESEARCH AREA



MAP OF MANKIAL VALLEY



DEDICATION

**This dissertation is
dedicated to my parents and teachers.**

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Asad Ullah



*IN THE NAME OF ALMIGHTY ALLAH, THE MOST BENEFICENT,
THE MOST MERCIFUL*

*"And when you said: 'O Moses! We are tired of eating one kind of food every day,
so pray to your Lord to bring forth for us that which the earth grows, such as
vegetables and cucumbers and wheats and lentils and onions!"*

(Al – Baqarah, 2:61)

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Asad Ullah

ABSTRACT
BIODIVERSITY AND ETHNOBOTANICAL STUDY OF VASCULAR PLANTS
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By

Asad Ullah

Taxonomy

A total of 262 species representing 84 families, 190 genera belonging to Lychophytes, Monilophytes and Lignophytes have been reported during this research. Only one family, one genus and one species has been recorded from the "Lycophytes". A total of 20 species belonging to 12 genera and 9 families have been collected from "Monilophytes" or the fern families and 241 species from 170 genera and 74 families from "Lignophytes".

In Monilophytes, Aspleniaceae (1 genus and four species) was leading family, followed by Woodsiaceae (2 genera and 4 species), Dryopterideaceae and Polypodiaceae with 2 genera and 3 species each, Pteridaceae with (1 genus and 2 species), Equisetaceae, Marsileaceae, Dennstaedtiaceae and Thylpteridaceae (1 geuns and 1 species each). Equisetaceae was the most primitive and Polypodiaceae was the most advanced family.

The Lignophytes were further divided in to 3 groups viz., Gymnosperms, Monocots and Dicots. The Gymnosperms were represented by 4 families, 7 genera and 7 species. Among Gymnosperms Pinaceae was the leading one (with 4 genera and 4 species) followed by Cupressaceae, Taxaceae and Ephedraceae (with 1 genus and 1 species each). Pinaceae was the most primitive and Ephedraceae was the most advanced family.

The Monocots were represented by 12 families, 23 genera and 24 species. Among Monocots Poaceae was the leading one (with 9 genera and 9 species) followed by Cyperaceae (with 3 genera and 3 species), Orchidaceae (with 2 genera and 2 species) and Juncaceae (with 1 genus and 2 species). Araceae, Liliaceae, Convallariaceae, Colchicaceae, Trilliaceae, Alliaceae, Iridaceae, and Dioscoreaceae (with 1 genus and 1 species). It is concluded that family Araceae was the primitive one and Poaceae was the advanced family. The Dicots were represented by 58 families, 147 genera and 211 species.

Among the Dicots Asteraceae was the leading one (with 15 genera and 24 species), followed by Apiaceae (with 13 genera and 16 species), Lamiaceae (with 12

genera and 18 species, Fabaceae (with 10 genera and 11 species), while Ranunculaceae (with 7 genera and 8 species), Caryophyllaceae (with 7 genera and 10 species) and family Rosaceae (with 7 genera and 8 species). Polygonaceae (with 6 genera and 11 species), Brassicaceae with 8 species and 5 genera, Amaranthaceae with 7 species and 3 genera, Scrophulariaceae (with 3 genera and 3 species), family Orobanchaceae (with genera and 4 species).

Crassulaceae (with 2 genera and 2 species), Onagraceae (with 2 genera and 5 species), Sapindaceae (with 2 genera and 2 species), Solanaceae (with 2 genera and 2 species), Convolvulaceae (with 2 genera and 2 species), Boraginaceae (with 2 genera and 5 species), Oleaceae (with 2 genera and 2 species), Caprifoliaceae (with 2 genera and 5 species), Adoxaceae (with 2 genera and 2 species) and family Campanulaceae (with 2 genera and 3 species). Family Balsaminaceae (with 1 genus and 8 species), Geraniaceae and Violaceae (with 1 genus and 2 species), Fagaceae (with 1 genus and 3 species), Gentianaceae (1 genus and with 3 species), Plantaginaceae (with 1 genus 4 species) and Berberidaceae, Papaveraceae, Buxaceae, Tamaricaceae, Phytolacaceae, Portulacaceae, Saxifragaceae, Hamamelidaceae, Paeoniaceae, Vitaceae, Oxalidaceae, Parnassiaceae, Euphorbiaceae, Salicaceae, Rhamnaceae, Elaeagnaceae, Celtidaceae, Cannabaceae, Moraceae, Urticaceae, Betulaceae, Juglandaceae, Lythraceae, Malvaceae, Thymeleaceae, Ebenaceae, Primulaceae, Rubiaceae, Verbenaceae and Araliaceae (with 1 genus and 1 species each). Ranunculaceae was the most primitive and Asteraceae was the most advanced family among the Dicots.

Ethnobotany

Among total 262 species of ethnobotanical importance, 211 were Dicot, 24 were monocot, 20 were Monilophytes and 7 were Gymnosperms, while Lycophytes are not used for any ethnobotanical purpose. The Ethnobotanical uses were divided in to 21 groups on the basis of their utility as under.

A total of twenty (20) species of Monilophytes belonging to nine (9) families were reported for their local utilitarian aspects. Among them Aspleniaceae and Woodsiaceae were the leading families with 4 species each, followed by Dryopteridaceae and Polypodiaceae with 3 species each, Pteridaceae with 2 species and Dennstaedtiaceae, Equisetaceae, Marsileaceae, Thelypteridaceae with one species each. Twenty (20) species were beautiful/ornamental, three (3) species were cash plants and five (5) species were medicinal.

A total of seven (7) species of Gymnosperms belonging to four (4) families were reported for their local utilitarian aspects. Among them family Pinaceae was the leading one with four (4) species, Cupressaceae, Ephedraceae and Taxaceae with one species each. Six (6) each were beautiful/ornamental and medicinal, five (5) each were cash plants, fuel plants, furniture and shelter plants.

A total of twenty three (24) species of monocot belonging to twelve (12) families were reported for their local utilitarian aspects. Family Poaceae was the leading one with nine (9) species, followed by Cyperaceae with three (3), Juncaceae with two (2) and Alliaceae, Araceae, Colchicaceae, Covallariaceae, Dioscoreaceae, Iridaceae, Liliaceae, Orchidaceae and Trilliaceae with one (1) species each. Sixteen (16) species were beautiful/ornamental, two (2) were brooms, one (1) cash, seven (7) fodder, one (1) harmful/poisonous, one (1) house holding item, one (1) invasive, six (6) livestock promoting, seven (7) medicinal, ten (10) soil reclamation and three (3) thatching were plants.

A total of two hundred and twelve (211) species of dicot belonging to fifty eight (58) families were reported for their local utilitarian aspects. Family Asteraceae was the leading one with twenty four (24) species, followed by Lamiaceae with eighteen (18), Apiaceae with sixteen (16), Fabaceae and Polygonaceae with eleven (11), Caryophyllaceae ten (10), Balsaminaceae, Brassicaceae, Ranunculaceae and Rosaceae eight (8) each, Amaranthaceae with six (6), Boraginaceae, Onagraceae and Caprifoliaceae with five (5) each, Plantaginaceae and Orobanchaceae four (4) species each, Fagaceae, Scrophlariaceae, Gentianaceae and Campanulaceae with three (3) each, Crassulaceae, Geraniaceae, Violaceae, Sapindaceae, Solanaceae, Convolvulaceae, Oleaceae and Adoxaceae with two (2) species each, while Berberidaceae, Papaveraceae, Buxaceae, Tamaricaceae, Phytolacaceae, Portulacaceae, Saxifragaceae, Hammamelidaceae, Paeoniaceae, Vitaceae, Oxalidaceae, Parnassiaceae, Euphorbiaceae, Salicaceae, Rhamnaceae, Elaeagnaceae, Celtidaceae, Cannabaceae, Moraceae, Urticaceae, Betulaceae, Juglandaceae, Lythraceae, Malvaceae, Thymeleaceae, Ebenaceae, Primulaceae, Rubiaceae, Verbenaceae and Araliaceae with one (1) species each.

One hundred and twenty one (121) species were beautiful/ornamental, ten (10) beverages, six (6) brooms, twenty nine (29) cash plants, twenty four (24) fuel, eighty four (84) fodder, ten (10) food, two (2) furniture, thirteen (13) fruit plants, four (4) harmful/poisonous, seventy one (71) honey bee species, 11 house holding items, one (1)

invasive, twenty (20) livestock promoting, one hundred and thirty seven (137) medicinal, four (4) sacred, six (6) soil reclamation, eighteen (18) shelter, ten (10) snuff ash, ten (10) thatching and nineteen (19) were vegetable.

It has been noted during the present studies that the area is rich in plant natural resources and forty (40) marketable medicinal species are identified for their economic value and their future role in the socio economic development and uplift of the livelihood of the local inhabitants. The price of one (1) species was more than Rs. 400/- kg., 2 species were Rs. 300-400/- kg., 11 species Rs. 200-300/- kg., 24 species are Rs. 100-200/- kg., and 2 species were less than Rs. 100/- kg. These marketable plants include *Adiantum capillus-veneris*, *Adiantum venustum*, *Ephedra gerardiana*, *Arisaema jacquemontii*, *Colchicum luteum*, *Polygonatum verticillatum*, *Dioscorea deltoidea*, *Trillium govanianum*, *Viburnum grandiflorum*, *Heracleum candicans*, *Artemisia japonica*, *Artemisia persica*, *Artemisia scoparia*, *Senecio chrysanthemoides*, *Berberis lyceum*, *Podophyllum hexandrum*, *Sisymbrium erysimoides*, *Valeriana hardwickii*, *Valeriana himalayana*, *Valeriana jatamansi*, *Valeriana stracheyi*, *Diospyros lotus*, *Desmodium elegans*, *Quercus semecarpifolia*, *Geranium lambertii*, *Geranium wallichianum*, *Juglans regia*, *Origanum vulgare*, *Thymus linearis*, *Paeonia emodi*, *Bistorta affinis*, *Bistorta amplexicaule*, *Primula denticulate*, *Aconitum heterophyllum*, *Caltha alba*, *Crataegus songarica*, *Bergenia ciliata*, *Hyoscyamus niger*, *Viola biflora* and *Viola canescens*.

Five species (5) of Monilophytes were reported for medicinal uses belonging to four (4) families. Six species (6) of Gymnosperms were reported belonging to four (4) families. Seven (7) species of Monocot were reported belonging to seven (7) families and 137 species of Dicot were reported for their medicinal uses belonging to fifty three (53) families which are used for curing 149 different health problems.

Conservation

Among the total two hundred and sixty two (262) species, two hundred and twenty three (223) were common, fifteen (15) were rare (*Equisetum arvense*, *Adiantum capillus-veneris*, *Juniperus communis*, *Taxus fuana*, *Viburnum grandiflorum*, *Chenopodium foliosum*, *Betula utilis*, *Astragalus candolleanus*, *Saussurea albescens*, *Caltha alba*, *Ziziphus jujuba*, *Cotoneaster affinis*, *Rubus ellipticus*, *Pouplus alba* and *Acer caesium*), eight (8) were endangered *Colchicum luteum*, *Dioscorea deltoidea*, *Podophyllum hexandrum*, *Dianthus jacquemontii*, *Elaeagnus umbellata*, *Crataegus*

songarica, *Aesculus indica* and *Hyoscyamus niger*, seven (7) were commercially threatened (*Cedrus deodara*, *Geranium wallichianum*, *Thymus linearis*, *Paeonia emodi*, *Plantago lanceolata*, *Bistorta amplexicaulis* and *Plantago major*), and Seven (7) were vulnerable (*Ephedra gerardiana*, *Polygonatum verticillatum*, *Berberis lycium*, *Parrotiopsis jacquemontiana*, *Aconitum heterophyllum*, *Bergenia ciliata* and *Viola biflora*), and two (*Marsilea minuta* and *Adiantum venustum*) were insufficiently known. While no extinct and intermediate species were reported. It is noted during the present research that four (4) species are endemic to Swat i.e. *Allium tripterum*, *Buplerum constancei*, *Elymus borianus* and *Ligusticum stewartii*. Two species *Indigofera heterantha* and *Ligusticum stewartii* are found in Mankial valley. The first one is endemic to Pakistan and the second one is endemic to Swat. Several rare, endangered, commercially threatened and vulnerable species are present in the valley. Certain floristic elements are met within the valley like, *Oxyria digyna*, *Quercus semicarpifolia*, *Cedrus deodara* and few others.

The inhabitants of Mankial Valley are living in the isolated region of the country and they are more dependent on plants as compare to other areas. Proper training, education regarding importance of medicinal plants and proper harvesting techniques are of imminent importance for the proper exploitation and exploration of the plant natural resources growing in the area. The inhabitants of the valley are not aware regarding the significance of plants diversity and its contribution in the international economy.

It has been noticed that majority of the collectors are small children or women and they are not aware about the proper collection, drying and storing and marketing procedure of the plants. For sustainable utilization and proper exploitation of the plant natural resources growing in the valley, it is recommended that there is a dreadful need of appropriate planning. Previously very negligible work has been carried out and the area was completely unexplored and almost all the species are collected and reported for the first time from the research area, which will provide base line information to the plant scientists and conservationist for further intensive research and taxonomic, floristic, conservation and ethnobotanical studies.

CHAPTER-1

BIODIVERSITY AND ETHNOBOTANICAL STUDY OF VASCULAR PLANTS IN MANKIAL VALLEY, HINDUKUSH RANGE, PAKISTAN

1. INTRODUCTION

Mankial Valley is one of the deepest Valleys of the Hindukush Range lies on 35°, 12' North latitudes and 72°, 32' East longitudes. It occurs 17 km short of Kalam on east side of the Kalam-Bahrain road. The area consists of two Mozas (Settlements units) bearing No. 18 and 19 viz. Badai with an area of 20620 acres and Mankial with 11658 acres resulting into a total area of 32278 acres. It is surrounded on the East by Kandya and Duber, on the West by Arayanai and Balakot, on the North by Boyoun and Shahoo and on the South by Ramet and Goornai (Anonymous, 1998). The altitude of Mankial ranges from 1764 m to 5726 m at the highest peak of Koohe Shaheen (Rahman *et al.*, 2003). The valley is a combination of mountainous peaks covered with snow, perpetual snow fields, permanent glaciers, water falls, high altitude grass lands, sharply flowing rivers, sprouting streams and comparatively less disturbed forest. The percentage share by area of mountains, valleys/pastures and rivers is estimated to be 95%, 45% and 0.5% respectively. Pastures are at elevation of above 3000 m and come under alpine regions with severe long winters starting from September to end of March and a very mild summer from June till August. Floral diversity is very rich and economic potential are there. The area represents variety of micro habitats supporting a diversified biodiversity (Ahmad and Siraj, 1996).

The research area is present in northern Swat and the vegetation of Northern Swat is classified into cool temperate coniferous (1400-2000 m), cold temperate coniferous (2000-3000 m), sub alpine (3000-4000 m) and alpine zones (>4000 m) (Champion *et al.*, 1965). Mostly these zones are away from the monsoon rains; therefore usual rainfall is very low ranging from 160.6-660.4 mm and snowfall from 1.82-4.50 m. Sometimes more than 4.50 m snowfall has occasionally been reported. Maximum temperature is about 10°C or less for 5-6 months. When the snow melts during June-August, ephemerals sprout. The temperature is below or 0°C during the winter period. Due to short growing season, thick snow cover, intense solar radiation, high wind velocity and low temperature result in the prevalence of a xerophytic habitat for plants in the alpine, turning them dwarf, stunted, hairy and rosette leaves. Heavy snowfall resulted into crooked and uneven appearance of the plants.

Human beings have always been dependent on plants for food and medicine. In the world as a whole about 70% of the human population relies on plants for medicine (Shinwari *et al.*, 2003). Among poor people living in inaccessible part of the world, such as in Mankial Valley the reliance on native plants for medicine make the biodiversity important therein. The people living in Mankial Valley are extremely poor. They obtain fuel, medicines and forage

for their livestock from the local plants, supplementing their diets and livestock and such crops are grown in terraced gardens and livestock (goats, cattle's and sheep's) are grazing on the slopes in summer. Due to population explosion, increasing demand of medicinal plants, over exploitation, unsustainable utilization and unscientific agricultural practices the plant biodiversity has been decreased significantly. This is a quantitative evident in the loss of precious flora and threatening various species growing the valley. It is naturally important that we start the documentation of the species present in the valley and develop an understanding role they play in the lives of the valley inhabitants and their ecological requirements. The present study will help in the future planning for the improvement and security of the livelihood of the inhabitants of the valley.

The man and his livestock are exclusively dependent upon plant biodiversity in the inaccessible far flung socio-economically backward areas of Pakistan like Mankial Valley. Though many workers have focused on taxonomic, (Parker, 1956; Kitamura, 1977; Stewart, 1967, 1972; Beg and Khan, 1977; Nasir and Ali, 1970-1989; Ali and Nasir, 1989-1991; Ali and Qaiser, 1993-2012); ethnobotanical and conservation studies of various other areas (Hussain *et al.*, 1995; Ahmad and Siraj, 1996; Khan, 1996; Gul *et al.*, 1999; Khan, 2001; Shinwari *et al.*, 2000 a; Shinwari *et al.*, 2000 b; Thomas and Shengji, 2003; Shinwari and Gilani, 2003; Shinwari *et al.*, 2003; Rahman *et al.*, 2003; Adnan *et al.*, 2003; Haider *et al.*, 2003; Latif *et al.*, 2003; Ghafoor *et al.*, 2003; Din *et al.*, 2003; Iqbal *et al.*, 2003; Rashid and Asad, 2005; Ullah *et al.*, 2005; Hussain *et al.*, 2006; Ullah *et al.*, 2006; Ullah and Rashid, 2007; Hussain *et al.*, 2008; Khan and Khatoon, 2008; Ali and Qaiser, 2009; Ullah *et al.*, 2009; Abbasi *et al.*, 2010; Alam and Ali, 2010; Ali and Qaiser, 2010; Hazrat *et al.*, 2010; Razzaq *et al.*, 2010; Shinwari, 2010; Ali, 2011; Ali *et al.*, 2011; Haq *et al.*, 2011; Hazrat *et al.*, 2011; Hussain *et al.*, 2011; Jan *et al.*, 2011; Khan *et al.*, 2011; Sher *et al.*, 2011; Shinwari and Qaiser, 2011; Ullah and Rashid, 2011; Qureshi, 2012; Shaheen and Shinwari, 2012 and Shaheen *et al.*, 2012). But after thorough literature survey it is found that except some preliminary work carried out by some workers, Mankial valley has not been fully explored botanically and no collection has been carried out in the past (Rahman *et al.*, 2003). Similarly, it has been noted that major Herbaria of the country are lacking representative collection of specimens from this valley. Further lack of critical taxonomic, ethnobotanical and conservation studies jeopardizes the validity of these findings.

Compilation, editing and publication of some families including family Asteraceae, Rosaceae and Scrophulariaceae have not been fully completed. According to Stewart (1972) there is still a need of complete exploration of various areas of the country. So far 221 fascals of Flora of Pakistan have been completed. After study of the Flora of Pakistan and Checklist of Plants of Swat State it is concluded that no plant specimen has been collected and deposited in any Herbarium in the Country including PUP, RAW, KUH, PFI and ISL. Stewart (1967) reported a checklist of plants from Swat that too is deficient of various aspects. Certain Sino-Japanese floristic elements are met within Mankial valley. Some of

them are *Oxyria digyna*, *Quercus semecarpifolia* and *Cedrus deodara* etc. (Ali and Qaiser, 1986). Due to stable ecosystem, these elements were presumed to be dominant in the past in the entire Valley.

Collection, documentation and preservation of plants in Herbarium has a prominent role in representing the gene pool and providing base for biosystematic phase of an area. Lacking such kind of information is creating an academic gape for carrying out future planning and utilization of plant natural resources. The height from sea level and unique topography has blessed this valley with extra ordinary floristic diversity. Unfortunately this valley is exposed to increasing human pressure, social injustice and low literacy rate that are destabilizing the biodiversity status especially species survival, habitat and ecosystem. It is feared that erosion of plant genetic resources in the prevailing scenario would further be shattering the ecological balance. Therefore, the critical taxonomic, ethnobotanical and conservation studies are planned for documentation of the baseline information and inventory preparation for the preservation and utilization of the plant natural resources.

2. OBJECTIVES

The present research is aimed to fulfill the objectives mentioned below.

1. To collect, compile and preserve vascular plants biodiversity.
2. To prepare a comprehensive checklist of the vascular plant biodiversity of the valley.
3. To document the ethnobotanical uses of vascular plant biodiversity.
4. To document the medicinal uses of the vascular plant biodiversity.
5. To evaluate conservation status of vascular plant biodiversity growing in the valley.
6. To publish a book on the ethnobotanical and medicinal uses of the important plants.
7. To provide baseline information regarding taxonomic, ethnobotanical and conservation studies of the vascular plant biodiversity for further research.
8. To deposit authentic voucher specimens in various National and International Herbaria for ready reference.

CHAPTER-2

LITERATURE REVIEW

Farooq (1990) reviewed the medicinal plants of Pakistan. Fifty-two species of indigenous medicinal plants from 25 families of angiosperms were dealt for their uses in traditional medicines and in Pakistan and India. Complete botanical description and their application in oriental medicines and usage as drugs in various Western and African countries are discussed in detail.

Siddiqui *et al.* (1994) Several medicinal plants were pharmacologically screened for their cardiac activity on isolated rabbit heart preparation. Out of these, 7 plants showed significant positive inotropic (cardiotonic) activity, along with the effects on the heart rate and coronary flow. In this research crude ethanolic and aqueous fractions were used.

Ansari *et al.* (1995) surveyed medicinal plants in District Khairpur. Information was provided on 35 species belonging to 23 families possessing medicinal properties. All are widespread in the district. All the information regarding their medicinal values and uses was collected from local people of the area, hakims, and professionals from the concerned literature.

Haq and Hussain (1995) Surveyed the medicinal plants of Palandri, District Poonch, by revealed that there were 47 such plants in the area. The local names, uses in the Pahari, Urdu, Punjabi and Pushto are discussed in detail alongwith the procedure of extracting information from the local inhabitants.

Shinwari *et al.* (1996) worked on collection of information regarding traditional usage of plant natural resources in Khagan valley. They collected 48 species which are used locally for various purposes, among them 26 plants were medicinal and 21 plants were fodder, while some other plants are locally used for making various tools or as ornamental species.

Khaliq and Hussain (1996) reported that the autumn and summer flora of Dabargai Hills, Swat, consisted of 140 species of 53 families. It has been documented that 125 taxa are used by the local inhabitants, among them 76 were used as fodder, 69 as medicinal, 18 as fuel wood, 12 as timber, 11 as vegetable, 13 as fruit, 6 as soil binder and 4 for making fence/hedges.

Khaliq (1996) recorded 125 species from Dabargai hills, Swat. He collected information on medicinal, traditional and local uses from local people.

Ansari *et al.* (1995) reported medicinal plants of District Khairpur Sindh and noted medicinal uses of various plants like *Hedera nepalensis* and found that it is medicinally active and used as a purgative, stimulant, diaphoretic and cathartic.

Tariq *et al.* (1995) reported anti-microbial medicinal plants from Karachi region. These crude extracts were tested for their medicinal properties against 25 Bacteria species to evaluate their anti microbial activity.

Shinwari *et al.* (1996) published the proceedings of the a workshop arranged for the future possibilities and collection of information regarding the local utilitarian aspects of the plant natural resources from the entire country.

Shinwari (1996) concluded that various anthropogenic and developmental activities are becoming severe threats to the natural resources of the Himalaya and Hindukush regions, where the local people are totally dependent upon the local usage of plants for supporting their livelihood.

Khan *et al.* (1996 a) analyze ten different localities at Deosai plains and worked out the problems facing by the alpine natural resources. They concluded that the local inhabitants are using the natural resources at alpine ecosystems unsustainably and the local flora and fauna are deteriorating rapidly, they recommended that proper planning and training of the local communities will be helpful to overcome various conservation issues.

Khan *et al.* (1996 b) worked out studies on the authentic identification of the *Matricaria chamomilla* (Wild Babuna) and obtained samples from various shopkeepers at Rawalpindi and Islamabad District to help in providing the real species to be used by the public for various medicinal purposes.

Khan *et al.* (1996 c) carried out studies on the adverse effect of fuel wood usage at Himalaya and Hindukush regions of the country and suggested that alternative sources of energy may be provided to reduce pressure on the local plant natural resources.

Sultana *et al.* (1996) screen out 56 species of mushrooms from all over the country and highlighted the internationally commercially exploited species of mushrooms.

Khan (1996) work out various utilitarian aspects of the plants growing in the Machiaria National Park, AJK and note that more than 80 taxa are used by the inhabitants of the area.

Marwat and Shinwari (1996) carried out studies on the Ethnobotanical and ethnomedicinal uses of the plant natural resources of Upper Siran valley, Mansehra and evaluated sevety nine (79) species for their various utilitarian aspects used by the local communities.

Qureshi and Ahmad (1996) focused on the publication of local knowledge especially Tibbe-e-Yunani and recommended that the medicinal flora is becoming endangered therefore, there is a need to make research on the commercial cultivation of such species.

Shinwari *et al.* (1996) carried out studies on various medicinal and local uses of the local plants at District Mansehra (Khagan Valley). They reported that there are forty eight (48) species which are used by the local communities for supporting their daily life and curing various diseases.

Rehaman and Khan (1996) carried out research to unveil the hidden information of various communities in the Kanak valley, District Mastung and interviewed women from six different villages to ensure the extraction of knowledge through integrated participatory approach.

Khan and Fevre (1996) screened out eighty five (85) species in District Chitral for its medicinal properties and usage.

Shah and Shinwari (1996) carried out studies on economic and medicinal potential of eighteen (18) species of *Potentilla* which can be locally exploited.

Shinwari and Shah (1996) documented 171 species which are used by the local communities in District Kharan Baluchistan for various medicinal and other local purposes.

Khalid and Siddiqui (1996) work out on the authentic identification, habitat and distribution of various complex species and their close relatives to avoid wrong identification while dealing with the medicinal and local usage of various species.

Ahmad and Sirajuddin (1996) work out on the ecological status of forty eight (48) medicinal plants growing in District Swat and documented the ethnobotanical uses of the plant natural resources of the area.

Badshah *et al.* (1996) screened out ninety seven (97) species growing in Pirghar Hill of South Waziristan for their ecological and ethnobotanical information and usage by the local communities.

Dastagir and Haq (1997) carried out studies on the local uses and pharmacognostic studies of *Acacia nilotica* and *Juglans regia* from different parts of the country.

Hamid *et al.* (1997) carried out studies on various medicinal uses i.e. laxative, stomachache, febrifuge and alternative of one species of *Datisca cannaabina* (Datiscaceae)

Rashid *et al.* (1997) documented studies on the potential threats to the habitat of *Dodonaea viscosa* and *Carissa opaca* in the Margalla Hills.

Rehman (1997) carried out studies on wild and cultivated honey bee species and prepared a checklist of one hundred and thirty (130) species growing in District Peshawar and its surrounding areas.

Iqbal (1997) worked out on various medicinal and local uses of sixty five (65) species from the Ghalegy Hills of District Swat.

Ashfaq and Zaidi (1998) compiled studies and prepare a report on the plant natural resources growing in the Northern areas of Pakistan.

Shinwari and Khan (1998) documented ethnobotanical and ethnomedicinal studies of twenty four (24) shrub species and twenty seven (27) tree species growing in Magalla Hills National Park, Islamabad.

Arshad and Akram (1999) worked out on the medicinal properties of fourty one (41) species growing near Arid Agriculture University, Rawalpindi Pakistan.

Ayaz (1999) evaluated one species of *Valerina jatamansii* for its various medicinal uses including antispasmodic, carminative and sedative and also conducted studies on the commercial trade of this species.

Khan *et al.* (1999) carried out studies on eighty eight (88) medicinal plants which are under practice by the local tabibs for curing sugar and discussed in detail how various medicines are prepared locally to cure diabetes patients.

Gul *et al.* (1999) conducted studies at various Districts of Malakand Division and documented the role of indigenous women knowledge in ethnobotany and ethnomedicines.

Shinwari *et al.* (2000 a) carried out studies on conservation issues facing by the plants in various areas of the Himalaya and Hindukush and concluded that the rich medicinal flora of these regions are facing severe threats.

Shinwari *et al.* (2000 b) published a complete review of various medicinally important plant species growing especially in the Northern areas of Pakistan and opined that about 80% of the endemic flora of the country is existing in the Northern parts of the country which is resulted in to a unique flora.

Iqbal (2000) documented the ethnobotanical and ethnomendicinal flora of the Malam Jabba, District Swat and reported one hundered and eighty seven (187) species for theis various utilitarian aspects.

Qureshi and Khan (2001) documented the medicinal flora of the Kahuta area in District Rawalpindi and documented information regarding twenty five (25) species of medicinal importance.

Shinwari *et al.* (2002) carried out studies on the possibilities and future of the medicinal species growing in Shinaki and Bar valley of Norther Areas of Pakistan and suggested the commercial cultivation of some important medicinal species i.e. *Carum bulbocastanum* (zeera) and *Ephedra gerardiana*.

Sher (2002) carried out research on the sustainable usage and medicinal properties of the high valued medicinal species growing in various valleys of District Chitral (Gabur and Begusht) and District Swat (Mahodand, Utror and Gabral).

Rehman and Ghafoor (2000) analyzed the natural resources of the Mount Elum, District Swat and carried out studies on 150 medicinal species growing in the area. He also pointed out various problems and threats facing by the local flora and correlated various aspects of his studies with the utility of the plant natural resources.

Ahmad and Sher (2003) conducted studies on the local utilitarian aspects of various plant species growing in various areas of District Chitral.

Hussain (2003) conducted studies on some species including its local utilitarian aspects, its role in community uplift and conservation growing in Drosh valley of District Chitral Pakistan.

Shinwari *et al.* (2003) carried studies on the conservation status of thirty four (34) medicinal plants species growing in the Astore area of Gilgit and concluded that 19 species were rare and 18 were vulnerable due to various reasons.

Thomas and Shengji (2003) carried out studies on management of plant natural resources and other Ethnobotanical aspects of the areas of Chitral, Naga Land India, Arunchal Pradesh, Chittagong hill tract, Bangladesh etc., its relation with human being and its importance in applied Ethnobotany.

Baart *et al.* (2004) documented studies on the local names of 203 species in Kalam Kohistani language, their urdu and English names and published a scientific paper on his findings.

Rahman *et al.* (2004) carried out preliminary survey of more than 55 plants species which are used as healing agents, while 10 species of medicinal importance worth Rs. 15.9 million are extracted and sold in the national and international market. Market surveys revealed that the middlemen and the processors harvest actual benefits of the medicinal plant resources whereas owners and collectors are kept intact merely to run the trade.

Wazir *et al.* (2004) documented the usage of forty one (41) species for their ethnobotanical and ethnomedicinal usage growing in the Chapursan Valley used by the local communities.

Shinwari *et al.* (2006) compiled a book on the medicinal flora of Pakistan consists of 466 species, including their habitat, botanical description, part used, uses, chemical constituents, distribution and conservation status studies.

Ullah *et al.* (2006) analyzed folk knowledge of the inhabitants of regarding Trees and Livelihood of the Gabral Valley. Twenty tree species belonging to eleven families and

nineteen genera were recorded. Among them 19 (95%) were utilized as timber, 18 (90%) were fuel wood, 13 (65%) medicinal, 12(60%) agro forestry, 12 (60%) agricultural tools, 10(50%) fodder, 10(50%) fruit plants, 8(40%) thatching/sheltering, 8(40%) fencing, 3(15%) condiments/spices, 8 (40%) furniture, 7(35%) ornamental, 6 (30%) honey bee species, 3 (15%) beverage, 1(5%) bark writing, 1(5%) huts/rooms and 1(5%) wool dye.

Panhwar and Abro (2007) compiled studies on the ethnobotanical usage of fifty (50) species used for curing various diseases and their local utilities.

Qureshi *et al.* (2007) conducted studies on local traditional and medicinal usage of thirty three (33) species growing in Ganga Chotti Hills and Sudhan Gali, District Bagh AJK.

Qureshi *et al.* (2007) carried out studies on various utilitarian aspects of 26 species used by the local communities for various medicinal and multiple purposes in District Mianwali.

Qureshi and Ghufra (2007) evaluated 49 species for their various medicinal uses and they conducted survey from the local inhabitants and Hakeems for collection of information regarding these plants.

Shinwari *et al.* (2007) compiled a book on the scientific names, vernacular names, part use, uses, marketability and other ethnobotanical aspects are of 102 species growing in Margalla Hills National Park, Islamabad.

Ullah and Rashid (2007) compiled and prepared a checklist of the weeds species of various crops growinh in Mankial valley and also high lighted the ethnobotanical, medicinal usage of twenty three (23) weed species growing in the valley alongwith its biological controle measures.

Ahmad and Husain (2008) conducted studies on the medicinal usage of twenty nine (29) species growing in the Kallar Kahar (Salt Range) practiced by the local communities.

Husain *et al.* (2008) evaluated fourty (40) species for their local and medicinal usage growing in Morgah Biodiversity Park, Rawalpindi Pakistan.

Ilahi (2008) carried out studies on the and reported the flora is rich with herbals, which have been over exploited resulting in deterioration of the habitat. As an alternate and to save the environment from further degradation, selected herbals were grown in the Medicinal Plants Farm of the University. This experience has been successful with increased biomass and medicinal ingredients production.

Khan and Khatoon (2008) conducted studies regarding medicinal uses of seventy eight (78) species growing in Bugrote and Haramosh valley for curing various diseases.

Ozturk *et al.* (2008) conducted studies on ecology, ethnobotany and ethnomedicinal aspects of 500 species used in Turkey and 23 species used in Cyperus for extraction of various drugs for curing different diseases.

Sholeh (2008) evaluated 160 species for their ethnobotanical uses in Birjand Iran and near Afghanistan boarder and decribed the traditional methods for extracting medicines from these plants.

Ali and Qaiser (2009) conducted studies on eighty three (83) species for their local and medicinal uses growing in various areas of District Chitral.

Qureshi *et al.* (2009) documented the local usage of twenty eight (28) species from the women of the Himalyan Region of the mountains in Pakistan and a total of 130 informants were interviewed for extraction of local knowledge.

Qureshi and Bhatti (2009) carried out studies on the ethnobotanical and medicinal usage of sixty (60) species distributed in Nara desert of Sindh Province.

Sardar and Khan (2009) recorded information regarding local utility of plant natural resources and collected information regarding 102 different species, which are used for various local and medicinal purposes.

Ullah and Rashid (2009) collected information regarding one hundred and thirty two spread into 65 families, among them 61 families were angiosperms, 54 of them were Dicot and 7 were monocot, while 3 families were Pteridophytes and one was gymnosperm. A total of sixty (60) plants belonging to 43 families were medicinally important, among them 40 were angiosperms, in which 37 were Dicot and 3 were monocot, while 2 were Pteridophytes and one was gymnosperm. One hundred and four (104) species belonging to 55 families were of multiple uses, in which 52 were angiosperms, among them 47 were Dicot and 5 were monocot, 2 were Pteridophytes and one was gymnosperm.

Abbas *et al.* (2010) carried out conservation status studies of *Cadaba heterotricha* based on its habitat, geographic range and population size.

Abbasi *et al.* (2010) conducted studies on twenty seven (27) species for their various medicinal uses from the local inhabitants of Abbottabad Abdad District.

Ahmad *et al.* (2010) carried out floristic, ecological and phytosociological studies of fourty seven (47) different stands of Deodar forest with focus on its natural distribution in Pakistan.

Ajaib *et al.* (2010) compilation of ethnobotanical and ethnomedicinal studies of thirty eight (38) species was carried out on the plants of Kotli District, AJK.

Alam and Ali (2010) conducted studies on the endemism of the *Androsace russellii* Y. Nasir in Pakistan and enlisted it as a Critically Endangered (CR) species.

Ali and Qaiser (2010) carried out studies on the endemism and conservation status of the species of *Astragalus gahiratensis* Ali and concluded that the main threat to this species is habitat degradation.

Fazal *et al.* (2010) prepared a checklist of the vascular flora of District Haripur and reported 211 species during his research.

Gilani *et al.* (2010) conducted studies on medicinal aspects of eighty one (81) species used for curing various diseases collected from various parts of Khyber Pakhtunkhwa.

Hazrat *et al.* (2010) compiled the medicinal and local usage of fifty (50) species growing in District Dir Ushera valley, Khyber Pakhtunkhwa.

Qasim *et al.* (2010) conducted data regarding forty eight (48) species growing in the coastal area for their local and medicinal uses by the local inhabitants of the valley.

Qureshi *et al.* (2010) compiled a comprehensive survey regarding sixty three (63) species growing in Nara Desert of Sindh province Pakistan.

Qureshi and Bhatti (2010) prepared a checklist of the floral diversity of 93 species growing in District Nawab Shah Sindh, Pakistan.

Razaq *et al.* (2010) conducted studies to elaborate the ethnomedicinal plant potential of Changa valley District Shangla, Pakistan. The study revealed that a total of 50 taxa, belonging to 32 families are used for medicinal purposes. Out of which 2 species are Pteridophyte i.e. *Adiantum venustum* D. Don, *A. capillus-veneris* L. and one Fungi i.e. *Morchella esculenta* (L.) Pers ex Fr. Furthermore, the number of perennial herbs, annual herbs, shrubs, trees and biennial herbs were 28, 9, 7, 5 and 1 respectively.

Shinwari (2010) conducted a comprehensive review on the medicinal flora of Pakistan and highlighted various issues related to the conservation and future of medicinal plants in Pakistan.

Tareen *et al.* (2010) conducted studies on the women usage of sixty one (61) medicinal species in two Districts of Balochistan including Kalat and Khuzdar.

Ali (2011) compiled a comprehensive research on the identification, taxonomic, collection and other associated problems of the medicinal flora of Pakistan.

Ali *et al.* (2011) carried out studies on medicinally and economically important plants species of Malam Jabba valley, Swat and prepared an enthnobotanical inventory of ninety (90) species alongwith their conservation status studies and associated issues.

Hameed *et al.* (2011) conducted studies on the local medicinal uses of the plants growing in Cholistan Desert area of Pkistan and noted that the local inhabitants are frequently using the different species to cure various diseases.

Haq *et al.* (2011) compiled studies on 156 species growing in Nandiar Khuwarr catchment area, which are used for curing various human and livestock diseases.

Hazrat *et al.* (2011) conducted ethnobotanical data regarding forty (40) species growing in Kohistan valley Dir (U) used by the local communities.

Hussain *et al.* (2011) conducted medicinal data regarding 47 species growing in Gilgit Baltistan region which are used by the local inhabitants for curing various diseases.

Jan *et al.* (2011) compiled data regarding fifty (50) medicinal species practiced by the local communities growing in Shahi Dir (L) Khyber Pakhtunkhwa, Pakistan.

Jan *et al.* (2011) conducted research on sixty five (65) species of medicinal importance used by the local inhabitants of Dir Kohistan Valleys, khyber Paktunkhwa Pakistan.

Khan *et al.* (2011) compiled medicinal flora of Chitral Gol National Park and documented thirty one (31) species for their medicinal usage practiced by the local communities.

Mahmood *et al.* (2011) conducted studies on the ethnobotanical uses of forty (40) important species growing in Neelam valley of AJK, which are used for curing various diseases and other local uses.

Marwat *et al.* (2011) compiled a research on forty (40) medicinal plants and the recopies prepared from thses species used by the local inhabitants in the District of Dera Ismail Khan.

Qureshi *et al.* (2011) provided botanical inventory of 130 plant species obeloning to 105 genera and 37 families growing near Arid Agriculture University, Rawalpindin Pakistan.

Qureshi *et al.* (2011) conducted studies on forty eight (48) medicinal species which are used by the local communities in District Khushab, Pakistan. They also provided information regarding the usage of different parts of these species for various purposes.

Sher *et al.* (2011) complied data regarding local and medicinal uses of 216 species collected from Buner district, Chagharzai Valley, Khyber Pakhtunkhwa, Pakistan.

Shinwari and Qaiser, (2011) conducted a critical research on the decline of plant species diversity and also highlighted various other factors which are effecting the natural floral fiversity in Pakistan. They have focused on the possible remedies for these causing agents.

Shinwari *et al.* (2011) conducted studies on various ethnobotanical groups based on usage and collected data regarding sixty (60) species at Kohat Pass, Khyber Pakhtunkhwa, Pakistan.

Sher *et al.* (2011) conducted studies on the ecology, floristics and biological spectrum of forty (40) species growing in village chotta Lahore of district Swabi, Khyber Pakhtunkhwa, Pakistan.

Ullah and Rashid (2011) carried out research on the inhabitants of the valley, in which Torwal are (67%) who remain in the valley all year. The remainder are Gujars (33%), who migrate seasonally. Both groups rely on the local plants and plant products for almost all their medicinal needs. Among the twenty plant species seven are used as a tonic, five for stomach problems, three each for diarrhoea, pain killer, blood purifier, and as a stimulant, two each for dysentery, wounds, carminative, antiseptic, and one each for cholera, dropsy, emetic, cathartic, ulcer, coolant, kidney problems, asthma, purgative, fever, vomiting, eye problems, toothache, milk production, fever, jaundice and throat infections.

Marwat *et al.* (2012) compiled studies on the local utilitarian aspects of twenty eight (28) weed species growing in various crops and prepared a complete data inventory regarding these weed species.

Qureshi (2012) conducted studies on the medicinal usage of thirty nine (39) species used for curing various diseases by the local communities.

Shaheen and Shinwari (2012) carried out studies on 108 plants for determining their community structure in Karambar lake and its surrounding areas in Northern Pakistan.

Shaheen *et al.* (2012) worked out on the local and medicinal uses of the alpine pastures of Bagh District, AJK and collected information regarding seventy one (71) species.

CHAPTER-3

MATERIALS AND METHODS

A. Research Plan for Floristic Studies

Field research trips were arranged throughout the research period especially during spring and summer 2002-2007 to the Mankial Valley Swat Kohistan (Annexure-I). Plant specimens were collected, documented, preserved and identified with the help of available literature (Parker, 1956; Qureshi and Khan, 1965-69, 1971; Stewart, 1967, 1972; Kitamura, 1977; Beg and Khan, 1977; Nasir and Ali, 1970-1989; Ali and Nasir, 1989-1991; Polunin and Stainton, 1990; Nasir and Rafiq, 1995 and Ali and Qaiser, 1993-2007) and comparing with preserved Herbarium specimens in the National Herbaria (PUP, PFI, KUH, RAW, ISL). Foreign visits were arranged to the Herbaria of University of Tokyo (TI), Peking Herbarium (PE), Institute of Botany CAS, Peking China; Intermountain Herbarium (UTC), Department of Biology, Utah State University, Logan USA and Missouri Botanical Garden Herbarium (MO) St. Louis USA for identification of complicated specimens. Voucher specimens were placed in Department of Botany Herbarium (PUP), University of Peshawar, Karachi University Herbarium (KUH), Quaid-e-Azam University Herbarium, Islamabad (ISL), Stewart Herbarium Rawalpindi (RAW), Intermountain Herbarium (UTC), Utah State University USA, University of Tokyo Museum (TI) and Peking Herbarium (PE) Beijing China. Phenaphthalene balls were used as insect repellent and the use of insecticides and pesticides were avoided due to its health hazards. The most recent classification system of angiosperms phylogeny group (Judd *et al.*, 2002) was followed for classification and the families, genera and species were arranged accordingly. Then plant genera and species under each family were described. Mounting of was made on standard size herbarium sheets (11.5 x 16.5 inches) and with (2/3/4 x 4/1/4 inches labels).

B. Research plan for ethnobotanical data retrieval

For ethnobotanical and medicinal data retrieval questionnaire were with modification from Croom (1983); Lipp (1989) and Ali and Qaiser (2009). One questionnaire per informant was used for recording ethnobotanical, medicinal and conservation data (Questionnaire-1). The informants were divided in to five age groups i.e. (20-30), (30-40), (40-50), (50-60) and (60 years and above). A total of 360 informants belonging to different communities were interviewed and emphasis was give to the old age groups being more informative. The informants were asked various questions regarding local name, part use, and method of collection, remedy preparation, dosage and local uses. For constituents, medicinal uses and terminologies the available literature was consulted i.e. (Boulos, 1983; Shinwari *et al.*, 2003; Shinwari *et al.*, 2006; Trease and Vans, 1985; Tyler *et al.*, 1970; Wallis, 1981 and Youngkin, 1950). The following procedure was adopted for ethnobotanical and medicinal data retrieval.

i. Selecting the informants

The selection of individuals as informants is a delicate social and political process therefore, awareness regarding the social and political map of the community was considered to avoid biased answers. The informants were therefore, selected from a broad range of people belonging to diverse groups of the community. The locals were involved to interview the female indirectly to the cultural and language barriers.

ii. Sampling techniques

Stijfhoorn (1996-1997) and Martin (2004) procedures were adopted for the preservation and documentation of various data regarding the plants and questions as per following schedule.

a. *Ex-situ* sampling (Artifact method)

The entire collection was processed for screening out the ethno-botanically and medicinally rich specimens with the help of local people and then further indigenous knowledge was extracted from the people about plants.

b. *In-situ* sampling (Inventory method)

This step was followed by the artifact method, which requires escorting the informant to the field for further verification of the data pertinent to the local knowledge of the inhabitants about various plant species. How much quantity is used and how local botanical resources are used; what procedure is followed for extracting benefits from plant and their products and how they are commercialized. What are the various benefits that are utilized by the local inhabitants from their ancestral ecological and management knowledge for the improvement of their daily life.

C. Conservation studies

"For conservation studies the following standard categories of IUCN were used (IUCN Species Survival Commission, 1994; Walter & Gillet, 1998)". These categories were further compared with the IUCN Red List Categories Version 3.1 (IUCN 2000). Data was recorded by filling questionnaire for studying conservation status of various plants species growing in the valley (Questionnaire-1).

i. Extinct

If the taxa are not available and growing wildly in the last 50 years.

ii. Endangered

The plant species which are in danger of extinction and facing difficulty in survival due to certain elements and their regular practice due to which the species number, distribution range and habitat are so much reduced that these species are feared to become extinct.

iii. Vulnerable

The plants species which will become endangered very soon if the factors causing such situation persist regularly.

iv. Rare

Plant species having a very less population and they are not endangered or vulnerable or suffering from serious problem but the phytogeographical distribution has become limited and they are scarcely present and having a rare presentation and the range is extensive.

v. Indeterminate

The plant species which can be placed in any one of the above four categories but the placement is not sure in any of the above categories.

vi. Insufficiently known

Due to lack of information some plant species are not sure to be placed in any of the above five categories and they are called as insufficiently known.

vii. Commercially threatened

The plant species which are over exploited and the populations are feared to become threatened if their use is not managed sustainably.

viii. Common

All those plant species which will not fall in any of the above categories will be put under the common species category.

CHAPTER-4

TRACHEOPHYTES (VASCULAR PLANTS)

Tracheo means tracheids and phytes mean plants. The Trachaeophytes form a well supported monophyletic group of generally large plants with branched sporophyte axis and well developed tissues with tracheids in the xylem and sieve cells in the phloem for the transport of water and carbohydrate within the plant. They form a major clade within the land plants (embryophytes).

Key to the major groups

1. + Sperm 2-flagellate ----- I. Lycophytes
- Sperm more than 2-flagellate or (without flagella) ----- 2. Euphylophytes
2. + Seeds absent, dispersal through spores ----- II. Monilophytes
- Seeds present dispersal through seeds ----- 3
3. + Carpels and endosperm present ----- 4
- Carpels and endosperm absent ----- III. Gymnosperms
4. + Leaves venation parallel, cotyledon one ----- IV. Monocotyledons
- Leaves venation netted, cotyledons two ----- V. Dicotyledons

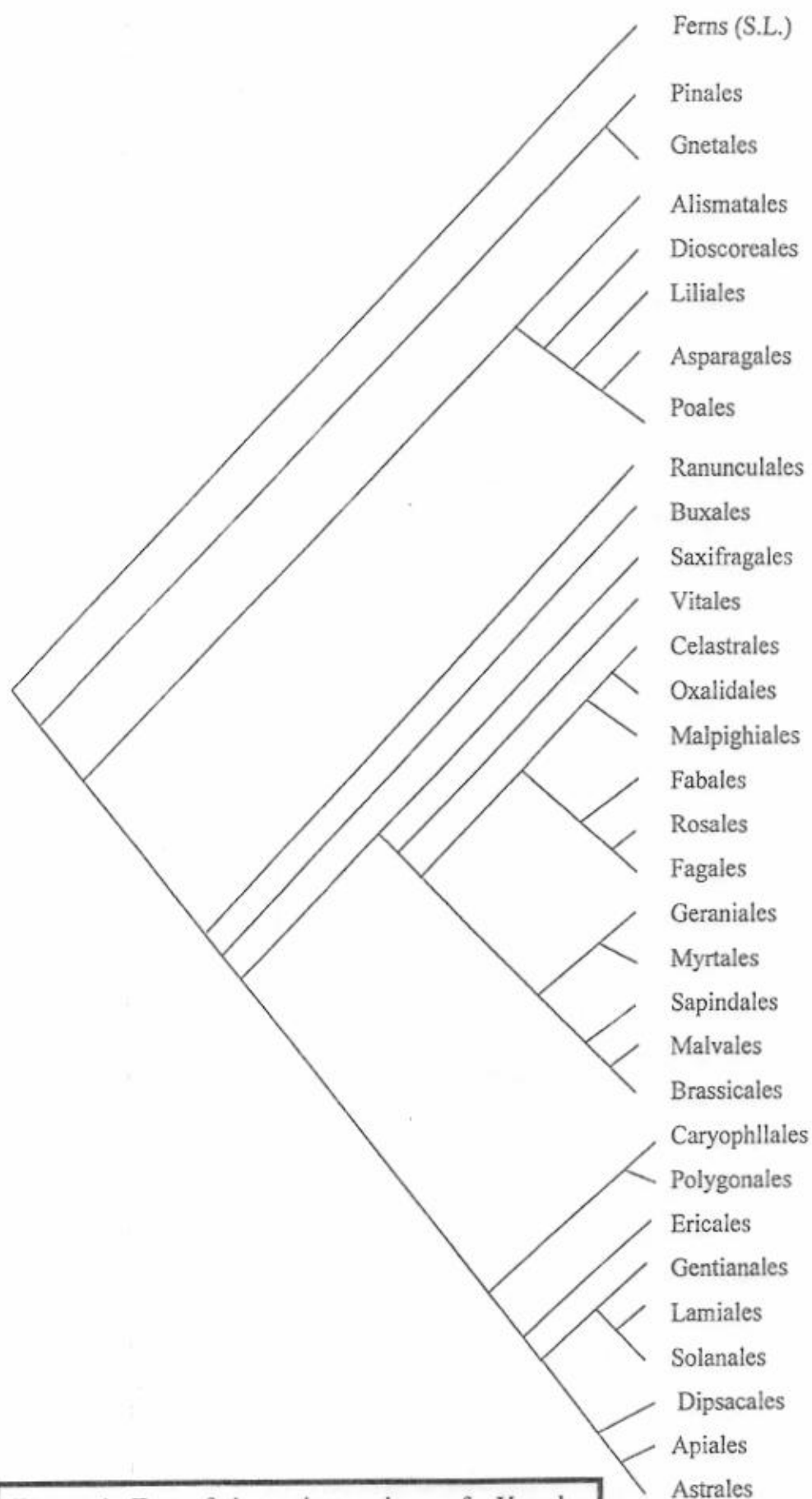


Figure 1. Tree of the various orders of Vascular Biodiversity found in Mankial Valley (Judd *et al.*, 2002).

A CHECKLIST OF THE TRACHEOPHYTES (VASCULAR PLANTS)

I. LYCHOPHYTES

Lycopodiales

1. Selaginellaceae

1. *Selaginella jacquemontii* Spring. Bull. Acad. Roy. Sci. Brux. 10:226.1843; Stewart, Ann. Cat. Vas. Pl. W. Pak. & Kash. 1. 1972; Nakaike and Malik, Cryp. Fl. Pak. 1:262.1992 (Plate-1, 1 & 2).

Mankial (Chokail Banda) $35^{\circ} 21' N$ $72^{\circ} 39' E$, 3012 m. *Asad and Rashid* 419 (PUP and PMNH).

II. MONILOPHYTES

Equisetales

1. Equisetaceae

1. *Equisetum arvense* L., Sp. Pl. 2:1061.1753; Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 2. 1972; Nakaike & Malik, Cryp. Fl. Pak., 1: 262. 1992 (Plate-1, 5).

Mankial (Ghond Patai) $35^{\circ} 19' N$ and $72^{\circ} 37' E$, 1766 m. *Asad and Rashid* 408 (PUP & PMNH).

Salviniales

2. Marsileaceae

1. *Marsilea minuta* L., Sp. Pl. 2:1099.1753; Mant. 308.1771; Stewart in Anno. Cata. of Vasc. Pl. W. Pak. & Kash. 21. 1972; Nakaike & Malik, Cryp. Fl. Pak. 1: 265. 1992 (Plate-1, 6).

Mankial (Ghond Patai) $35^{\circ} 19' N$ and $72^{\circ} 37' E$, 1766 m. *Asad and Rashid* 409 (PUP & PMNH).

Polypodiales

3. Dennstaedtiaceae

1. *Pteridium aquilinum* (L.) Kuhn, in Decken, Reis. Bot. 3 (3) II.1879; Syn. *Pteris aquiline* L., Sp. Pl. 1075.1753; Stewart in Anno. Cata. of Vasc. Pl. W. Pak. & Kash. 7. 1972; Dhir, K. K. & A. Sood, Fern. Fl. Muss. Hills. Biblio Pterido. 2:36.1981.

Mankial (Jabba-I) $35^{\circ} 17' N$ and $72^{\circ} 40' E$, 2563 m. *Asad and Rashid* 1861 (PUP & PMNH).

4. Pteridaceae

1. *Pteris cretica* L., Mant. Pl. 130.1767; Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 8.1972; Nakaike & Malik, Cryp. Fl. Pak. 1:264.1992 (Plate-2, 9).

Mankial (Serai-IV) $35^{\circ} 21' N$ and $72^{\circ} 40' E$, 2405 m. *Asad and Rashid* 214 (PUP & PMNH).

2. *Pteris vittata* L., Sp. Pl. 2:1074.1753; Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 8. 1972; Malik, Cryp. Fl. Pak. 1: 264. 1992 (Plate-2, 10).

Mankial (Serai-IV) $35^{\circ} 21' N$ and $72^{\circ} 40' E$, 2405 m. *Asad and Rashid* 1863 (PUP & PMNH).

5. Aspleniaceae

1. *Asplenium adiantum-nigrum* L., Sp. Pl. 2:1081.1753; 1753; Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 17. 1972; Nakaike & Malik, Cryp. Fl. Pak. 1: 267. 1992 (Fig. LXII, Dhir & Sood, 1981).

Mankial (Badai-II) 35° 19'N and 72° 38' E, 1890 m. *Asad and Rashid* 489 (PUP & PMNH).

2. *Asplenium ceterach* L., Sp. Pl. 2:1080.1753; Bir, Fraser-Jenkins, & Lovis, Fern Gaz. 13 (1): 61.1985; Nakaike & Malik, Cryp. Fl. Pak. 1: 267.1992 (Plate-1, 3).

Mankial (Serai-IV) 35° 21'N and 72° 40' E, 2405 m. *Asad and Rashid* 208 (PUP & PMNH).

3. *Asplenium septentrionale* (L.) Hoffmann, Bot. Taschenb. Deutschl. Fl. (Krypt.) 2: 12. 1795; Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 18. 1972; Nakaike & Malik, Cryp. Fl. Pak. 1: 269. 1992 (Fig. LX, Dhir & Sood, 1981).

Mankial (Char Banda) 35° 18'N and 72° 41' E, 3200 m. *Asad and Rashid* 669 (PUP & PMNH).

4. *Asplenium trichomanes* L., Sp. Pl. 2: 1080. 1753; Stewart in Anno. Cata. Vasc. Pl. of W. Pak. & Kash. 18. 1972; Nakaike & Malik, Cryp. Fl. Pak. 1: 269. 1992 (Plate1, 4).

Mankial (Serai-IV) 35° 21' N and 72° 40' E, 2405 m. *Asad and Rashid* 1864 (PUP & PMNH).

6. Woodsiaceae

1. *Athyrium mackinnonii* (Hope) C. Chr., Ind. Fil. 143: 1905; Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 9. 1972; Nakaike & Malik, Cryp. Fl. Pak. 2: 333. 1993 (Plate-2, 12).

Mankial (Serai-IV) 35° 21' N and 72° 40' E, 2405 m. *Asad and Rashid* 501 (PUP & PMNH).

2. *Athyrium rupicola* (Hope) C. Chr., Ind. Fil., 145, 1905; Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 10. 1972; Nakaike & Malik, Cryp. Fl. Pak. 2: 33. 1993.

Mankial (Mankial village) 35° 19' N and 72° 36' E, 1764 m. *Asad and Rashid* 1860 (PUP & PMNH).

3. *Cystopteris fragilis* (L.) Bernhardt, Neues J. Bot. 1(2):27:1806; Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 11. 1972; Nakaike & Malik, Cryp. Fl. Pak. 2: 334. 1993 (Fig. X0I, Dhir & Sood, 1981).

Mankial (Mankial village) 35° 19' N and 72° 36' E, 1764 m. *Asad and Rashid* 1870 (PUP & PMNH).

4. *Cystopteris dickieana* R. Sim, Gand. Farm. Journ. 2 (20): 308. 1848; Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 10. 1972; Nakaike & Malik, Cryp. Fl. Pak. 2: 334. 1993.

Mankial (Mankial village) 35° 19' N and 72° 37' E, 1764 m. *Asad and Rashid* 1870 (PUP & PMNH).

7. Thelypteridaceae

1. *Christella dentata* (Forssk.) Brownsey et Jermy, Britan, Fern Gazzatte, 10: 338. 1973; Dhir, K. K. & A. Sood, Fern Fl. Muss. Hills. Biblio. Pterido, 2:73.1981; Nakaike & Malik, Cryp. Fl. Pak. 1: 266. 1992 (Plate-2, 11).

Mankial (Mankial village) 35° 19'N and 72° 36' E, 1764 m. *Asad and Rashid* 1869 (PUP & PMNH).

8. Dryopteridaceae

1. *Dryopteris ramosa* (Hope) C. Chr., Ind. Fil. 287. 1905; Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 13. 1972; Nakaike & Malik, Cryp. Fl. Pak. 1: 275. 1992.

Mankial (Mehnain) 35° 19' N and 72° 37' E, 1764 m. *Asad and Rashid* 1866 (PUP & PMNH).

2. *Polystichum discretum* (D. Don) Diels, Nat. Pfl., 1 (4) 199. 1899; Stewart in Anno. Cata. Vasc. Pl. of W. Pak. & Kash. 14. 1972; Nakaike & Malik, Cryp. Fl. Pak. 2: 340. 1993.

3. *Polystichum thomsonii* (Hk. f.) Bedd., Ferns Brit. Ind. T. 126. 1866; Stewart in Anno. Cata. of Vasc. Pl. W. Pak. & Kash. 14. 1972.

Mankial (Serai-III) 35° 21' N and 72° 40' E, 2400 m. *Asad and Rashid* 1867 (PUP & PMNH).

9. Polypodiaceae

1. *Adiantum capillus-veneris* L., Sp. Pl. 2: 1096. 1753; Stewart in Anno. Cata. Vasc. Pl. of W. Pak. & Kash. 4. 1972; Nakaike & Malik, Cryp. Fl. Pak. 2: 324. 1993 (Plate-2, 8).

Mankial (Mehnain-II) 35° 19' N and 72° 38' E, 1764 m. *Asad and Rashid* 1888 (PUP & PMNH).

2. *Adiantum venustum* D. Don, Prodr. Flora of Nepal, 17. 1825; Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 4. 1972; Nakaike & Malik, Cryp. Fl. Pak. 2: 325. 1993 (Plate-2, 7).

Mankial (Serai-III) 35° 21' N and 72° 40' E, 2400 m. *Asad and Rashid* 1862 (PUP & PMNH).

3. *Allosorus stelleri* (Rupr.) Beddome, R. H. The Ferns of Brit. India: 1: 73. 1973 (Fig. LXIII, Dhir & Sood, 1981).

Mankial (Char banda) 35° 18' N and 72° 41' E, 3200 m. *Asad and Rashid* 1865 (PUP & PMNH).

III. GYMNOSPERMS (gymno=naked, sperms=seeds)

Coniferales

1. Pinaceae

1. *Abies pindrow* Royle, Illustr. Bot. Himal. 350. t. 86, 1836; Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 25. 1972; Nasir & Nasir, Gymnospermae in Fl. Pak. 178-186: 12. 1987 (Plate-3, 15 & 16).

Mankial (Takki Gaider-I) 35° 18' N and 72° 39' E, 2641 m. *Asad and Rashid* 1875 (PUP & PMNH).

2. *Cedrus deodara* (Roxb. ex D. Don), G. Don in Loudon, Hort. Brit. ed. 1: 388. 1830; Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 25. 1972; Nasir & Nasir, Gymnospermae in Fl. Pak. 178-186: 14. 1987 (Plate-3, 17).

Mankial (Bhadai Patti-III) 35° 20' N and 72° 38' E, 2058 m. *Asad and Rashid* 1880 (PUP & PMNH).

3. *Picea smithiana* (Wall.) Boiss, Fl. Or. 5: 700. 1884; Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 25. 1972; Nasir & Nasir, Gymnospermae in Fl. Pak. 178-186: 13-14. 1987 (Fig. 3-D, Fl. of Pak.).

Mankial (Jabba-I) 35° 17' N and 72° 40' E, 2563 m. *Asad and Rashid* 861 (PUP & PMNH).

4. *Pinus wallichiana* A. B. Jackson, Kew Bull., 1938; Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 26. 1972; Nasir & Nasir, Gymnospermae in Fl. Pak. 178-186: 7. 1987 (Plate-3, 18).

Mankial (Takki Gaider-II) $35^{\circ} 18' N$ and $72^{\circ} 39' E$, 2645 m. *Asad and Rashid* 1023 (PUP & PMNH).

2. Cupressaceae

1. *Juniperus communis* L., Sp. Pl. 2: 1040. 1753; Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 27. 1972; Nasir & Nasir, Gymnospermae in Fl. Pak. 178-186: 18. 1987 (Plate-3, 13).

Mankial (Chokail Banda-I) $35^{\circ} 21' N$ and $72^{\circ} 39' E$, 3088 m. *Asad and Rashid* 648 & 1574 (PUP & PMNH).

3. Taxaceae

1. *Taxus fuana* Nan Li & R. R. Mill. Taxon, 57 (1): 211-222. 2008; Zucc in Abhandl. Bayer. Akad. Classe Math. Phys. 3:805. t. 5. 1843; Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 27. 1972; Nasir & Nasir, Gymnospermae in Fl. Pak. 178-186: 26. 1987 (Plate-4, 19).

Mankial (Takki Gaider-I) $35^{\circ} 18' N$ and $72^{\circ} 39' E$, 2641 m. *Asad and Rashid* 1876 (PUP & PMNH).

Gnetales

4. Ephedraceae

1. *Ephedra gerardiana* Wall. ex Stapf in Akad. Wiss. Wien. Math. Naturwiss. K. I. Denkschr. 56 (2): 75, Emend Florin, Kungl. Sv. Vetensk. Handl. Ser. 3, 12 (1) 1933; Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 22. 1972; Nasir & Nasir, Gymnospermae in Fl. Pak. 178-186: 30. 1987 (Plate-3, 14).

Mankial (Gaider Jabba-I) $35^{\circ} 18' N$ and $72^{\circ} 41' E$, 2810 m. *Asad and Rashid* 1842 (PUP & PMNH).

IV. MONOCOTS

Alismatales

1. Araceae

1. *Arisaema jacquemontii* Blume, Rumphia. 1:95.1836; Stewart in Anno. Cata. Vasc. Pl. of W. Pak. & Kash. 34. 1972; Nasir, Araceae in Fl. Pak. 120: 11. 1978 (Plate-4, 20).

Mankial (Mankial village) $35^{\circ} 19' N$ and $72^{\circ} 36' E$, 1764 m. *Asad and Rashid* 190 (PUP & PMNH).

PETALOID MONOCOTS

Liliales

2. Liliaceae

1. *Northolirion thomsonianum* (D. Don) Stapf in Kew Bull. 1934: 95. 1934; Ali, Liliaceae in Fl. Pak. 215: 88. 2007 (Plate-5, 27).

Mankial (Beer Mankial) $35^{\circ} 19' N$ and $72^{\circ} 38' E$, 1905 m. *Asad and Rashid* 1879 (PUP & PMNH).

3. Convallariaceae

1. *Polygonatum verticillatum* All. 131; FBI 6:321; Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 57. 1972; Ali, Convallariaceae in Fl. Pak. 213: 6. 2005 (Plate-4, 22).
Mankial (Gaider Jabba-III) 35° 18' N and 72° 40' E, 2820 m. *Asad and Rashid* 1720 (PUP & PMNH).

4. Colchicaceae

1. *Colchicum luteum* Baker in Gard. Chron. 7: 34. 1874; Stewart in Anno. Cata. Vasc. Pl. of W. Pak. & Kash. 50. 1972; Nasir, Colchicaceae in Fl. Pak. 125: 1. 1979 (Plate-4, 21).
Mankial (Chokial Banda-II) 35° 22' N and 72° 40' E, 3275 m. *Asad and Rashid* 1891 (PUP & PMNH).

5. Trilliaceae

1. *Trillium govanianum* Wall. ex Royle, Illustration of Botanical Himalayan, Mountains, t. 93. 384. 1839; Stewart, Ann. Cat. W. Pak. & Kash. 58. 1972; Ghafoor, Trilliaceae in Fl. Pak. 105:1. 1974 (Plate-5, 29).
Mankial (Serai-IV) 35° 21' N and 72° 40' E, 2405 m. *Asad and Rashid* 1822 (PUP & PMNH).

Asparagales

6. Alliaceae

1. *Allium victorialis* L., Sp. Pl. 295. 1753; Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 47. 1972; Nasir, Alliaceae in Fl. Pak. 83: 13. 1975.
Mankial (Serai-III) 34° 21' N and 72° 40' E, 2400 m. *Asad and Rashid* 1923 (PUP & PMNH).

7. Iridaceae

1. *Iris hookeriana* Foster in Gard. Chron. Ser. 3. 1: 611. 1887; Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 64. 1972; Mathew, Iridaceae in Fl. Pak. 202:17. 2000 (Plate-4, 24).
Mankial (Jabba-I) 35° 17' N and 72° 40' E, 2563 m. *Asad and Rashid* 862 (PUP & PMNH).

8. Orchidaceae

1. *Dactylorhiza hatagirea* (D. Don) Soo in Ann. Univ. Scient. Budapest., Sect. Biol. 3:341. 1960; Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 67. 1972; Renz, Orchidaceae in Fl. Pak. 164: 25. 1984 (Plate-5, 28).
Mankial (Bhadai-II) 35° 19' N and 72° 38' E, 1890 m. *Asad and Rashid* 56 & 838 (PUP & PMNH).
2. *Spiranthes sinensis* (Pers.) Ames, Orchid. 2:53. 1908; Renz in Rech. f. Fl. Iran. 126: 51. Pl. 18. 1978; Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 73. 1972; Renz, Orchidaceae in Fl. Pak. 164: 43. 1984.
Mankial (Jabba-I) 35° 17' N and 72° 40' E, 2563 m. *Asad and Rashid* 446 (PUP & PMNH).

Dioscoreales
9. Dioscoreaceae

1. *Dioscorea deltoidea* Wall. ex Kunth, Enum. 5: 340. 1850; Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 62. 1972; Siddiqui, Dioscoreaceae in Fl. Pak. 53: 5. 1973 (Plate-4, 23).
Mankial (Bhadai-III) 35° 19' N and 72° 38' E, 1894 m. *Asad and Rashid* 526 & 1420 (PUP & PMNH).

COMMELINOID MONOCOTS

Poales
10. Juncaceae

1. *Juncus membranaceus* Royle ex Don in Trans. Linneaus Society, 18 (3): 317. 1840; Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 39. 1972; Jaffri, Juncaceae in Fl. Pak. 138: 10. 1981 (Plate-5, 25).
Mankial (Mankial village) 35° 19' N and 72° 36' E, 1764 m. *Asad and Rashid* 818 (PUP & PMNH).
2. *Juncus sphacelatus* Decne. in Jacquem., Voy. Bot. 172. 1844; Buchen. in Bot. Jahrb. 6: 225. 1885; Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 40. 1972; Jaffri, Juncaceae in Fl. Pak. 138: 12. 1981 (Plate-5, 26).
Mankial (Bhadai-III) 35° 19' N and 72° 38' E, 1894 m. *Asad and Rashid* 879 (PUP & PMNH).

11. Cyperaceae

1. *Carex karoii* (Freyn) Freyn, Oesterr. Botanical, Z. 40: 330. 1890; Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 78. 1972; Kukkonen, Cyperaceae in Fl. of Pak. 206: 217. 2001.
Mankial (Bhadai-II) 35° 19' N and 72° 38' E, 1890 m. *Asad and Rashid* 1382 (PUP & PMNH).
2. *Cyperus niveus* Retz., Observation Botany, 5: 12. 1788; Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 91. 1972; Kukkonen, Cyperaceae in Fl. Pak. 206: 129. 2001 (Fig. 23, Fl. of Pak.).
Mankial (Bhadai Patti-II) 35° 20' N and 72° 38' E, 2054 m. *Asad and Rashid* 2382 (PUP & PMNH).
3. *Schoenoplectus litoralis* (Schrader) Palla, Botanical Jahrb. 10: 299. 1889; Kukkonen, Cyperaceae in Fl. Pak. 206: 20. 2001.
Mankial (Bhadai Patti-I) 35° 20' N and 72° 38' E, 2069 m. *Asad and Rashid* 1938 (PUP & PMNH).

12. Poaceae

1. *Arundo donax* L., Sp. Pl. 1: 81. 1753; Boissier, Flora of Oregon, 5: 564. 1884; Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 133. 1972; Cope, Poaceae in Fl. Pak. 143: 21. 1982.
Mankial (Mehrain-II) 35° 19' N and 72° 38' E, 1764 m. *Asad and Rashid* 2864 (PUP & PMNH).

2. *Dichanthium annulatum* (Forssk.) Stapf in Prain, Flora of Tropical Africa, 9: 178. 1917; Blatter & McCann, Bombay Grasses 94.1935; Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 108. 1972; Cope, Poaceae in Fl. Pak. 143: 283. 1982 (Fig. 30, Fl. of Pak.).
Mankial (Mankial village) 35° 19' N and 72° 36' E, 1764 m. *Asad and Rashid* 1886 (PUP & PMNH).
3. *Dactylis glomerata* L., Sp. Pl. 1: 71. 1753; Boissier, Flora of Oregon, 5: 596. 1884; Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 150. 1972; Cope, Poaceae in Fl. Pak. 143: 436. 1982 (Plate-6, 31).
Mankial (Mehnain-I) 35° 19' N and 72° 37' E, 1764 m. *Asad and Rashid* 439 (PUP & PMNH).
4. *Digitaria ciliaris* (Retz.) Koel, Descr. Gram. 27.1802; Bor in Townseed, Guest & Al-Rawi, Flora of Iraq 9: 478. 1968; Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 117. 1972; Cope, Poaceae in Fl. Pak. 143: 228. 1982.
Mankial (Serai-IV) 35° 21' N and 72° 40' E, 2405 m. *Asad and Rashid* 2605 (PUP & PMNH).
5. *Echinochloa crus-galli* (L.) P. Beauv., Ess. Agrostology, 53. 161. 1812; Blatter & McCann, Bombay Grasses 150. 1935; Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 120. 1972; Cope, Poaceae in Fl. Pak. 143: 196. 1982 (Fig. 22, Fl. of Pak.).
Mankial (Serai-III) 35° 21' N and 72° 40' E, 2405 m. *Asad and Rashid* 1750 (PUP & PMNH).
6. *Pennisetum lanatum* Klotzsch in Bot. Erg. Walden Reise. 65, t. 99.1862; Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 123. 1972; Cope, Poaceae in Fl. Pak. 143: 235. 1982 (Fig. 21-3 & 4, Fl. of Pak.).
Mankial (Bhadai-III) 35° 19' N and 72° 38' E, 1894 m. *Asad and Rashid* 2750 (PUP & PMNH).
7. *Piptatherum gracilis* Mez in Feddes, Repert. 17: 211. 1921; Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 166. 1972; Cope, Poaceae in Fl. Pak. 143: 553. 1982 (Plate-6, 32).
Mankial (Beer) 35° 19' N and 72° 38' E, 1905 m. *Asad and Rashid* 393 (PUP & PMNH).
8. *Poa alpina* L., Sp. Pl. 1: 67. 1753; Boissier, Flora of Oregon, 5: 605. 1884; Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 155. 1972; Cope, Poaceae in Fl. Pak. 143: 404. 1982 (Plate-5, 30).
Mankial (Bhadai-I) 35° 19' N and 72° 38' E, 1886 m. *Asad and Rashid* 440 (PUP & PMNH).
9. *Setaria pumila* (Poir.) Roem. & Schult., System, Vegetation, 2: 891. 1817; Clayton in Tutin, Flora of Europe, 5: 263. 1980; Cope, Poaceae in Fl. Pak. 143: 181. 1982 (Fig. 19, Fl. of Pak.).
Mankial (Bhadai Patti-II) 35° 20' N and 72° 38' E, 2054 m. *Asad and Rashid* 1837 (PUP & PMNH).

EUDICOTS (TRICOLPATES)

BASAL TRICOLPATE

1. Ranunculales

1. Ranunculaceae

1. *Aconitum heterophyllum* Wall. ex Royle, *Illust. Bot. Himal. Mount.* 56. 13. 1833; Coventry, *Wild Flow. Kash.* 3: 23. 1930; Stewart in *Anno. Cata. Vasc. Pl. W. Pak. & Kash.* 258. 1972; Riedl & Nasir, *Ranunculaceae in Fl. Pak.* 193: 32-33. 1991 (Plate-22, 131).
Mankial (Chokial Banda-II) 35° 22' N and 72° 40' E, 3275 m. *Asad and Rashid* 189 (PUP & PMNH).
2. *Anemone vitifolia* Bush. Ham. DC., *Syst. Nat.* 1:210.1817; Stewart in *Anno. Cata. Vasc. Pl. W. Pak. & Kash.* 261. 1972; Qureshi & Chaudhri in *Pakistan Systematics*, 4 (1-2): 110. 1988; Riedl & Nasir, *Ranunculaceae in Fl. Pak.* 193: 70. 1991 (Plate-22, 132).
Mankial (Kafar Banda) 35° 18' N and 72° 39' E, 2835 m. *Asad and Rashid* 1873 (PUP & PMNH).
3. *Aquilegia pubiflora* Wall. ex Royle, *Illustration Botanical Himalayan Mountain*, 1: 55. 1834; Stewart in *Anno. Cata. Vasc. Pl. W. Pak. & Kash.* 262. 1972; Qureshi & Chaudhri in *Pakistan Systematics*, 4 (1-2): 15. 1988; Riedl & Nasir, *Ranunculaceae in Fl. Pak.* 193: 15. 1991 (Plate-23, 133).
Mankial (Takki Gaider-II) 35° 18' N and 72° 39' E, 2645 m. *Asad and Rashid* 11 & 104 (PUP & PMNH).
4. *Caltha alba* Camb. in Jacquem. *Voy. Botany*, 6. 1844; Stewart in *Anno. Cata. Vasc. Pl. W. Pak. & Kash.* 263. 1972; Qureshi & Chaudhri in *Pakistan Systematics*, 4 (1-2): 28. 1988; Riedl & Nasir, *Ranunculaceae in Fl. Pak.* 193: 26. 1991 (Plate-23, 134).
Mankial (Gaider Jabba-III) 35° 18' N and 72° 40' E, 2820 m. *Asad and Rashid* 64 (PUP & PMNH).
5. *Clematis grata* Wall., *Plants of Asia. Rar.* 1: 83. 98. 1830; Tamura in *Kitam., Fl. Afghan.* 123. 1960; Stewart in *Anno. Cata. Vasc. Pl. W. Pak. & Kash.* 264. 1972; Qureshi & Chaudhri in *Pakistan Systematics*, 4 (1-2): 126. 1988; Riedl & Nasir, *Ranunculaceae in Fl. Pak.* 193: 88. 1991 (Plate-23, 135).
Mankial (Bhadai-III) 35° 19' N and 72° 38' E, 1894 m. *Asad and Rashid* 550 (PUP & PMNH).
6. *Ranunculus arvensis* L., *Sp. Pl.* 1: 555. 1753; Tamura in *Kitamura, Fl. Afghan.* 130. 1960; Stewart in *Anno. Cata. Vas. Pl. W. Pak. & Kash.* 269. 1972; Riedl & Nasir, *Ranunculaceae in Fl. Pak.* 193: 131. 1991.
Mankial (Mankial village) 35° 19' N and 72° 36' E, 1764 m. *Asad and Rashid* 1877 (PUP & PMNH).
7. *Ranunculus laetus* Wall. ex Hook. f. & Thoms., *Fl. Ind.* 36. 1855; Tamura in *Kitam., Fl. Afghan.* 1: 30. 1960; Stewart in *Anno. Cata. Vas. Pl. W. Pak. & Kash.* 271. 1972; Riedl & Nasir, *Ranunculaceae in Fl. Pak.* 193: 141. 1991 (Plate-23, 136).
Mankial (Ghund Patai) 35° 19' N and 72° 37' E, 1766 m. *Asad and Rashid* 174 & 185 (PUP & PMNH).

8. *Thalictrum cultratum* Wall., Plant Asia Rar. 2: 26. 1831; Qureshi & Chaudhri in Pak. Syst. 4 (1-2): 102. 1988; Riedl & Nasir, Ranunculaceae in Fl. Pak. 193: 103. 1991. (Plate-23, 137).

Mankial (Mehnain-II) 35° 19' N and 72° 38' E, 1764 m. *Asad and Rashid* 1873 (PUP & PMNH).

2. Berberidaceae

1. *Berberis lycium* Royle in Trans. Linnean Society, 17: 94. 1834; Hook. f., Flora of British India, 1: 110. 1872; Parker, Forest Flora of Punjab, 14. 1958; Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 278. 1972; Jafri, Bereridaceae in Fl. Pak. 87: 10. 1975 (Plate-10, 60).

Mankial (Bhadai Patti-II) 35° 20' N and 72° 38' E, 2054 m. *Asad and Rashid* 1825 (PUP & PMNH).

3. Papaveraceae

1. *Corydalis diphyllo* Wall., Tent. Fl. Nep. 54. 1824; Jafri, Fumariaceae in Fl. Pak. 73: 6. 1974 (Plate-20, 117).

Mankial (Mankial village) 35° 19' N and 72° 36' E, 1764 m. *Asad and Rashid* 353 (PUP, PMNH).

Buxales

1. Buxaceae

1. *Sarcococca saligna* (D. Don) Muell., Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 457. 1972; Ghafoor, Buxaceae in Fl. Pak. 65: 2. 1974 (Fig. 1-F, Fl. of Pak.).

Mankial (Tapra) 35° 20' N and 72° 38' E, 2060 m. *Asad and Rashid* 2353 (PUP, PMNH).

CORE EUDICOTS (CORE TRICOLPATE)

Caryophyllid clade

1. Tamaricaceae

1. *Tamaricaria elegans* (Royle) Qaiser & Ali, Blumea 24: 153. 1978; Qaiser, Tamaricaceae in Fl. Pak. 141. 44. 1982 (Fig. 18, Fl. of Pak.).

Mankial (Mehnain-II) 35° 19' N and 72° 38' E, 1764 m. *Asad and Rashid* 1497 (PUP, PMNH).

2. Caryophyllaceae

1. *Arenaria neelgherrensis* Wight and Arn., Prodr. Fl. Ind. Or. 43. 1834; Ghazanfar & Nasir, Caryophyllaceae in Fl. Pak. 175: 8-9. 1986 (Fig. 1, Fl. of Pak.).

Mankial (Bhadai-I) 35° 19' N and 72° 38' E, 1886 m. *Asad and Rashid* 63 (PUP, PMNH).

2. *Arenaria orbiculata* Royle ex Edgew. in Hook. f., Flora of British India, 1: 240. 1874; Stewart in Anno. Cata. Vasc. Pl. of W. Pak. & Kash. 239. 1972; Ghazanfar & Nasir, Caryophyllaceae in Fl. Pak. 175: 9. 1986.

Mankial (Mankial village) 35° 19' N and 72° 36' E, 1764 m. *Asad and Rashid* 742 (PUP & PMNH).

3. *Arenaria serpyllifolia* L., Sp. Pl. 423.1753; Ghazanfar & Nasir, Caryophyllaceae in Fl. Pak. 175: 6. 1986 (Fig. 1, Fl. of Pak.).
Mankial (Bhadai-II) 35° 20' N and 72° 38' E, 2054 m. *Asad and Rashid* 106 (PUP & PMNH).
4. *Cerastium fontanum* Baumg., Enum. Strip. Transs. 1: 425. 1816; Ghazanfar & Nasir, Caryophyllaceae in Fl. Pak. 175: 6. 1986.
Mankial (Bhadai Patti-III) 35° 20' N and 72° 38' E, 2075 m. *Asad and Rashid* 1306 (PUP & PMNH).
5. *Dianthus jacquemontii* Edgeward ex Hooker, f., Flora of British India, 1: 214. 1984; Ghazanfar & Nasir, Caryophyllaceae in Fl. Pak. 175: 117. 1986 (Plate-13, 73).
Mankial (Mankial village) 35° 19' N and 72° 37' E, 1763 m. *Asad and Rashid* 1406 (PUP & PMNH).
6. *Minertia kashmirica* (Edgew.) Mattf. In B. Jahrb. 57 (Belbl. 126): 32. 1921; Ghazanfar & Nasir, Caryophyllaceae in Fl. Pak. 175: 14. 1986.
Mankial (Serai-I) 35° 21' N and 72° 41' E, 2605 m. *Asad and Rashid* 1464 (PUP & PMNH).
7. *Silene gonosperma* (Rupr.) Bocquet, Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 246. 1972; Ghazanfar & Nasir, Caryophyllaceae in Fl. Pak. 175: 66. 1986 (Plate-13, 75).
Mankial (Jabba-I) 35° 17' N and 72° 40' E, 2563 m. *Asad and Rashid* 628 (PUP & PMNH).
8. *Silene vulgaris* (Moench) Gracke, Fl. Nord. Mittel-Dutsch. 9, 64. 1869; Ghazanfar & Nasir, Caryophyllaceae in Fl. Pak. 175: 76. 1986 (Plate-13, 74).
Mankial (Bhadai Patti-III) 35° 20' N and 72° 38' E, 2075 m. *Asad and Rashid* 14 (PUP & PMNH).
9. *Spergularia diandra* (Guss.) Heldr. & Sart. in Herbs Grases Norm. 492. 1124. 1855; Ghazanfar & Nasir, Caryophyllaceae in Fl. Pak. 175: 76. 1986 (Plate-13, 76).
Mankial (Beer) 35° 19' N and 72° 38' E, 1905 m. *Asad and Rashid* 742 (PUP & PMNH).
10. *Stellaria monosperma* Buch. Ham. ex D. Don, Proder, Flora of Nepal, 215.1825; Ghazanfar & Nasir, Caryophyllaceae in Fl. Pak. 175: 22. 1986.
Mankial (Beer) 35° 19' N and 72° 38' E, 1905 m. *Asad and Rashid* 1563 (PUP & PMNH).

3. Amaranthaceae

1. *Achyranthes aspera* L., Boissier, Flora of Oregon, 4: 993. 1879; Townsend, Amaranthaceae in Fl. Pak. 71: 33. 1974 (Plate-6, 35).
Mankial (Mankial village) 35° 19' N and 72° 36' E, 1764 m. *Asad and Rashid* 725 (PUP & PMNH).
2. *Amaranthus viridis* L., Sp. Pl. 2: 1405. 1762; Townsend, Amaranthaceae in Fl. Pak. 71: 14-16. 1974 (Plate-6, 36).
Mankial (Mehnain-II) 35° 19' N and 72° 38' E, 1764 m. *Asad and Rashid* 851 (PUP & PMNH).
3. *Amaranthus spinosus* L., Sp. Pl. 1: 991. 1753; Townsend, Amaranthaceae in Fl. Pak. 71: 9. 1974 (Plate-7, 37).
Mankial (Mankial village) 35° 19' N and 72° 36' E, 1764 m. *Asad and Rashid* 971 (PUP & PMNH).

4. *Chenopodium album* L., Sp. Pl. 219. 1753; Freitag *et al.*, Chenopodiaceae in Fl. Pak. 204:40.2001.

Mankial (Mankial village) 35° 19' N and 72° 36' E, 1764 m. *Asad and Rashid* 1868 (PUP & PMNH).

5. *Chenopodium botrys* L., Sp. Pl. 219. 1753; Freitag *et al.*, Chenopodiaceae in Fl. Pak. 204: 40. 2001 (Fig. 7-E, Fl. of Pak.).

Mankial (Mankial village) 35° 19' N and 72° 36' E, 1764 m. *Asad and Rashid* 1882 (PUP & PMNH).

6. *Chenopodium foliosum* Asch., Fl. Brandenburg. 1: 572. 1864; Freitag *et al.*, Chenopodiaceae in Fl. Pak. 204: 18. 2001 (Plate-7, 38).

Mankial (Bhadai-III) 35° 19' N and 72° 38' E, 1894 m. *Asad and Rashid* 741 (PUP & PMNH).

7. *Chenopodium murale* L., Sp. Pl. 219.1753; Freitag, Hedge, Jafri, Kothe-Heinrich, Omer & Uotila, Chenopodiaceae in Fl. Pak. 204: 26. 2001 (Fig. 4-E, Fl. of Pak.).

Mankial (Bhadai Patti-II) 35° 20' N and 72° 38' E, 2054 m. *Asad and Rashid* 1841 (PUP & PMNH).

4. Phytolacaceae

1. *Phytolacca latbenia* (Moq.) Walter in Engl. Jahrb. 37, Beibl. 85:12.1906; Dar, Phytolacaceae in Fl. Pak. 3: 1. 1970 (Plate-20, 119).

Mankial (Mehnain-II) 35° 19' N and 72° 38' E, 1764 m. *Asad and Rashid* 711 (PUP & PMNH).

5. Portulacaceae

1. *Portulaca oleracea* L., Sp. Pl. 445. 1753; Ghafoor, Portulacaceae in Fl. Pak. 51: 3. 1973 (Plate-22, 129).

Mankial (Mankial village) 35° 19' N and 72° 36' E, 1764 m. *Asad and Rashid* 971 (PUP & PMNH).

2. Polygonales

1. Polygonaceae

1. *Bistorta affinis* (D. Don) Green, Leaf. 1: 21. (1904); Qaiser, Polygonaceae in Fl. Pak. 205: 64. 2001 (Fig. 10-B, Fl. of Pak.).

Mankial (Kamar Khwa-I) 35° 22' N and 72° 40' E, 2746 m. *Asad and Rashid* 1677 (PUP & PMNH).

2. *Bistorta amplexicaule* (D. Don) Green in Leaf. 1: 21. 1904; Qaiser, Polygonaceae in Fl. Pak. 205: 67. 2001 (Plate-22, 122).

Mankial (Baik-II) 35° 21' N and 72° 39' E, 2606 m. *Asad and Rashid* 787 (PUP & PMNH).

3. *Fagopyrum esculentum* Moench, Meth. 290.1794; Qaiser, Polygonaceae in Fl. Pak. 205: 121. 2001 (Plate-21, 123).

Mankial (Mankial village) 35° 19' N and 72° 37' E, 1763 m. *Asad and Rashid* 153 (PUP & PMNH).

4. *Oxyria digyna* (L.) Hill, Hort. Kew. 158. 1769; Qaiser, Polygonaceae in Fl. Pak. 205: 126. 2001 (Plate-21, 125).

Mankial (Tapra) 35° 20' N and 72° 38' E, 2060 m. *Asad and Rashid* 1557 (PUP & PMNH).

5. *Persicaria barbata* (L.) Hara in Fl. E. Himal. 70. 1966; Qaiser, Polygonaceae in Fl. Pak. 205: 45. 2001 (Fig. 5, Fl. of Pak.).
Mankial (Mehnain-II) 35° 19' N and 72° 39' E, 1764 m. *Asad and Rashid* 152 (PUP & PMNH).
6. *Persicaria glabra* (Willd.) M. Gomes in Ann. Inst. Segunda Enseñ. Habana. 2: 278. 1896; Qaiser, Polygonaceae in Fl. Pak. 205: 33. 2001 (Plate 21-, 124).
Mankial (Bhadai-II) 35° 19' N and 72° 38' E, 1890 m. *Asad and Rashid* 538 (PUP & PMNH).
7. *Polygonum aviculare* L., Sp. Pl. 362. 1753; Qaiser, Polygonaceae in Fl. Pak. 205: 95. 2001 (Fig. 15, Fl. of Pak.).
Mankial (Ghund Patai) 35° 19' N and 72° 37' E, 1766 m. *Asad and Rashid* 26 (PUP & PMNH).
8. *Polygonum plebejum* R. Br., Prodr. 420. 1810; Danser in Bull. Jard. Bot. Buit. Ser. 3 (8): 140. 1927; Qaiser, Polygonaceae in Fl. Pak. 205: 101. 2001.
Mankial (Ghund Patai) 35° 19' N and 72° 37' E, 1763 m. *Asad and Rashid* 102 (PUP & PMNH).
9. *Rumex dentatus* L., Mantissa. II: 226. 1771; Qaiser, Polygonaceae in Fl. Pak. 205: 158. 2001 (Plate-21, 126).
Mankial (Ghund Patai) 35° 19' N and 72° 37' E, 1766 m. *Asad and Rashid* 459 & 105 (PUP & PMNH).
10. *Rumex hastatus* D. Don, Prodr. Flora of Nepal, 74. 1825; Qaiser, Polygonaceae in Fl. Pak. 205: 139. 2001 (Plate-22, 127).
Mankial (Mankial village) 35° 19' N and 72° 37' E, 1764 m. *Asad and Rashid* 460 (PUP & PMNH).
3. *Rumex nepalensis* Spreng., Syst. 2:159.1825; Qaiser, Polygonaceae in Fl. Pak. 205:156.2001 (Fig. Plate-22, 128).
Mankial (Bhadai Patti-II) 35° 20' N and 72° 38' E, 2054 m. *Asad and Rashid* 461 (PUP & PMNH).

ROSID CLADE

1. Saxifragales

1. Saxifragaceae

1. *Bergenia ciliata* (Haw.) Sternb., Rev. Saxif. Suppl. 2: 2. 1831; Ghazanfar, Saxifragaceae in Fl. Pak. 108: 4. 1977 (Plate-26, 152 & 153).
Mankial (Serai-II) 35° 21' N and 72° 41' E, 2620 m. *Asad and Rashid* 581 (PUP & PMNH).

2. Crassulaceae

1. *Hylotelephium ewersii* (Ledeb.) H. Ohba, Kunjun & Ohba in Zheng-yi & Raven, Fl. China 8: 210. 2001; Sarwar, Crassulaceae in Fl. Pak. 209: 46. 2002. (Plate-14, 79).
Mankial (Takki Gaider-II) 35° 18' N and 72° 39' E, 2645 m. *Asad and Rashid* 1058 (PUP & PMNH).

2. *Sedum hispanicum* L., Sp. Pl. 2: 618. 1762; Sarwar, Crassulaceae in Fl. Pak. 209: 7-8. 2002 (Plate-14, 80).

Mankial (Takki Gaider-III) $35^{\circ} 18' N$ and $72^{\circ} 39' E$, 2830 m. *Asad and Rashid* 589 (PUP & PMNH).

3. Hamamelidaceae

1. *Parrotiopsis jacquemontiana* (Dcne.) Rehder in Journ. Arn. Arb. 1: 256. 1920; Ali, Hamamelidaceae in Fl. Pak. 2: 1-2. 1970 (Plate-16, 96).

Mankial (Mehnain-I) $35^{\circ} 19' N$ and $72^{\circ} 37' E$, 1764 m. *Asad and Rashid* 1874 (PUP & PMNH).

4. Paeoniaceae

1. *Paeonia emodi* Wall. ex Royle, Illustr. Bot. Himal. Mount. 1: 57. 1834. Nasir, Paeoniaceae in Fl. Pak. 121: 2-3. 1978 (Plate-20, 115 & 116).

Mankial (Kakora) $35^{\circ} 17' N$ and $72^{\circ} 40' E$, 3035 m. *Asad and Rashid* 1072 (PUP & PMNH).

Vitales

1. Vitaceae

1. *Vitis vinifera* L., Sp. Pl. 202. 1753; Kitamura, Pl. W. Pak. & Afgh. 104. 1964; Nazimuddin & Qaiser, Vitaceae in Fl. Pak. 147: 5-6. 1982 (Plate-27, 162).

Mankial (Mankial village) $35^{\circ} 19' N$ and $72^{\circ} 36' E$, 1743 m. *Asad and Rashid* 2375 (PUP & PMNH).

Geraniales

1. Geraniaceae

1. *Geranium lambertii* Sweet, Geran. 4: 338. 1827; Nasir, Geraniaceae in Fl. Pak. 149: 16-17. 1983 (Plate-16, 94).

Mankial (Serai-III) $35^{\circ} 21' N$ and $72^{\circ} 40' E$, 2400 m. *Asad and Rashid* 769 (PUP & PMNH).

2. *Geranium wallichianum* D. Don ex Sweet, Geran. 1: 90. 1821; Nasir, Geraniaceae in Fl. Pak. 149: 15. 1983 (Plate-16, 93).

Mankial (Bhadai Patti-III) $35^{\circ} 20' N$ and $72^{\circ} 38' E$, 2058 m. *Asad and Rashid* 766 (PUP & PMNH).

Oxalidales

1. Oxalidaceae

1. *Oxalis corniculata* L., Sp. Pl. 435. 1753; Nasir, Oxalidaceae in Fl. W. Pak. 4: 2-3. 1971 (Plate-19, 110).

Mankial (Mehnain-I) $35^{\circ} 19' N$ and $72^{\circ} 37' E$, 1764 m. *Asad and Rashid* 1561 (PUP & PMNH).

Celastrales

1. Parnassiaceae

1. *Parnassia cabulica* Planch. ex Clarke in Hooker f., Flora of British India, 2: 403. 1878; Siddiqi, Parnassiaceae in Fl. W. Pak. 31: 2-3. 1973 (Plate-20, 118).

Mankial (Serai-II) $35^{\circ} 21' N$ and $72^{\circ} 41' E$, 2620 m. *Asad and Rashid* 571 (PUP & PMNH).

Malpighiales
1. Euphorbiaceae

1. **Euphorbia wallichii** Hooker f. *Flora of British India*, 5: 258. 1887; Stewart in *Anno. Cata. Vasc. Pl. W. Pak. & Kash.* 453. 1972; Smith, *Euphorbiaceae in Fl. Pak.* 172: 140. 1986 (Plate-14, 82).

Mankial (Kamar Khwa Banda-I) $35^{\circ} 22' N$ and $72^{\circ} 46' E$, 3088 m. *Asad and Rashid* 1038 (PUP & PMNH).

2. Violaceae

1. **Viola biflora** L., *Sp. Pl.* 936.1735; Qaiser & Omer, *Violaceae in Fl. Pak.* 166: 20. 1985 (Plate-27, 161).

Mankial (Serai-IV) $35^{\circ} 21' N$ and $72^{\circ} 40' E$, 2405 m. *Asad and Rashid* 400 (PUP & PMNH).

2. **Viola canescens** Wall. ex Roxb., *Fl. Ind.* 2: 450.1824; Qaiser & Omer, *Violaceae in Fl. Pak.* 166: 6. 1985 (Plate-27, 160).

Mankial (Bhadai Patti-III) $35^{\circ} 20' N$ and $72^{\circ} 38' E$, 2075 m. *Asad and Rashid* 1873 (PUP & PMNH).

3. Salicaceae

2. **Populus alba** L., *Sp. Pl.* 1034. 1753; Ali, *Salicaceae in Fl. Pak.* 203: 51-52. 2001 (Plate-25, 148).

Mankial (Bhadai-II) $35^{\circ} 19' N$ and $72^{\circ} 38' E$, 1890 m. *Asad and Rashid* 1845 (PUP & PMNH).

Fabales

1. Fabaceae

1. **Astragalus candolleanus** Royle ex Benth. In *Royle, Illustration of Botany Himalayan Mountains*, 199. 1835; Ali, *Papilionaceae in Fl. Pak. W. Pak.* 100: 184. 1977 (Plate-14, 83).

Mankial (Bhadai-III) $35^{\circ} 20' N$ and $72^{\circ} 38' E$, 2058 m. *Asad and Rashid* 1845 (PUP & PMNH).

2. **Colutea nepalensis** Sims in *Bot. Mag. T.* 2622. 1826; Ali, *Papilionaceae in Fl. W. Pak.* 100: 92-93. 1977 (Plate-14, 84).

Mankial (Serai-III) $35^{\circ} 21' N$ and $72^{\circ} 40' E$, 2400 m. *Asad and Rashid* 694 (PUP & PMNH).

3. **Desmodium elegans** DC. In *Annotiaon Scientific National*, 4: 100. Jan. 1825; Ali, *Papilionaceae in Fl. W. Pak.* 100: 350. 1977 (Plate-15, 85).

Mankial (Bhadai-) $35^{\circ} 19' N$ and $72^{\circ} 38' E$, 1894 m. *Asad and Rashid* 415 & 579 (PUP & PMNH).

4. **Indigofera heterantha** Wall. ex Brandis, *For. Fl. N. W. & C. Ind.* 135. 1874; Ali, *Papilionaceae in Fl. W. Pak.* 100: 82. 1977 (Plate-15, 86).

Mankial (Mehnain-II) $35^{\circ} 19' N$ and $72^{\circ} 38' E$, 1764 m. *Asad and Rashid* 874 (PUP & PMNH).

5. **Lespedeza juncea** (L.) Pers., *Syno. Plantarum*, 2: 318. 1807; Ali, *Papilionaceae in Fl. W. Pak.* 100: 360. 1977.

Mankial (Tapra) $35^{\circ} 20' N$ and $72^{\circ} 38' E$, 2060 m. *Asad and Rashid* 567 (PUP & PMNH).

6. *Lathyrus pratensis* L., Sp. Pl. 733. 1753; Ali, Papilionaceae in Fl. W. Pak. 100: 278. 1977.

Mankial (Bhadai-III) 35° 19' N and 72° 38' E, 1894 m. *Asad and Rashid* 150 (PUP & PMNH).

7. *Medicago sativa* L., Sp. Pl. 778. 1753; Davis, Fl. Turk. 3: 488. 1970; Ali, Papilionaceae in Fl. W. Pak. 100: 305-306. 1977.

Mankial (Mankial village) 35° 19' N and 72° 36' E, 1764 m. *Asad and Rashid* 230 (PUP & PMNH).

8. *Mellilotus indica* (L.) All., Flora of Pedem. 1: 308. 1785; Ali, Papilionaceae in Fl. W. Pak. 100: 308-309. 1977.

Mankial (Jabba) 35° 17' N and 72° 40' E, 2563 m. *Asad and Rashid* 237 (PUP & PMNH).

9. *Mellilotus officinalis* (L.) Pall., Reise 537. 1776; Ali, Papilionaceae in Fl. W. Pak. 100: 308-309. 1977 (Plate-15, 87).

Mankial (Char Banda) 35° 18' N and 72° 41' E, 3200 m. *Asad and Rashid* 335 (PUP & PMNH).

10. *Trigonella gracilis* Benth. In Royle, Illustration of Botanical Himalayan Mountains, 197. 1835; Ali, Papilionaceae in Fl. W. Pak. 100: 297. 1977 (Plate-15, 88).

Mankial (Serai-II) 35° 21' N and 72° 41' E, 2620 m. *Asad and Rashid* 956 (PUP & PMNH).

11. *Trifolium repens* L., Sp. Pl. 767. 1753; Boissier, Fl. Or. 2: 86. 1872; Ali, Papilionaceae in Fl. W. Pak. 100: 288. 1977 (Plate-15, 89).

Mankial (Gaider Jabba-III) 35° 18' N and 72° 40' E, 2820 m. *Asad and Rashid* 1259 (PUP & PMNH).

Rosales

1. Rosaceae

1. *Cotoneaster affinis* var. *bacillaris* (Lindl.) Schneider, Ill. Hind. Laubh. I: 757. 1906; Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 347. 1972; Polunin & Stainton, Flowers of Hima. 117. 1986 (Plate-24, 139).

Mankial (Nara-II) 35° 22' N and 72° 40' E, 2768 m. *Asad and Rashid* 557 (PUP & PMNH).

2. *Crataegus songarica* C. Koch in Verh. Verz. Beford Gartenb. Preuss. n. s. I: 287. 1853; Polunin & Stainton in Flowers of Hima. 119. 1986 (Plate-24, 140 & 141).

Mankial (Tapra) 35° 20' N and 72° 41' E, 2060 m. *Asad and Rashid* 562 (PUP & PMNH).

3. *Fragaria nubicola* Lindl. ex Lacaite in J.L.S. 43:467.1916; Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 352. 1972; Polunin & Stainton, Flowers of Hima. 123. 1986 (Plate-24, 142).

Mankial (Kamar Khwa-II) 35° 22' N and 72° 40' E, 2750 m. *Asad and Rashid* 1493 (PUP & PMNH).

4. *Potentilla supina* L., Sp. Pl. 497. 1753; Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 359. 1972; Polunin & Stainton, Flowers of Himalaya, 126.1986.

Mankial (Jabba-I) 35° 17' N and 72° 40' E, 2563 m. *Asad and Rashid* 554 (PUP & PMNH).

5. *Potentilla microphylla* var. *microphylla* D. Don, Fl. Br. Ind. 2: 352 (1878); Polunin & Stainton, Fl. Hima. 126. 1986 (Plate-24, 143).

Mankial (Gaider Jabba-II) 35° 18' N and 72° 41' E, 2818 m. *Asad and Rashid* 1524 (PUP & PMNH).

6. *Rosa macrophylla* Lindl. Ros. Monogr. 35, t. 6.1820; Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 366. 1972; Polunin & Stainton, Flowers of Himalaya, 113. 1986 (Plate-24, 144).

Mankial (Serai-IV) $35^{\circ} 21' N$ and $72^{\circ} 40' E$, 2405 m. *Asad and Rashid* 1492 (PUP & PMNH).

7. *Rubus ellipticus* Smith in Rees. l.c. 16; Fl. Br. Ind. 2: 336; Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 367. 1972; Polunin & Stainton, Flowers of Himalayas, 111. 1986 (Plate-25, 145).

Mankial (Mehnain-II) $35^{\circ} 19' N$ and $72^{\circ} 38' E$, 1764 m. *Asad and Rashid* 1491 (PUP & PMNH).

8. *Sorbaria tomentosa* (Lindl.) Rehder in Journ. Arn. Arb. 19:75.1938; Polunin & Stainton, Flowers of Hima. 112. 1986 (Plate-25, 146).

Mankial (Mankial village) $35^{\circ} 19' N$ and $72^{\circ} 36' E$, 1764 m. *Asad and Rashid* 578 (PUP & PMNH).

2. Rhamnaceae

1. *Ziziphus jujuba* Mill., Garden Dictionary Edition 8 (1). 1768; Qaiser & Nizamuddin, Rhamnaceae in Fl. Pak. 140: 15. 1981 (Plate-23, 138).

Mankial (Mankial village) $35^{\circ} 19' N$ and $72^{\circ} 36' E$, 1764 m. *Asad and Rashid* 789 (PUP & PMNH).

3. Elaeagnaceae

1. *Elaeagnus umbellata* Thunb., Fl. Jap. 66. t. 14. 1784; Nasir, Elaeagnaceae in Fl. W. Pak. 85: 4. 1975.

Mankial (Ghund Patti) $35^{\circ} 19' N$ and $72^{\circ} 37' E$, 1766 m. *Asad and Rashid* 46 (PUP & PMNH).

4. Celtidaceae

1. *Celtis australis* L. Sp. Pl. 1043. 1753; Akhtar, Ulmaceae in Fl. Pak. 170: 9. 1985.

Mankial (Ghund Patai) $35^{\circ} 19' N$ and $72^{\circ} 37' E$, 1766 m. *Asad and Rashid* 895 (PUP & PMNH).

5. Cannabaceae

1. *Cannabis sativa* L., Sp. Pl. 1027. 1753; Qaiser, Cannabaceae in Fl. W. Pak. 44: 3. 1973 (Plate-12, 69).

Mankial (Mankial village) $35^{\circ} 19' N$ and $72^{\circ} 36' E$, 1764 m. *Asad and Rashid* 1388 (PUP & PMNH).

6. Moraceae

1. *Ficus carica* L., Sp. Pl. 1059. 1953; Ghafoor, Moraceae in Fl. Pak. 171: 19-20. 1985 (Plate-18, 108).

Mankial (Mankial village) $35^{\circ} 19' N$ and $72^{\circ} 37' E$, 1764 m. *Asad and Rashid* 1389 (PUP & PMNH).

7. Urticaceae

1. *Urtica dioica* L., Sp. Pl. 984. 1753; Ghafoor, Urticaceae in Fl. Pak., 137: 2. 1981 (Plate-27, 159).

Mankial (Beer) $35^{\circ} 19' N$ and $72^{\circ} 38' E$, 1905 m. *Asad and Rashid* 1489 (PUP & PMNH).

Fagales

1. Fagaceae

1. *Quercus baloot* Griff., Itin. Not. 328. 1848; Nasir, Fagaceae in Fl. W. Pak. 104: 7.1976 (Plate-16, 91).

Mankial (Bhadai Patti-I) $35^{\circ} 19' N$ and $72^{\circ} 38' E$, 1886 m. *Asad and Rashid* 223 (PUP & PMNH).

2. *Quercus incana* Roxb., Hort. Beng. 104. 1814; Fl. Ind. Car. 3: 642. 1832; Nasir, Fagaceae in Fl. W. Pak. 104: 7. 1976. (Plate-15, 90).

Mankial (Tapra) $35^{\circ} 20' N$ and $72^{\circ} 38' E$, 2060 m. *Asad and Rashid* 221 (PUP & PMNH).

3. *Quercus semecarpifolia* Smith in Rees, Cyclop. Quercus. 29. Dec. 1814; Nasir, Fagaceae in Fl. W. Pak. 104: 5. 1976 (Plate-16, 92).

Mankial (Char Banda) $35^{\circ} 18' N$ and $72^{\circ} 41' E$, 3200 m. *Asad and Rashid* 347 (PUP & PMNH).

2. Betulaceae

1. *Betula utilis* D. Don, Prodr. Fl. Nep. 58. 1825; Nasir, Betulaceae in Fl. W. Pak. 95: 1-2. 1976 (Plate-10, 58 & 59).

Mankial (Char Banda) $35^{\circ} 18' N$ and $72^{\circ} 41' E$, 3200 m. *Asad and Rashid* 1680 (PUP & PMNH).

3. Juglandaceae

1. *Juglans regia* L., Sp. Pl. 997. 1753; Nasir, Juglandaceae in Fl. W. Pak. 14: 1-2. 1972 (Plate-17, 97).

Mankial (Bhadai-I) $35^{\circ} 19' N$ and $72^{\circ} 38' E$, 1886 m. *Asad and Rashid* 2270 (PUP & PMNH).

Myrtales

1. Onagraceae

1. *Epilobium cylindricum* D. Don, Prodr. Flora of Nepal, 222. 1825; Hoch & Raven, Onagraceae in Fl. Pak. 139: 22. 1981 (Fig. 3, Fl. of Pak.).

Mankial (Bhadai Patti-III) $35^{\circ} 20' N$ and $72^{\circ} 38' E$, 2075 m. *Asad and Rashid* 2273 (PUP & PMNH).

2. *Epilobium hirsutum* L., Sp. Pl. 347. 1753; Hoch & Raven, Onagraceae in Fl. Pak. 139: 16. 1981 (Plate-19, 112).

Mankial (Mankial village) $35^{\circ} 19' N$ and $72^{\circ} 36' E$, 1764 m. *Asad and Rashid* 12 (PUP & PMNH).

3. *Epilobium parviflorum* Schreber, Spicilist Flora Lips. 146, 155. 1771; Hoch & Raven, Onagraceae in Fl. Pak. 139: 17. 1981 (Fig. 2, Fl. of Pak.).

Mankial (Mehnain-II) 35° 19' N and 72° 38' E, 1764 m. *Asad and Rashid* 2274 (PUP & PMNH).

4. *Epilobium royleanum* Hausskn., Oest. Botanical, Z. 29: 55. 1879; Hoch & Raven, Onagraceae in Fl. Pak. 139: 17. 1981.

Mankial (Bhadai-III) 35° 19' N and 72° 38' E, 1894 m. *Asad and Rashid* 2275 (PUP & PMNH).

5. *Oenothera rosea* L., Her. ex Ait., Hort. Kew ed. 1.2:3.1789; Hoch & Raven, Onagraceae in Fl. Pak. 139: 41-42. 1981 (Plate-19, 111).

Mankial (Ghund Patai) 35° 19' N and 72° 37' E, 1764 m. *Asad and Rashid* 2276 (PUP & PMNH).

2. Lythraceae

1. *Punica granatum* L., Sp. Pl. 472. 1753; Ghazanfar, Punicaceae in Fl. W. Pak. 102: 1-2. 1976 (Plate-17, 98).

Mankial (Mankial village) 35° 19' N and 72° 36' E, 1764 m. *Asad and Rashid* 2277 (PUP & PMNH).

EUROSID II

Brassicales

1. Brassicaceae

1. *Capsella bursa-pastoris* (L.) Med., Pflanz. 1: 84.1793; Jafri, Brassicaceae in Fl. W. Pak. 55: 90-91. 1973.

2. *Cardamine hirsuta* L., Sp. Pl. 655. 1753; Jafri, Brassicaceae in Fl. W. Pak. 55: 169. 1973 (Plate-11, 66).

Mankial (Gaider Jabba-I) 35° 18' N and 72° 41' E, 2810 m. *Asad and Rashid* 492 (PUP & PMNH).

3. *Cardamine flexuosa* With., Botanical Arr. British Pl. 3: 578. 3. 1796; Jafri, Brassicaceae in Fl. W. Pak. 55: 169. 1973 (Fig. 21, Fl. of Pak.).

Mankial (Gaider Jabba-III) 35° 18' N and 72° 40' E, 2820 m. *Asad and Rashid* 350 (PUP & PMNH).

4. *Lepidium sativum* L., Sp. Pl. 644. 1753; Jafri, Brassicaceae in Fl. W. Pak. 55: 55. 1973.

Mankial (Bhadai-III) 35° 19' N and 72° 38' E, 1894 m. *Asad and Rashid* 1843 (PUP & PMNH).

5. *Nasturtium officinale* R. Br. in Aitchison Horticult. Kew. 2. 4: 110. 1812; Jafri, Brassicaceae in Fl. W. Pak. 55: 185. 1973 (Plate-11, 65).

Mankial (Bhadai-II) 35° 19' N and 72° 38' E, 1890 m. *Asad and Rashid* 531 (PUP & PMNH).

6. *Sisymbrium erysimoides* Desf., Fl. Atlant. 2: 84. 1799; Jafri, Brassicaceae in Fl. W. Pak. 55: 253. 1973.

Mankial (Bhadai Patti-III) 35° 19' N and 72° 38' E, 2075 m. *Asad and Rashid* 280 (PUP & PMNH).

7. *Sisymbrium loeselii* L., Cent. Pl. 1: 18. 49. 1755; Jafri, Brassicaceae in Fl. W. Pak. 55: 251. 1973 (Plate-12, 67 & Fig. 33, Fl. of Pak.).

Mankial (Mehnain-II) $35^{\circ} 19' N$ and $72^{\circ} 38' E$, 1764 m. *Asad and Rashid* 24 (PUP & PMNH).

8. *Sisymbrium orientale* L., Cent. Plantarum, 2: 24. 1756; Jafri, Brassicaceae in Fl. W. Pak. 55: 253. 1973.

Mankial (Bhadai-III) $35^{\circ} 19' N$ and $72^{\circ} 38' E$, 1894 m. *Asad and Rashid* 350 (PUP & PMNH).

Malvales

1. Malvaceae

1. *Malva neglecta* Wallr. in Syll. Ratisburg, 1: 140. 1824; Abedin, Malvaceae in Fl. W. Pak. 130: 34. 1973 (Plate-19, 109).

Mankial (Ghund Pati) $35^{\circ} 19' N$ and $72^{\circ} 37' E$, 1766 m. *Asad and Rashid* 268 & 35 (PUP & PMNH).

2. Thymeleaceae

1. *Daphne mucronata* Royle, III. Bot. Himal. Mount. 232. 81. f. 2. 1836; Nasir, Thymeleaceae in Fl. W. Pak. 12: 1-3. 1971 (Plate-27, 158).

Mankial (Mehnain-I) $35^{\circ} 19' N$ and $72^{\circ} 37' E$, 1764 m. *Asad and Rashid* 1350 (PUP & PMNH).

Sapindales

1. Sapindaceae

1. *Acer caesium* Wall. ex Brandis, For. Fl. NW. & C. India. 111, tab. 21. 1874; Murray, Aceraceae in Fl. W. Pak. 92: 5. 1975 (Plate-25, 149).

Mankial (Kafar Banda) $35^{\circ} 18' N$ and $72^{\circ} 39' E$, 2835 m. *Asad and Rashid* 732 (PUP & PMNH).

2. *Aesculus indica* (Wall. ex Camb.) Hooker f. in Curtis, Botanical Magazine, 5. 117. 1859; Nasir, Hippocastanaceae in Fl. W. Pak. 82: 1-3. 1975 (Plate-25, 150 & Plate-26, 151).

Mankial (Jabba-I) $35^{\circ} 17' N$ and $72^{\circ} 40' E$, 2563 m. *Asad and Rashid* 340 & 540 (PUP & PMNH).

ASTERID CLADE (SYMPETALAE)

Ericales

1. Balsaminaceae

1. *Impatiens balfourii* Hook. f., Botanical Magazine, 129: 7878. 1903; Nasir, Balsaminaceae in Fl. Pak. 133: 10. 1980.

Mankial (Ghund Pati) $35^{\circ} 19' N$ and $72^{\circ} 37' E$, 1766 m. *Asad and Rashid* 1061 (PUP & PMNH).

2. *Impatiens brachycentra* Kar. & Kir. in Bulletin Society Natural History Mosc. 1: 179. 1842; Nasir, Balsaminaceae in Fl. W. Pak. 133: 3. 1980 (Fig. 1, Fl. of Pak.).

Mankial (Ghund Patai) $35^{\circ} 19' N$ and $72^{\circ} 37' E$, 1766 m. *Asad and Rashid* 1363 (PUP & PMNH).

3. *Impatiens edgeworthii* Hook. f., Flora of British India, 1: 476. 1874; Nasir, Balsaminaceae in Fl. W. Pak. 133: 6. 1980 (Plate-10, 55).

Mankial (Ghund Pati) 35° 19' N and 72° 37' E, 1766 m. *Asad and Rashid* 1479 (PUP & PMNH).

4. *Impatiens flemingii* Hook. f. in Rec. Botanical Survey of India, 4: 9. 1904; Nasir, Balsaminaceae in Fl. W. Pak. 133: 10. 1980 (Plate-10, 56).

Mankial (Bhadai Pati-II) 35° 20' N and 72° 38' E, 2054 m. *Asad and Rashid* 1519 (PUP & PMNH).

5. *Impatiens glandulifera* Royle, Illustrations of Plants of Himalayan Mountains, 151. 28. 2. 1834; Nasir, Balsaminaceae in Fl. W. Pak. 133: 12. 1980 (Fig. 2, Fl. of Pak.).

Mankial (Tapra) 35° 20' N and 72° 38' E, 2060 m. *Asad and Rashid* 1059 (PUP & PMNH).

6. *Impatiens meeboldii* Hook. f. in Kew. Bull. 8. 291. 1910; Nasir, Balsaminaceae in Fl. W. Pak. 133: 11. 1980 (Fig. 2, Fl. of Pak.).

Mankial (Bhadai-II) 35° 19' N and 72° 38' E, 1890 m. *Asad and Rashid* 118 (PUP & PMNH).

7. *Impatiens sulcata* Wall. in Roxb. Flora of India Carey, 2: 458. 1824; Nasir, Balsaminaceae in Fl. W. Pak. 133: 13. 1980.

Mankial (Bhadai-III) 35° 19' N and 72° 38' E, 1894 m. *Asad and Rashid* 760 (PUP & PMNH).

8. *Impatiens thomsonii* Hook. f. in J. Linnean Society of Botany, 4: 128. 1860; Nasir, Balsaminaceae in Fl. W. Pak. 133: 13. 1980 (Plate-10, 57).

Mankial (Bhadai Patti-I) 35° 19' N and 72° 37' E, 2069 m. *Asad and Rashid* 715 (PUP & PMNH).

2. Ebenaceae

1. *Diospyros lotus* L., Sp. Pl. 1057. 1753; Ghazanfar, Ebenaceae in Fl. W. Pak. 116: 1-2. 1978 (Plate-14, 81).

Mankial (Bhadai-III) 35° 20' N and 72° 38' E, 2075 m. *Asad and Rashid* 62 (PUP & PMNH).

3. Primulaceae

Primula denticulata Smith, Exotic Botany, 2: 109. 114. 1805; Nasir, Primulaceae in Fl. Pak. 157: 29. 1984 (Plate-22, 130).

Mankial (Kafar Banda) 35° 18' N and 72° 39' E, 2835 m. *Asad and Rashid* 673 (PUP & PMNH).

CORE ASTERIDS

EUASTERIDS I

Solanales

1. Solanaceae

1. *Hyoscyamus niger* L., Sp. Pl. 179. 1753; Nasir, Solanaceae in Fl. Pak. 168: 50. 1985 (Plate-27, 157).

Mankial (Gaider Jabba-I) 35° 18' N and 72° 41' E, 2810 m. *Asad and Rashid* 299 (PUP & PMNH).

2. *Solanum nigrum* L., Sp. Pl. 186.1753; Nasir, Solanaceae in Fl. Pak. 168: 6. 1985.

Mankial (Mankial village) 35° 19' N and 72° 36' E, 1764 m. *Asad and Rashid* 1881 (PUP & PMNH).

2. Convolvulaceae

1. *Convolvulus arvensis* L., Sp. Pl. 153. 1753; Austin & Ghazanfar, Convolvulaceae in Fl. Pak. 126: 28. 1979. (Plate-13, 77).

Mankial (Bhadai-I) 35° 19' N and 72° 38' E, 1886 m. *Asad and Rashid* 761 (PUP & PMNH).

2. *Cuscuta reflexa* Roxb., Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 580. 1972; Rajput and Tahir, Cuscutaceae in Fl. Pak. 189: 5. 1988. (Plate-13, 78).

Mankial (Mankial village) 35° 19' N and 72° 36' E, 1764 m. *Asad and Rashid* 742 (PUP & PMNH).

3. Boraginaceae

1. *Cynoglossum glochidiatum* Wall. ex Benth. In Royle, Illustrations of Botanical Himalayan Mountains, 306. 1836; Nasir, Boraginaceae in Fl. Pak. 191: 160. 1989 (Plate-11, 63).

Mankial (Bhadai-III) 35° 19' N and 72° 38' E, 1894 m. *Asad and Rashid* 110 (PUP & PMNH).

2. *Cynoglossum lanceolatum* Forssk., Flora of Aegypt, Arab. 41. 1775; Stewart in Anno. Cata. Vasc. Plants of W. Pakistan & Kashmir, 584. 1972; Nasir, Boraginaceae in Fl. Pak. 191: 159. 1989.

Mankial (Mehnain-II) 35° 19' N and 72° 38' E, 1764 m. *Asad and Rashid* 160 (PUP & PMNH).

3. *Lindolfia anchusoides* (Lindl.) Lehm., Stewart, Ann. Cat. Vasc. Pl. W. Pak. & Kash. 595. 1972; Nasir, Boraginaceae in Fl. of Pak. 191: 188. 1989.

Mankial (Bhadai Patti-III) 35° 20' N and 72° 38' E, 2058 m. *Asad and Rashid* 1820 (PUP & PMNH).

4. *Lindolfia stylosua* (Kar. & Kir.) Brand, Pflanzenr. Iv. 252 (Heft. 78):85.1921; Nasir, Family Boraginaceae in Flora of Pakistan, 191: 190. 1989.

Mankial (Bhadai-II) 35° 19' N and 72° 38' E, 1890 m. *Asad and Rashid* 1833 (PUP & PMNH).

5. *Lindolfia longiflora* (Benth.) Baill. Hist. Pl. 10:379.1890; Nasir, Boraginaceae in Fl. Pak. 191: 159. 1989 (Plate-11, 64).

Mankial (Mankial village) 35° 19' N and 72° 37' E, 1763 m. *Asad and Rashid* 1696 (PUP & PMNH).

Gentianales

1. Rubiaceae

1. *Galium hirtiflorum* Recquien ex DC., Prodr. 4: 600. 1830; Nazimuddin & Qaiser, Rubiaceae in Fl. Pak. 190: 77-78. 1989 (Plate-25, 147).

Mankial (Mankial village) 35° 19' N and 72° 36' E, 1764 m. *Asad and Rashid* 535 (PUP & PMNH).

2. Gentianaceae

1. *Swertia cordata* (G. Don) Clarke in Hooker Flora of British India, 4: 123. 1883; Omer, Gentianaceae in Fl. Pak. 197: 163-164. 1995 (Plate-16, 95 & Fig. 53, Fl. of Pak.).

Mankial (Kakora) $35^{\circ} 17' N$ and $72^{\circ} 40' E$, 3035 m. *Asad and Rashid* 1500 (PUP & PMNH).

2. *Swertia longifolia* Boiss., Diagn. Pl. Nou. Ser. 1 (5): 90. 1844; Omer, Gentianaceae in Fl. Pak. 197: 155-156. 1995 (Fig. 52, Fl. of Pak.).

Mankial (Char Banda) $35^{\circ} 18' N$ and $72^{\circ} 41' E$, 3200 m. *Asad and Rashid* 1352 (PUP & PMNH).

3. *Swertia paniculata* Wall., Pl. As. Rar. 3: 205. 1832; Omer, Gentianaceae in Fl. Pak. 157: 158-159. 1995.

Mankial (Gaider Jabba-III) $35^{\circ} 18' N$ and $72^{\circ} 40' E$, 2820 m. *Asad and Rashid* 525 (PUP & PMNH).

Lamiales

1. Oleaceae

1. *Fraxinus xanthoxyloides* (G. Don) DC., Proder 8: 275. 1844; Grohmann, Oleaceae in Fl. Pak. 59: 3. 1974.

Mankial (Mankial village) $35^{\circ} 19' N$ and $72^{\circ} 37' E$, 1764 m. *Asad and Rashid* 541 (PUP & PMNH).

2. *Jasminum humile* L., Sp. Pl. 7. 1753; Grohmann, Oleaceae in Fl. Pak. 59: 14. 1974 (Fig. 4, Fl. of Pak.).

Mankial (Bhadai-III) $35^{\circ} 19' N$ and $72^{\circ} 38' E$, 1894 m. *Asad and Rashid* 555 (PUP & PMNH).

2. Plantaginaceae

1. *Plantago amplexicaulis* Cav., Icon. Descr. 2: 22. 125. 1793; Kazmi, Plantaginaceae in Fl. Pak. 62: 10. 1974 (Plate-21, 121).

Mankial (Mehnain-II) $35^{\circ} 19' N$ and $72^{\circ} 38' E$, 1763 m. *Asad and Rashid* 225 (PUP & PMNH).

2. *Plantago depressa* Willd., Enumerated Plant Horticulture Berol Supply, 8. 1813; Kazmi, Plantaginaceae in Fl. Pak. 62: 7. 1974.

Mankial (Jabba) $35^{\circ} 17' N$ and $72^{\circ} 40' E$, 2563 m. *Asad and Rashid* 240 (PUP & PMNH).

3. *Plantago lanceolata* L., Sp. Pl. 113. 1753; Kazmi, Plantaginaceae in Fl. Pak. 62: 11. 1974.

Mankial (Ghund Patai) $35^{\circ} 19' N$ and $72^{\circ} 37' E$, 1766 m. *Asad and Rashid* 58 (PUP & PMNH).

4. *Plantago major* Willd., Sp. Pl. 112. 1753. Kazmi, Plantaginaceae in Fl. Pak. 62: 4. 1974 (Plate-21, 121).

Mankial (Mehnain-I) $35^{\circ} 19' N$ and $72^{\circ} 37' E$, 1764 m. *Asad and Rashid* 175 (PUP & PMNH).

3. Scrophulariaceae

1. *Scrophularia scabiosifolia* Benthum in Decondole Prodr. 10, 311. 1846; Nasir & Rafiq, Wild, Fl. Pak. 189.1995 (Plate-26, 154).

Mankial (Ghud Patai) 35° 19' N and 72° 37' E, 1766 m. *Asad and Rashid* 1896 (PUP & PMNH).

2. *Verbascum thapsus* L., Sp. Pl. 1: 177. 1753; Polunin & Stainton, Fl. Hima. 291. 1986; Nasir & Rafiq, Wild, Fl. Pak. 184. 1995. (Plate-26, 155).

Mankial (Bhadai-I) 35° 19' N and 72° 38' E, 1763 m. *Asad and Rashid* 1825 (PUP & PMNH).

3. *Veronica anagallis-aquatica* L., Sp. Pl. 1: 12. 1753; Polunin & Stainton, Fl. Hima. 291. 1986; Nasir & Rafiq, Wild, Fl. Pak. 184. 1995 (Plate-26, 156).

Mankial (Beer) 35° 19' N and 72° 38' E, 1805 m. *Asad and Rashid* 1826 (PUP & PMNH).

4. Orobanchaceae

1. *Euphrasia himalayica* Wettst., Monogr. Euphr. 180, pl. 4, f. 291-5. 1896; Polunin & Stainton, Fl. Hima. 298. 1986; Nasir & Rafiq, Wild, Fl. Pak. 187. 1995.

Mankial (Serai-II) 35° 21' N and 72° 41' E, 2620 m. *Asad and Rashid* 1827 (PUP & PMNH).

2. *Orobanche alba* Steph. in Willd., Sp. Pl. 3: 350. 1800; Jafri, Orobanchaceae in Fl. W. Pak. 98: 23. 1976 (Plate-19, 113).

Mankial (Char Banda) 35° 18' N and 72° 41' E, 3200 m. *Asad and Rashid* 1828 (PUP & PMNH).

3. *Pedicularis pectinata* Wall ex. Benthum, Scroph. Ind. 52. 1835; Nasir & Rafiq, Wild, Fl. Pak. 188. 1995 (Plate-19, 114).

Mankial (Serai-I) 35° 21' N and 72° 41' E, 2650 m. *Asad and Rashid* 1561 (PUP & PMNH).

4. *Pedicularis pyramidata* Royle in Bth., Scroph. Ind. 52. 1835; Nasir & Rafiq, Wild, Fl. Pak. 188-189. 1995.

Mankial (Serai-III) 35° 21' N and 72° 40' E, 2400 m. *Asad and Rashid* 787 (PUP & PMNH).

5. Verbenaceae

1. *Verbena officinalis* L., Sp. Pl. 20. 1753; Jafri and Ghafoor, Verbenaceae in Fl. Pak. 77. 4. 1974.

Mankial (Mankial Valley) 35° 19' N and 72° 36' E, 1764 m. *Asad and Rashid* 1831 (PUP & PMNH).

6. Lamiaceae

1. *Calamintha hydaspidis* (Falconer ex Benth.) Hedge, Labiatae in Fl. Pak. 192.237-238.1990.

Distribution: Mankial (Kakora) 35° 17' N and 72° 40' E, 3035 m. *Asad and Rashid* 31 (PUP & PMNH).

2. *Isodon rugosus* (Wall. ex Benthum) Codd in Taxon Journal, 17: 239.1968; Stewart in J. Agr. Hor. Soc. Ind. 1,1:99.1867; Hedge, Labiatae in Fl. Pak. 192. 280. 1990 (Plate-18, 107).

Mankial (Mankial village) 35° 19' N and 72° 37' E, 132 & 451 m. *Asad and Rashid* 132 & 451 (PUP & PMNH).

3. *Marrubium vulgare* L., Sp. Pl. 2: 583. 1753; Hedge, Labiatae in Fl. Pak. 192. 55-56. 1990 (Fig. 6, Fl. of Pak.).
Mankial (Jabba) 35° 17' N and 72° 40' E, 2563 m. *Asad and Rashid* 243 (PUP & PMNH).
4. *Mentha longifolia* (L.) Huds., Fl. Monspel. 19.1756; Amoen. Acad. 4:485.1759; Hedge, Labiatae in Fl. Pak. 192. 260-261.1990 (Plate-17, 99).
Mankial (Mehnain-II) 35° 19' N and 72° 38' E, 1764 m. *Asad and Rashid* 77 (PUP & PMNH).
5. *Nepeta cataria* L., Sp. Pl. 2: 570. 1753; Hedge, Labiatae in Fl. Pak. 192. 97. 1990 (Fig. 12, Fl. of Pak.).
Mankial (Serai-I) 35° 21' N and 72° 41' E, 2605 m. *Asad and Rashid* 618 (PUP & PMNH).
6. *Nepeta clarkei* Hook., f. British India, 4: 663. 1885; Stewart in Pak. J. For. 11:53.1961; Hedge, Labiatae in Fl. Pak. 192.88.1990.
Mankial (Mankial village) 35° 19' N and 72° 36' E, 1764 m. *Asad and Rashid* 432 (PUP & PMNH).
7. *Nepeta erecta* (Royle ex Benth.) Benth., Hedge, Labiatae in Fl. Pak. 192. 87. 1990 (Plate-18, 103).
Mankial (Serai-I) 35° 21' N and 72° 41' E, 2605 m. *Asad and Rashid* 618 (PUP & PMNH).
8. *Nepeta govaniana* (Wall. ex Benth) Lab., Hedge, Labiatae Fl. Pak. 192. 86. 1990 (Fig. 10, Fl. of Pak.).
Mankial (Serai-II) 35° 21' N and 72° 41' E, 2620 m. *Asad and Rashid* 676 (PUP & PMNH).
9. *Nepeta juncea* Benthum in Decondole, Prodr. 12. 379. 1848; Hedge, Labiatae in Fl. Pak. 192. 108. 1990.
Mankial (Serai-I) 35° 21' N and 72° 41' E, 2605 m. *Asad and Rashid* 633 (PUP & PMNH).
10. *Nepeta laevigata* (D. Don) Hand. Hedge, Labiatae in Fl. Pak. 192. 78. 1990 (Fig. 10, Fl. of Pak.).
Mankial (Jabba) 35° 17' N and 72° 40' E, 2563 m. *Asad and Rashid* 654 (PUP & PMNH).
11. *Nepeta paulsenii* Briquet in Bot. Tidsskr. 28: 235. 1908; Rech. f., Iran. 150: 123, t. 113, 554 f. 4. 1982; Hedge, Labiatae in Fl. Pak. 192. 76. 1990.
Mankial (Beer) 35° 19' N and 72° 38' E, 1905 m. *Asad and Rashid* 657 (PUP & PMNH).
12. *Origanum vulgare* L., Sp. Pl. 2: 590. 1753; Stewart in Pak. J. For. 11:51.1961; Hedge, Labiatae in Fl. Pak. 192. 244-247. 1990 (Plate-18, 105).
Mankial (Char Banda) 35° 18' N and 72° 41' E, 3200 m. *Asad and Rashid* 403 & 1437 (PUP & PMNH).
13. *Phlomis bracteosa* Royle ex Benthum in Hooker Bot. Misc. 3: 383. 1833; Stewart in Pak. J. For. 11:53.1961; Hedge, Labiatae in Fl. Pak. 192. 151. 1990 (Fig. 18, Fl. of Pak.).
Mankial (Char Banda) 35° 18' N and 72° 41' E, 3200 m. *Asad and Rashid* 341 & 559 (PUP & PMNH).
14. *Prunella vulgaris* L., Sp. Pl. 2: 600. 1753; Hedge, Labiatae in Fl. Pak. 192. 134. 1990 (Plate-18, 106).
Mankial (Serai-II) 35° 21' N and 72° 41' E, 2620 m. *Asad and Rashid* 718 (PUP & PMNH).
15. *Stachys emodi* Hedge, Labiatae in Fl. Pak. 192.185.1990 (Plate-18, 104).
Mankial (Bhadai-III) 35° 19' N and 72° 38' E, 1894 m. *Asad and Rashid* 582 & 1670 (PUP & PMNH).

16. *Thymus linearis* Benth in Wall. Pl. As. Rar. 1; 131. 1830; Hedge, Labiatae in Fl. Pak. 192. 248-249. 1990 (Plate-17, 101).

Mankial (Serai-II) 35° 21' N and 72° 41' E, 2620 m. *Asad and Rashid* 810 (PUP & PMNH).

17. *Lamium album* L., Sp. Pl. 2: 579. 1753; Hedge, Labiatae in Fl. Pak. 192. 164-165. 1990 (Plate-17-100).

Mankial (Mankial village) 35° 19' N and 72° 36' E, 1764 m. *Asad and Rashid* 1646 (PUP & PMNH).

18. *Leonurus cardiaca* L., Sp. Pl. 2: 584. 1753; Hedge, Labiatae in Fl. Pak. 192. 170. 1990 (Plate-17, 102).

Mankial (Jabba) 35° 17' N and 72° 40' E, 2563 m. *Asad and Rashid* 692 (PUP & PMNH).

EUASTERIDS II

Apiales

1. Araliaceae

1. *Aralia cachemirica* Dcne. in Jacq., Voy. Bot. 72. 81. 1844; Ghazanfar, Araliaceae in Fl. Pak. 86: 4. 1975 (Plate-7, 42).

Mankial (Mehnain) 35° 19' N and 72° 38' E, 1764 m. *Asad and Rashid* 63 (PUP & PMNH).

2. *Hedra nepalensis* K. Koch, Hort. Dendrology, 284. 75. 1853; Kitamura in Fauna & Fl. Nepal Himal. 1. 186. 1955 (Plate-8, 43).

Mankial (Beer) 35° 19' N and 72° 38' E, 1905 m. *Asad and Rashid* 548 (PUP & PMNH).

2. Apiaceae

1. *Aegopodium burtii* E. Nasir, Stewart in Anno. Cata. Vasc. Plants of W. Pak. & Kash. 509. 1972; Nasir, Umbelliferae in Fl. Pak. 20: 68. 1972.

Mankial (Badai-II) 35° 19' N and 72° 38' E, 1890 m. *Asad and Rashid* 1882 (PUP & PMNH).

2. *Bupleurum lanceolatum* Wall. ex DC., Proder, 4: 132. 1830; Nasir, Umbelliferae in Fl. Pak. 20: 45. 1972 (Fig. 27, Fl. of Pak.).

Mankial (Kamar Khwa Bnada-I) 35° 22' N and 72° 46' E, 2770 m. *Asad and Rashid* 638 (PUP & PMNH).

3. *Bupleurum nigrescens* E. Nasir, Nasir, Umbelliferae in Fl. Pak. 20: 56-58. 1972.

Mankial (Ghund Patai) 35° 19' N and 72° 37' E, 1766 m. *Asad and Rashid* 559 (PUP & PMNH).

4. *Bupleurum tenue* Buch. Ham. ex Don, Proder Flora of Nepal. 182. 1825; Nasir, Umbelliferae in Fl. Pak. 20: 55. 1972.

Mankial (Ghund Patai) 35° 19' N and 72° 37' E, 1766 m. *Asad and Rashid* 61 (PUP & PMNH).

5. *Chaerophyllum reflexum* Lindl. in Royle, Illustrations Botanical Himalayan Mountains, 232. 1835; Nasir, Umbelliferae in Fl. Pak. 20: 88-89. 1972 (Fig. 27, Fl. of Pak.).

Mankial (Kamar Khwa-II) 35° 22' N and 72° 40' E, 2750 m. *Asad and Rashid* 656 (PUP & PMNH).

6. *Eriocycla staintonii* Riedl & Kuber in Osterr. Akad. Wiss. 12: 365. 1964; Nasir, Umbelliferae in Fl. Pak. 20: 76. 1972.
Mankial (Char Banda) 35° 18' N and 72° 41' E, 3200 m. *Asad and Rashid* 306 (PUP & PMNH).
7. *Heracleum candicans* Wall. ex Decondole Proder, 4: 192. 1830; Nasir, Umbelliferae in Fl. Pak. 20: 129. 1972. (Plate-7, 39).
Mankial (Tapra) 35° 20' N and 72° 38' E, 2060 m. *Asad and Rashid* 845 (PUP & PMNH).
8. *Ligusticum elatum* C. B. Clarke in Hooker f., Flora of British India, 2: 698. 1879; Nasir, Umbelliferae in Fl. Pak. 20: 123. 1972 (Fig. 36, Fl. of Pak.).
Mankial (Ghund Patai) 35° 19' N and 72° 37' E, 1766 m. *Asad and Rashid* 532 (PUP & PMNH).
9. *Ligusticum stewartii* (Hiroe) E. Nasir, Umbelliferae in Fl. Pak. 20: 121. 1972. (Fig. 34, Fl. of Pak.).
Mankial (Bhadai-II) 35° 19' N and 72° 38' E, 1890 m. *Asad and Rashid* 688 (PUP & PMNH).
10. *Oenanthe javanica* (Blume) DC., Prodr. 4: 138. 1830; Nasir, Umbelliferae in Fl. Pak. 20: 25. 1972. (Fig. 6, Fl. of Pak.).
Mankial (Ghund Patai) 35° 19' N and 72° 37' E, 1766 m. *Asad and Rashid* 63 (PUP & PMNH).
11. *Pimpinella diversifolia* DC., Prodr. 4: 122. 1830; Nasir, Umbelliferae in Fl. Pak. 20: 64. 1972 (Fig. 18, Fl. of Pak.).
Mankial (Kafar Banda) 35° 18' N and 72° 39' E, 2835 m. *Asad and Rashid* 437 (PUP & PMNH).
12. *Scaligeria aitchisonii* Wolff in Fedde, Repert. Nov. Sp. 21: 109. 1925; Nasir, Umbelliferae in Fl. Pak. 20: 83. 1972.
Mankial (Serai-III) 35° 21' N and 72° 40' E, 2400 m. *Asad and Rashid* 257 (PUP & PMNH).
13. *Scandix pecten-veneris* L., Sp. Pl. 256. 1753; Nasir, Umbelliferae in Fl. Pak. 20: 92. 1972; (Plate-7, 40).
Mankial (Bhadai Patti-III) 35° 20' N and 72° 38' E, 2058 m. *Asad and Rashid* 696 (PUP & PMNH).
14. *Sium latijugum* C. B. Clarke in Hooker f., Flora of British India, 2: 683. 1879; Nasir, Umbelliferae in Fl. Pak. 20: 24. 1972.
Mankial (Ghund Patai) 35° 19' N and 72° 37' E, 1766 m. *Asad and Rashid* 42 (PUP & PMNH).
15. *Torilis leptophylla* (L.) Reichb. f. in Icon. Fl. Germ. 21: 169, t. 2010.1866; Nasir, Umbelliferae in Fl. Pak. 20: 105. 1972.
Mankial (Bhadai Patti-III) 35° 20' N and 72° 38' E, 2054 m. *Asad and Rashid* 594 (PUP & PMNH).
16. *Vicatia wolffiana* (Wolff ex Fedde) Norman in Journ. Bot. Lond. 78: 229. 1940; Nasir, Umbelliferae in Fl. Pak. 20: 37. 1972 (Plate-7, 41).
Mankial (Serai-III) 35° 21' N and 72° 40' E, 2400 m. *Asad and Rashid* 688 (PUP & PMNH).

Dipsacales

1. Caprifoliaceae

1. **Dipsacus inermis** Wall. in Roxb., Fl. Ind. 1:367.1820; Nasir, Dipsacaceae in Fl. Pak. 94:9-10.1975 (Plate-12, 70).
Mankial (Bhadai-I) $35^{\circ} 19' \text{ N}$ and $72^{\circ} 38' \text{ E}$, 1886 m. *Asad and Rashid* 553 (PUP & PMNH).
2. **Valeriana hardwickii** Wall. in Roxb., Fl. Ind. 1:166.1820; Nasir, Valerianaceae in Fl. Pak. 101: 6. 1976 (Plate-12, 72).
Mankial (Mehnain-I) $35^{\circ} 19' \text{ N}$ and $72^{\circ} 36' \text{ E}$, 1764 m. *Asad and Rashid* 441 (PUP & PMNH).
3. **Valeriana himalayana** Grub. in Not. Syst. Herbal Institue of Botanical Academy of Science, URSS. 19: 344. 1959; Nasir, Valerianaceae in Fl. Pak. 101:6.1976.
Mankial (Bhadai Patti-I) $35^{\circ} 20' \text{ N}$ and $72^{\circ} 38' \text{ E}$, 2069 m. *Asad and Rashid* 1739 (PUP & PMNH).
4. **Valeriana jatamansi** Jones in Asiat. Research, 2: 416. 1790; Nasir, Valerianaceae in Fl. Pak. 101: 3.1976 (Plate-12, 71).
Mankial (Serai-II) $35^{\circ} 21' \text{ N}$ and $72^{\circ} 41' \text{ E}$, 2620m. *Asad and Rashid* 1466 (PUP & PMNH).
5. **Valeriana stracheyi** Clarke in Hooker f., Flora of British India, 3: 212. 1881; Nasir, Valerianaceae in Fl. Pak. 101: 9. 1976.
Mankial (Takki Gaider-III) $35^{\circ} 18' \text{ N}$ and $72^{\circ} 39' \text{ E}$, 2830 m. *Asad and Rashid* 1498 (PUP & PMNH).

2. Adoxaceae

1. **Sambucus wightiana** Wall. ex Wight & Arn. in Prodr. Fl. Penins. Ind. Or. 1:38.1834; Nasir, Sambucaceae in Fl. Pak. 123: 1. 1978 (Plate-6, 33).
Mankial (Bhadai-II) $35^{\circ} 19' \text{ N}$ and $72^{\circ} 38' \text{ E}$, 1890 m. *Asad and Rashid* 6 (PUP & PMNH).
2. **Viburnum cotinifolium** D. Don, Prodr. Fl. Nep. 144.1825; Akhtar, Caprifoliaceae in Fl. Pak. 174: 7. 1986 (Plate-6, 34).
Mankial (Mankial village) $35^{\circ} 19' \text{ N}$ and $72^{\circ} 37' \text{ E}$, 1764 m. *Asad and Rashid* 340 (PUP & PMNH).

Asterales

1. Campanulaceae

1. **Campanula latifolia** L., Sp. Pl. 165. 1753; Nasir, Campanulaceae in Fl. Pak. 155: 14-16. 1984 (Plate-12, 68).
Mankial (Nara-I) $35^{\circ} 22' \text{ N}$ and $72^{\circ} 40' \text{ E}$, 2764 m. *Asad and Rashid* 761 (PUP & PMNH).
2. **Campanula pallida** Wall. in Asiat. Research. 13:375.1820; Nasir, Campanulaceae in Fl. Pak. 155: 6-7. 1984.
Mankial (Baik-II) $35^{\circ} 21' \text{ N}$ and $72^{\circ} 39' \text{ E}$, 2606 m. *Asad and Rashid* 628 (PUP & PMNH).
3. **Codonopsis clematidea** (Schrenk) C.B. Clarke in Hooker f., Flora of British India, 3: 433. 1881; Nasir, Campanulaceae in Fl. Pak. 155: 2. 1984.
Mankial (Bhadai Patti-II) $35^{\circ} 20' \text{ N}$ and $72^{\circ} 38' \text{ E}$, 2054 m. *Asad and Rashid* 629 (PUP & PMNH).

2. Asteraceae

1. **Achillea millefolium** L., Sp. Pl. 899.1753; Ghafoor, Asteraceae (I) - Anthemideae in Fl. Pak. 207:42.2002.
Mankial (Serai-III) 35° 21' N and 72° 40' E, 2400 m. *Asad and Rashid* 661 (PUP & PMNH).
2. **Bidens cernua** L., Sp. Pl. 2:832.1753; FNA, 21:184-185.2006; Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 724. 1972 (Plate-9, 52).
Mankial (Ghund Patai) 35° 19' N and 72° 37' E, 1766 m. *Asad and Rashid* 20 (PUP & PMNH).
3. **Anaphalis margaritacea** (L.) Benthum in Benthum & Hooker f., Genera Plantarum, 2: 303. 1873; Qaiser & Rubina, Asteraceae (II)-Inuleae, Plucheeae & Gnaphalieae in Fl. Pak. 210: 180. 2002.
Mankial (Serai-II) 35° 21' N and 72° 41' E, 2620 m. *Asad and Rashid* 249 (PUP & PMNH).
4. **Anaphalis triplinervis** (Sims.) C.B. Clarke, Comp. Ind. 105. 1876; Qaiser & Rubina, Asteraceae (II)-Inuleae, Plucheeae & Gnaphalieae in Fl. Pak. 210: 188. 2002 (Plate-9, 51).
Mankial (Char Banda) 35° 18' N and 72° 41' E, 3200 m. *Asad and Rashid* 296 (PUP & PMNH).
5. **Artemisia biennis** Willd., Phytogr. 11, n. 39.1794; Ghafoor, Asteraceae (I) - Anthemideae in Fl. Pak. 207:132.2002 (Plate-8, 46).
Mankial (Tapra) 35° 20' N and 72° 38' E, 2060 m. *Asad and Rashid* 563 (PUP & PMNH).
6. **Artemisia elegantissima** Pamp., Nuovo Giorn. Bot. Ital., n.s. 32:454.1926; Ghafoor, Asteraceae (I) - Anthemideae in Fl. Pak. 207:123.2002 (Fl. of Pak. Fig. 19).
Mankial (Mankial village) 35° 19' N and 72° 37' E, 1764 m. *Asad and Rashid* 535 (PUP & PMNH).
7. **Artemisia japonica** Thunb., Fl. Jap. 310.1784; Ghafoor, Asteraceae (I) - Anthemideae in Fl. Pak. 207:98.2002 (Fig. 19, Fl. of Pak.).
Mankial (Tapra) 35° 20' N and 72° 38' E, 2060 m. *Asad and Rashid* 563 (PUP & PMNH).
8. **Artemisia moorcroftiana** Wall. ex DC., Prodr. 6: 117.1881; Hooker f., Flora of British India, 3: 327.1881; Ghafoor, Asteraceae (I) - Anthemideae in Fl. Pak. 207:128.2002.
Mankial (Char Banda) 35° 18' N and 72° 41' E, 3200 m. *Asad and Rashid* 339 (PUP & PMNH).
9. **Artemisia persica** Boiss., Diagn. Pl. Or. Nov., Ser. 1(6): 91. 1846; Ghafoor, Asteraceae (I) - Anthemideae in Fl. Pak. 207:112.2002 (Plate-8, 44).
Mankial (Bhadai-I) 35° 19' N and 72° 38' E, 1886 m. *Asad and Rashid* 583 (PUP & PMNH).
10. **Artemisia scoparia** Waldst. & Kit., Pl. Rar. Hung. 1: 66. t. 65. 1802; Ghafoor, Asteraceae (I) - Anthemideae in Fl. Pak. 207:107.2002 (Plate-8, 45).
Mankial (Ghund Patai) 35° 19' N and 72° 37' E, 1766 m. *Asad and Rashid* 8 (PUP & PMNH).
11. **Artemisia santolinifolia** Turcz. ex Krasch., Fl. Zap. Sib. 11: 2791.1949; Tutin in Fl. Europ. 4:183.1976; Ghafoor, Asteraceae (I) - Anthemideae in Fl. Pak. 207:139.2002.
Mankial (Kafar Banda) 35° 18' N and 72° 39' E, 2835 m. *Asad and Rashid* 423 (PUP & PMNH).
12. **Aster altaicus** Willd., Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 750. 1972; Nasir & Rafiq, Wild, Fl. Pak. 128.1995 (Plate-8, 48).
Mankial (Bhadai-II) 35° 19' N and 72° 38' E, 1890 m. *Asad and Rashid* 123 (PUP & PMNH).

13. *Aster molliusculus* (DC.) C. B. Clarke, Polunin & Stainton, Fl. Hima. 184.1986; Nasir & Rafiq, Wild, Fl. Pak. 128.1995 (Plate-9, 49).
Mankial (Gaider Jabba-III) 35° 18' N and 72° 40' E, 2820 m. *Asad and Rashid* 740 (PUP & PMNH).
14. *Cirsium falconeri* (Hook. f.) Petrak in Biblioth. Bot. 78:9.1912; Polunin & Stainton, Fl. Hima. 209. 1986 (Plate-9, 50).
Mankial (Bhadai Patti-I) 35° 20' N and 72° 38' E, 2069 m. *Asad and Rashid* 534 (PUP & PMNH).
15. *Cirsium verutum* (D. Don) Sprengel, Polunin & Stainton, Fl. Hima. 209-210. 1986.
Mankial (Char Banda) 35° 18' N and 72° 41' E, 3200 m. *Asad and Rashid* 159 (PUP & PMNH).
16. *Conyza aegyptiaca* (L.) Ait., FNA, 20:348.2006; Stewart in Anno. Cata. Vasc. Pl. W. Pak. & Kash. 735. 1972.
Mankial (Mehnain-I) 35° 19' N and 72° 37' E, 1764 m. *Asad and Rashid* 197 (PUP & PMNH).
17. *Cousinia thomsonii* C. B. Clarke, Comp. Ind. 213. 1876; Nasir & Rafiq, Wild, Fl. Pak. 138.1995; Polunin & Stainton, Fl. Hima. 203. 1986.
Mankial (Mehnain-II) 35° 19' N and 72° 38' E, 1764 m. *Asad and Rashid* 181 (PUP & PMNH).
18. *Echinops cornigerus* DC., Polunin & Stainton, Fl. Hima. 202. 1986; Nasir & Rafiq, Wild, Fl. Pak. 137. 1995.
Mankial (Gaider Jabba-III) 35° 18' N and 72° 40' E, 2820 m. *Asad and Rashid* 486 (PUP & PMNH).
19. *Handelia trichophylla* (Schrenk) Heimerl, Oesterr. Bot. 71: 215. 1922; Ghafoor, Asteraceae (I) - Anthemideae in Fl. Pak. 207:77.2002 (Fig. 15, Fl. of Pak.).
Mankial (Mankial village) 35° 19' N and 72° 37' E, 1764 m. *Asad and Rashid* 73 (PUP & PMNH).
20. *Leucanthemum vulgare* Lam., Fl. Fr. 2:137.1778; Ghafoor, Asteraceae (I) - Anthemideae in Fl. Pak. 207: 48. 2002 (Plate-8, 47).
Mankial (Bhadai Patti-II) 35° 20' N and 72° 38' E, 2054 m. *Asad and Rashid* 610 (PUP & PMNH).
21. *Saussurea albescens* (DC.) Sch. Bip., Polunin & Stainton, Fl. Hima. 205-206. 1986.
Mankial (Kafar Banda) 35° 18' N and 72° 39' E, 2835 m. *Asad and Rashid* 488 (PUP & PMNH).
22. *Leontopodium himalayanum* DC., Prodr. 6:276.1838; Qaiser & Rubina, Asteraceae (II) -Inuleae, Plucheeae & Gnaphalieae in Fl. Pak. 210:147.2002.
Mankial (Char Banda) 35° 18' N and 72° 41' E, 3200 m. *Asad and Rashid* 356 (PUP & PMNH).
23. *Sonchus asper* (L.) Hill, Herb. British, 1: 47. 1769; Nasir & Rafiq, Wild, Fl. Pak. 121. 1995.
Mankial (Mankial village) 35° 19' N and 72° 37' E, 1764 m. *Asad and Rashid* 17 (PUP & PMNH).

24. **Taraxacum officinale** F. H. Wiggers, Prim. Fl. Holsat. 56. 1780; Nasir & Rafiq, Wild, Fl. Pak. 118.1995; (Plate-9, 54).

Mankial (Ghund Patai) $35^{\circ} 19' N$ and $72^{\circ} 37' E$, 1766 m. *Asad and Rashid* 131 (PUP & PMNH).

25. **Senecio chrysanthemoides** DC., Polunin & Stainton, Fl. Hima. 200. 1986 (Plate-9, 53).

Mankial (Ghund Patai) $35^{\circ} 19' N$ and $72^{\circ} 37' E$, 1766 m. *Asad and Rashid* 133 (PUP & PMNH).

Table 1. Inventory of Tracheophytes distributed in Mankial valley, Hindukush Range Swat.

Lychophytes			
Order Lycopodiales			
S. No.	Family	Genus	Species
1.	Selaginellaceae	<i>Selaginella</i> P. Beauv.	<i>S. jacquemontii</i> Spring.
Monilophytes (Ferns and their allies)			
Order Equisetales			
1.	Equisetaceae	<i>Equisetum</i> L.	<i>E. arvense</i> L.
Order Polypodiales			
2.	Marsileaceae	<i>Marsilea</i> L.	<i>M. minuta</i> L.
3.	Dennstaedtiaceae	<i>Pteridium</i> Scopoli	<i>P. aquilinum</i> (L.) Kuhr.
4.	Pteridaceae	<i>Pteris</i> L.	<i>P. critica</i> L. <i>P. vittata</i> L.
5.	Aspleniaceae	<i>Asplenium</i> L.	<i>A. adiantum-nigrum</i> (L.) Hook. <i>A. ceterach</i> L. <i>A. septentrionale</i> (Sw.) Hook. <i>A. trichomanes</i> (Huds.) Hook. <i>A. mackinnonii</i> (Hope) C. Chr. <i>A. rupicola</i> (Hope) C. Chr.
6.	Woodsiaceae	<i>Athyrium</i> Roth. <i>Cystopteris</i> Bernhardt	<i>C. dickieana</i> R. Sim <i>C. fragilis</i> (L.) Bernh.
7.	Thelypteridaceae	<i>Christella</i> Leveille	<i>C. dentata</i> (Forssk.) Rownsey
8.	Dryopteridaceae	<i>Dryopteris</i> Adanson. <i>Polystichum</i> Roth.	<i>D. ramosa</i> (Hope) C. Chr. <i>P. discretum</i> (D. Don) Diels <i>P. nepalense</i> (D. Don) J. Smith
9.	Polypodiaceae	<i>Adiantum</i> L. <i>Allosorus</i> Bernhardt	<i>A. capillus-veneris</i> L. <i>A. venustum</i> D. Don <i>A. stelleri</i> (Rupr.) Bedd
Lignophytes (Gymnosperms)			
Order Pinales			
1.	Pinaceae	<i>Pinus</i> L. <i>Abies</i> Miller <i>Picea</i> Dietr <i>Cedrus</i> Trew	<i>P. wallichiana</i> A. B. Jackson <i>A. pindrow</i> Royle <i>P. smithiana</i> (Wall.) Boiss. <i>C. deodara</i> (Roxb. ex D. Don) G. Don
2.	Cupressaceae	<i>Juniperus</i> L.	<i>J. communis</i> L.
3.	Taxaceae	<i>Taxus</i> L.	<i>T. fauna</i> Nan Li & R. R. Mill
Order Gnetales			
4.	Ephedraceae	<i>Ephedra</i> L.	<i>E. gerardiana</i> Wall. ex Stapf
Lignophytes (Angiosperms) Monocot			
Order Alismatales			
1.	Araceae	<i>Arisaema</i> Mart.	<i>A. Jacquemontii</i> Blume
Order Liliales			
2.	Liliaceae	<i>Northolirion</i> Wall. Ex Boiss.	<i>N. thomsonianum</i> (D. Don) Stapf
3.	Convallariaceae	<i>Polygonatum</i> Miller	<i>P. verticillatum</i> All.
4.	Colchicaceae	<i>Colchicum</i> L.	<i>C. luteum</i> Baker
5.	Trilliaceae	<i>Trillium</i> L.	<i>T. govanianum</i> Wall. ex Royle
Order Asparagales			
6.	Alliaceae	<i>Allium</i> L.	<i>A. victorialis</i> L.
7.	Iridaceae	<i>Iris</i> L.	<i>I. hookeriana</i> Foster

8.	Orchidaceae	<i>Dactylorhiza</i> N. J. de Necker ex Nevski <i>Spiranthus</i> L.	<i>D. hatagirea</i> (D. Don) Soo <i>S. sinensis</i> (Pers.) Ames
Order Dioscoreales			
9.	Dioscoreaceae	<i>Dioscorea</i> L.	<i>D. deltoidea</i> Wall. ex Kunth
Order Poales			
10.	Juncaceae	<i>Juncus</i> L.	<i>J. membranaceus</i> Royle ex Don <i>J. sphacelatus</i> Decne.
11.	Cyperaceae	<i>Carex</i> L. <i>Cyperus</i> L. <i>Schoenoplectus</i> (H. G. L. Reichenb.) Palla	<i>C. karo</i> (Freyn.) Freyn <i>C. niveus</i> Retz. <i>S. litoralis</i> (Schrad.) Palla
12.	Poaceae	<i>Digitaria</i> Haller <i>Echinochloa</i> P. Beauv <i>Pennisetum</i> L.C. Rich. <i>Setaria</i> P. Beauv <i>Dichanthium</i> Willemet <i>Arundo</i> L. <i>Dactylis</i> L. <i>Poa</i> L. <i>Piptatherum</i> P. Beauv.	<i>D. ciliaris</i> (Retz.) Koel <i>E. crus-galli</i> (L.) P. Beauv <i>P. lanatum</i> Klotzsch <i>S. pumila</i> (Poir.) Roem <i>D. annulatum</i> (Forssk.) Stapf <i>A. donax</i> L. <i>D. glomerata</i> L. <i>P. alpina</i> L. <i>P. gracile</i> Mez
Lignophytes (Angiosperms) Dicot			
Order Ranunculales			
1.	Ranunculaceae	<i>Ranunculus</i> L. <i>Aconitum</i> L. <i>Clematis</i> L. <i>Anemone</i> L. <i>Thalictrum</i> L. <i>Aquilegia</i> L. <i>Caltha</i> L.	<i>R. arvensis</i> L. <i>R. laetus</i> Wall. ex Hook. <i>A. heterophyllum</i> Wall. ex Royle <i>C. grata</i> Wall. <i>A. vitifolia</i> Bush. <i>T. cultratum</i> Wall. <i>A. pubiflora</i> Wall. ex Royle <i>C. alba</i> Camb.
2.	Berberidaceae	<i>Berberis</i> L.	<i>Berberis aitchisonii</i> Ahrendt
3.	Papaveraceae	<i>Corydalis</i> Medik.	<i>C. diphylla</i> Wall.
Order Buxales			
4.	Buxaceae	<i>Sarcococca</i> Lindl.	<i>S. saligna</i> (D. Don) Muell.
Order Caryophyllales			
5.	Tamaricaceae	<i>Tamaricaria</i> Qaiser & Ali	<i>T. elegans</i> (Royle) Qaiser & Ali
6.	Caryophyllaceae	<i>Arenaria</i> L. <i>Cerastium</i> L. <i>Dianthus</i> L. <i>Minuartia</i> L. <i>Silene</i> L. <i>Spergularia</i> J. & C. Presl. <i>Stellaria</i> L.	<i>A. neelgherrensis</i> Wight and Arn. <i>A. orbiculata</i> Royle ex Edgew. <i>A. serpyllifolia</i> L. <i>C. fontanum</i> Baumg. <i>D. jacquemontii</i> Edgew. ex Hook. <i>M. kashmirica</i> (Edgew.) Mattf. <i>S. gonosperma</i> (Rupr.) Bocquet <i>S. vulgaris</i> (Moench) Gracke <i>S. diandra</i> (Guss.) Heldr. <i>S. monosperma</i> Buch. Ham. ex D. Don
7.	Amaranthaceae	<i>Achyranthes</i> L. <i>Amaranthus</i> L.	<i>A. aspera</i> L. <i>A. viridis</i> L. <i>A. spinosus</i> L.

		<i>Chenopodium</i> L.	<i>C. album</i> L. <i>C. botrys</i> L. <i>C. foliosum</i> Asch. <i>C. murale</i> L. <i>P. latbenia</i> (Moq.) Walter <i>P. oleracea</i> L.
8.	Phytolacaceae	<i>Phytolacca</i> L.	
9.	Portulacaceae	<i>Portulaca</i> L.	
Order Polygonales			
10.	Polygonaceae	<i>Bistorta</i> Adans. <i>Fagopyrum</i> Mill. <i>Oxyria</i> Hill <i>Persicaria</i> Mill. <i>Polygonum</i> L. <i>Rumex</i> L.	<i>B. affinis</i> (D. Don) Green <i>B. amplexicaule</i> (D. Don) Green <i>F. esculentum</i> Moench <i>O. digyna</i> (L.) Hill <i>P. barbata</i> (L.) Hara <i>P. glabra</i> (Willd.) M. Gomes <i>P. aviculare</i> L. <i>P. plebejum</i> R. Br. <i>R. dentatus</i> L. <i>R. hastatus</i> D. Don <i>R. nepalensis</i> Spreng.
Order Saxifragales			
11.	Saxifragaceae	<i>Bergenia</i> Moench	<i>B. ciliata</i> (Haw.) Sternb.
12.	Crassulaceae	<i>Sedum</i> L. <i>Hylotelephium</i> H. Ohba <i>Parrotiopsis</i> (Niedenzu) C.K. Schneider <i>Paeonia</i> L.	<i>S. hispanicum</i> L. <i>H. ewersii</i> (Ledeb.) H. Ohba <i>P. jacquemontiana</i> (Dcne.) Rehder <i>P. emodi</i> Wall. ex Royle
13.	Hamamelidaceae		
14.	Paeoniaceae		
Order Vitales			
15.	Vitaceae	<i>Vitis</i> L.	<i>V. vinifera</i> L.
Order Geraniales			
16.	Geraniaceae	<i>Geranium</i> L.	<i>G. lambertii</i> Sweet <i>G. wallichianum</i> D. Don ex Sweet
Order Oxalidales			
17.	Oxalidaceae	<i>Oxalis</i> L.	<i>O. corniculata</i> L.
Order Celastrales			
18.	Parnassiaceae	<i>Parnassia</i> L.	<i>P. cabulica</i> Planch. ex Clarke
Order Malpighiales			
19.	Euphorbiaceae	<i>Euphorbia</i> L.	<i>E. wallichii</i> Hook.
20.	Violaceae	<i>Viola</i> L.	<i>V. biflora</i> L. <i>V. canescens</i> Wall. ex Roxb.
21.	Salicaceae	<i>Pouplus</i> L.	<i>P. alba</i> L.
Order Fabales			
22.	Fabaceae	<i>Astragalus</i> L. <i>Colutea</i> L. <i>Desmodium</i> Desv. <i>Indigofera</i> L. <i>Lespedeza</i> Mich. <i>Lathyrus</i> L. <i>Medicago</i> L. <i>Mellilotus</i> Mill.	<i>A. candolleanus</i> Royle ex Benth. <i>C. nepalensis</i> Sims <i>D. elegans</i> DC. <i>I. heterantha</i> Wall. ex Brandis <i>L. juncea</i> (L. f.) Persoon var. <i>juncea</i> <i>L. pratensis</i> L. <i>M. sativa</i> L. <i>M. indica</i> (L.) All.

		<i>Trigonella</i> L.	<i>M. officinalis</i> (L.) Pall.
		<i>Trifolium</i> L.	<i>T. gracilis</i> Benth.
			<i>T. repens</i> L.
Order Rosales			
23.	Rosaceae	<i>Rubus</i> L.	<i>R. ellipticus</i> Smith
			<i>P. microphylla</i> var. <i>microphylla</i> D. Don
		<i>Potentilla</i> L.	<i>P. supina</i> L.
			<i>R. macrophylla</i> Lindl.
		<i>Rosa</i> L.	<i>F. nubicola</i> Lindl. ex Lacaita
		<i>Fragaria</i> Polunin & Stainton	<i>C. affinis</i> var. <i>bacillaris</i> (Lindl.) Schneider
		<i>Cotoneaster</i> Polunin & Stainton	<i>C. songarica</i> C. Koch
		<i>Crataegus</i> L.	<i>S. tomentosa</i> (Lindl.) Rehder
		<i>Sorbaria</i> A. Br.	<i>Z. jujuba</i> Mill.
24.	Rhamnaceae	<i>Ziziphus</i> Mill.	<i>E. angustifolia</i> L.
25.	Elaeagnaceae	<i>Elaeagnus</i> L.	<i>C. caucasica</i> Willd.
26.	Celtidaceae	<i>Celtis</i> L.	<i>C. sativa</i> L.
27.	Cannabaceae	<i>Cannabis</i> L.	<i>F. carica</i> L.
28.	Moraceae	<i>Ficus</i> L.	<i>U. dioica</i> L.
29.	Urticaceae	<i>Urtica</i> L.	
Order Fagales			
30.	Fagaceae	<i>Quercus</i> L.	<i>Q. baloot</i> Griff.
			<i>Q. incana</i> Roxb.
			<i>Q. semecarpifolia</i> Smith
31.	Betulaceae	<i>Betula</i> L.	<i>B. utilis</i> D. Don
32.	Juglandaceae	<i>Juglans</i> L.	<i>J. regia</i> L.
Order Myrtales			
33.	Onagraceae	<i>Epilobium</i> L.	<i>E. cylindricum</i> D. Don
			<i>E. hirsutum</i> L.
			<i>E. parviflorum</i> Schreber
			<i>E. royleanum</i> Hausskn.
		<i>Oenothera</i> L.	<i>O. rosea</i> L.
34.	Lythraceae	<i>Punica</i> L.	<i>P. granatum</i> L.
Order Brassicales			
35.	Brassicaceae	<i>Capsella</i> Medik.	<i>C. bursa-pastoris</i> (L.) Medik.
		<i>Lepidium</i> L.	<i>L. sativum</i> L.
		<i>Cardamine</i> L.	<i>C. hirsuta</i> L.
		<i>Nasturtium</i> R. Br.	<i>C. flexuosa</i> With.
			<i>N. officinale</i> R. Br.
		<i>Sisymbrium</i> L.	<i>S. erysimoides</i> Desf.
			<i>S. loeselii</i> L.
			<i>S. orientale</i> L.
Order Malvales			
36.	Malvaceae	<i>Malva</i> L.	<i>M. neglecta</i> Wallr.
37.	Thymeleaceae	<i>Daphne</i> L.	<i>D. mucronata</i> Royle

Order Sapindales

38. Sapindaceae

Aesculus L.
Acer L.

A. indica (Wall. ex Camb.) Hook.
A. cappadocicum Gleditsch

Order Ericales

39. Balsaminaceae

Impatiens L.

I. balfourii Hook.
I. brachycentra Kar. & Kir.
I. edgeworthii Hook.
I. flemingii Hook.
I. glandulifera Royle
I. meeboldii Hook.
I. sulcata Wall.
I. thomsonii Hook.

40. Ebenaceae

Diospyros L.

D. lotus L.

41. Primulaceae

Primula L.

P. minutissima Jacquem. ex Duby

Order Solanales

42. Solanaceae

Solanum L.
Hyoscyamus L.
Convolvulus L.
Cuscuta L.

S. nigrum L.
H. niger L.
C. arvensis L.
C. reflexa Roxb.
C. glochidiatum Wall.
C. lanceolatum Forssk.
L. anchusoides (Lindl.) Lehm.
L. stylosa (Kar. & Kir.) Brand
L. longiflora (Benth.) Baill.

43. Convolvulaceae

44. Boraginaceae

Cynoglossum L.

Lindolfia S. Lehmann

Order Gentianales

45. Rubiaceae

Galium L.

G. hirtiflorum Recquien ex DC.

46. Gentianaceae

Swertia L.

S. longifolia Boiss.
S. cordata (G. Don) Clarke
S. paniculata Wall.

Order Lamiales

47. Oleaceae

Fraxinus L.
Jasminum L.

F. xanthoxyloides (G. Don) DC.
J. humile L.

48. Plantaginaceae

Plantago L.

P. amplexicaulis Cav.
P. lanceolata L.
P. depressa Willd.
P. major Willd.

49. Scrophulariaceae

Scrophularia L.
Verbascum L.
Veronica L.
Euphrasia L.
Orobanche L.
Pedicularis L.

S. scabiosifolia Bth.
V. thapsus L.
V. anagallis-aquatica L.
E. himalayica Wettst.
O. alba Steph.
P. pectinata Wall ex. Beth.
P. pyramidata Royle
V. officinalis Linn.

51. Verbenaceae

Verbena Linn.

52. Lamiaceae

Mentha L.
Marrubium L.
Nepeta L.

M. longifolia (L.) Huds.
M. vulgaris L.
N. cataria L.

		<i>Phlomis</i> L.	<i>N. clarkei</i> Hook.
		<i>Stachys</i> L.	<i>N. erecta</i> (Royle ex Benth.) Benth.
		<i>Origanum</i> L.	<i>N. govaniana</i> (Wall. ex Benth.) Lab.
		<i>Prunella</i> L.	<i>N. juncea</i> Benth.
		<i>Thymus</i> L.	<i>N. laevigata</i> (D. Don) Hand.
		<i>Calamintha</i> Millar	<i>N. paulsenii</i> Briquet in Bot.
		<i>Isodon</i> (Schrader ex Benth.) Spach	<i>P. bracteosa</i> Royle ex Benth.
		<i>Lamium</i> L.	<i>S. emodi</i> Hedge
		<i>Leonurus</i> L.	<i>O. vulgare</i> L.
			<i>P. vulgaris</i> L.
			<i>T. linearis</i> Benth.
			<i>C. hydaspidis</i> (Falconer ex Benth.) Hedge
			<i>I. rugosus</i> (Wall. Ex Benth.) Codd
			<i>L. album</i> L.
			<i>L. cardiaca</i> L.
Order Apiales			
53. Araliaceae		<i>Aralia</i> L.	<i>A. cachemirica</i> Dcne.
54. Apiaceae		<i>Aegopodium</i> L.	<i>A. burttii</i> E. Nasir
		<i>Bupleurum</i> L.	<i>B. lanceolatum</i> Wall.
		<i>Chaerophyllum</i> L.	<i>B. nigrescens</i> E. Nasir
		<i>Eriocyclus</i> Lindl.	<i>B. tenue</i> Buch.
		<i>Heracleum</i> L.	<i>C. reflexum</i> Lindl.
		<i>Ligusticum</i> L.	<i>E. staintonii</i> Riedl & Kuber
		<i>Oenanthe</i> L.	<i>H. candicans</i> Wall. ex DC.
		<i>Pimpinella</i> L.	<i>L. elatum</i> C.B. Clarke
		<i>Scaligeria</i> DC.	<i>L. stewartii</i> (Hiroe) E. Nasir
		<i>Scandix</i> L.	<i>O. javanica</i> (Blume) DC.
		<i>Sium</i> L.	<i>P. diversifolia</i> DC.
		<i>Torilis</i> Adans.	<i>S. aitchisonii</i> Wolff
		<i>Vicatia</i> DC.	<i>S. pecten-veneris</i> L.
			<i>S. latijugum</i> C. B. Clarke
			<i>T. leptophylla</i> (L.) Reichb.
			<i>V. wolffiana</i> (Wolff ex Fedde) Norman
Order Dipsacales			
55. Caprifoliaceae		<i>Dipsacus</i> L.	<i>D. inermis</i> Wall.
		<i>Valeriana</i> L.	<i>V. hardwickii</i> Wall.
			<i>V. himalayana</i> Grub.
			<i>V. jatamansi</i> Jones
			<i>V. stracheyi</i> Clarke
56. Adoxaceae		<i>Sambucus</i> L.	<i>S. wightiana</i> Wall.
		<i>Viburnum</i> L.	<i>V. cotinifolium</i> D. Don
Order Asterales			
57. Campanulaceae		<i>Campanula</i> L.	<i>C. latifolia</i> L.
		<i>Codonopsis</i> Wall.	<i>C. pallida</i> Wall.
			<i>C. clematidea</i> (Schrenk) C. B. Clarke

Artemisia L.

Handelia Heimerl

Leucanthemum Miller

Aster L.

Conyza Lessing

Cirsium Miller

Cousinia C. B. Clarke

Echinops L.

Saussurea DC.

Anaphalis DC.

Leontopodium R. Br. ex
Cass.

Bidens L.

Sonchus L.

Taraxacum F. H. Wiggers

Senecio L.

A. biennis Willd.

A. elegantissima Pamp.

A. japonica Thunb.

A. moorcroftiana Wall. ex DC.

A. persica Boiss.

A. scoparia Waldst. & Kit.

A. santolinifolia Turcz. ex Krasch.

H. trichophylla (Schrenk) Heimerl

L. vulgare Lam.

A. altaicus Willd.

A. molliusculus (DC.) C. B. Clarke

C. aegyptiaca (L.) Ait.

C. falconeri (Hook. f.) Petrak

C. verutum (D. Don) Sprengel

C. thomsonii C. B. Clarke

E. cornigerus DC.

S. albescens (DC.) Sch.

A. margaritacea (L.) Benth.

A. triplinervis (Sims.) C. B.
Clarke.

L. himalayanum DC.

B. cernua L.

S. asper (L.) Hill

T. officinale F. H. Wiggers

S. chrysanthemoides DC.

Table 2. Percentage of genera and species of the Trachaeophytes distributed in Mankial Valley Swat

Lychophytes					
S. No.	Family	No. of genera	% age	No. of species	%age
1.	Selaginellaceae	1	100	1	100
Monilophytes (Ferns and their allies)					
S. No.	Family	No. of genera	% age	No. of species	% age
1.	Equisetaceae	1	8.33	1	5
2.	Marsileaceae	1	8.33	1	5
3.	Dennstaedtiaceae	1	8.33	1	5
4.	Pteridaceae	1	8.33	2	10
5.	Aspleniaceae	1	8.33	4	20
6.	Woodsiaceae	2	16.66	4	20
7.	Thelypteridaceae	1	8.33	1	5
8.	Dryopteridaceae	2	16.66	3	15
9.	Polypodiaceae	2	16.66	3	15
Lignophytes (Gymnosperms)					
S. No.	Family	No. of genera	% age	No. of species	%age
1.	Pinaceae	4	57	4	57
2.	Cupressaceae	1	14.3	1	14.3
3.	Taxaceae	1	14.3	1	14.3
4.	Ephedraceae	1	14.3	1	14.3
Lignophytes (Angiosperms) Monocot & D					
S. No.	Family	No. of genera	% age	No. of species	%age
1.	Araceae	1	4.34	1	4.17
2.	Liliaceae	1	4.34	1	4.17
3.	Convallariaceae	1	4.34	1	4.17
4.	Colchicaceae	1	4.34	1	4.17
5.	Trilliaceae	1	4.34	1	4.17
6.	Alliaceae	1	4.34	1	4.17
7.	Iridaceae	1	4.34	1	4.17
8.	Orchidaceae	2	8.69	2	8.32
9.	Dioscoreaceae	1	4.34	1	4.17
10.	Juncaceae	1	4.34	2	8.32
11.	Cyperaceae	3	13.04	3	12.5
12.	Poaceae	9	39.13	9	37.5
Lignophytes (Angiosperms) Dicot					
S. No.	Family	No. of genera	% age	No. of species	%age
1.	Ranunculaceae	7	4.76	8	3.80
2.	Berberidaceae	1	0.68	1	0.47
3.	Papaveraceae	1	0.68	1	0.47
4.	Buxaceae	1	0.68	1	0.47
5.	Tamaricaceae	1	0.68	1	0.47
6.	Caryphyllaceae	7	4.76	10	4.76

S. No.	Family	No. of genera	% age	No. of species	%age
7.	Amaranthaceae	3	2.04	7	3.33
8.	Phytolacaceae	1	0.68	1	0.47
9.	Portulacaceae	1	0.68	1	0.47
10.	Polygonaceae	6	4.08	11	5.23
11.	Saxifragaceae	1	0.68	1	0.47
12.	Crassulaceae	2	1.36	2	0.95
13.	Hamamelidaceae	1	0.68	1	0.47
14.	Paeoniaceae	1	0.68	1	0.47
15.	Vitaceae	1	0.68	1	0.47
16.	Geraniceae	1	0.68	2	0.95
17.	Oxalidaceae	1	0.68	1	0.47
18.	Parnassiaceae	1	0.68	1	0.47
19.	Euphorbiaceae	1	0.68	1	0.47
20.	Violaceae	1	0.68	2	0.95
21.	Salicaceae	1	0.68	1	0.47
22.	Fabaceae	10	6.80	11	5.23
23.	Rosaceae	7	4.76	8	3.80
24.	Rhamnaceae	1	0.68	1	0.47
25.	Elaeagnaceae	1	0.68	1	0.47
26.	Celtidaceae	1	0.68	1	0.47
27.	Cannabaceae	1	0.68	1	0.47
28.	Moraceae	1	0.68	1	0.47
29.	Urticaceae	1	0.68	1	0.47
30.	Fagaceae	1	0.68	3	1.42
31.	Betulaceae	1	0.68	1	0.47
32.	Juglandaceae	1	0.68	1	0.47
33.	Onagraceae	2	1.36	5	2.38
34.	Lythraceae	1	0.68	1	0.47
35.	Brassicaceae	5	3.40	8	3.80
36.	Malvaceae	1	0.68	1	0.47
37.	Thymeleaceae	1	0.68	1	0.47
38.	Sapindaceae	2	1.36	2	0.95
39.	Balsaminaceae	1	0.68	8	3.80
40.	Ebenaceae	1	0.68	1	0.47
41.	Primulaceae	1	0.68	1	0.47
42.	Solanaceae	2	1.36	2	0.95
43.	Convolvulaceae	2	1.36	2	0.95
44.	Boraginaceae	2	1.36	5	2.38
45.	Rubiaceae	1	0.68	1	0.47
46.	Gentianaceae	1	0.68	3	1.42
47.	Oleaceae	2	1.36	2	0.95
48.	Plantaginaceae	1	0.68	4	1.90

S. No.	Family	No. of genera	% age	No. of species	% age
49.	Scrophulariaceae	3	2.04	3	1.42
50.	Orobanchaceae	3	2.04	4	1.90
51.	Verbenaceae	1	0.68	1	0.47
52.	Lamiaceae	12	8.16	18	8.57
53.	Araliaceae	1	0.68	1	0.47
54.	Apiaceae	13	8.84	16	7.61
55.	Caprifoliaceae	2	1.36	5	2.38
56.	Adoxaceae	2	1.36	2	0.95
57.	Campanulaceae	2	1.36	3	1.42
58.	Asteraceae	15	10.20	24	11.42

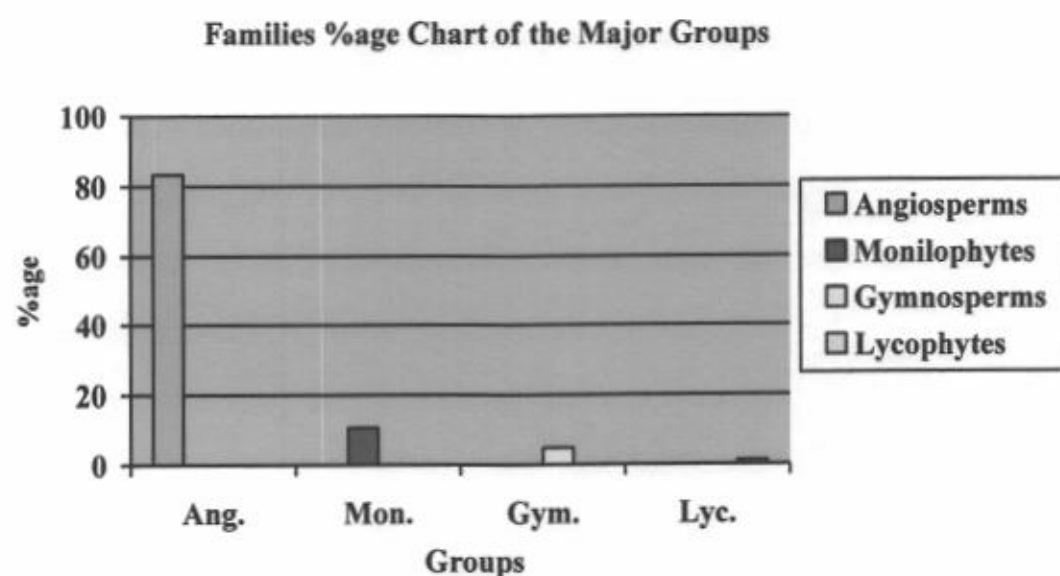


Figure 2. Showing the % age distribution of major families of Trachaeophytes in the Mankial Valley (Angiosperms 83.82%, Monilophytes 10.71%, Gymnosperms 4.76% and Lycophytes 1.20%).

CHAPTER-5

ETHNOBOTANICAL AND MEDICINAL DESCRIPTION

A. SPECIES OF ETHNOBOTANICAL USES

Among total 262 species of Ethnobotanical importance, 211 were Dicot, 24 were monocot, 20 were Monilophytes and 7 were Gymnosperms. The Ethnobotanical uses were divided into 21 groups on the basis of their utility as under.

I. Monilophytes

A total of twenty species (20) belonging to nine (9) families were reported for their local utilitarian aspects. Among them Aspleniaceae and Woodsiaceae were the leading families with 4 species each, followed by Dryopteridaceae and Polypodiaceae with 3 species each, Pteridaceae with 2 species and Dennstaedtiaceae, Equisetaceae, Marsileaceae, Thelypteridaceae with one species each. Twenty (20) species were beautiful/ornamental, three (3) species were cash plants and five (5) species were medicinal.

II. Lignophytes (Gymnosperms)

A total of seven (7) species belonging to four (4) families were reported for their local utilitarian aspects. Among them family Pinaceae was the leading one with four (4) species, Cupressaceae, Ephedraceae and Taxaceae with one species each. Six (6) each were beautiful/ornamental and medicinal, five (5) each were cash plants, fuel plants, furniture and shelter plants.

II. Lignophytes (Angiosperms) Monocot

A total of twenty four (24) species belonging to twelve (12) families were reported for their local utilitarian aspects. Family Poaceae was the leading one with nine (9) species, followed by Cyperaceae with three (3), Juncaceae with two (2) and Alliaceae, Araceae, Colchicaceae, Covallariaceae, Dioscoreaceae, Iridaceae, Liliaceae, Orchidaceae and Trilliaceae with one (1) species each. Sixteen (16) species were beautiful/ornamental, two (2) were brooms, one (1) cash, seven (7) fodder, one (1) harmful/poisonous, one (1) house holding item, one (1) invasive, six (6) livestock promoting, seven (7) medicinal, ten (10) soil reclamation and three (3) thatching were plants.

IV. Lignophytes (Angiosperms) Dicot

A total of two hundred and twelve (211) species belonging to fifty eight (58) families were reported for their local utilitarian aspects. Family Asteraceae was the leading one with twenty four (24) species, followed by Lamiaceae with eighteen (18), Apiaceae with sixteen (16), Fabaceae and Polygonaceae with eleven (11), Caryophyllaceae ten (10), Balsaminaceae,

Brassicaceae, Ranunculaceae and Rosaceae eight (8) each, Amaranthaceae with six (6), Boraginaceae, Onagraceae and Caprifoliaceae with five (5) each, Plantaginaceae and Orobanchaceae four (4) species each, Fagaceae, Scrophlariaceae, Gentianaceae and Campanulaceae with three (3) each, Crassulaceae, Geraniaceae, Violaceae, Sapindaceae, Solanaceae, Convolvulaceae, Oleaceae and Adoxaceae with two (2) species each, while Berberidaceae, Papaveraceae, Buxaceae, Tamaricaceae, Phytolacaceae, Portulacaceae, Saxifragaceae, Hammamelidaceae, Paeoniaceae, Vitaceae, Oxalidaceae, Parnassiaceae, Euphorbiaceae, Salicaceae, Rhamnaceae, Elaeagnaceae, Celtidaceae, Cannabaceae, Moraceae, Urticaceae, Betulaceae, Juglandaceae, Lythraceae, Malvaceae, Thymeleaceae, Ebenaceae, Primulaceae, Rubiaceae, Verbenaceae and Araliaceae with one (1) species each. Details regarding scientific, vernacular name, habit, flowering period, collection method, part used, preparation, dosage, other uses and description were carried out. For constituents and medicinal uses of these high valued medicinal plants the available literature was consulted i.e. (Shinwari *et al.*, 2003; Shinwari *et al.*, 2006; Trease and Vans, 1985; Tyler *et al.*, 1970; Wallis, 1981 and Youngkin, 1950).

I. MONILOPHYTES (FERNS AND THEIR ALLIES)

1. ASPLENIACEAE

Scientific name:	<i>Asplenium adiantum nigrum</i> (L.) Hook.
Vern. Name:	Babrozay
Habit:	Herb
Flower period:	No flower
Collection method:	Cutting/digging
Part used/Admin.:	Whole plant/orally
Constituents:	Glycoside, Mangiferin, Isomangiferin and Xanthone-O-glycoside.
Preparation/Dosage:	The frond and rhizome are dried, grinded and one teaspoonful powder is taken twice daily with warm water or green tea.
Medicinal uses:	Cold, cough, diuretic, expectorant, jaundice, laxative and purgative.
Other uses:	Ornamental
Description:	Commonly known as spleenwort. Triangular and compound leaves are present. Petiole is reddish green, shiny and hairy. Sori are present on lower side of the leaf in chains.

2. EQUISETACEAE

Scientific name:	<i>Equisetum arvense</i> L.
Vern. Names:	Bandakay
Habit:	Herb
Flowering period:	No flower
Collection method:	Cutting/digging
Part used/ Admin.:	Whole plant/externally
Constituents:	Saponin and silicic acid.
Preparation/Dosage:	Extract obtained from whole plant is mixed with mustard oil.
Medicinal uses:	Hair tonic and against lice.
Other uses:	Washing utensil.
Description:	Rhizomatous perennial; stem consists of nodes and internodes with alternate vertical ridges and grooves; leaves in whorled and fused; sporangia in strobili.
Plate No.	(1-5)

3. MARSILEACEAE

Scientific name:	<i>Marsilea minuta</i> L.
Vern. Names:	Shawtalay
Habit:	Herb
Flowering period:	No flower
Collection method:	Cutting/digging
Part used/Admin.:	Whole plant/orally
Constituents:	Chloroform, coumarin, flavonoids, phenol, protein, tannin and xanthoprotein.
Preparation/Dosage:	The is collected, the fresh leaves are cooked and eaten as saag twice daily.
Medicinal Uses:	Anti-cholesterol, balance blood pressure, cough, opthalmic, reduce, uric acid and triglycerol.
Other uses:	Ornamental
Description:	Commonly known as water clover plant, it is aquatic with slender stem. Leaves are petiolated and with 4 leaflets. Sori bean or pea shape and Sporocarp is present at the base of petiole with 2 sori.
Plate No.	(1-6)

4. POLYPODIACEAE

1. Scientific name:	<i>Adiantum capillus-veneris</i> L.
Vern. Names:	Sumbal
Habit:	Herb
Flower period:	No flower
Collection method:	Cutting/digging
Part used/Admin.:	Fronds/orally
Constituents:	Essential oil, tannin, glucosides, quinic acid, luteolol, quercetol, adiantone, hydroxy adiantone.
Preparation/Dosage:	The dried fronds are grinded and one teaspoonful powder is mixed with butter or honey or taken with green twice daily.
Medicinal uses:	Scorpion stings & bites, astringent, diuretic, expectorant and febrifuge.
Other uses:	Ornamental and cash plant.
Description:	Frond deciduous, monomorphic, without midrib; stipe dark purple, grooved; indusium false, enrolled margins, sporangia marginal transverse and straight or some what curved.
Plate No.	(2-8)

2. Scientific name:	<i>Adiantum venustum</i> D. Don
Vern. Names:	Sumbal
Habit:	Herb
Flowering period:	No flower
Collection method:	Cutting/digging
Part used/Admin.:	Fronds/orally
Constituents:	Adiantone, Leucopelargonidine, kaempferol glucoside, quercetin glucoside, triterpenoid keto alcohol, carotenoid and isoadiantone.
Preparation/Dosage:	The dried frond are grinded and one teaspoonful is taken with butter, honey or green tea twice daily.
Medicinal uses:	Diuretic, emetic, expectorant and scorpion stings, bites and piles.
Other uses:	Ornamental and cash plant
Description:	Rhizome long creeping; frond 30 cm high, 15 cm wide; stipe dark purplish, grooved above, scaly at base; blade three pinnate at the base and without midrib; indusium false; sporangia marginal; and kidney shaped.
Plate No.	(2-7)

II. LIGNOPHYTES (GYMNOSPERMS)

1. CUPRESSACEAE

Scientific name:	<i>Juniperus communis</i> L.
Vern. Names:	Gugar
Habit:	Shrub
Flowering period:	No flower
Collection method:	Cutting/collection
Part used/Admin.:	Berries (Cones)/orally
Constituents:	Essential oil, oxalic acid, resin and juniperin.
Preparation/Dosage:	The cones are grinded into powder or extract of the cone is obtained. One teaspoonful powder or one cup of extract is taken twice daily.
Medicinal uses:	Carminative, diuretic and stimulant.
Other uses:	Ornamental
Description:	A tough high altitude low growing shrub, leaves needle like and 3 at each node. Male cones axillary, female solitary, scales becoming fleshy when mature, with bluish black globose berries.
Plate No.	(3-13)

2. EPHEDRACEAE

Scientific name:	<i>Ephedra gerardiana</i> Wall.ex Stapf
Vern. Names:	Asmania
Habit:	Shrub
Flowering period:	May to June
Collection method:	Cutting and collection
Part used/Admin.:	Fruit/branches/Orally
Constituents:	Ephedrine and pseudo ephedrine
Preparation/Dosage:	Decoction of fruits, branches and powder of branches are used. One cup decoction or ½ teaspoon powder mixed with honey are taken twice daily.
Medicinal uses:	Constriction of blood vessels, dilation of the pupil and stimulant.
Other uses:	Cash plant
Description:	Shrubby plant, tufted, dense; branchlets green, striate, smooth; male strobilus solitary or in clusters; female strobilus solitary; berry 7-8 mm long, ovoid and red color.
Plate No.	(3-14)

3. PINACEAE

1. Scientific name:	<i>Abies pindrow</i> Royle
Vern. Name:	Achar
Habit:	Tree
Flowering period:	No flower
Collection method:	Cutting
Part used/Admin.:	Leaves/orally
Constituents:	Lignin, okanin, taxine, tannin and resin.
Preparation/Dosage:	Extrac or powder of leaves are prepared and ½ cup of extact or ½ teaspoon of powder mixed with honey are taken twice daily.
Medicinal uses:	Antispasmodic, asthma, astringent, bronchitis, carminative, expectorant, stomachic and tonic.
Other uses:	Cones are ornamental, cash plant, fuel and shelter.
Description:	It is a tall tree and may reach up to 60 meters in height. The color of trunk is grey and the needles are arranged spirally on the branches. The uper side of the needles is furrowed. The male cone is about 2 cm in length and green, size of female cone is 8-12 cm long violet purple.
Plate No.	(3-15 & 16)

2. Scientific name: *Cedrus deodara* (Roxb. Ex Lambert)
- Vern. Names: Diyar, deodar, cedar
- Habit: Tree
- Flowering period: No flower
- Collection method: Collection of oil and gum
- Part used/Admin.: Oil/gum/orally
- Constituents: Ascorbic acid, cedar oil and cholesterol.
- Preparation/Dosage: Oil and gum are obtained from the stem. ½ teaspoon oil or gum are mixed with honey or a cup of green tea and taken twice daily.
- Medicinal uses: Acne, carminative, diaphoretic, diuretic, dropsy, fever, flatulence, hair loss and piles.
- Other uses: Ornamental, cash plant, fuel and shelter.
- Description: Branches horizontal; branchlets drooping; leaves acicular, 3-sided; male cones solitary at the tips of dwarf shoot, erect, purplish; female cone solitary, erect, brown; seeds obovate.
- Plate No. (3-17)
3. Scientific name: *Pinus wallichiana* A. B. Jackson
- Vern. Names: Peeuch
- Habit: Tree
- Flowering period: No flower
- Collection method: Cutting and collection
- Part used/Admin.: Wood and resin/orally
- Constituents: Tar and turpentine
- Preparation/Dosage: The resin is obtained from the stem and ½ teaspoon of resin is mixed with honey or green tea and taken twice daily.
- Medicinal uses: Asthma, cough, diaphoretic, skin irritation, stimulant, treatment of facial acne and ulceration.
- Other uses: Ornamental, cash plant, fuel and shelter.
- Description: The leaves are in pairs of 5 needles. This is commonly known as blue pine. Male cone in group and many in numbers. The female cone are hanging and two to three in number. The bark of the plant is grey and scales are present.
- Plate No. (3-18)

4. TAXACEAE

Scientific name:	<i>Taxus fauna</i> Nan Li & R. R. Mill.
Vern. Names:	Banya
Habit:	Tree
Flowering period:	No flower
Collection method:	Cutting
Part used/Admin.:	Whole tree/needles/overallly
Constituents:	Ephedrine, taxine, taxinine
Preparation/Dosage:	Extract of needles is obtained, mixed with ½ cup of green tea and taken twice daily.
Medicinal uses:	Antiseptic, aphrodisiac, asthma, bronchitis, congestion of many organs, clumping of erythrocytes, cough, epilepsy, fruits are poisonous causing irritation, indigestion, sedative and anticancer.
Other Uses:	Ornamental, cash plant, fuel and shelter.
Description:	Tree upto 30 meters tall. Green needles and grey bark. Needles flat, spiny, glossy green, two ranked, fruit fleshy and red in color. The female cones are green in color and solitary.
Plate No.	(4-19)

II. LIGNOPHYTES (ANGIOSPERMS) MONOCOTS

1. ALLIACEAE

Scientific name:	<i>Allium victorialis</i> L.
Vern. Names:	Piazakay
Habit:	Herb
Flowering period:	May-September
Collection method:	Cutting and digging
Part used/Admin.:	Whole plant/orally
Constituents:	Gitogenin, astragalin, kaempferol, d-glucoside, saponin and disulfides.
Preparation/Dosage:	Extrac of dried rhizome or powder of whole plant are prepared. One cup once daily or ½ teaspoon mixed with honey is taken twice daily.
Medicinal uses:	Antiscorbutic, antitumor, carminative, diuretic, in menstruation, repellent and vermifuge.
Other uses:	Ornamental
Description:	Plant with cylindrical bulb (4-6 cm long), 3-6 petiolate, lanceolate to ovate leaves. Pedicel 1-2 cm long and tepals yellowish white, 5 mm long. Style exerted and seeds spherical.

2. ARACEAE

Scientific name:	<i>Arisaema jacquemontii</i> Blume
Vern. Name:	Marjarai
Habit:	Herb
Flowering period:	June to August
Collection method:	Digging
Part used/Admin.:	Rhizome/bulb/orally
Constituents:	Volatile acid, alkaloids and calcium oxalate crystal.
Preparation/Dosage:	Rhizome is dried and grinded into powder, $\frac{1}{4}$ of a teaspoon is mixed with butter and taken twice daily.
Medicinal uses:	The rhizome of plant is poisonous.
Other uses:	Ornamental/harmful and poisonous.
Description:	Parodioecious herb with bulb roots; leaves not pedate; leaflet 5-7. Spathe tube longer than the limb.
Plate No.	(4-20)

3. COLCHICACEAE

Scientific name:	<i>Colchicum luteum</i> L.
Vern. Names:	Zair gulay
Habit:	Herb
Flowering period:	April to June
Collection method:	Digging
Part used/Admin.:	Dried corms/orally
Constituents:	Alkaloid colchicine
Preparation/Dosage:	The corm is grinded into powder and $\frac{1}{4}$ teaspoon is mixed with butter or honey and taken twice daily.
Medicinal uses:	Anti-gout, aphrodisiac, alterative, carminative, in spleen and liver diseases, laxative and in rheumatism.
Other uses:	Ornamental
Description:	Perennial herb with 3-6 linear lanceolata leaves and ovoid to oblong corm. Flower yellow color, born on scape and perianth united into a tube. Fruit is capsule.
Plate No.	(4-21)

4. CONVALLARIACEAE

Scientific name:	<i>Polygonatum verticillatum</i> All.
Vern. Names:	Nooryalam
Habit:	Herb
Flowering period:	April to July
Collection method:	Digging
Part used/Admin.:	Rhizome/orally
Constituents:	Biotin, flavonoid, folic acid, niacin, pantothenic acid and phenol.
Preparation/Dosage:	The rhizome is grinded into powder and ½ teaspoon is mixed with butter or honey and taken twice daily in humans. In cattles 250 grams of powder mixed with maize flour is given once as a full dose.
Medicinal uses:	Antibacterial, antifungal, aphrodisiac, antirheumatic, increase lactation in cattle.
Description:	Rootstock thick, creeping; stem angled and grooved; the nodes are with whorled leaves, flowers are hanging and white with green tips; fruit berry, dark purple.
Plate No.	(4-22)

5. DIOSCORACEAE

Scientific name:	<i>Dioscorea deltoidea</i> Wall.
Vern. Names:	Ratalu/kanees
Habit:	Herb
Flowering period:	April to July
Collection method:	Digging
Part used/Admin.:	Tubers/orally
Constituents:	Saponin, diosgenin, resin, starch and calcium oxalate.
Preparation/Dosage:	The tubers are dried, grinded into powder and ½ teaspoon (in children) or one teaspoonful (in adults) is mixed with ghur or butter and taken twice daily.
Medicinal uses:	Colic, diuretic, expectorant and root powder is anthelmintic and useful to expel tape worms.
Other uses:	Ornamental
Description:	Stem glabrous twining clockwise; leaves simple, alternate, ovate; flowers in small distant clusters; fruit 3-winged capsule obovate or obcordate.
Plate No.	(4-23)

6. ORCHIDACEAE

Scientific name:	<i>Dactylorhiza hatagirea</i> (D. Don) Soo.
Vern. Names:	Sala
Habit:	Herb
Flowering period:	May to July
Collection method:	Digging and cutting
Part used/Dmin.:	Tubers/orally
Constituents:	Albumin, glucoside, starch and mucilage.
Preparation/Dosage:	The tubers are dried, grinded into powder and one teaspoonful is mixed with ghur, butter or honey and taken twice daily.
Medicinal uses:	Aphrodisiac, expectorant and nervine.
Other uses:	Ornamental
Description:	Perennial herb with underground tuber. With hollow stem and leaves radical and cauline. Flowers zygomorphic, purplish pink in a stout spike. Lip of petal broad, spur short. Fruit a capsule.
Plate No.	(5-28)

7. TRILLIACEAE

Scientific name:	<i>Trillium govanianum</i> Wall. ex Royle
Vern. Names:	Tande jarri
Habit:	Herb
Flowering period:	May to July
Collection method:	Digging
Part used/Admin.:	Rhizome/orally
Constituents:	Acid saponin, tannin and trillin.
Preparation/Dosage:	The rhizome is dried, grinded and one teaspoonful is mixed with honey and taken twice daily.
Medicinal uses:	Astringent, alterative, emetic and tonic.
Other uses:	Ornamental
Description:	Rhizomatous herbaceous plant. There are three whorls of leaves, ovate, petiolate, glabrous. Tepals lanceolata, spreading and reflexed in fruit. Fruit a red to dark purple berry.
Plate No.	(5-29)

II. LIGNOPHYTES (ANGIOSPERMS) DICOTS

1. ADOXACEAE

1. Scientific name: *Sambucus wightiana* Wall. ex Wight & Am.
Vern. Names: Mushkiara
Habit: Herb
Flowering period: May to June
Collection method: Cutting and digging
Part used/Admin.: Whole plant/orally
Constituents: Cyanogenic glycoside, sambunigrin and essential oil.
Preparation/Dosage: Syrup is prepared from the riped fruits and one teaspoonful of syrup is mixed with a glass of milk and taken twice daily.
Medicinal uses: Diaphoretic, diuretic, expectorant, purgative and used in dropsy.
Other uses: Ornamental and honey bee species.
Description: Shrub with compound and opposite leaves. The inflorescence is cymose or corymb. The flowers are actinomorphic and bisexual. The sepals are (3 to 5) and very small. The petals are fused. The fruit is a drupe but looking like a berry, which is consisting of (3 to 5) pyrenes.
Plate No. (6-33)
2. Scientific name: *Viburnum grandiflorum* Wall. ex DC.
Vern. Names: Guch
Habit: Herb
Flowering period: May to July
Collection method: Collecting and cutting
Part used/Admin.: Fruit and branches/orally
Constituents: Resin, tannin, viburnin and valerianic acid.
Preparation/Dosage: The fruits are taken directly. The branched and leaves are dried and grinded into powder. One teaspoonful is mixed with honey or taken directly with a cup of green tea.
Medicinal uses: Antispasmodic, astringent, haemostatic, nervine, tonic, and uterine sedative.
Other uses: Ornamental, beverage, cash plant, fruit plant and honey bee species.
Description: The plants are shrubs. The inflorescence is cymose or corymbose. The sepals are forming a calyx with five teeth. The corolla is consist of five lobes. The androecium is consisting of five stamens. There is only one seed in the flattened drupe.
Plate No. (6-34)

2. AMARANTHACEAE

1. Botanical name: *Achyranthus aspera* L.
Vern. Name: Gishkay
Habit: Herb
Flowering period: April to July
Collection method: Cutting
Part used/Admin: Whole plant/orally
Constituents: Achyranthine, alkaloids, flavonoids, saponins, steroid and terpenoids.
Preparation/Dosage: Decoction or dried powder of the plant are prepared. One cup of decoction or one teaspoonful with butter is taken twice daily.
Medicinal uses: Diuretic, in removal of stones from kidney and laxative.
Other uses: Fodder
Description: Erect herb; leaves opposite, obovate or sub-orbicular. Inflorescence a spike, flowers green, solitary, perianth segments 4-5. Fruit achene.
Plate No. (6-35)
2. Botanical name: *Amaranthus viridis* L.
Vern. Name: Chawairay
Habit: Herb
Flowering period: May to September
Collection method: Cutting
Part used/Admin.: Whole plant/orally
Constituents: Albuminoid, amaranthin, calcium oxalate, carbohydrate, nitrates, and lecithins.
Preparation/Dosage: The fresh leaves and branches are cooked and eaten as saag as desired.
Medicinal uses: Astringent, cardiac, digestive, in Calcium and Vitamin A deficiency and urolithiasis.
Other uses: Ornamental, cash plant, fodder, food and vegetable.
Description: Annual herb, stem glabrous and erect. Leaves simple, petiole long, flower green, in paniculate spike, bracts and bracteoles deltoid-ovate to lanceolate-ovate. Fruit a capsule, dark brown to black.
Plate No. (6-36)

3. Botanical name: *Amaranthus spinosus* L.
 Vern. Name: Chawairay
 Habit: Herb
 Flowering period: May to September
 Collection method: Cutting
 Part used/Admin.: Whole plant/orally
 Constituents: Alanine, amaranthin, nicotinic acid, potassium nitrate, serine and valine.
 Preparation/Dosage: The fresh leaves and branches are cooked and eaten as saag as desired.
 Medicinal uses: Colic, diuretic, emollient, gonorrhea, in eczema, menorrhagia and purgative.
 Other uses: Fodder and live stock promoting.
 Description: Annual herb, stem erect, leaves alternate with a pair of axillary spines. Stem slender, glabrous. Flower green, axillary or terminal, often paniculate spikes. Fruit ovoid capsule, seed black and shining.
 Plate No. (7-37)

4. Botanical name: *Chenopodium album* L.
 Vern. Name: Sarmay
 Habit: Herb
 Flowering period: May to August
 Collection method: Cutting
 Part used/Admin.: Whole plant/orally
 Constituents: Albuminoids, betalin, chenopodin, cholin, essential oil, saponin and lanolinic acid.
 Preparation/Dosage: The fresh leaves and branches are cooked and eaten as saag as desired.
 Medicinal uses: Anthelmintic, diuretic, in jaundice and laxative.
 Other uses: Fodder
 Description: Annual, 10-150 cm, stems. Inflorescence a spiciform or cymosely branched panicle. Seeds black, some what ovate.

5. Botanical name: *Chenopodium botrys* L.
 Vern. Name: Skha kharawa
 Habit: Herb
 Flowering period: May to August
 Collection method: Cutting
 Part used/Admin.: Whole plant/orally
 Constituents: Chenopodosides A & B and essential oil.
 Preparation/Dosage: The extract or powder of the plant is obtained. ½ cup of extract or ½ teaspoonful mixed with honey and used twice daily.
 Medicinal uses: In cough, jaundice and vermifuge.
 Description: Aromatic annual, 5-40(-70) cm. Stems erect, with several ascending branches. Leaves dull green, somewhat glaucous. Inflorescence elongate, axillary with smaller cymes. Perianth segments 5. Stamens 1-5, stigmas 2. Seeds horizontal, black, round in outline.
6. Botanical name: *Chenopodium murale* L.
 Vern. Name: Binakai
 Habit: Herb
 Flowering period: May to August
 Collection method: Cutting
 Part used/Admin.: Whole plant/orally
 Constituents: Ascorbic acid, ascaridol and essential oil.
 Preparation/Dosage: The fresh leaves and branches are cooked and eaten as saag as desired.
 Medicinal uses: Anthelmintic, antispasmodic, aromatic, carminative, laxative and Stimulant.
 Other uses: Fodder
 Description: Annual, stem yellowish to green, to 70 (-90) cm, erect. Leaves usually olive green, sometimes yellowish, broadly ovate, rhombic, coarsely dentate. Inflorescence terminal and axillary divaricately branched. Flowers bisexual and sometimes female. Tepals are five. Androecium are five and number of stigma are two. Seeds are flattened, black, testa prominently pitted.

3. APIACEAE

1. Botanical name: *Chaerophyllum reflexum* Lindl.
Vern. Name: Not known
Habit: Herb
Flowering period: May to June
Collection method: Cutting/collecting/orally
Part used/Admin.: Whole plant/orally
Constituents: Limonene, p-cymene and sabinene.
Preparation/Dosage: The fruits are collected and mixed with ghur. 100 grams of chunks are prepared and taken twice daily.
Medicinal uses: Antibacterial, aphrodisiac, used in kidney and urinary disorder.
Other uses: Fodder
Description: Size is about 1 meter and herb. Smooth or sparsely hairy. Leaves bipinnate, glabrous to pubescent; pinnae finely divided. Rays 6-12. Involucre of 5-8 lanceolate bracts. Fruit 1- (3) in an umbel, cylindric to ellipsoid.
2. Botanical name: *Eriocycla staintonii* Riedl & Kuber
Vern. Name: Not known
Habit: Herb
Flowering period: May to June
Collection method: Cutting
Part used/Admin.: Whole plant/orally
Constituents: Not known
Preparation/Dosage: The fruits are collected and mixed with ghur. 100 grams of chunks are prepared and taken twice daily.
Medicinal uses: Aphrodisiac, in kidney and urinary disorder.
Other uses: Fodder
Description: Herbs, up to 20 cm tall. Leaves mostly basal, 2-5 cm long, pinnate. Umbels terminal and lateral. Rays 2-5, unequal, 5-15 mm long, pubescent. The size of flower and the flower stalk are equal. The shape of the fruit is oblong.

3. Botanical name: *Heracleum candicans* Wall. ex DC.
 Vern. Name: Skhwara
 Habit: Herb
 Flowering period: May to July
 Collection method: Cutting
 Part used/Admin.: Whole plant/orally
 Constituents: Alkyl coumarins, candinol A, candibirins A & B, isophellodenol C and spirobifuranocoumarins.
 Preparation/Dosage: The fruits are collected and mixed with ghur. 100 grams of chunks are prepared and taken twice daily.
 Medicinal uses: AIDS, cold, cough, flu, headache, leukemia, psoriasis, rheumatism and throat infections.
 Other uses: Ornamental and honey bee species.
 Description: Hairy herbs with upright stem, large size leaves, pinnate, 20-40 cm long, under surface densely pubescent and white; margin serrate-dentate. Rays 15-35, pubescent. Pedicels pubescent. Fruit 5-10 mm long, elliptic and ridges prominent.
 Plate No. (7-39)

4. Botanical name: *Oenanthe javanica* (Blume) DC.
 Vern. Name: Not known
 Habit: Herb
 Flowering period: May to July
 Collection method: Cutting
 Part used/Admin.: Whole plant/orally
 Constituents: α -terpinene, caryophyllene, glucosides, oenanthoside A, p-cymene, phenyl acetaldehyde, phenylpropanoids and polyacetylenes.
 Preparation/Dosage: The fruits are collected and mixed with ghur. 100 grams of chunks are prepared and taken twice daily.
 Medicinal uses: Antiseptic, depurative, febrifuge, fever, gynae problems, influenza, jaundice and styptic.
 Other uses: Honey bee species.
 Description: Non hairy herb, upright. Roots are coming out from nodes. The leaves are may be dissected, ovate shape leaflets are there. The margins are not smooth. There are (10 to 20) number of rays in the umbel. Fruit oblong, c. 2 mm long.

5. Botanical name: *Pimpinella diversifolia* DC.
 Vern. Name: Tarpakhi
 Habit: Herb
 Flowering period: May to July
 Collection method: Cutting
 Part used/Admin.: Whole plant/orally
 Constituents: Anethole, elemicine, geijerene, isoeugenol, methyl eugenol, phenyl acetate, pregeijerene and limonene.
 Preparation/Dosage: The fruits are collected and mixed with ghur. 100 grams of chunks are prepared and taken twice daily.
 Medicinal uses: Aromatic, carminative and diuretic.
 Other uses: Honey bee species.
 Description: Hairy perennial herbs with pinnate cauline and simple lower leaves. The shape is cordate to ovate. The number of leaflets are (3 to 5). Rays 5-20, 1-2.5 cm long, pubescent. Petals white, outer larger. Fruit ovate to ovoid, 2 mm long.
6. Botanical name: *Torilis leptophylla* (L.) Reichb.
 Vern. Name: Not known
 Habit: Herb
 Flowering period: May to July
 Collection method: Cutting
 Part used/Admin.: Whole plant/orally
 Constituents: P-coumaric, ferulic and sinapic acid.
 Preparation/Dosage: The fruits are collected and mixed with ghur. 100 grams of chunks are prepared and taken twice daily.
 Medicinal uses: The plant has shown antibacterial activities against some pathogens
 Other uses: Ornamental
 Description: Plants with 2-pinnate leaves. Herbaceous annual and the size may reach upto (60 cm). Peduncles 2-4 cm long, stout. Umbels usually lateral. Rays 2-5, unequal. The shape of fruit is ovoid or oval, the size is about (4 mm) in length.

4. ARALIACEAE

Scientific name:	<i>Hedera nepalensis</i> K. Koch.
Vern. Name:	Kurie/palul
Habit:	Climber
Flower period:	July to August
Collection method:	Cutting
Part used/Admin.:	Leaves and berries/orally
Constituents:	Alpha-hedrin, arsenic oxide, glucoside, helixin and saponin.
Preparation/Dosage:	Decoction of leaves and syrup of berries is prepared. ½ cup of decoction or syrup is taken twice daily.
Medicinal uses:	Anti-diabetic, cathartic, diaphoretic, purgative and stimulant.
Other uses:	Ornamental and fodder.
Description:	Perennial climbers. Root aerial, leaves simple, lanceolate to ovate. Inflorescence paniculate umbels, flowers yellow, pedicels and peduncles hairy. Fruit a berry.
Plate No.	(8-43)

5. ASTERACEAE

1. Botanical name:	<i>Artemisia biennis</i> Willd.
Vern. Name:	Tarkha
Habit:	Herb
Flowering period:	May to August
Collection method:	Cutting
Part used/Admin:	Whole plant/orally
Constituents:	Acetylene, α -pinene, β -ocimene, β -farnesene, camphor, ketone, methyl chavicol and methyl eugenol.
Preparation/Dosage:	Decoction of plant is obtained, mixed with honey and milk. One cup is taken twice daily.
Medicinal uses:	Antibacterial, anthelmintic, colic, menstruation, poultice, sores and wounds.
Other uses:	Honey bee species.
Description:	An annual or biennial glabrous, non-aromatic herb. Basal leaves with 3-6 cm long petioles. Capitula heterogamous, numerous, erect, hemispherical-oblong, Receptacle conical. Florets numerous, all fertile, greenish-yellow; Cypselas oblong-oblongeolate, finely striate, brown.
Plate No.	(8-46)

2. Botanical name: *Artemisia japonica* Thunb.
 Vern. Name: Tarkha
 Habit: Herb
 Flowering period: May to August
 Collection method: Cutting
 Part used/Admin.: Leaves/orally
 Constituents: Eudesmene, eugenol, dehydrofalcarinol, dehydrofalcarindiol, oploidiol sesquiterpenes and vanillin.
 Preparation/Dosage: Decoction of plant is obtained, mixed with honey and milk. One cup is taken twice daily.
 Medicinal uses: Digestive, gynae problems and juice is used in vaginitis.
 Other uses: Honey bee species and vegetable.
 Description: Perennial herb, 50-90 cm tall. Basal leaves cuneate, oblong-obovate. Capitula heterogamous, numerous, short to long pedunculate, broadly ovate to $\pm$ globose. Receptacle hemispherical, glabrous. Florets 12-15, yellow. Cypselas oblanceolate, c. 1 mm long and dark brown.
- Figure No. (20)
3. Botanical name: *Artemisia moorcroftiana* Wall. Ex. DC.
 Vern. Name: Tarkha
 Habit: Herb
 Flowering period: May to August
 Collection method: Cutting
 Part used/Admin.: Whole plant/orally
 Constituents: α -thujone, β -thujone, β -pinene, camphor, hydrocarbons, monoterpenes and sesquiterpene.
 Preparation/Dosage: Decoction of plant is obtained, mixed with honey and milk. One cup is taken twice daily.
 Medicinal uses: The plant is anthelmintic.
 Other uses: Honey bee species.
 Description: Perennial, petiolated herbs, the size is (40-50 cm). Capitula heterogamous, hemispherical, 4-4.5 x 4-6 mm. Receptacle $\pm$ convex. Florets 15-20, all fertile, purplish. Long exerted purple style branches. Cypselas linear-oblong, with terminal corolla scar, brown.

4. Botanical name: *Artemisia persica* Boiss.
 Vern. Name: Tarkha
 Habit: Herb
 Flowering period: May to August
 Collection method: Cutting
 Part used/Admin.: Whole plant/orally
 Constituents: α -terpinene, ascaridole, β -phellandrene, ocimenone, p-cymene, terpinolene.
 Preparation/Dosage: Decoction of plant is obtained, mixed with honey and milk. One cup is taken twice daily.
 Medicinal uses: Febrifuge, tonic and vermifuge.
 Other uses: Honey bee species.
 Description: A densely greyish tomentose, basally woody shrub. Leaves 3-pinnatisect. Two types of flowers are present. The stalk bearing florets is with or without hairs. The petals are yellow in color and all florets are fertile. Cypselas light brown and oblong.
- Plate No. (8-44)
5. Botanical name: *Artemisia scoparia* Waldst. & Kit.
 Vern. Name: Dona jhan
 Habit: Herb
 Flowering period: May to August
 Collection method: Cutting
 Part used/Admins.: Whole plant/orally
 Constituents: Lactone, scoparin and essential oil.
 Preparation/Dosage: Decoction of plant is obtained, mixed with honey and milk. One cup is taken twice daily.
 Medicinal uses: Anthelmintic and purgative.
 Other uses: Honey bee species.
 Description: Biennial or perennial, basally woody herb. Capitula heterogamous, numerous, shortly pedunculate. Receptacle conical, glabrous. The petals are of yellow color, the number of florest are (10 to 12). There are 5-toothed, glandular corolla. Cypselas oblong-oval, brown.
- Plate No. (8-45)

6. Botanical name: *Artemisia santolinifolia* Turcz. Ex Krasch.
 Vern. Name: Tarkha
 Habit: Herb
 Flowering period: May to August
 Collection method: Cutting
 Part used/Admin: Whole plant/orally
 Constituents: Aromatic oil, p-pinene, lactones, sesquiterpene and terpenoids.
 Preparation/Dosage: Decoction of plant is obtained, mixed with honey and milk. One cup is taken twice daily.
 Medicinal uses: Anthelmintic and antipyretic
 Other uses: Honey bee species.
 Description: Basally woody perennial with numerous, very straight, branches. The leaves are petiolated. Leaf is sparsely hairy to glabrous. Capitula shortly peduncled. Receptacle convex, glabrous. Florets yellow, all fertile, marginal florets 10-12. Cypselas brown.
7. Botanical name: *Leucanthemum vulgare* Lam.
 Vern. Name: Guli nazak
 Habit: Herb
 Flowering period: May to July
 Collection method: Cutting
 Part used/Admin.: Whole plant/orally
 Constituents: Azulene, α -bisabolol, decanoic acid, farnesene, farnesol, β -farnesene, nerolidol, sesquiterpene and γ -eudesmol.
 Preparation/Dosage: The fresh flowers (capitulum) are collected, dried and a tea is prepared from the these and 1 cup is taken twice daily.
 Medicinal uses: Antispasmodic, burns, decoction is used in eye problems diaphoretic, diuretic, emmenagogue poultice, wounds and tonic
 Other uses: Ornamental, cash plant and honey bee species.
 Description: Rhizomatous perennial, 1 m tall. Leaves long petioled, green-glaucous, obovate-spathulate to oblong-obovate. Capitula long-peduncled, radiate or discoid. Ray-florets, in radiate forms, 12-30. Cypselas variable in size, 2-3 mm long, 10-ribbed.
- Plate No. (6-47)

8. Botanical name: *Conyza aegyptiaca* (L.) Ait.
 Vern. Name: Malooch
 Habit: Herb
 Flowering period: May to July
 Collection method: Cutting
 Part used/Admin.: Whole plant/orally
 Constituents: Essential oil, d-limonene and terpineol.
 Preparation/Dosage: Extract of whole plant is prepared and one cup is taken twice daily.
 Medicinal uses: Haemostatic, stimulant, astringent, diuretic, used in diarrhea, dysentery and cystitis.
 Other uses: Fodder and honey bee species.
 Description: Annuals with upright or branching stem, the size is (10 to 120 cm). Both types of leaves are present. Heads radiate or disciform. Ray florets pistillate petals are purple or white. Disc florets 3-30, bisexual, fertile, corollas yellowish. Cypselae compressed.
9. Botanical name: *Cirsium verutum* (D. Don) Sprengel
 Vern. Name: Not known
 Habit: Herb
 Flowering period: April to July
 Collection method: Cutting
 Part used/Admin.: Leaves, root and seeds/orally
 Constituents: Not known
 Preparation/Dosage: The leaves, roots and seeds are grinded into powder and ½ teaspoonful is mixed with honey or butter and taken twice daily.
 Medicinal uses: Febrifuge and stomachache.
 Other uses: Fodder
 Description: Flowers heads purple, mauve or pink. Leaves hairless above, nearly hairless to cottony-haired beneath. The basal leaves linear, stalked, with many triangular lobes, each lobe with a long terminal spine and shorter lateral spine. Stem densely cottony-hairy.

10. Botanical name: *Echinops cornigerus* DC.
 Vern. Name: Barum dandi
 Habit: Herb
 Flowering period: July to August
 Collection method: Cutting
 Part used/Admin.: Whole plant/orally
 Constituents: Acetylenes, polyenes and thiophenes.
 Preparation/Dosage: The seeds are grinded and powder is mixed with ghur. Small chunks of 50 grams are prepared and taken twice daily.
 Medicinal uses: Nerve tonic, aphrodisiac, diuretic and alterative.
 Other uses: Fuel plant
 Description: Herbs, low growing, branched with cottony stems, very leafy. Leaves pinnatifid with lobes ending in spines, 10-20 cm, lanceolate or elliptic. Inflorescence of numerous densely packed pale blue flowers heads. Florets 1.5 cm long.

11. Botanical name: *Saussurea albescens* (DC.) Sch.
 Vern. Name: Azghakay
 Habit: Herb
 Flowering period: July to August
 Collection method: Cutting and digging
 Part used/Admin.: Whole plant/orally
 Constituents: Anthroquinone, lupeol, p-sitosterol, rubiadin and rhynchotechol.
 Preparation/Dosage: The seeds are grinded and powder is mixed with ghur. Small chunks of 50 grams are prepared and taken twice daily.
 Medicinal uses: Anti-inflammatory, cardio tonic, cold, cough, rheumatism and stomachache.
 Other uses: Ornamental and fodder.
 Description: Stem slender, up to 120 cm. Leaves very variable, the upper stalk less linear to broadly lanceolate, the lower stalked, entire to shallow lobed, usually white wooly beneath. Flowers pink, cylindrical flower heads, which are numerous and borne in branched flat topped clusters on a simple erect leafy stem. Flower heads 1.3-2 cm long.

12. Botanical name: *Anaphalis margaritacea* (L.) Benth.
 Vern. Name: Not known
 Habit: Herb
 Flowering period: June to August
 Collection method: Cutting
 Part used/Admin.: Leaves/orally
 Constituents: Apigenin, flavonoids, phenolic acid, sterols, spiraein, tiliroside, triterpenoids, quercetin and ursolic acid.
 Preparation/Dosage: The dried leaves are grinded into powder and mixed with honey or butter. One teaspoonful is taken twice daily.
 Medicinal uses: Anodyne, antiseptic, astringent, burns, diarrhea, dysentery, emetic, expectorant, infusion is steamed and inhaled for headache, poultice, sores, swellings and ulcer.
 Other uses: Ornamental
 Description: Erect herbs, 30-80 cm tall. Leaves linear-lanceolate or narrowly elliptic. The petals are white or yellow. The corolla of female florets is lobed. Hermaphrodite flowers are with small fruit. The pistillate flowers produce brown color fruit of oblong shape.
13. Botanical name: *Sonchus asper* (L.) Hill
 Vern. Name: Shodapai
 Habit: Herb
 Flowering period: May to August
 Collection method: Cutting
 Part used/Admin.: Whole plant/orally and externally
 Constituents: Alkaloids, ascorbic acid, flavonoids, niacin, phenol, riboflavin, tannins and thiamine.
 Preparation/Dosage: Decoction is obtained and the dried leaves are mixed with butter and poultice is prepared. One cup decoction is taken twice daily and the poultice is used one daily and regularly changed.
 Medicinal uses: Used in boils, as poultice and in wounds.
 Other uses: Ornamental, fodder, honey bee and live stock promoting.
 Description: Hollow stem, biennial or annual with lanceolate or obovate leaves. The capitula stalk is hairy or not. Corolla tube is larger than the ligule. The fruit is ellipsoid in shape and brown in color.

14. Scientific name: *Taraxacum officinale* Weber.
- Vern. Name: Booda boodai
- Habit: Herb
- Flowering period: February to August
- Collection method: Cutting
- Part used/Admin.: Leaves and roots/orally
- Constituents: Bitter crystalline principle, homotaraxasterol, saponin, taraxacin, taraxacetine and taraxasterol.
- Preparation/Dosage: The leaves and roots are grinded into powder and mixed with honey or ghur and ½ teaspoon is taken twice daily.
- Medicinal uses: Tonic, diuretic, constipation, jaundice, kidney and liver diseases.
- Other uses: Ornamental, honey bee species and live stock promoting.
- Description: Perennial herb, with milky juice. Leaves simple, sessile, radical, narrow oblong. Flower yellow, solitary and born on a hollow leafless stalk. Fruits smooth achenes.
- Plate No. (9-54)
15. Scientific name: *Senecio chrysanthemoides* DC.
- Vern. Name: Zairgulay
- Habit: Herb
- Flowering period: July to September
- Collection method: Cutting
- Part used/Admin.: Flower/orally
- Constituents: Senecionine, seneciophylline and jaconine.
- Preparation/Dosage: The fresh flower buds (capitulum) are collected and shade dried. Tea is prepared and one cup is taken twice daily.
- Medicinal uses: Leaves infusion is given in indigestion and liver diseases.
- Other uses: Ornamental and honey bee species.
- Description: Erect perennial herb; stem robust; leaves deeply pinnate, upper surface dark green, lower whitish. Flower-head numerous, yellow. Ray florets strapped shaped. Achene is ribbed and pappus hairs white.
- Plate No. (9-53)

6. BETULACEAE

Scientific name:	<i>Betula utilis</i> D. Don
Vern. Name:	Birich
Habit:	Tree
Flowering period:	July to September
Collection method:	Cutting
Part used/Admin.:	Leaves and bark/orally
Constituents:	Betulin, betulinic acid and triterpenoid.
Preparation/Dosage:	Decoction of leaves and fresh bark is obtained and one cup is taken daily.
Medicinal uses:	Antibacterial, diuretic, in gout, in kidney and bladder stones and in rheumatism.
Other uses:	Cash and sacred plant
Description:	Tree up to 8 m tall. Beautiful thin bark which peel off in transparent horizontal strips. Leaves ovate to rhomboid, 5-8 cm and toothed. Male catkins 5-10 cm long, female strobili erect. Nut elliptic ovate, 2-3 mm long.
Plate No.	(10-58 & 59)

7. BERBERIDACEAE

1. Scientific Name:	<i>Berberis lycium</i> Royle
Vern. name:	Zairlargay/korai
Habit:	Thorny shrub
Flowering period:	April to June
Collection method:	Cutting and digging
Part used:	Berries and rhizome
Constituents:	Alkaloids, berberine, berbamine, flavonoids, saponins, starch grain, tannin and umbellatine.
Preparation/Dosage:	Syrup of riped berries and powder of rhizome are obtained. One glass of syrup is taken daily and one teaspoonful of powder is taken with a glass of milk twice daily.S
Medicinal uses:	Stomachic, intestinal coli, expectorant, diarrhea, piles, jaundice.
Other uses:	Ornamental, beverages, brooms, cash plant, fuel plant, fodder, fruit plant, honey bee species, soil reclamation, shelter, snuff ash and thatching.
Description:	Evergreen shrub with spines. Stem whitish gray, leaves sessile, lanceolate, inflorescence racemose. Flower yellow, fruit ovoid berry, black-blue in colour.
Plate No.	(10-60)

2. Scientific Name: *Podophyllum hexandrum* Royle.
 Vern. name: Kakora
 Habit: Herb
 Flowering period: April to June
 Collection method: Cutting and digging
 Part used/Admin.: Fruit and rhizome/orally
 Constituents: Podophyllin, podophyllotoxin, podophyllol, resin and quercetin.
 Preparation/Dosage: The fruit and rhizome are grinded into powder. ½ teaspoon is taken twice daily mixed with honey or a cup of green tea.
 Medicinal uses: Alterative, anti-cancer, emetic, hepatic stimulant, laxative and purgative.
 Other uses: Cash plant
 Description: Perennial herb, with long petioled leaves, palmate, deeply 3-5 lobed. Lamina 12-25 cm broad. Flowers white. Berry oblong elliptic, red. Seeds numerous and embeded in the pulp.
 Plate No. (11-61 & 62)

8. BRASSICACEAE

1. Scientific name: *Capsella bursa-pastoris* (L.) Medik.
 Vern. name: Bambaisa
 Habit: Herb
 Flowering period: April to July
 Collection method: Cutting
 Part used/Admin.: Leaves, flowers, seeds/orally
 Constituents: Ascorbic, bursenic, tartaric and tannic acid, choline, saponin & glycoside.
 Preparation/Dosage: The fresh leaves are cooked and eaten as saag. The mature seeds are collected and mixed with ghur or a glass of milk and taken twice daily.
 Medicinal uses: Stimulent, astringent, antiscorbic, haematuria, dropsy, diarrhoea and in blood pressure.
 Other uses: Ornamental and vegetable.
 Description: Annual herb; stem erect, glabrous. The lower leaves forming a rosette. The upper are without stalk, smooth or toothed. Flower small, white, seeds small, ellipsoid and brown.

2. Scientific name: *Lepidium sativum* L.
 Vern. Name: Halim
 Habit: Herb
 Flowering period: May to July
 Collection method: Cutting
 Part used/Admin.: Whole plant/orally
 Constituents: Essential oil, glucoside and glucotropaeolin.
 Preparation/Dosage: The fresh leaves are cooked and eaten as saag. The mature seeds are collected and mixed with ghur or a glass of milk and taken twice daily.
 Medicinal uses: Stimulent, alterative, aphrodisiac, aperient, dysentery, diarrhoea, in piles, diuretic and expectorant.
 Other uses: Ornamental and vegetable.
 Description: Lyrate leaves are present. It is an annual non-hairy herb. There are up to 30 flowers in the inflorescence. The petals are pink or white and the size of flower is very minute. Siliculae 4.5-6 mm long, elliptic to sub orbicular and brown.
3. Scientific name: *Nasturtium officinale* R. Br.
 Vern. Name: Tarmara
 Habit: Herb
 Flowering period: March to July
 Collection method: Cutting
 Part used/Admin.: Whole plant/orally
 Constituents: Calcium, essential oil, iodine, iron, phosphorus, protein, Vitamin A, C and E.
 Preparation/Dosage: The fresh leaves are cooked and eaten as saag as much as desired.
 Medicinal uses: Antiscorbutic, appetizer, diuretic, tonic for anemia, blood purifier, tuberculosis, in tumors, in chest infection and as stomachache.
 Other uses: Food and vegetable
 Description: Perennial, rhizomatous, aquatic, floating herb, 10-80 cm long. Leaves lyrate-pinnate. Racemes 10-25 flowered. Flowers c. 4 mm across, white. Siliquae oblong, sub cylindrical, 10-20 mm long.
- Plate No. (11-65)

4. Scientific name: *Sisymbrium erysimoides* Desf.
 Vern. Name: Jenjaray
 Habit: Herb
 Flower period: May to July
 Collection method: Cutting
 Part used/Admin.: Seeds/orally
 Constituents: Not known
 Preparation/Dosage: The seeds are collected, dried and mixed with home made acchar and taken twice daily.
 Medicinal uses: Restorative, expectorant, asthma, stimulant, throat and chest infection.
 Other uses: Beverage and vegetable
 Description: Annual, upright and branching. Lower leaves are lyrate-pinnatipartite. Racemes 50-100 flowered. Siliquae 20-40 mm long. Septum hyaline. Seeds oblong-ellipsoid, brown, somewhat papillose.
5. Scientific name: *Sisymbrium loeselii* L.
 Vern. Name: Not known
 Habit: Herb
 Flowering period: May to July
 Collection method: Cutting
 Part used/Admin.: Leaves and flowers/orally
 Constituents: Isopropyl, glucosinolates, isothiocyanate and butyl isothiocyanate.
 Preparation/Dosage: The seeds are collected, dried and mixed with home made acchar and taken twice daily.
 Medicinal uses: Antiscorbutic leaves and flowers are used in scurvy and scrofula.
 Other uses: Fodder
 Description: Annual 30-120 cm tall. Basal and lower leaves lyrate-pinnatipartite. Racemes 50-100 flowered. Petals color is yellow. The petals are large in size than sepals. Seeds 25-30 in each locule, oblong-ellipsoid and brown.
- Plate No. (12-67)

9. BUXACEAE

- Scientific Name: *Sarcococca saligna* (D. Don) Muell.
Vern. Name: Shenkaye
Habit: Shrub
Flowering period: May to August
Collection method: Cutting
Part used/Admin: Leaves and shoots/orally
Constituents: Alkaloids, E-salignone, flavonoids, Na-dimethylsaracodine, phenols, salignarine A-E, saponin, sarcorine, sarconadine and tannins.
Preparation/Dosage: Extraction of leaves and shoots is obtained. Sugar is mixed with extraction and two cups are taken daily.
Medicinal uses: Cardio suppressant, poultice is applied in swollen joints in pain, root decoction is given in gonorrhea, vasodilator and tracheal relaxant.
Other uses: Ornamental, fuel plant, honey bee species and soil reclamation plant.
Description: Evergreen shrub, 2 m tall, green bark/branches. Leaves narrow to broadly lanceolate. Pistillate, staminate or mixed of both flowers are present. Flowers sessile, greenish-white, unisexual. Ovary tri-carpellary. Fruit purple, sub globose drupe.

10. CAMPANULACEAE

- Scientific name: *Campanula latifolia* L.
Habit: Herb
Flowering period: May to August
Collection method: Cutting
Part used/Admins.: Leaves and flowers/orally
Constituents: Adipate, β -D-glucoside, ethyl docosanoate, flavonoids, isorhamnetin, lobetyol and quercetin.
Preparation/Dosage: The leaves and flowers are grinded into powder and mixed with ghur. One teaspoonful is taken twice daily.
Medicinal uses: The plant is emetic.
Other uses: Fodder
Description: Perennial, erect, 1 m tall. Leaves large, broadly lanceolate to oval or ovate. Flowers large. Calyx teeth linear. Corolla campanulate, dark purple-blue. Capsule 1 cm long, dehiscing at the base.
Plate No. (12-68)

11. CANNABACEAE

Scientific name:	<i>Cannabis sativa</i> L.
Vern. Name:	Bhang
Habit:	Herb
Flowering period:	April to September
Collection method:	Collecting and cutting
Part used/Admin.:	Leaves/orally
Constituents:	Alcohol, cannabinine, cannabinal, cannabigerol, cannabidiol, cannabidiolic acid, cannin, pseudo cannabinal and resin.
Preparation/Dosage:	Special decoction of leaves known as <i>Thandai</i> is prepared. Dry fruits and milk are mixed with the decoction and one glass is taken once daily.
Medicinal uses:	Anti-malaria, anodyne, analgesic, appetizer, anthrax, blood poisoning, dysentery, dysmenorrhoea, narcotic, sedative and sexual tonic.
Other uses:	Beverages, brooms, cash plants, honey bee species and snuff ash plant.
Description:	Annual herb, 1.5 m tall. Leaves palmately 3-9 foliolate. Male flowers 4-6 mm across, greenish. Tepals elliptic or oblong. Female flower as large as the perigonium. Achene shining and yellowish brown.
Plate No.	(12-69)

12. CAPRIFOLIACEAE

1. Scientific name:	<i>Dipsacus inermis</i> Wall.
Vern. Name:	Piazgulay
Habit:	Herb
Flowering period:	June to August
Collection method:	Cutting and digging
Part used/Admin.:	Roots/orally
Constituents:	Akebia saponin, cantleyoside, loganin, oleanic acid, phenolic acid, vanillic acid.
Preparation/Dosage:	The roots are grinded into powder and then mixed with butter or honey. One teaspoonful is taken twice daily.
Medicinal uses:	The root powder is considered to be expectorant, hypnotic, insecticide, sedative and stimulant.
Other uses:	Ornamental and honey bee species.
Description:	Perennial 2-3 m tall herb. Middle and upper cauline leaves usually entire, 10-18 cm long. Flowering heads few, sub globose. Flowers cream-white, Calyx sub stipitate, 4-lobed. Corolla tube c. 1 cm long, lobes obtuse. Involucel sub-quadrangular and glabrous.
Plate No.	(12-70)

2. Scientific name: *Valeriana hardwickii* Wall.
 Vern. Name: Desi Mushke Bala
 Habit: Herb
 Flowering period: June to August
 Collection method: Cutting and digging
 Part used/Admin.: Rhizome/orally
 Constituents: α -cedrene, bornyl acetate, cuparene, methyl linoleate and valeracetate.
 Preparation/Dosage: The rhizome is grinded into powder. One teaspoonful is mixed with honey or butter and taken twice daily.
 Medicinal uses: Aphrodisiac, antispasmodic, bitter, carminative, diaphoretic, diuretic, dysentery and emmenagogue, insomnia and neurosis.
 Other uses: Cash plant
 Description: Herbs, 30-60 cm or more tall. Rootstock with fibrous roots. Stem stout, solitary and pubescent. Radical leaves few, ovate-orbiculate. The inflorescence is corymbose or cymose. Achene pubescent, longer than the upper bracts.
- Plate No. (12-72)
3. Scientific name: *Valeriana himalayana* Grub.
 Vern. Name: Desi Mushke Bala
 Habit: Herb
 Flowering period: June to August
 Collection method: Cutting and digging
 Part used/Admins.: Rhizome/orally
 Constituents: α -kessyl acetate, kessyl acetate, kessane, maaliol and valeranone.
 Preparation/Dosage: The rhizome is grinded into powder. One teaspoonful is mixed with honey or butter and taken twice daily.
 Medicinal uses: Asthma, cough, increasing memory, nerve problems, paralysis and psychiatric problems
 Other uses: Cash plant
 Description: A dioecious herb, 11-38 cm tall. Rootstock with slender roots. Scape solitary or 2-3. Lower cauline leaves pinnati-partite, with 1-3 lateral lobes, the terminal one largest, ovate-oblong to elliptic-ovate, entire or slightly toothed. Flowers in dichotomous corymbs or compact heads, pink or white. Achene 2.5-3 mm long, glabrous.

4. Scientific name: *Valeriana jatamansi* Jones
 Vern. Name: Mushke Bala
 Habit: Herb
 Flowering period: June to August
 Collection method: Cutting and digging
 Part used/Admin.: Rhizome/orally
 Constituents: α -curcumene, borneol, bornyl acetate, β -bisabolene, camphene, farnesene, isovaleric acid and terpinyl acetate.
 Preparation/Dosage: The rhizome is grinded into powder. One teaspoonful is mixed with honey or butter and taken twice daily.
 Medicinal uses: Antispasmodic, aromatic, carminative, cholera, constipation, dysentery, hysteria, in insomnia, neurosis and tonic.
 Other uses: Cash plant
 Description: Herb 16-60 cm tall. Rhizome elongate, with fibrous roots. Stems 3-6 in number. Radical leaves cordate or ovate. Cauline leaves sessile, smaller, uppermost often 3-fid. Flowers in lax corymbose cymes or dense corymbs. Achene tomentose.
- Plate No. (12-71)
5. Scientific name: *Valeriana stracheyi* Clarke
 Vern. Name: Desi Mushke Bala
 Habit: Herb
 Flowering period: June to August
 Collection method: Cutting and digging
 Part used/Admin.: Rhizome/orally
 Constituents: α -kessyl acetate, kessyl acetate, kessane, maaliol and valeranone.
 Preparation/Dosage: The rhizome is grinded into powder. One teaspoonful is mixed with honey or butter and taken twice daily.
 Medicinal uses: Antispasmodic, bronchitis, headache, insomnia and sedative.
 Other uses: Cash plant
 Description: The plant is rhizomatous herb, with fibrous roots. Stem solitary or 3-5. Radical leaves deciduous, lyrate pinnatisect. Flowers in lax, slender, dichotomous spikes. Achene 2-2.5 mm long.

13. CARYOPHYLLACEAE

1. Scientific name: *Dianthus jacquemontii* Edgew. ex Hook.
Vern. Name: Not known
Habit: Herb
Flowering period: June to September
Collection method: Cutting
Part used/Admin.: Whole plant/orally
Constituents: Not know
Preparation/Dosage: The whole plant is grinded into powder and mixed with ghur. One teaspoonful is taken twice daily.
Medicinal uses: Antibacterial, anthelmintic, diaphoretic, diuretic, emmenagogue, febrifuge, haemostatic, leaves are used for eye sight, opthalmic, skin inflammation, swellings and urinary stones.
Other uses: Ornamental and fodder.
Description: Perennial with woody stock. Stem many, 38-45 cm tall. Leaves linear and basally congested. Flowers solitary, terminal. Petals white, limb 10 mm, exerted, toothed at the apex, barbulate.
Plate No. (13-73)
2. Scientific name: *Silene vulgaris* (Moench) Gracke
Vern. Name: Manghotay
Habit: Herb
Flowering period: June to September
Collection method: Cutting
Part used/Admin.: Whole plant/orally
Constituents: Flavonoids, fucopyranoside, galactopyranosyl, oic acid, oxoolean, saponin and silenoides.
Preparation/Dosage: The whole plant is grinded into powder and mixed with ghur. One teaspoonful is taken twice daily.
Medicinal uses: Emollient, fumigant and opthalmic.
Other uses: Ornamental and honey bee species.
Description: Plants up to 68 cm tall. Stem weak, greenish-yellow and erect. Leaves ovate to ovate-lanceolate and margin scabrid. Bracts and bracteoles lanceolate-linear. Inflorescence few-flowered dichasium. Petals white to pink, limb 5-6 mm, deeply bifid. Carpophore glabrous. Capsule 10 mm long.
Plate No. (13-74)

14. CELTIDACEAE

Scientific name:	<i>Celtis australis</i> Willd.
Vern. Name:	Tagha
Habit:	Tree
Flowering period:	March to June
Collection method:	Cutting
Part used/Admin.:	Whole plant/orally
Constituents:	Fatty oils and tannins.
Preparation/Dosage:	Decoction is obtained from the leaves. One cup is taken twice daily.
Medicinal uses:	Ammenorrhoea, in swelling and epilepsy.
Other uses:	Fodder, fuel, fruit, house holding items, shelter and thatching plant.
Description:	It is a leaf shedding tree with ovate leaves having round base. Flowers small, pale green. Stamens 5, filaments short, opposite the perianth lobes. Drupe c. 7 mm, sub globose and reddish-brown.

15. CONVULVULACEAE

1. Scientific name:	<i>Convolvulus arvensis</i> L.
Vern. Name:	Prewatai
Habit:	Herb
Flowering period:	March to June
Collection method:	Cutting and collecting
Part used/Admin.:	Whole plant/orally
Constituents:	Convolvulin, resin and tannin.
Preparation/Dosage:	Extraction of whole plant is obtained. One cup is used twice daily.
Medicinal uses:	Purgative, skin diseases and poultice.
Other uses:	Ornamental, fodder and live stock promoting.
Description:	Annual, perennial, prostrate or climbing herbs. Stem 20-100 cm long, glabrous to pubescent. Leaves ovate to broadly oblong or linear to linear oblong, sagittate to hastate. Campanulate flowers. The fruit shape is globose and size is about (5 mm). Seeds 4 and dark brown.
Plate No.	(13-77)

2. Scientific name:	<i>Cuscuta reflexa</i> Roxb.
Vern. Name:	Maicha
Habit:	Climber
Flowering period:	April to July
Collection method:	Cutting and collecting
Part used/Admin.:	Whole plant/orally
Constituents:	Amerbelin, cuscutin and cuscotalin.
Preparation/Dosage:	Extraction of whole plant is obtained. One cup is used twice daily.
Medicinal uses:	Purgative, fever, carminative, diuretic and jaundice
Other uses:	Harmful/poisonous and invasive.
Description:	Stem succulent, light to dark brown. Leaves persistent, cup-shaped, fleshy, margin scarious, obovate and obtuse. Flowers arranged in paniculate cymes, ivory white. Calyx lobes 5 and fleshy. Corolla lobes 5 and ivory white. Capsule globose-conical and brown.
Plate No.	(13-78)

16. EBENACEAE

Scientific name:	<i>Diospyros lotus</i> L.
Vern. Name:	Daz Dana
Habit:	Tree
Flowering period:	April to August
Collection method:	Cutting
Part used/Admin.:	Whole plant/orally
Constituents:	Invert sugar, malic acid and tannic acid.
Preparation/Dosage:	The riped fruits are dried are eaten as dry fruit as much as desired.
Medicinal uses:	Carminative, purgative, antifebrile and promote secretion.
Other uses:	Cash, fuel, fodder, fruit plant, honey bee species, house holding items, shelter and thatching plant.
Description:	Stems woody. Leaves petiolate elliptic or broadly lanceolate. Flowers sessile to pedicellate. Male flowers in 2-3 flowered cymes, female solitary and larger than male. Corolla yellowish-brown red. Stamens 16, in 2 opposite rows. Berry globose to ovoid, mealy-white when unripe, dark purple to black when ripe.
Plate No.	(14-81)

17. ELAEGNACEAE

Scientific name:	<i>Elaeagnus umbellata</i> Thunb.
Vern. Name:	Ghanumranga
Habit:	Tree
Flowering period:	June to August
Collection method:	Cutting
Part used/Admin.:	Fruits/orally
Constituents:	Amino acids, galactose, glucose, protein, trans ethyl cinnamat, umbellatin and xylose.
Preparation/Dosage:	The riped fruits are eaten directly as much as desired.
Medicinal uses:	Stimulent, cardiac and astringent.
Other uses:	Ornamental, beverage, cash plant, fodder, fruit plant, honey bee species, house holding items, shelter, thatching plant.
Description:	Small tree, shoots with silvery scales. Leaves elliptic-oblong to oblong-lanceolate, acute or obtuse, undersurface color is grey. The flowers are covered with scale. The calyx is forming a tube. The shape of fruit is oblong or eliptic and brown in color.

18. EUPHORBIACEAE

Scientific nam:	<i>Euphorbia wallichii</i> Hook.
Vern. Name:	Mandano
Habit:	Herb
Flower period:	May to September
Collection method:	Cutting and digging
Part used/Admin.:	Whole plant/orally
Constituents:	Daucosterol, β -sitosterol, β -amyirin, β -amyirin acetate, euphorbon, palmitic, scopoletin and triterpenoids. .
Preparation/Dosage:	Leaves are dried and grinded into powder. One teaspoonful is mixed with ghur and taken twice daily.
Medicinal uses:	Emetic, cathartic, laxative and diaphoretic.
Other uses:	Poisonous/Harmful plant
Description:	Plants are herbs with elliptic, ovate and alternate leaves. The plant is forming tufted stem. Pseudoumbels 5-6 (-7) rayed. Cyathia sessile, fruits trilobite-sub globose, seeds ovoid.
Plate No.	(14-82)

19. FABACEAE

1. Scientific name: *Astragalus candolleanus* Royle ex Benth.
Vern. Name: Ghorjakay
Habit: Shrub
Flower period: June to August
Collection method: Digging and cutting
Part used/Admin.: Dried roots and leaves/orally
Constituents: Carbohydrates and mucilage contents.
Preparation/Dosage: Roots and leaves are grinded into powder and mixed with honey. One teaspoonful is taken twice daily.
Medicinal uses: Anemia, cold, fever, heart diseases, hepatitis, influenza, kidney diseases and hepatitis.
Other uses: Beautiful/Ornamental, harmful/poisonous and honey bee species.
Description: Shrub, sub-erect or prostrate, leaf imparipinnately compound, oblong or elliptic in shape. Stipules c. 6-7 mm long, free. Inflorescence a compact raceme, calyx c. 2.5-1.3 cm long. Vexillum c. 2.5-2.6 mm long, wings shorter than vexillum. Fruit c. 1.7-2.6 cm long.
Plate No. (14-83)
2. Scientific name: *Desmodium elegans* DC.
Vern. Name: Sambar
Habit: Shrub
Flower period: June to September
Collection method: Digging
Part used/Admin.: Root/orally
Constituents: Alkaloid desmodin and fibre.
Preparation/Dosage: The roots are grinded into powder and mixed with ghur. Chunks of 100 grams are prepared and one chunk is taken twice daily.
Medicinal uses: Carminative, diuretic and tonic.
Other uses: Beautiful/Ornamental and honey bee species.
Description: Shrub, 1.8-2.5 m tall with trifoliate leaves, orbicular, ovate to obovate, obtuse to acuminate. Inflorescence a panicle, the calyx tube is longer than the teeth. Corolla 10-12.5 mm long, pale-lilac to dark purple. Fruit sessile, 3-7.5 cm long, 6-6.5 mm broad.
Plate No. (15-85)

3. Scientific name: *Indigofera heterantha* Wall. ex Brandis
 Vern. Name: Ghoreja
 Habit: Shurb
 Flower period: May to July
 Collection method: Digging and cutting
 Part used/Admin.: Whole plant/orally
 Constituents: Indigotin (Glucoside) and tannin.
 Preparation/Dosage: The roots and leaves are grinded into powder and mixed with ghur. One teaspoonful is taken twice daily.
 Medicinal uses: Antibacterial, epilepsy, haemorrhoides, hepatitis, ulcer, whooping cough and wounds.
 Other uses: Beautiful/Ornamental, brooms, cash plant, fuel plant, fodder, honey bee species, house holding items, shelters, snuff ash and thatching.
 Description: Shrub, 1.8-2.5 m tall. Leaf imparipinnately compound. The flowers are pedunculate and racemose. Calyx camapunate, pubescent, teeth as long as the tube. Corolla purple or pale red. Fruit c. 2.5 - 5 cm long.

Plate No. (15-86)

4. Scientific name: *Lespedeza juncea* (L. f.) Persoon var. *juncea*
 Vern. Name: Oormaray
 Habit: Shrub
 Flower period: July to September
 Collection method: Digging and cutting
 Part used/Admins.: Whole plant/orally
 Constituents: Phytosterol, saponin, tricin and vitamins.
 Preparation/Dosage: Decoction is obtained and one cup is taken twice daily.
 Medicinal uses: Used in ringworms and scabies.
 Other uses: Beautiful/Ornamental and fodder plant.
 Description: The plant is shrub with compound leaves. There are (2 to 4) flowers in the umbel like inflorescence. The petals are longer than the sepals. The corolla is pink or yellow color. The fruit is smooth.

5. Scientific name: *Lathyrus pratensis* L.
 Vern. Name: Zaira chilo
 Habit: Herb
 Flower period: June to August
 Collection method: Digging and cutting
 Part used/Admin.: Whole plant/orally
 Constituents: Unsaturated fatty acids, particularly linoleic and oleic acid.
 Preparation/Dosage: The fresh leaves of the plant are cooked and eaten as saag and taken as much as desired.
 Medicinal uses: Anti-tumor, repellent and resolvent.
 Other uses: Fodder and vegetable.
 Description: Plants are perennial, with compound leaves. There are (3 to 12) flowers in the inflorescence, which is racemose. Calyx 6-9 mm long, teeth somewhat unequal. Corolla yellow. The size of fruit is (2 to 3 x 5 to 6 mm) bearing 4-8 seeds.

6. Scientific name: *Medicago sativa* L.
 Vern. Name: Peeshtaray
 Habit: Herb
 Flower period: May to September
 Collection method: Digging and cutting
 Part used/Admin.: Whole plant/orally
 Preparation/Dosage: The fresh leaves of the plant are cooked and eaten as saag and taken as much as desired.
 Constituents: Asparagine, trigonelline, minerals, phytoestrogens and vitamin C.
 Medicinal uses: Antiscorbutic, anodyne, antibacterial, aperient, counteract scurvy, diuretic, emetic, febrifuge, haemostatic, nutritive, stimulant and tonic.
 Other uses: Fodder, food and vegetable.
 Description: Perennial herbs with compound leaves. The leaves are linear or obovate in shape. Racemose inflorescence is existing. The size of calyx tube and teeth are equal. The petals are pale or violet in color. The fruits are coiled and bearing (10 to 20) seeds.

7. Scientific name: *Mellilotus indica* (L.) All
 Vern. Name: Sahraye Peeshtaray
 Habit: Herb
 Flower period: March to August
 Collection method: Digging and cutting
 Part used/Admin.: Whole plant/overally
 Constituents: The plants are reportedly contains some amino acids.
 Preparation/Dosage: The fresh leaves of the plant are cooked and eaten as saag and taken as much as desired.
 Medicinal uses: Astringent, diarrhea, emollient and narcotic.
 Other uses: Fodder
 Description: Erect annual herb, 15-60 cm tall. The shape of leaves is lanceolate or oblong and margins are with teeth. The raceme is bearing (10 to 15) flowers. The size of corolla is large than calyx. The petals are yellow in color. There is a single fruit with a single seed.
8. Scientific name: *Mellilotus officinalis* (L.) Pall
 Vern. Name: Not known
 Habit: Herb
 Flower period: September onwards
 Collection method: Digging and cutting
 Part used/Admin.: Whole plant/orally
 Constituents: Betulinic acid, hexadecanoic acid, lupanone, lupeol and oleanic acid.
 Preparation/Dosage: The fresh leaves of the plant are cooked and eaten as saag and taken as much as desired.
 Medicinal uses: Emollient, aromatic, carminative, expectorant, heal wounds, diuretic, ophthalmic, antispasmodic, and styptic.
 Other uses: Fodder
 Description: The plants are with compound leaves. Upright, biennial or annual plants. The inflorescence is racemose. Petals are yellow in color. The fruit is glabrous and usually 1-seeded.
- Plate No. (15-87)

9. Scientific name: *Trigonella gracilis* Benth.
 Vern. Name: Not known
 Habit: Herb
 Flower period: July to September
 Collection method: Digging and cutting
 Part used/Admin.: Whole plant/orally
 Constituents: Aromatic compounds, calcium, iron and phosphorus.
 Preparation/Dosage: The fresh leaves of the plant are cooked and eaten as saag and taken as much as desired.
 Medicinal uses: Aphrodisiacs, astringent, bitter, carminative, gynae problems and tonic.
 Other uses: Fodder, food, honey bee species and soil reclamation plant.
 Description: Perennial, stem trailing, 15-45 cm long, glabrous, cuneate, retuse, obovate and minutely toothed. Inflorescence 1-5 flowered, peduncle longer than the leaf, ending in an awn. The petals are yellow in color. The size of calyx and corolla are almost equal. The fruit is bearin (1 to 3) seeds.
 Plate No. (15-88)

10. Scientific name: *Trifolium repens* L.
 Vern. Name: Shoutal
 Habit: Herb
 Flower period: April to July
 Collection method: Digging and cutting
 Part used: Whole plant
 Constituents: Cyanogenic glucoside lotaustralin and pinitol.
 Preparation/Dosage: The fresh leaves of the plant are cooked and eaten as saag and taken as much as desired.
 Medicinal uses: Astringent, antirheumatic, antiscrophulatic, depurative, detergent, opthalmic and tonic.
 Other uses: Beautiful/Ornamental, fodder, food, honey bee species, live stock promoting, soil reclamation plant and vegetable.
 Description: The plants are perennial. Leaves are compound and the leaflets are obovate in shape. Racemose inflorescence is there bearing smelling flowers. The petals are pink or white color. The fruit is with 3 to 4 seeds.
 Plate No. (15-89)

20. FAGACEAE

1. Scientific name: *Quercus incana* Roxb.
Vern. Name: Banj
Habit: Tree
Flower period: August to September
Collection method: Cutting and collecting
Part used/Admin.: Whole plant and seeds/orally
Constituents: Fibre, hemi cellulose, lignin and tannins.
Preparation/Dosage: The seeds are fried in fire and eaten as a dry fruit as much as desired.
Medicinal uses: Astringent, diuretic, diarrhea, indigestion, gonorrhoea and asthma.
Other uses: Fuel plant, honey bee species, house holding items, shelter and snuff ash plant.
Description: Trees with tomentum and ovate, elliptic or lanceolate leaves. The dorsal side is green and the ventral is whitish bearing tomentum. Size of petiole is 0.4-1.5 cm long. Male flowers in catkins, 6-14 cm long, stamens 4-6, cupule c. 1.2 cm broad, sub-globose, enclosing half the nut at maturity. Nut 1-2 cm long, umbo tipped and glabrescent.

Plate No. (15-90)

2. Scientific name: *Quercus semecarpifolia* Smith
Vern. Name: Seray
Habit: Tree
Flower period: May to June
Collection method: Cutting and collecting
Part used/Admin.: Whole plant and seed/orally
Constituents: Fibre, phenolics, protein and tannins.
Preparation/Dosage: The seeds are fried in fire and eaten as a dry fruit as much as desired.
Medicinal uses: Anti-inflammatory, diarrhea and dysentery.
Other uses: Fuel plant, honey bee species, house holding items, shelter and snuff ash plant.
Description: Tree or shrubby, leaves oblong to elliptic-oblong, 3.5-12 x 1.6-7.5 cm, obtuse, rarely acute, green and glabrescent above, rusty tomentose below, leathery, nerves forked, margin entire to spinose. Male inflorescence 4-8 cm long, bracts broadly ovate. Androecium consists of (5 to 8) stamens. The fruit is a globose nut, dark brown when mature.

Plate No. (16-92)

21. GERANIACEAE

1. Scientific name: *Geranium lambertii* Sweet
Vern. Name: Sra zeela
Habit: Herb
Flower period: June to September
Collection method: Digging
Part used/Admin.: Rhizome/orally
Constituents: Essential oil
Preparation/Dosage: The dried rhizome is grinded into powder, mixed in *Halwa* and eaten twice daily as much as needed.
Medicinal uses: Antipyretic, cold, cough and tonic.
Other uses: Beautiful/Ornamental and cash plant.
Description: Plant up to 45 cm, stem ascending, pubescent. Leaves reniform, plamati-partite, 5-angled, 5.5-7 cm broad. Peduncles up to 18.5 cm long, 2-flowered. Sepals 10-12 mm long, elliptic ovate, glandular hairy.
- Plate No. (16-94)
2. Scientific name: *Geranium wallichianum* D. Don ex Sweet
Vern. Name: Sra zeela/Rattanjot
Habit: Herb
Flower period: July to September
Collection method: Digging
Part used/Admin.: Rhizome/orally
Constituents: Gallic acid, pectin, red matter, starch, sugar and tannin.
Preparation/Dosage: The dried rhizome is grinded into powder, mixed in *Halwa* and eaten twice daily as much as needed.
Medicinal uses: Used in ulcer, as tonic, astringent, dysentery, diarrhea, hemorrhages and leucorrhoea.
Other uses: Beautiful/Ornamental and cash plant.
Description: rhizomatous hairy perennial. The leaves are ovate and five-angled. There are two flowers on one stalk. The size of calyx is (8 to 10 mm). The corolla is 1.5-2 cm long, slightly retuse, mauve. Mericarps hairy, seed 5 mm long and oblong.
- Plate No. (16-93)

22. GENTIANACEAE

1. Scientific name: *Swertia longifolia* Boiss.
Vern. Name: Skhwara
Habit: Herb
Flower period: June to October
Collection method: Digging and cutting
Part used/Admin.: Whole plant/orally
Constituents: Xanthone and xanthone-diglycoside.
Preparation/Dosage: Root is grinded into powder, mixed with ghur and 100 gram chunk is taken twice daily.
Medicinal uses: Anti-inflammatory, febrifuge and anti-hepatic
Other uses: Beautiful/Ornamental and fodder.
- Description: The plant is non hairy, perennial with obovate or ovate lower leaves, which are sharp or obtuse. Inflorescence paniculate. Calyx lobes ovate, acute. Corolla bluish white to pale green. Capsule 8-12 mm, seeds corrugate and cristate.
- Figure No. (28)
2. Scientific name: *Swertia cordata* (G. Don) Clarke
Vern. Name: Skhwara
Habit: Herb
Flower period: August to October
Collection method: Digging and cutting
Part used/Admin.: Whole plant/orally
Preparation/Dosage: Root is grinded into powder, mixed with ghur and 100 gram chunk is taken twice daily.
Constituents: Xanthone and 1-Hydroxy-3-5-7-8-tetramethoxyxanthone.
Medicinal uses: Asthma, constipation and dyspepsia.
Other uses: Beautiful/Ornamental and fodder.
- Description: Annual, stem 15-80 cm, quadrangular. Leaves cordate-ovate, opposite, sessile. Inflorescences broadly paniculate. Corolla bluish white to white with purple veins. Glands one per lobes and naked. Ovary 4-5 mm, style distinct, stigma orbicular to sub orbicular. Capsule 6-8 mm. Seeds corrugate-cristate.
- Plate No. (16-95)

3. Scientific name:	<i>Swertia paniculata</i> Wall.
Vern. Name:	Skhwara
Habit:	Herb
Flower period:	July to November
Collection method:	Digging and cutting
Part used/Admin.:	Whole plant/orally
Preparation/Dosage:	Root is grinded into powder, mixed with ghur and 100 chunk gram is taken twice daily.
Constituents:	Secoiridoids, flavonoids, and xanthones.
Medicinal uses:	Bitter and stomachache.
Other uses:	Beautiful/Ornamental and fodder.
Description:	Annual, stem 15-90 cm, quadrangular, branched or simple leaves. Inflorescences paniculate, penatmerous. Calyx lobes ovate, acute, glabrous or hairy or pubescent, equal or unequal. Corolla bluish white or greenish yellow, lobes with purple band above gland Capsule 5-10 mm and seeds rounded.

23. JUGLANDACEAE

Scientific name:	<i>Juglans regia</i> L.
Vern. Name:	Ghuzz
Habit:	Tree
Flower period:	February to April
Collection method:	Peeling, cutting and collecting
Part used/Admin.:	Bark, leaves and fruit/orally
Constituents:	Juglone, hydrojuglone and tannin.
Preparation/Dosage:	The dried bark is cut into pieces and used as <i>Dhandasa</i> . Fresh leaves are used as <i>Dhandasa</i> . The dried fruit are directly taken or mixed with <i>Halwa</i> .
Medicinal uses:	Anthelmintic, anti-inflammatory, astringent, rheumatism, sore throat, toothache and tonic.
Other uses:	Beverages, cash plant, fuel plant, furniture, fruit plant, honey bee species, house holding items, shelter and snuff ash plant.
Description:	It is a tree with compound and deciduous leaves. The number of tepals are 4 in male catkin. The female flowers are (1 to 3) in number. The fruit is a drupe, globose or ovoid in shape, with green color epicarp and the endocarp is bony and dividable to 2 parts. The seed has two or four lobes.
Plate No.	(17-97)

24. LYTHRACEAE

Scientific name:	<i>Punica granatum</i> L.
Vern. Name:	Annangoray
Habit:	Tree
Flower period:	April to July
Collection method:	Cutting and picking
Part used/Admin.:	Bark, leaves and fruit/orally
Constituents:	Alkaloid pelletrine, pseudopelletierine, pelletierine, isopeletierine and methylpeletierine.
Preparation/Dosage:	The bark, leaves and pulp of fruit are used as condiments. One teaspoonful powder fruit pulp is mixed with ghur and seeds are taken directly.
Medicinal uses:	Cardiac, stomachic, used in diarrhea, dysentery, dysuria, astringent, anthelmintic, cooling, refrigerant & carminative
Other uses:	Beautiful/Ornamental, cash plant, fuel plant, fruit plant, honey bee species and snuff ash plant.
Description:	Tree, 1.5-5 m tall. The shape of leaves is elliptic, oblong or obovate and smooth. The petals are red in color. The fruit is globose shape and bearing pink or red seeds. The testa thick, fleshy and juicy.
Plate No.	(17-98)

25. LAMIACEAE

1. Scientific name:	<i>Mentha longifolia</i> (L.) Huds.
Vern. Name:	Veenalay
Habit:	Herb
Flower period:	May to November
Collection method:	Cutting
Part used/Admin.:	Whole plant/orally
Constituents:	Ethanol, menthol, menthone, piperitone, terpineol and volatile oil.
Preparation/Dosage:	Both dried and fresh leaves are mixed with curd (chttney) and taken as mush as desired.
Medicinal uses:	Antirheumatic, antiseptic, aromatic, carminative, colics, diarrhea, dysentery, stimulant, stomachache and in tonsillitis, in asthma, cold, cough and headache.
Other uses:	Ornamental, cash plant, food and honey bee species.
Description:	Perennial, aromatic herb. Leaves variable in size, ovate to lanceolate to narrow oblong-elliptic and green. Inflorescence of verticillasters corolla light purple, violet, mauve or white.
Plate No.	(17-99)

2. Scientific Name: *Marrubium vulgare* L.
 Vern. Name: Krachay
 Habit: Shrub
 Flower period: June to August
 Collection method: Cutting
 Part used/Admin.: Whole plant/orally
 Constituents: Bitter substances, essential oil and marrubin.
 Preparation/Dosage: The leaves are grinded into powder and mixed with honey and sugar.
 One teaspoonful is taken twice daily.
 Medicinal uses: Carminative, expectorant, diuretic, pectoral, in cough, cold, pulmonary diseases and tonic.
 Other uses: Ornamental and fuel plant.
 Description: Small shrub up to 30-40 cm tall. The leaf upper surface is rough and with thin hairs. The leaf shape is circular or ovate. Verticillasters axillary, many flowered. Corolla white, 9 mm. Nutlets triquetrous and ovoid.

3. Scientific Name: *Nepeta cataria* L.
 Vern. Name: Jalbanga
 Habit: Herb
 Flower period: May to August
 Collection method: Cutting
 Part used/Admin.: Whole plant/orally
 Constituents: Ascorbic acid, α -pinene, β -nepetalactone and cineol.
 Preparation/Dosage: The leaves are grinded into powder and mixed with honey and sugar.
 One teaspoonful is taken twice daily.
 Medicinal uses: Antispasmodic, astringent, carminative, colic, cough, diaphoretic, emmenagogue, insomnia, menstruation, nervine, refrigerant, sedative, stimulant, stomachache and tonic.
 Other uses: Ornamental and fodder.
 Description: A perennial herb with erect stem, leaf length 3-6 cm, ovate to cordate, Cymes axillary basally, Corolla white with purple spots on larger lower lip. Nutlets nearly triquetrous.

4. Scientific Name: *Nepeta erecta* L.
 Vern. Name: Jalbanga
 Habit: Herb
 Flower period: May to August
 Collection method: Cutting
 Part used/Admin.: Whole plant/orally
 Constituents: Essential oil, isoiridomyrmecin and nepetalactone.
 Preparation/Dosage: The leaves are grinded into powder and mixed with honey and sugar.
 One teaspoonful is taken twice daily.
 Medicinal uses: Used in cold, fever, headache, as stomachache and carminative.
 Description: Perennial herbs, up to 120 cm, rhizome woody. Leaves 40-80 x 20-40 mm, narrow to broad ovate, green above, paler below. Inflorescence of separated verticillasters. Corolla 20-25 mm, pale mauve to deep violet blue. The fruit is brown in color and broad obovoid in shape.
- Plate No. (18-103)
5. Scientific Name: *Stachys emodi* Hedge
 Vern. Name: Kharbotay
 Habit: Herb
 Flower period: June to August
 Collection method: Cutting
 Part used/Admin.: Whole plant/orally
 Constituents: Alkaloids stachydrine, betonicine and tannin.
 Preparation/Dosage: The leaves are grinded into powder and mixed with honey and sugar.
 One teaspoonful is taken twice daily.
 Medicinal uses: Antispasmodic, anthelmintic, astringent, carminative, diuretic, diarrhea, dysentery, emetic and expectorant.
 Other uses: Ornamental and fuel.
 Description: Perennial herbs, 30-60 cm, unbranched. Verticillasters many flowered. Calyx green or purplish, 6-10 mm. Corolla pale pink to pinkish purple, 10-17 mm, style 2-fid, nutlets brown, oblong ovoid, 2 x 1.7 mm, apically rounded.
- Plate No. (18-104)

6. Scientific Name: *Origanum vulgare* L.
 Vern. Name: Shamakay, marjorm
 Habit: Herb
 Flower period: June to October
 Part used/Admin.: Whole plant/orally
 Collection method: Digging and cutting
 Constituents: Tannin, phenol, resin, coriariamyrtin.
 Preparation/Dosage: The leaves are grinded into powder, mixed with butter and one teaspoonful is taken twice daily.
 Medicinal uses: Antispasmodic, astringent, carminative, diuretic, stimulant, stomachic and tonic.
 Other uses: Fodder, diuretic, used in washing utensils. It is also used for toothache and earache.
 Description: It is a perennial herb with rhizome, roots fibrous, aromatic and stem is branched, hairy or not, the leaves are green to purplish. Leaves are oval simple, margined are smooth and elliptic. Inflorescence much branched, verticillasters 2-flowered.

Plate No. (18-105)

7. Scientific Name: *Prunella vulgaris* L.
 Vern. Name: Binoray
 Habit: Herb
 Flower period: June to August
 Collection method: Cutting
 Part used/Admin.: Whole plant/orally
 Constituents: Essential oil and bitter principle.
 Preparation/Dosage: The roots and leaves are grinded into powder and mixed with ghur. One teaspoonful is taken twice daily.
 Medicinal uses: Antispasmodic, antiseptic, antipyretic, antirheumatic, alterative, cough, expectorant, piles and tonic.
 Other uses: Ornamental, honey bee species and livestock promoting.
 Description: Perennial herbs with creeping rhizome. Leaves oblong, to ovate-oblong, acute, cuneate, Uppermost leaves sessile. Inflorescence a spike, Calyx 7-8 mm, purple or green, tubular, upper lip truncate with 3 short mucronulate teeth, lower lip deeply divided in to 2 lanceolate teeth. Calyx 9 mm long, tube straight. Nut lets 1.8 – 1 mm, pale brown and smooth.

Plate No. (18-106)

8. Scientific Name: *Thymus linearis* Benth.
 Vern. Name: Speerkay
 Habit: Herb
 Flower period: June to September
 Collection method: Digging
 Part used/Admin.: Whole plant/orally
 Constituents: Essential oil, phenol, p-cymene, terpenes and terpenes alcohols.
 Preparation/Dosage: Green tea is prepared from fresh and dried leaves. Two cups are taken daily or dose may be increased as required.
 Medicinal uses: Antirheumatic, antipyretic, antispasmodic, carminative, cough, cold, flu and stomachache.
 Other uses: Ornamental, beverage, cash plant, honey bee species and livestock promoting.
 Description: Mat forming, branched, dwarf and creeping, aromatic herb. Leaves in fascicles at the nodes, elliptic-obovate to linear lanceolate. Stem 4-angled. Inflorescence ovoid-capitate. Calyx 3.5-4 mm, tubular to campanulate, purplish. Corolla 6 mm long, pale lilac, pink purplish or violet. Stamens clearly exerted in hermaphrodite flowers. Nutlets pale brown and ovoid.

Plate No. (17-101)

9. Scientific Name: *Isodon rugosus* (Wall. ex Bth.) Codd
 Vern. Name: Sperry, burtus
 Habit: Shrub
 Flower period: May to October
 Collection method: Cutting
 Part used/Admin.: Branches/leaves/orally
 Constituents: Caryophyllene, alpha-pinene, beta-phellandrene, p-cymene and myrcene.
 Preparation/Dosage: The leaves are grinded into powder and mixed with ghur. One teaspoonful is taken twice daily. The decoction of plant is antiseptic.
 Medicinal uses: Antiseptic.
 Other uses: Ornamental, brooms, fuel plant, fodder and soil reclamation plant.
 Description: Aromatic much branched shrub. Branched stem and slender. The leaves are ovate, upper surface is green and hairy. The lower surface is white and stellate hairs are present on it, these are crenate or crenulate; cymes on slender lateral branches.

Plate No. (18-107)

10. Scientific Name: *Lamium album* L.

Vern. Name: Kraachay

Habit: Herb

Flower period: May to August

Collection method: Cutting

Part used/Admin.: Whole plant/orally

Constituents: Anthocyanins, betaines, flavonoids, iridoids, lamiol, lamioside, phenyl propanoids, secoiridoids and terpenes.

Preparation/Dosage: The leaves are grinded into powder, mixed with honey or ghur and one teaspoonful is taken twice daily.

Medicinal uses: Antispasmodic, astringent, cancer, cholagogue, depurative, diuretic, expectorant, hypnotic, ophthalmic, pectoral, resolvent, sedative, styptic, tonic and vaso contractor.

Other uses: Fuel plant

Description: Perennial herb with rhizome. Stems erect, unbranched, 20-70 cm, 4 angled, purplish below. Leaves ovate, serrate, acute, cordate to truncate. Verticillasters 3-7, up to 20-flowered, distant. Calyx 10-15 mm long. Corolla white, rarely light rose, 20-25mm. Stamens $\pm$ included under upper lip. Style $\pm$ equally bifid. Nut lets dark brown.

Plate No. (17-100)

11. Scientific Name: *Leonurus cardiaca* L.

Vern. Name: Kharaye

Habit: Herb

Flower period: May to August

Collection method: Collection

Part used/Admin.: Flowers heads/orally

Constituents: Alkaloids, diterpenoids, flavonoids, glycoside, iridoids and saponins.

Preparation/Dosage: The leaves are grinded into powder, mixed with honey or ghur and one teaspoonful is taken twice daily.

Medicinal uses: Anti-cholesterol, antispasmodic, cardiac, diuretic, gynae problems, sedative, stimulant and tonic.

Other uses: Fodder plant

Description: Perennial herb with a spreading rhizome. Stems 4 angled, 50-100 cm. Leaves variously dissected, ovate in outline, deeply lobed. Verticillasters to 10-15 mm in diameter, flowers non pedicillate. The calyx size in length is 5 mm. The color of corolla is rose or white, c. 12 mm long; upper lip densely white villous; tube obliquely annulate. Nut lets pale brown, c. 2.5 long, apically pilose.

Plate No. (17-102)

26. MORACEAE

Scientific Name:	<i>Ficus carica</i> Forssk.
Vern. Name:	Inzar, injeer, fig
Habit:	Tree
Flower period:	April to June
Collection method:	Cutting
Part used/Admin.:	Fruit, latex, leaves and wood/orally
Constituents:	Calcium, carbohydrates, iron, phosphorus, proteins and vitamins.
Preparation/Dosage:	The fruits are taken directly. The leaves are grinded into powder, mixed with ghur and one teaspoonful is taken twice daily.
Medicinal uses:	Anti-asthmatic, aphrodisiac, demulcent, laxative, piles and urine problem.
Other uses:	Cash plant, fuel, fodder, fruit, house holding items, Livestock, sacred, shelter and thatching plant.
Description:	Bark smooth, grey or dull white; leaves ovate to nearly orbicular with glabrous to tomentose grooved petiole; hypanthodia axillary solitary or paired; figs pyriform-obovoid, yellowish to brownish violet.
Plate No.	(18-108)

27. MALVACEAE

Scientific Name:	<i>Malva neglecta</i> Wall.
Vern. Name:	Panerak, samchal
Habit:	Herb
Flower period:	April to July
Collection method:	Cutting
Part used/Admin.:	Leaves/orally
Constituents:	Anthocyanins, flavonoids, galactose, galacturonic acid, glucuronic acid, malvin, phenolic acid, rhamnose and tannins.
Preparation/Dosage:	The fresh leaves are cooked and eaten directly as saag as much as desired.
Medicinal uses:	Antispasmodic, cooling, haemorrhoides, purgative and urinary problem.
Other uses:	Ornamental, fodder, food, honey bee species, livestock promoting and vegetable.
Description:	Perennial woody herb. Leaves orbicular, deeply cordate. Flowers axillary, 3 on 4 in fascicles. Epicalyx segments linear to linear-lanceolate. Sepals are free, the size is 5-8 mm long. The Petals are 10-13 mm long in size, 3-4 mm broad, oblong-obovate, purplish or pinkish. Fruit depressed, the size is 5-6 mm across; mericarps 13-15. Seed dark brown, reniform, 1 mm long.
Plate No.	(19-109)

28. OXALIDACEAE

Scientific Name:	<i>Oxalis corniculata</i> L.
Vern. Name:	Treewakay
Habit:	Herb
Flower period:	March to October
Collection method:	Cutting and collection
Part used/Admin.:	Leaves/orally
Constituents	Potassium oxalate
Preparation/Dosage:	The fresh leaves are cooked and eaten directly as saag as much as desired.
Medicinal Uses:	Anti-scorbic, cooling, refragant and stomachache.
Other uses:	Ornamental, food and vegetable.
Description:	Herb, hairy, roots are present at nodes. Leaflets 3, flowers pedicillate and ins umbels and terminal. The calyx with 5 sepals and crolla with 5 petals. Flowers color is yellow. The stamens are short and styles are long. The number of carpels are 5. Fruit a capsule and sub cylindric in shape.
Plate No.	(19-110)

29. ONAGRACEAE

1. Scientific Name:	<i>Epilobium hirsutum</i> L.
Vern. Name:	Aplum
Habit:	Herb
Flower period:	May to August
Collection method:	Cutting
Part used/Admin.:	Leaves/orally
Constituents:	Ascorbic acid, galic acid, muscilage, pectin, pyrogallol and tannin.
Preparation/Dosage:	The dried leaves are grinded into powder and mixed with ghur or honey. One teaspoonful is taken twice daily.
Medicinal uses:	Astringent, cooling and used in diarrhea.
Other uses:	Ornamental
Description:	Erect perennial herb, stems 0.2-2.5 m tall, branched, hairy. Leaves oblong lanceolate or lanceolate, 2-12 x 0.5-4.5 cm, acute apex, sub cuneate base. Inflorescence erect and branched. Flowers erect, petals are deeply notched, bright rose purple. Capsule 3-10 cm long. The seeds are obovoid.
Plate No.	(19-112)

2. Scientific Name:	<i>Oenothera rosea</i> L.
Vern. Name:	Palay
Habit:	Herb
Flower period:	May to September
Collection method:	Cutting and collection
Part used/Admin.:	Seeds/orally
Constituents:	Oil, palmitic acid, oleic acid, linoleic acid and steric acid.
Preparation/Dosage:	The dried leaves are grinded into powder and mixed with ghur or honey. One teaspoonful is taken twice daily.
Medicinal uses:	Anemia, gynae problems and psoriasis.
Other uses:	Ornamental
Description:	Branched perennial herb, stems ascending, 1-4 dm tall. Leaves sub entire, elliptic or ovate. The color of petals is rose or purple and shape is obovate, 4-12 mm long. The fruit is a clavate capsule. The shape of seeds are obovoid or oblong in shape, 0.7-0.9 mm long, with a dark spot at each end.
Plate No.	(19-111)

30. OLEACEAE

1. Scientific Name:	<i>Fraxinus xanthoxyloides</i> (G. Don) DC.
Vern. Name:	Hanuz and soom
Habit:	Tree
Flower period:	May to August
Collection method:	Cutting
Part used/Admin.:	Bark and fruit/orally
Constituents:	Fraxin, flavonoids, glucoside, kaempferol and quercetin.
Preparation/Dosage:	The bark is grinded into powder and mixed with honey. One teaspoonful is taken twice daily. The fruits are taken directly.
Medicinal Uses:	Astringent, bitter, febrifuge and tonic.
Other uses:	Fodder and house holding items.
Description:	Shrub or tree, grey bark, smooth, dark and cracked old. Leaves opposite, 8-12 cm, ovate-lanceolate or ovate-oblong, sessile or sub sessile. Flowers in dense heads. Calyx lacking in male flowers, small and persistent in bisexual flowers. Corolla lacking. Samarae spatulate, 3-4 cm long, in dense fascicles.

Scientific Name:	<i>Jasminum humile</i> L.
Vern. Name:	Zair rambail
Habit:	Shrub
Flower period:	June to August
Collection method:	Cutting and Digging
Part used/Admin.:	Flowers and roots/orally
Constituents:	Essential oil and alkaloid Jasminin.
Preparation/Dosage:	Green tea is prepared from dried flowers. Roots are grinded into powder and mixed with ghur and one teaspoonful is taken twice daily.
Medicinal Uses:	Astringent, used in ring worms and as a tonic.
Other uses:	Ornamental, fuel plant, honey bee species and sacred plant.
Description:	Evergreen, glabrous climbing shrub. Leaves alternate; leaflets 3-5, coriaceous, dark green above, elliptic, ovate or lanceolate, acute or obtuse; flowers, yellow, in terminal cymoses; Fruits Berry.

31. OROBANCHACEAE

Scientific Name:	<i>Euphrasia himalayica</i> Wettst.
Vern. Name:	Not known
Habit:	Herb
Flower period:	May to August
Collection method:	Digging and cutting
Part used/Admin.:	Whole plant
Constituents:	Resin, tannin and volatile oil.
Preparation/Dosage:	Decoction of plant is obtained and mixed with sugar. One cup is taken twice daily.
Medicinal uses:	Cold, cough, eye inflammation, hay fever and sore throat.
Other uses:	Fodder
Description:	A small annual. Stem slender with erect branches. Leaves ovate, 5-12 mm, toothed. Inflorescence in terminal spikes like clusters of small white and purple tinged 2-lipped flowers with yellow throat. Stamens didynamous. Corolla c. 8 mm, limb 5 lobed, lower lip 3 lobed. Calyx with narrow triangular hairy lobes.

32. PAEONIACEAE

Scientific Name:	<i>Paeonia emodi</i> Wall. ex Royle
Vern. Name:	Mamaikh
Habit:	Herb
Flower period:	June to August
Collection method:	Cutting and Digging
Part used/Admin.:	Rhizome and seeds/orally
Constituents:	Galactoside, gallic acid, momoterpene, methyl gallate, oxalic acid, oligostilbene, paeoninol and tannin.
Preparation/Dosage:	The rhizome and seeds are grinded and mixed with ghur or <i>Halwa</i> . About 500 grams is given to cattles at once and 50 grams is given to human beings twice daily for a period of one week.
Medicinal Uses:	Backache, blood purifier, cathartic, colic, dropsy, emetic, epilepsy, hysteria, rheumatism, urinary problems and tonic.
Other uses:	Cash plant and livestock promoting.
Description:	Perennial, 50 cm or more tall. Leaves biternate or ternate, lamina pale on undersurface. Flowers solitary, axillary, 8-9 cm broad. Bracts leafy. Sepals imbricate, oblong to sub orbicular. Petals 8, white, obovate, 4-5 x 2.7-3.8 cm. Seeds 3-5, large, globose-ovoid, c. 8 mm broad, brown-black, bright scarlet red when unripe.
Plate No.	(20-115 & 116)

33. PAPAVERACEAE

Scientific Name:	<i>Corydalis diphyllo</i> Wall.
Vern. Name:	Bhutkis
Habit:	Herb
Flowering period:	June to August
Collection method:	Cutting and digging
Part used:	Whole plant
Constituents:	Bulbocapnine, corydaline, fumeric acid and starch.
Preparation/Dosage:	The extraction of the whole plant is obtained and mixed with honey. One cup is taken twice daily.
Medicinal uses:	Alterative, bitter, diuretic, opthalmic and tonic.
Other uses:	Ornamental
Description:	Perennial herb, stem 15-30 cm tall. Racemes 5-15 flowered, flowers 15-20 mm long, showy, purple or bright orange yellow with violaceous pink darker tips, spur as long or little longer than the lamina of upper petal. Sepals 1-1.5 mm in diameter, sub orbicular, denticulate. Capsules oblong-elliptic to oblong-ovate, 10-15 mm long.
Plate No.	(20-117)

34. PARNASSIACEAE

Scientific Name:	<i>Parnassia cabulica</i> Planch. ex Clarke
Vern. Name:	Not known
Habit:	Herb
Flowering period:	May to August
Collection method:	Cutting and collecting
Part used/Admin.:	Whole plant/orally
Constituents:	Not known
Preparation/Dosage:	The extraction of the whole plant is obtained and mixed with honey. One cup is taken twice daily.
Medicinal uses:	Used in digestive disorders.
Description:	Plants 11.5-15.5 cm tall. Leaves 1-1.5 cm long, ovate, obtuse to acute. Scape thin and slender, aphyllous. Flowers 1.4-1.5 cm in diameter. The calyx is forming a tube. The size of petals is 6-11x2-4. Staminodes oblong quadrate to oblong-cuneate. Capsule obovate.
Plate No.	(20-118)

35. PHYTOLACACEAE

Scientific Name:	<i>Phytolacca latbenia</i> (Moq.) Walter
Vern. Name:	Thamakoo sag
Habit:	Shrubby
Flowering period:	May to August
Collection method:	Digging and cutting
Part used/Admin.:	Whole plant/orally
Constituents:	Bitter substances and phytolacca toxin.
Preparation/Dosage:	The extraction of the leaves is obtained and mixed with sugar. One cup is taken twice daily.
Medicinal uses:	Narcotic and pains of joints.
Other uses:	Ornamental and honey bee species
Description:	Plant shrubby, 1-2 m tall. Stem stout, fistular. Leaves lanceolate to ovate, 12-30 cm long. Inflorescence leaf opposed, short peduncled raceme, up to 25 cm long. Flowers greenish, 5 mm in diameter. Perianth 5, polyphyllous, each oblong, obtuse. Stamens 10, persistent. Carpels 6-8, free. Fruit a cluster of dark purple berries.
Plate No.	(20-119)

36. PLANTAGINACEAE

1. Scientific Name: *Plantago amplexicaulis* Cav.
Vern. Name: Isphaghol
Habit: Herb
Flowering period: May to August
Collection method: Cutting and collecting
Part used/Admin.: Leaves and seeds/orally
Constituents: Arabinose, galacturonic acid, pentosan, rhamnose and xylose.
Preparation/Dosage: The extraction of the leaves is obtained and mixed with honey, seed are mixed with a glass of milk. One cup extraction or one glass milk mixed with seeds are taken twice daily.
Medicinal uses: Astringent, diabetes, demulcent, febrifuge, infusion is ophthalmic, laxative, low cholesterol and pectoral.
Other uses: Ornamental and livestock promoting.
Description: Annual herbs, no stem, branched at base, up to 30 cm tall. Leaves close or distant, spiral, lanceolate, 4-15 mm long, entire or toothed. Many scapes, erect, axillary 10-25 cm long. Sepals broad ovate, 3.5 mm long, sub acute. Corolla not hairy, ovate, 2-3.75 mm long, acute. Capsule ellipsoid, 6 mm long, seeds 2, black and 4 mm long.
Plate No. (21-121)
2. Scientific Name: *Plantago lanceolata* L.
Vern. Name: Warokay isphaghol
Habit: Herb
Flowering period: May to August
Collection method: Cutting and collecting
Part used/Admin.: Leaves and seeds/orally
Constituents: Aucubin, flavonoids, mucilage, phenolic acid, polysaccharide, salicylic acid and tannins.
Preparation/Dosage: The extraction of the leaves is obtained and mixed with honey, seed are mixed with a glass of milk. One cup extraction or one glass milk mixed with seeds are taken twice daily.
Medicinal uses: Bronchitis, purgative, antipyretic, inflammation, constipation and in wounds.
Other uses: Ornamental and livestock promoting.
Description: Small acaulescent perennial herb, the size may be 60 cm. The shape of leaves is narrow lanceolata, elliptic and acute. Spikes dense, conic-cylindrical, sub globose to globose. The sepals are glabrous and the anterior one is connate, bilobed and obovate. The lobes of corolla are narrow ovate. The number of seeds are 2 and they are smooth.

3. Scientific Name: *Plantago depressa* Willd.

Vern. Name: Isphaghol

Habit: Herb

Flowering period: May to August

Collection method: Cutting and collecting

Part used/Admin.: Leaves and seeds/orally

Constituents: Acteoside, geniposidic acid, majorosid, plantainoside, plantamajoside, sitosterol, sterol and ursolic acid.

Preparation/Dosage: The extraction of the leaves is obtained and mixed with honey, seed are mixed with a glass of milk. One cup extraction or one glass milk mixed with seeds are taken twice daily.

Medicinal uses: The plant is laxative.

Other uses: Livestock promoting.

Description: Annual herb, up to 12 cm tall. Leaves in rosettes, lamina 5-10 cm long, elliptic to elliptic-lanceolate to ovate, 5-7 nerved. Scape 6-15 cm long, arched. Spikes nearly equaling the peduncle. Sepals 2 mm long, slightly concave, anterior ones narrow obovate, elliptic to broad elliptic. Corolla tube equal to the calyx, lobes small, elliptic to ovate. Anthers exserted and capsule conical. Seeds 5 and purplish brown.

4. Scientific Name: *Plantago major* Willd.

Vern. Name: Ghat isphaghol

Habit: Herb

Flowering period: May to August

Collection method: Cutting and collecting

Part used/Admin.: Leaves and seeds/orally

Constituents: Bitter compound, glucoside aucubin and saponin.

Preparation/Dosage: The extraction of the leaves is obtained and mixed with honey, seed are mixed with a glass of milk. One cup extraction or one glass milk mixed with seeds are taken twice daily.

Medicinal uses: Antipyretic, boils and laxative.

Other uses: Ornamental and livestock promoting.

Description: Perennial herb, adventitious roots with rootstocks. Leaves in rosettes, spirally arranged, ovate elliptic, 3-9 nerved. Scapes many, 13-15 cm long, arched and erect. Calyx 3 mm long, glabrous, sepals broadly elliptic, oblong to round obtuse. Corolla greenish or yellowish white, lobes elliptic- ovate. Anthers at first lilac, later whitish or yellowish. Capsule 2-3 mm long and globose. Seeds minute and dull black.

Plate No. (20-120)

37. POLYGONACEAE

1. Scientific Name: *Bistorta affinis* (D. Don) Green

Vern. Name: Anjabar

Habit: Herb

Flowering period: June to August

Collection method: Digging and collecting

Part used/Admin.: Rhizome

Constituents: Tannin 6-galloyglucose

Preparation/Dosage: The rhizome is grinded into powder and mixed with ghur. One teaspoonful is taken twice daily.

Medicinal uses: Anti-inflammatory and astringent.

Other uses: Ornamental

Description: Densely tufted and perennial herb. Leaves basal as well as cauline sessile or shortly petiolate. Ocrea 4-10 mm long, tubular, brown with veins. Inflorescence a pedunculate, 2-4 cm spicate head. Flowers pedicellate, 2.5-3.0 mm across. Tepals 5, biseriate and pink, obtuse to acute and elliptic. Stamens 8, biseriate, filaments long. Nuts dark brown, smooth and shining.

2. Scientific Name: *Bistorta amplexicaule* (D. Don) Greene

Vern. Name: Masloon

Habit: Herb

Flowering period: June to August

Collection method: Cutting

Part used: Shoot, leaves

Constituents: Glucopyranoside, phenolic acid, sulfate and tannin.

Preparation/Dosage: Extraction of shoots and leaves is obtained and mixed with sugar. One cup is taken twice daily.

Medicinal uses: Inflammation laryngitis and sore throat.

Other uses: Ornamental and fodder

Description: Erect perennial, rhizomatous herb, simple or branched. Leaves broadly lanceolate-ovate, serrate, acuminate, amplexicaulis. The inflorescence is terminal and simple or branched. The shape of tepals is lanceolate to ovate, it is obtuse, entire and unequal in size. The number of stamens are 8, with short and unequal filaments with dark bluish anthers. The fruit is a ovate nut and the color is black or dark brown.

Plate No. (21-122)

3. Scientific Name: *Fagopyrum esculentum* Moench
 Vern. Name: Not known
 Habit: Herb
 Flowering period: June to August
 Collection method: Digging and collecting
 Part used/Admin.: Whole plant/orally
 Constituents: Amylose, amylopectin, fagopyrins, fats, Iron, lysine, protien, Selenium, starch, theronine, tryptophan, tannins and Zinc.
 Preparation/Dosage: Whole plant is dried and grinded in to flour then bread is prepared and eaten directly as much as desired.
 Medicinal uses: Acrid, astringent, galactagogue and vaso dilator.
 Other uses: Fodder and vegetable.
 Description: Annual herb, stem ribbed, reddish. Leaves petiolate, lamina triangular or sagittate and cordate. Ochrea 2-3 mm long, hyaline, pubescent near the base. Inflorescence axillary and terminal, many-flowerd, corymbose cyme. Flowers pink or red. Perianth segments 5-partite, ovate or oblong-ovate. Stamens 8, unequal, alternating with glands. Nuts deeply 3-angled narrowed at both ends.
 Plate No. (21-123)

4. Scientific Name: *Persicaria barbata* L.
 Vern. Name: Palpulak
 Habit: Herb
 Flower period: June to August
 Collection method: Digging and collecting
 Part used/Admin.: Root/orally
 Preparation/Dosage: The root is grinded in to powder and mixed with honey or butter. One teaspoonful is taken twice daily.
 Medicinal uses: Astringent, carminative, colic, pesticide and root is used in scabies.
 Other uses: Leaves are crushed with sand and to kill fish.
 Description: Erect 30-60 cm annual herb. The leaves are lanceolata or linear. The color of ochrea is brown. The inflorescence is many flowered. The tepals are unequal, obtuse, biseriate, obovate to oblanceolate. The numbers os stamens are 8 and they are equal in size. Stigmas capitate and nuts trigonous black and shining.

5. Scientific Name: *Polygonum aviculare* L.
 Vern. Name: Bandakay
 Habit: Herb
 Flowering period: May to August
 Collection method: Digging and collecting
 Part used/Admin.: Whole plant/orally
 Constituents: 3-arabinoisolis avicularin, essential oil, glycoside quercetin and polygenic acid.
 Preparation/Dosage: The fresh plant is cooked and eaten as saag as much as needed.
 Medicinal uses: Anodyne, astringent, emetic and purgative.
 Other uses: Fodder and vegetable
 Description: Sub erect, ascending or decumbent, annual branched herb. Leaves heterophyllous, larger and smaller, elliptic - lanceolate or ovate, acute, entire, dotted. Ochrea 0.75-1.25 cm long, bifid, silvery, membranous lacerate. Inflorescence solitary, axillary or 3-5 clusters. Flower 0.5-0.75 mm across, The tepals are 5, elliptic-lanceolate or ovate. Stamens 5, filaments short, equal; anthers dorsifixed. The fruit is a an ovate nut, which is shining and black.

6. Scientific Name: *Rumex dentatus* L.
 Vern. Name: Shalkhay
 Habit: Herb
 Flowering period: June to August
 Collection method: Cutting and digging
 Part used/Admin.: Leaves and roots/orally
 Constituents: Chrysophanol, emodin, proteins, carbohydrates and vitamin.
 Preparation/Dosage: The fresh plant is cooked and eaten as saag as much as needed. The roots are grinded in to powder and mixed with honey. One teaspoonful is taken twice daily.
 Medicinal uses: Astringent, diuretic, emollient and in irritation.
 Other uses: Ornamental, snuff ash and vegetable.
 Description: Annual, stem 20-60 cm high herb. The leaves at base are ovate or oblong, petiole shorter or as long as the lamina. Inflorescence many-flowered. The pedicel is thin, longer and articulate at lower portion. The fruit is a nut and 2-2.5 mm in size.

Plate No. (21-126)

7. Scientific Name: *Rumex hastatus* D. Don
 Vern. Name: Tarookay
 Habit: Herb
 Flower period: June to August
 Collection method: Cutting
 Part used/Admin.: Leaves and young shoot/oraliy
 Constituents: Ascorbic acid, oxalic acid and oxy-methyl-anthroquinone.
 Preparation/Dosage: Leaves and shoots are cooked and taken as saag as much as needed.
 Medicinal uses: Anemia, carminative, cooling, diuretic, refrigerant and stomachache.
 Other uses: Ornamental, fodder, snuff ash and vegetable.
 Description: Low richly branching shrub. Leaves with petioles of the same length as the blade; blade hastate, the size is very much variable. The panicles are terminal and erect. Pedicels thin, filiform, articulate near the base. External perianth segments ovate-elliptic, obtuse, Nut up to 2 mm long and brown.
- Plate No. (22-127)
8. Scientific Name: *Rumex nepalensis* Spreng.
 Vern. Name: Tarookay
 Habit: Herb
 Flowering period: June to August
 Collection method: Cutting and digging
 Part used: Leaves and roots
 Constituents: Chrysophanic acid, nepodin and tannin.
 Preparation/Dosage: The fresh plant is cooked and eaten as saag as much as needed. The roots are grinded in to powder and mixed with honey. One teaspoonful is taken twice daily.
 Medicinal uses: Antipyretic, asthma, astringent, bronchitis, diuretic, emmenagogue, piles and purgative.
 Other uses: Vegetable
 Description: Perennial herb, 60-170 cm high, erect. The lower leaves are 1-2 times as long as broad with cordate base. Many-flowered inflorescence in whorls. Pedicels about as long as the valve. External perianth segments about as long as half of the breadth of the valves. Nut about 4 mm long and dark brown.
- Plate No. (22-128)

38. PORTULACACEAE

Scientific Name:	<i>Portulaca oleracea</i> L.
Vern. Name:	Warkharay
Habit:	Herb
Flowering period:	June to September
Collection method:	Cutting and collecting
Part used/Admin.:	Whole plant/orally
Constituents:	Ca-Oxalate crystals
Preparation/Dosage:	Leaves and shoots are cooked and taken as saag as much as needed.
Medicinal uses:	Alterative, astringent, demulcent, diuretic, kidney and lungs diseases, liver, refrigerant and vermifuge.
Other uses:	Ornamental, food, honey bee species and vegetable.
Description:	Annual or perennial, green or purplish green herb. Leaves alternate or sub opposite. Inflorescence cymose, with clusters of 3-6 flowers. Flowers sessile, yellow, 5-8 mm across. Sepals sub equal, united in to 2-3 mm long tube. Petals 5, deliquescent, slightly united. Stamens 7-12, united and adnate to petals. Capsule many-seeded, seeds shining black.
Plate No.	(22-129)

39. PRIMULACEAE

Scientific Name:	<i>Primula denticulata</i> Smith
Vern. Name:	Mameera
Habit:	Herb
Flowering period:	June to August
Collection method:	Digging
Part used/Admin.:	Rhizome/orally
Constituents:	Flavone glucoside and saponin
Preparation/Dosage:	The rhizome is grinded in to fine powder and put in eyes twice daily.
Medicinal uses:	Antibacterial, gynae problems and ophthalmic.
Description:	A mat forming herb, having lanceolate, serrate, under surface farinose leaves. Scape absent or from or present. Flowers heteromorphic, pink to pink-purple. The sepals are 2-2.5 mm in size and campanulate. The size of corolla tube is 6-9 mm, longer than the sepals. Ovary sub globose. The size of the style is 1.5 mm. The fruit is a capsule containing brown ovoid seeds.
Plate No.	(22-130)

40. RANUNCULACEAE

1. Scientific Name: *Aconitum heterophyllum* Wall. ex Royle
Vern. Name: Sarbawalay
Habit: Herb
Flowering period: June to August
Collection method: Digging
Part used/Admin.: Rhizome/orally
Constituents: Aconitic acid, aconitine, aitisine, anthorine and heterophylline.
Preparation/Dosage: The rhizome is grinded in to powder and mixed with *Halwa*. It is taken as muc as desired.
Medicinal uses: Aphrodisiac, febrifuge and tonic.
Other uses: Cash plant
Description: Biennial herb with tubers. Stem 25-70 cm simple or branched. Lower most leaves with long petioles, orbicular cordate to ovate-cordate. Inflorescence a loose raceme, rarely sub paniculate. Sepals blue to violet, glabrous. The corolla is clawed and with a hood. The seeds are follicles and the shape is obpyramidate. The size of seed is 3-4 mm.

Plate No. (22-131)
2. Scientific Name: *Anemone vitifolia* Bush.
Vern. Name: Rattanjot
Habit: Herb
Flowering period: June to August
Collection method: Collection and digging
Part used/Admin.: Seeds and roots/orally
Constituents: Anemonin, heterochromatin, obtusilobinin, obtusilobin, obtusilobicinin and ranunculin.
Preparation/Dosage: The seeds and roots are grinded in to powder and mixed with honey or butter. One teaspoonful is taken twice daily.
Medicinal uses: Emmenagogue and rheumatism.
Other uses: Ornamental
Description: Perennial with woody rootstock. Stem erect, 30-90 cm, often branched. Petioles longer than lamina Flowers 3-4.5 cm in diameter, white. Sepals 5-8, obovate-oblong or ovate, sub acute or obtuse silky outside. Carpels in large heads, very numerous, embedded in dense wool and styles is short.

Plate No. (22-132)

3. Scientific Name: *Aquilegia pubiflora* Wall. ex Royle
 Vern. Name: Chani
 Habit: Herb
 Flowering period: May to August
 Collection method: Cutting
 Part used/Admin.: Whole plant/orally
 Constituents: Aquileginine, aquiligin, berberine, capric acid, glycoside, myrestic, oleic, lauric and succinic acids.
 Preparation/Dosage: Extraction of leaves and flowers is obtained and mixed with sugar. One cup is taken twice daily.
 Medicinal uses: The plant is highly poisonous
 Other uses: Ornamental
 Description: Herb with rootstock, stem 15-70 cm tall. Radical leaves biternate, petioles 15 cm long, leaflets 8-30 cm long and wide. Flowers 2-severals. The color of sepals is purplish-blue or dark red; corolla has the same color. The spurs are hooked and the staminodes are 5-6 mm. Carpels 5-6, densely pubescent. Follicles 13-20 mm long.
 Plate No. (23-133)
4. Scientific Name: *Caltha alba* Camb.
 Vern. Name: Baringu
 Habit: Herb
 Flowering period: June to August
 Collection method: Cutting and Digging
 Part used/Admin.: Flower and roots/orally
 Constituents: Protoanemonine, helleborin and veratrin.
 Preparation/Dosage: Extraction of flowers and roots is obtained and mixed with sugar. One cup is taken twice daily.
 Medicinal uses: Carminative, diuretic, headache, jaundice and ophthalmic.
 Other uses: Ornamental and honey bee species.
 Description: Perennial herb, 20-60 cm. Basal leaves long petiolated, and broadly ovate sheath, blade reniform, 4-15 cm wide, margins hooked or crenate, stem leaves smaller. Inflorescence is corymbose and petals are white. The calyx is consists of 5-6 petaloid sepals. The androecium is consisting of many stamens. The Gynoecium has up to 15 carpels. The fruit is a follicle and the seeds are black in color, sometimes brown.
 Plate No. (23-134)

5. Scientific Name: *Thalictrum cultratum* Wall.
 Vern. Name: Guljarai
 Habit: Herb
 Flowering period: June to August
 Collection method: Digging
 Part used/Admin.: Root/orally
 Constituents: Barberine and thalictrine.
 Preparation/Dosage: The roots are grinded in to powder and mixed with honey. One teaspoonful is taken twice daily.
 Medicinal uses: Aperient, diuretic, dyspepsia, febrifuge, purgative and tonic.
 Description: Perennial rhizomatous herbs with erect stems and alternate, 2-4 pinnatipartite leaves. Leaflets lobed or dentate, sub orbicular to ovate or obovate in outline. Flowers small. Sepals 4, deciduous. Stamens numerous, longer or slightly shorter than the sepals. Carpels few to numerous. Achenes unilocular, 1-seeded fusiform.

Plate No. (23-137)

41. RHAMNACEAE

Scientific Name: *Ziziphus jujuba* Mill.
 Vern. Name: Markhanaray
 Habit: Tree
 Flowering period: May to August
 Collection method: Collection and cutting
 Part used/Admin.: Fruit and leaves/orally
 Constituents: Microcrystalline substance and zizyphic acid.
 Preparation/Dosage: The dried fruits are taken directly. Fruits and leaves are boiled with green tean for making *Joshanda*. One cup is taken twice daily.
 Medicinal uses: Bark is used for wounds and sores, blood purifier, bronchitis, cold, cough, emollient, expectorant and pectoral.
 Other uses: Beverage, cash plant, fuel, fruit, honey bee species,
 Description: A small size tree, branched and prickles are present. The leaves are glabrous lanceolata, crenate, oblong, ovate and serrate. The flowers are in clusters, 3-4 mm in size and with short peduncles. Calyx ovate, acuminate somewhat keeled. Petals spathulate, fruit globose or oblong and shining.

Plate No. (22-138)

42. ROSACEAE

1. Scientific Name: *Cotoneaster affinis* var. *bacillaris* (Lindl.) Schneider
Vern. Name: Mamanra
Habit: Shrub
Flowering period: May to July
Collection method: Collection
Part used/Admin.: Fruit/orally
Constituents: Cyanogenetic glycoside, prulaurasin and sorbitol.
Preparation/Dosage: The riped fruits are taken directly. Sometimes a drink is also prepared.
Medicinal uses: Aperient, astringent, expectorant and stomachache.
Other uses: Ornamental and honey bee species.
Description: Branched, erect and deciduous shrub. The flowers are white. It has variable lanceolate, but with shorter and broader ovate or elliptic leaves which are densely white-wooly beneath when young, and with more woolly-haired peduncles, flowers-stalked and with denser inflorescence.
Plate No. (22-139)
2. Scientific Name: *Crataegus songarica* C. Koch
Vern. Name: Gony
Habit: Tree
Flowering period: May to July
Collection method: Cutting and collection
Part used/Admin.: Flowers and fruit/orally
Preparation/Dosage: The flowers are used for making green tea. The riped fruits are taken directly for various heart problems.
Constituents: Crategin, glucoside HCN and oxalic acid.
Medicinal uses: Dysporea, heart tonic, hypertrophy, improves blood flow and used as heart appression.
Other uses: Cash, fruit plant and honey bee species.
Description: A deciduous tree up to 8m with grayish branches, deeply and sharply lobed leaves, and lax flat-topped clusters of white flowers. Flowers to 1.5 cm across, long-stalked, calyx wooly haired below. Leaves deeply lobed and teethed. Blade broadly ovate or rhombic in outline, 3-5 cm. Fruit red and globular.
Plate No. (24-140 & 141)

3. Scientific Name: *Fragaria nubicola* Lindl. ex Lacaita
 Vern. Name: Balmangay
 Habit: Herb
 Flowering period: May to July
 Collection method: Collection
 Part used/Admin.: Fruit/orally
 Constituents: Gallic acid, pectin, sugar and tannin.
 Preparation/Dosage: The riped fruits are taken directly.
 Medicinal uses: Astringent, diabetes, diarrhea, dysentery, hemorrhages, gonorrhoea, and leucorrhoea.
 Other uses: Ornamental
 Description: A small softly silky haired and trifoliate herb. The runners giving roots at nodes. The leaflets are toothed deeply. The flower color is white. The sepals are 5 and having epicalyx. The crolla consists of 5 petals. The stalk of the leaves is long and arise from roots. The fruit is globular.
 Plate No. (24-142)

4. Scientific Name: *Potentilla supina* L.
 Vern. Name: Not known
 Habit: Herb
 Flowering period: June to August
 Collection method: Cutting
 Part used/Admin.: Leaves/orally
 Constituents: Not known
 Preparation/Dosage: The dried leaves are grinded in to powder and mixed with honey. One teaspoonful is taken twice daily.
 Medicinal uses: Astringent, febrifuge, toothache (Odontalgic) and tonic
 Other uses: Ornamental
 Description: A dwarf tufted mate forming perennial, with pinnate leaves and solitary yellow flowers 1-1.3 cm across. Flowering stem leafless, 2-3 cm, petals rounded to obovate, much longer than the woody haired calyx. Leaves very variable, 2.5-5 cm, oblong, with densely grouped leaflets spreading forwards and upwards, silky beneath, root stock stout, often branched at apex, covered with old leaf bases.

5. Scientific Name: *Rosa macrophylla* Lindl.
 Vern. Name: Jangali gulab
 Habit: Shrub
 Flowering period: June to August
 Collection method: Cutting and collection
 Part used/Admin.: Bark and flower/overally
 Constituents: Volatile oil and quercetin.
 Preparation/Dosage: Tea is prepared from the flowers. The bark is grinded in to powder and mixed with ghur. One teaspoonful is take twice daily.
 Medicinal uses: Aperient, astringent, tonic and laxative.
 Other uses: Ornamental and honey bee species.
 Description: Shrub 3-5 m, with dark red or purple stems with few prickles, bright pink flowers 3-7 cm across. Petals 5, broadly obcordate, sepals long pointed often with leafy tip. Leaves 8-20 cm, with 7-11 ovate-elliptic, finely toothed leaflets to 5 cm or more. Fruit very large, to 5 cm, red, flask-shaped.
- Plate No. (24-144)
6. Scientific Name: *Rubus ellipticus* Smith
 Vern. Name: Karwara
 Habit: Shrub
 Flowering period: June to August
 Collection method: Collection
 Part used/Admins.: Fruit/overally
 Constituents: Citric acid, malic acid, pectin and tannic acid.
 Preparation/Dosage: The riped fruits are taken directly as much as desired.
 Medicinal uses: Astringent, diarrhea and laxative.
 Other uses: Fodder, fruit plant and honey bee species.
 Description: Shrub with stout stems covered with bristles, usually trifoliate leaves, and white flowers. Flowers 1-1.5 cm across, calyx lobes woody haired on both sides, shorter than petals. Leaflets leathery, elliptic or obovate toothed. Green above, grey wooly beneath. Fruit globular, yellow, clustered.
- Plate No. (25-145)

7. Scientific Name: *Sorbaria tomentosa* (Lindl.) Rehder
 Vern. Name: Speenakay
 Habit: Shrub
 Flowering period: May to August
 Collection method: Cutting and digging
 Part used/Admin.: Whole plant/orally
 Constituents: Gallic and tannic acid.
 Preparation/Dosage: The riped berries are collected and drink is prepared. One cup is taken twice daily.
 Medicinal uses: Used as external and internal astringent.
 Other uses: Ornamental, broom, fodder, honey bee species, soil reclamation and shelter.
 Description: A slender deciduous shrub up to 3 m or more, with long pinnate leaves, and large terminal, pyramidal branched clusters of tiny white flowers. Clusters 20-45 cm long, flowers 5-7 mm across, petals rounded. Leaves 20-40 cm long, leaflets lanceolate slender-pointed, 5-10 cm, double toothed, hairy beneath.
- Plate No. (25-146)

43. RUBIACEAE

- Scientific Name: *Galium hirtiflorum* Recquien ex DC.
 Vern. Name: Jeeshkay
 Habit: Herb
 Flowering period: May to August
 Collection method: Cutting
 Part used/Admin.: Whole plant/orally
 Constituents: Glucoside asperuloside.
 Preparation/Dosage: Extraction of the whole plant is obtained. One cup is used twice daily.
 Medicinal uses: Aperient, anti-scorbic, diuretic, urinary problems and dropsy.
 Other uses: Fodder
 Description: Herb, annual, decumbent with pilose branches and stem. Leaves 4-6 in a whorl, 5-10 x 2-3 mm, sessile, lanceolate or oblanceolate, upper side glabrous, lower covered with weak hairs, with recurved margins. Inflorescence axillary, terminal, paniculate. Minute flowers, corolla segments ovate, obtuse, ciliate. Fruit 2 mm long, globose and covered with hooked hairs.
- Plate No. (25-147)

44. SALICACEAE

Scientific Name:	<i>Pouplus alba</i> L.
Vern. Name:	Speerdad
Habit:	Tree
Flowering period:	June to August
Collection method:	Cutting and collecting
Part used/Admin.:	Leaves and wood/orally
Constituents:	Phenolic compounds
Preparation/Dosage:	Decoction of leaves is obtained. One cup is taken twice daily.
Medicinal uses:	Alterative, anodyne, anorexia, anti-inflammatory, antiseptic, antipyretic, astringent, backache, poultice, debility, digestive, diuretic, febrifuge, liver disorder and tonic.
Other uses:	Fuel, fodder, furniture, shelter and thatching plant.
Description:	Tree, with smooth whitish bark. Dense soft cottony tomentum on young shoots. Leaves ovate, with obtuse, acute, cottony on the lower surface. Male catkin 5-10.5 cm long. stamens 5-10. Female catkin 3-5 cm. Bract oblanceolate, hairy, tip slightly toothed. Capsule 5-6.5 mm long, shortly pedicellate.
Plate No.	(25-148)

45. SAPINDACEAE

1. Scientific Name:	<i>Acer caesium</i> Wall. ex Brandis
Vern. Name:	Chinaray
Habit:	Tree
Flowering period:	May to August
Collection method:	Collection
Part used/Admin.:	Fruit/orally
Constituents:	β -D-glucoside and various combinations of methyl gallate.
Preparation/Dosage:	The fruits are grinded in to powder and mixed with honey. One teaspoonful is taken twice daily.
Medicinal uses:	It has noted that the fruits of this species are astringent.
Other uses:	It is also used as a fodder and shelter
Description:	A tall tree up to 20 m size. The bark is smooth and the color is dark brown. Leaves deciduous, 5-15 cm across, 5-7-lobed. Flowers 5-merous, 6-8 mm across, yellow-green. Sepals oblong and 3-4 mm in size. Petals spatulate and 3-4 mm in size. Stamens 8, included. Samaras compressed, glabrous, 2-4 cm long, nutlets compressed.
Plate No.	(25-149)

2. Scientific Name: *Aesculus indica* (Wall. ex Camb.) Hook.
 Vern. Name: Binkhor
 Habit: Tree
 Flowering period: June to August
 Collection method: Cutting and collecting.
 Part used/Admin.: Bark, fruit and seeds/orally
 Constituents: Aesculin, esculegenic acid, esculetol, fraxin, phlorizin, quercitrin, saponoides and tannin.
 Preparation/Dosage: The mature seeds are cooked in eaten directly. The dried bark is grinded in to powder and mixed with honey or butter and one teaspoonful is taken twice daily.
 Medicinal uses: Astringent, colics, rheumatism and tonic.
 Other uses: Fodder and honey bee species.
 Description: Tree, 20 m or more tall. Petiole 10-15 cm long. Leaflets 5-7, elliptic to oblong-lanceolate. Panicles 15-30 cm long, puberulous to tomentose. The sepals tube is campanulate and 5 mm in size. The corolla is white to yellowish and consists of 4 unequal petals. The ovary is elongated and style size is equal to the filaments. The fruit is a ovoid capsule. The seed size is 2.7-3.5 cm broad, dark brown and shiny.

Plate No. (25-150 & 26-151)

46. SAXIFRAGACEAE

- Scientific Name: *Bergenia ciliata* (Haw.) Sternb.
 Vern. Name: Zakhame Hayat
 Habit: Herb
 Flowering period: June to August
 Collection method: digging and collecting
 Part used/Admin.: Rhizome/orally
 Constituents: Albumin, gallic acid, glucose, metarbin, mineral salts, mucilage, tannic acid and wax.
 Preparation/Dosage: The rhizome is grinded in to powder and mixed with ghur. One teaspoonful is taken twice daily.
 Medicinal uses: Astringent, demulcent, diuretic and urinary problems
 Other uses: Ornamental
 Description: Perennial herbs, 50 cm tall, succulent. Rhizome woody, covered with leaf bases. Leaves basal, rosulate, coriaceous. Scape thick with a showy racemose or corymbose inflorescence. Flowers pentamerous, free from the carpels. Sepals 5, erect. Stamens 10. Carpels 2, ovary superior. Seeds elongate, smooth or minutely tuberculate.

Plate No. (26-152 & 153)

47. SCROPHULARIACEAE

Scientific Name:	<i>Verbascum thapsus</i> L.
Vern. Name:	Khardug
Habit:	Hersb
Flowering period:	May to August
Collection method:	Cutting and digging
Part used/Admin.:	Whole plant/orally
Constituents:	Bitter substances and saponin.
Preparation/Dosage:	Seed are collected and mixed with honey, butter or ghur. One teaspoonful is taken twice daily.
Medicinal uses:	Anti-asthmatic, aphrodisiac, cough, narcotic and psoriasis.
Other uses:	Ornamental and fuel
Description:	Hairy biennial herb up to 1.5 m tall. The leaves are lanceolate, crenate and the lower leaves are petiolate, the size is 15x6 cm. The panicles are spicate and very dense. The pedicle are short, the calyx is 7 mm with lanceolate lobes. The petals are yellow in color. The number of stamens are 5 and the fruit is an ovoid capsule.
Plate No.	(26-155)

48. SOLANACEAE

1. Scientific Name:	<i>Solanum nigrum</i> L.
Vern. Name:	Karmachoo
Habit:	Herb
Flowering period:	May to August
Collection method:	Cutting and digging
Part used/Admin.:	Whole plant/orally
Constituents:	alkaloid solanine, saponin and solanidine.
Preparation/Dosage:	The fresh leaves are cooked and taken as saag. Extract of the berries and fresh leaves is obtained and one cup is taken twice daily.
Medicinal uses:	Diaphoretic, diuretic, expectorant, heart diseases, hepatitis, laxative, liver, leprosy, rheumatism, sedative and in spleen enlargement.
Other uses:	Ornamental, beverage and vegetable.
Description:	Annual 15-60 cm tall herb. The leaves are dentate irregularly. The sepals are hairy or not hairy. The corolla is longer than the calyx. The color of anthers is yellow, which are splitting by apical pores. The stigma is capitate with glabrous ovary. The fruit is a globose to ovoid berry and 5-8 mm in size. The color of berry is orange red or black.

2. Scientific Name:	<i>Hyoscyamus niger</i> L.
Vern. Name:	Bange-dewana
Habit:	Herb
Flowering period:	June to August
Collection method:	cutting and collecting
Part used/Admin.:	Leaves and seeds/orally
Constituents:	Alkaloids, atropine, apoatropine, hyoscyamine, hyoscypikrin and scopolamine.
Preparation/Dosage:	Extrat of leaves is obtained. The seeds are grinded in to powder and mixed with honey. One cup of extract and one teaspoonful of seed are taken twice daily.
Medicinal uses:	Anodyne, astringent, asthma, expectorant, narcotic, sedative, tonic and whooping cough.
Other uses:	Ornamental
Description:	It is a perennial herb, hairy or not and up to 1.5 m tall. The leaves are sessile, oblong to ovate. The calyx is infundibuliform and campanulate. The color of corolla is pale yellow and beautiful brown purple nerves are present on the petals. The stamens are unequal in size and almost exerted. The style is purple in color and longer than the stamens. The seeds are reniform and brown.
Plate No.	(27-157)

49. THYMELEACEAE

Scientific Name:	<i>Daphne mucronata</i> Royle
Vern. Name:	Leughonay
Habit:	Shrub
Flowering period:	May to August
Collection method:	Digging and cutting
Part used/Admin.:	Whole plant/orally
Preparation/Dosage:	The riped fruits are taken directly but not more than 5 fruits a day. The leaves are grinded in to powder and mixed with honey. One teaspoonful is taken twice daily.
Constituents:	Daphnin, daphentin, glucoside and umbelliferone.
Medicinal uses:	Anti-rheumatism, anti-tumour, irritant and purgative.
Other uses:	Fuel, fruit, honey bee species, livestock promoting and sacred plant.
Description:	Shrub 2.5 m tall, the shape of leaves is lanceolate, oblong and elliptic. The corolla is with tomentum and white in color. Stamens 8, 2-seriate, upper 4 antisepalous, sub sessile. Berry sub globose, 10 mm long, pubescent, orange.
Plate No.	(27-158)

50. URTICACEAE

Scientific Name:	<i>Urtica dioica</i> L.
Vern. Name:	Seezonkay
Habit:	Herb
Flowering period:	May to July
Collection method:	Cutting and collecting
Part used/Admin.:	Whole plant/orally
Constituents:	Formic acid, histamine, mucilage, provitamin-A, lecithin and tannin.
Preparation/Dosage:	Extract of plant is obtained and one cup is taken twice daily.
Medicinal uses:	Astringent, diuretic, haematuria, jaundice, kidney problems, leucorrhoea and menorrhea.
Other uses:	Fuel
Description:	Dioecious, perennial herb, 50-150 cm with stinging hairs. Leaves with 1.5-4 cm long petiole; lanceolate to ovate. Racemes of cymes axillary. Flowers pale-greenish, or whitish, bracts of male flowers smaller than those of female flowers. Sepals pubescent. Achenes up to c. 1.5 mm pale green or greenish-brown.
Plate No.	(27-159)

51. VERBENACEAE

Scientific Name:	<i>Verbena officinalis</i> L.
Vern. Name:	Jeshkay
Habit:	Herb
Flowering period:	May to August
Collection method:	Cutting and collecting
Part used/Admin.:	Whole plant/orally
Constituents:	Glucoside, verbenalin and verbenin.
Preparation/Dosage:	The leaves and seeds are grinded in to powder and mixed with ghur. One teaspoonful is taken twice daily.
Medicinal uses:	Used as febrifuge, nerve tonic and in rheumatism.
Other uses:	Fodder
Description:	Herb with opposite leaves, decussate, rarely whorled or alternate. The inflorescence is definite or may be indefinite. The flowers are zygomorphic. The sepals are fused and campanulate. The petals are free and the number of lobes are equal to the calyx. The androecium is didynamous and stamens are 4. The fruit is usually schizocarpic.

52. VIOLACEAE

1. Scientific Name: *Viola biflora* L.

Vern. Name: Benausha

Habit: Herb

Flowering period: June to August

Collection method: Collecting

Part used/Admin.: Whole plant/orally

Constituents: Violine and quercitine

Preparation/Dosage: Extract of the plant is obtained. One cup is taken twice daily.

Medicinal uses: Anti-spasmodic, diaphoretic, emetic, emollient, laxative and pectoral.

Other uses: Ornamental and cash plant

Description: it is a perennial herb, the size is about 20 cm. Stem weak but distinct and slender. Leaves broadly reniform, cordate at base. Flowers solitary and yellow in color and with long peduncle. Sepals are lanceolate, acute and entire. Petals are obovate to oblong, obtuse and entire. The fruit is an ovoid-oblong capsule.

Plate No. (27-161)

2. Scientific Name: *Viola canescens* Wall. ex Roxb.

Vern. Name: Benausha

Habit: Herb

Flowering period: June to August

Collection method: Collecting

Part used/Admin.: Whole plant/orally

Constituents: Alkaloid violine, methylsalicylate and quercitine.

Preparation/Dosage: Extract of the plant is obtained. One cup is taken twice daily.

Medicinal uses: Astringent, anti-pyretic, demulcent, diaphoretic, diuretic, emollient and laxative.

Other uses: Ornamental and cash plant

Description: A stoloniferous herb, with branched roots. Stem absent, leaves basal, broadly ovate, reniform and cordate. The flowers are very small and the petals color is violet or pale violet. The calyx is consists of 5 sepals. The spurs are short and compressed, mostly straight or reflexed. Style club shaped; ovary ovate and hairy. Capsule is globose and many-seeded.

Plate No. (27-160)

53. VITACEAE

Scientific Name:	<i>Vitis vinifera</i> L.
Vern. Name:	Angoor
Habit:	Shrub
Flowering period:	May to August
Collection method:	Cutting and collecting
Part used/Admin.:	Fruit and leaves/orally
Constituents:	Malic acid, oxalic acid and tartaric acid.
Preparation/Dosage:	The fruits are directly taken. Drink is also prepared from the fruits and one glass is taken twice daily.
Medicinal uses:	Activate hepatic function, asthma, astringent, cardiac, cooling, demulcent, dyspepsia, diuretic, excellent blood builder, stomachache, laxative and migraine.
Other uses:	Ornamental, beverage, cash plant, food, fruit, honey bee species, sacred and shelter plant.
Description:	The stem is somewhat woody and climbing. The leaves are with tendrils, dissected, cordate and orbicular. The flowers color is green and the calyx is very small. The petals are lanceolate in shape. The fruit having different colors and it is a berry of different sizes (greenish, red, pinkish, purple, black or violet). The seeds are ovoid or pyriform and a beak is present.
Plate No.	(27-162)

B. SPECIES OF MEDICINAL USES

Five species (5) of Monilophytes were reported for medicinal uses belonging to four (4) families. Family Polypodiaceae was presented by two (2) species and family Aspleniaceae, Equisetaceae and Marsileaceae were presented by one species each. Six species (6) of Gymnosperms were reported belonging to four (4) families. Family Pinaceae was presented by three (3) species, Cupressaceae, Ephedraceae and Taxaceae were presented by one (1) species each. Seven (7) species of Monocot were reported belonging to seven (7) families and each family was presented by one species each. One hundred and thirty seven (137) species of Dicot were reported belonging to fifty three (53) families. Asteraceae by fifteen (15) species, Lamiaceae by eleven (11) species, Fabaceae by ten (10) species, Polygonaceae by eight (8) species, Rosaceae by seven (7) species, Amaranthaceae and Apiaceae by 6 (six) species each. Brassicaceae, Caprifoliaceae and Ranunculaceae by five (5) species each. Plantaginaceae four (4) and Geraniaceae by three (3) species each. Adoxaceae, Berberidaceae, Caryophyllaceae, Convolvulaceae, Fagaceae, Geraniceae, Onagraceae, Oleaceae, Sapindaceae, Solanaceae and Violaceae were presented by two (2) species each. Araliaceae, Betulaceae, Buxaceae, Campanulaceae, Cannabaceae, Celtidaceae, Ebenaceae, Elaeagnaceae, Euphorbiaceae, Juglandaceae, Lythraceae, Moraceae, Malvaceae, Oxalidaceae, Orobanchaceae, Paeoniaceae, Papaveraceae, Parnassiaceae, Phytolacaceae, Portulacaceae, Primulaceae, Rhamnaceae, Rubiaceae, Salicaceae, Saxifragaceae, Scrophulariaceae, Thymeleaceae, Urticaceae, Verbenaceae and Vitaceae were presented by one species each.

CHAPTER-5

BIODIVERSITY AND CONSERVATION

A. BIODIVERSITY

The distinct biological species existing on the earth in millions are the result of a longest period of evolution aging about 3.5 billions years. Biodiversity is a combination of two words (biology and diversity). In late 1970 in a lay book Raymond F. Dasmann (a conservationist and wild life scientist) used terminology of Biological diversity. For the first time W. G. Rosen in 1985 coined the term Biodiversity. Then the term Biodiversity was coined by. It appeared in a publication by E. O. Wilson in 1988.

Biologists most often define "biological diversity" or "biodiversity" as the "totality of genes, species, and ecosystems of a region" (Wilcox, 1982). The most recent and acceptable definition is that "Biodiversity is the variability among living organisms from all sources including inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species, and of ecosystems" (CBD, 2010).

Biodiversity is the diversity at gene, species and ecosystem level and it is helping in maintaining the sustainability of natural system that is ultimately supporting various spheres of life by providing the following services.

- i) Pharmaceuticals, raw materials, fuel wood, fodder, food, energy, wood, clothes, fibres, fruits, vegetables, cereals, pulses, nuts and legumes etc.
- ii) The biological control of pests, purification process and free of cost recycling.
- iii) All the species having their: (a) ecological adaptation and implitude in the form of genetic information adopted through the complex process of evolution in millions of years. (b) maintenance of the natural gene pool as a raw material for adaptation in future.

Conservation, sustainable utilization and proper exploitation of Biodiversity is important and reduction of Biodiversity will ultimately: (a) disturb the ecosystem and will reduce its provision of free of cost services. (b) the species will become unable to survive in the changing global climate change and thus various plants and animals population, communities and the diverse ecosystems will become unproductive. Disturbances are always there but the sustainable use of Biodiversity is like an insurance policy to combat these environment unfriendly activities.

B. CONSERVATION

According to Webster Dictionary Conservation is a combination of two Latin OR French words i.e. (Con+server OR Con+servare) and is in use since 1922. The Latin: Conserver OR French: Conservare (to keep preserve) and in English: Conservation. The prefix con + servare mean (keep watch, maintain). Originated in 14th Century. The preservation and sustainable use of the biodiversity is called conservation. It is believed that keeping a thing in an entire situation or state or taking action for protection, preservation and guarding is known as conservation.

The Conservation is divided into two main types on the basis of their nature and existence viz. (i) On-site (*In-situ* conservation) and (ii) Off-site (*Ex-situ* conservation). Since the population of the world has been increased with a very rapid speed in the last century and that is ultimately causing global warming and climate change therefore, the emerging field of Conservation biology has attracted worldwide importance to combat these global challenges.

It is an integrated field which needs knowledge of basic biological sciences like genetics, ecology, Botany, Zoology and microbiology. Similarly, the knowledge of social sciences including economics, anthropology, sociology and philosophy and that of management sciences like fisheries and wildlife.

The field of conservation Biology developed over the last 23 years due to the response of the intellectual community to a serious kind of crisis in conservation of biological diversity.

The old concept of conservation of single species has been changed today and the focus is now not only on a single use like fuel wood or medicinal but the changing global climatic conditions have compelled the Conservation Biologists to focus on the complex and fragile relationships existing in the biosphere, ecosphere, lithosphere, hydrosphere and atmosphere and all complex process and its components (Shinwari *et al.*, 2003).

Humans and resources are the main focus in conservation studies and two systems dominated the resource conservation i.e. the romantic ethics of Emerson, Thoreau and Muir and the resource conservation ethic of Pinchot based on utilitarian philosophy. The view point of Pinchot is the most acceptable one world wide. The three principles of the Aldo Leopards are common to all of conservation biology (Shinwari *et al.*, 2003).

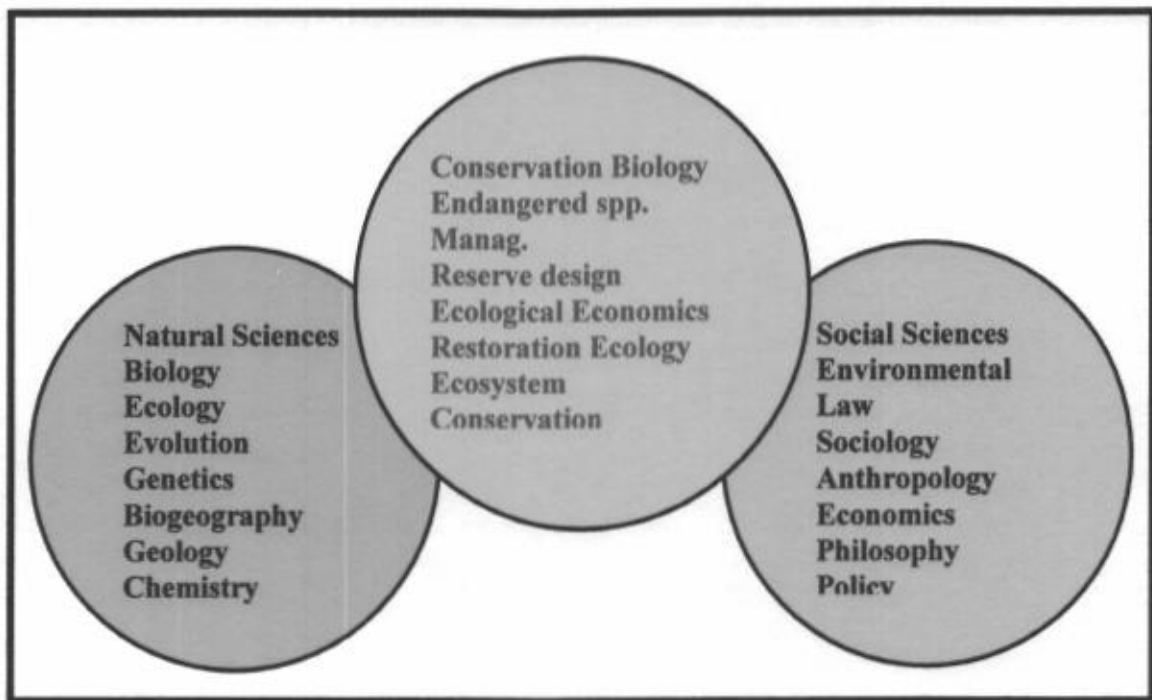


Figure 3. Source: Showing the integrated approach of Conservation biology and its relationship with other branches of natural and social sciences (Adopted after Shinwari *et al.*, 2003)".

“Aldo Leopold’s Evolutionary-Ecological-Ethical Principles”

1. In understanding conservation problems evolution should be the central focus.
2. Change must be a part of conservation because Ecological systems are dynamic and nonequilibrium.
3. One other important component is Humans and they must be included in conservation.

Conservation biology has some characteristics, which are not always found in other sciences. They are summarized as under.

1. A multidisciplinary approach is required for this crisis discipline.
2. Evolutionary time scale is important for this inexact science.
3. For success long-term vigilance is required for this value laden science.
4. Understanding of the ecosystem and innovation, flexibility, multiple talents of the practitioner’s are required for its understanding.
5. Being an extra ordinary subject it offers outstanding career, challenges and rewards.

The traditional utilization by the people living in the far flung and isolated regions of the country like Hindukush Himalaya is a sign of the rich Biodiversity present in the mountainous ecosystems of the of the country. The traditional knowledge of the management of the natural resources in these areas is providing baseline information for the planning and sustainability of the natural resources. The local knowledge of the inhabitants in such isolated regions is of great importance for the researchers and planners who are interested in improvement of the livelihood of the inhabitants living in such isolated regions of the country. But it has been observed during the present study that such a valuable ecological knowledge is under severe stress which is ultimately resulted into a big socio economic change. The traditional knowledge developed through the local practices and experiences which has been transferred from the parents to the descendants has been feared to be lost (Shinwari *et al.*, 2003).

Since inception on this globe the human beings are dependent upon the herbal medicines for curing different kinds of diseases. All such remedies and recipes are the product of the local knowledge of the inhabitants of the such areas resulted in the present day ethnomedicinal studies. But it has been observed that due to severe anthropogenic activities, globalization of the world economy and poor implementation of law about 90% of the natural forest has been lost in the Hindukush Himalaya. Such drastic changes can not be overcome by the traditional and local practices of conservation formulated by the inhabitants of such isolated regions (Shinwari *et al.*, 2000).

Many species are suffering from extinction and many other are suffering from the conservation status problems, becoming vulnerable, endangered or critically endangered. Thus the balance of the ecosystem has been disturbed by such activities and natural process have been altered by the human beings themselves. The population explosion has resulted into an unsustainable ecosystem and the fragile ecosystems have been disrupted and many of them are at the verge of extinction. It is feared that if the present situation exists then 1/4th of the present day species may become disappear in the coming few years (Shinwari *et al.*, 2003).

In this context identification of the endemic flora and its conservation status is of immense importance to enlist the vulnerable, endangered or critically endangered species. It has been noticed that 100 species are disappearing daily and if this process persists then 25% of the total flora will disappear within the next few years. According to some estimates about 15-20% of the flora of Pakistan is endangered including many of the endemic species of Pakistan (Shinwari *et al.*, 2000).

The total flora of District Swat if consist of 1550 species and the adjoining flora of District Chitral consist of 934 species (Stewrat, 1967 & 1972). It has been estimated that flora of Swat contains 87 threatened plants, similarly District Buner with 23 and District Chitral has 31 species threatened, which are threthened (Shinwari *et al.*, 2000).

According to previous studies it has been reported that 6.3% species in district Swat and 3% in district Chitral is threatened, in which 1.7% is considered to be endangered, 2.7% is vulnerable and 1.6% of the flora in District Swat is rare. Similarly out of the total 3% of Chitral, 0.6 % is endangered, 1.2 % vulnerable and 1.2 % is rare (Shinwari *et al.*, 2003).

C. ENDEMISM IN SWAT

According to the recent findings in Pakistan 428 endemics have been reported so for, in which 13 species are found in Swat endemic to Pakistan. Four species i.e. *Allium tripterum*, *Bupleurum constancei*, *Elymus borianus* and *Ligusticum stewartii* are endemic to Swat. Two species i.e. *Indigofera heterantha* and *Ligesticum stewartii* are found in Mankial valley. The first one is endemic to Pakistan and the second one is endemic to Swat.

D. CONSERVATION STATUS OF PLANT SPECIES IN MANKIAL VALLEY

Among the total two hundred and sixty two (262) species, two hundreds and fourteen (214) were common, thirteen (13) were endangered, sixteen (16) were vulnerable, fifteen (15) were rare, two (2) were insufficiently known and four (4) were commercially threatened. While no extinct and intermediate species were reported. The detail of the conservation status other than common species was as under (Table no. 1, 2 & Graph no. 1).

1. Extinct

No extinct species has been reported from the area during the present study.

2. Endangered

Among the endangered species *Aesculus indica*, *Bergenia ciliata*, *Bistorta amplexicaulis*, *Crataegus songarica*, *Dioscorea deltoidea*, *Hyoscyamus niger*, *Juniperus communis*, *Paeonia emodi*, *Podophyllum hexandrum*, *Polygonatum verticillatum*, *Pouplus alba*, *Taxus fuana* and *Valeriana jatamansi*.

3. Vulnerable

Among the vulnerable species *Acer caesium*, *Aconitum heterophyllum*, *Adiantum capillus-veneris*, *Berberis lycium*, *Bupleurum nigrescens*, *Colchicum luteum*, *Daphne mucronata*, *Elaeagnus umbellata*, *Ephedra gerardiana*, *Euphorbia wallichii*, *Indigofera heterantha*, *Juglans regia*, *Ligusticum stewartii*, *Parrotiopsis jacquemontiana*, *Sambucus wightiana* and *Viola biflora*.

4. Rare

Among the rare species *Achillea millefolium*, *Astragalus candolleanus*, *Betula utilis*, *Caltha alba*, *Chenopodium foliosum*, *Corydalis diphylla*, *Cotoneaster affinis*, *Equisetum arvense*, *Planta go major*, *Rubus ellipticus*, *Saussurea albescens*, *Spiranthes sinensis*, *Thymus linearis*, *Viburnum grandiflorum* and *Ziziphus jujuba*.

5. Indeterminate

No indeterminate species has been reported from the area during the present study.

6. Insufficiently known

Among the insufficiently known species *Marsilea minuta* and *Adiantum venustum* were recorded.

7. Commercially threatened

Among the commercially threatened species *Cedrus deodara*, *Geranium wallichianum*, *Plantago lanceolata*, and *Plantago depressa* were present in the valley.

E. MARKETABLE MEDICINAL PLANT SPECIES OF MANKIAL VALLEY

During the present research work 40 species are identified as marketable plants and the local collectors collect these plant and generate revenue for their livelihood (Table marketable plants). It was noted that the price of one species was more than Rs. 400/- per k.g., 3 were from Rs. 200/- to Rs. 300/- per k.g., 2 were from Rs. 100/- to Rs. 200/- and 24 were less than Rs. 100/- per k.g. The locals collect these plants and sale them to local Hakims and local Traders. The local Hakims use these plants for curing various diseases and sell out some plants for preparation of medicine to the local consumes, while the local Hakims also sell out excess of plants to big Traders. The big Traders sell out plants to various companies, where some are used in preparation of

various food items, some are purchased by Hakeems, some are sell out at National markets and some are exported to various countries (Figure no. 21 Collectors).

The chain of marketable medicinal plants start at Mankial valley, where collectors collect these plants, process it and after proper drying they sale it out at main market at Madyan. The local traders bring these plants to Mingora and sell out these plants on big traders. The big traders sell these plants at various markets at Peshawar, Rawalpindi, Lahore and Karachi. From these cities the medicinal plants are exported to United Kingdom (UK), China, India, Iran and Afghanistan (Shinwari *et al.*, 2000a). It has been observed that the maximum benefit is goes to the traders in the big cities, when they export these plants then they earn huge foreign exchange. The price detail of the marketable medicinal plants is as under.

Plants with price of more than Rs. 400/- per kg	= 1
Plants having price from Rs. 300/- to Rs. 400/- per kg	= 2
Plants having price from Rs. 200/- to Rs. 300/- per kg	= 11
Plants having price from Rs. 100/- to Rs. 200/- per kg	= 24
Plants having price of <u>less than Rs. 100/- per kg</u>	<u>= 2</u>
Total plants= 40	

F. PASTURE MANGAEMENT SYSTEM AT MANKIAL VALLEY

I. Introduction of the local inhabitants

Mankial valley is covering an area of 32278 acres and is dividable furhte in to two valleys known as Serai and Jabba. The Serai is draining by the River Serai and the Mashkoon and Badai are drinning by River Mankial. The junction of these rivers is at Badai where they join each other, and ultimately it proceed towards River Swat at Mankial village near the Mankial bridge.

The two sub valleys of Mankial are inhabiting by two major ethenic groups i.e. Torwal and Gujars. Serai valley is occupied by Gujars and they are residing in the valleys of Badai and Serai, while the Torwal are living from Mankial valley to Badai village and owns left side of the Jabba valley. Among the total 32278 acres of area the Gujars having living in Badai owned 20,620 acres and Torwal living in Mankial owned 11,658 acres of land. The population is less in the valley and the total population is about 6000 in which 65% are Torwal while 35% are Gujars.

Mankial valley is a combination from high glaciated peaks to irrigated terraced agricultural fields at lower valley bed. The valley has different kinds of forests including

mixed coniferous, deodar, blue pine, broad leaved and oak forests. The valley floor and the terraced fields are providing land for cultivation of off season vegetables like turnip, peas, gourd and beans etc. and agricultural fields are playing a very important role in the economy of the valley. While the livestock is another source of income for both the communities living in the valley. It is very interesting that the Torwal and Gujars having a very different kind of livelihood from each others.

During the winter almost all the Gujars migrates to various areas of Punjab and lower Khyber Pakhtunkhwa, while the Torwals are not doing so and present in the valley for the entire year. When the winter is on his then the Gujars return back during the months of April or May and stay up to September. Depending upon the diversity of the valley the Gujars taking movement all around the valley in a defined cycle while using their pastures, land, livestock and forest resources. During the present studies it has been noticed that about 75% of the population migrates while only 25% stay in the valley during the severe period of winter.

II. Utility and Management of Pastures

There are three different clans of Gujar community living in the valley viz. Suleman Khel, Inam Khel and Habib Khel. The Suleman Khel live in Badai village and Serai village has been occupied by Inam Khel and Habib Khel. It has been noticed that only six families of Inam Khel are living in Badai village. The chokail is a common pasture of all the clans and all the rest of the pastures have been divided among these clans.

When the winter season begin so 75% of the Gujars shifted to Punjab and lower Khyber Pakhtunkhwa, only 25% remains during winter in serai and Bdai villages. When the the snow mwelts and the temperature increase during April or early May then they start sowing maize and off season vegetables to support their livelihood. During this time the temperature become increase then during mid May they move towards the mid pastures.

The pastures of Ukar Beg, BAgnoo and Bela are allotted to Habib Khel and some families are also given the right to graze their cattles in Jabba valley. The pastures of Kamar Khwa and Banr are allotted to Inam Khel and few families of Suleman Khel are also allowed to graze their cattles in Serai valley and after that they move towards Birna pastures. There is no restriction after allotment of the pastures on any clan and they can move according to their need and shifting to the pastures is on independent basis based on every body handiness.

The oak branches are used as fodder for the livestock by the Gujars due to scarcity of fodder plants at the initial stage. During this time for safeguarding the higher altitude pastures like Chokial a watcher locally called "*Kakhey*" is appointed. It has been noticed that 4 watchers are appointed and they are paid an amount of Rs. 100/ for a period of one month by every family. These watchers are going daily for their duties to the higher altitude pastures and due to severe cold weather they return back at the evening to their homes.

When the resources of the mid pastures are exhausted after a period of one month then a meeting is called and all the families decide a date with their mutual consensus and collective wisdom for shifting to the Chokail pastures. It is ensured that the pastures resources must be used on equitable share basis and over exploitation and unsustainable use is strictly prohibited during the grazing period. The Gujars are rear their cattle including buffaloes, cows, sheep and goats in the higher altitude and prepare various dairy products and "*Desi Ghee*" during their stay at higher altitude. They use donkeys as a communication source for shifting their livelihood requirements.

The Dinki Bek, Danna Sar, Mainz Banada and Poly Sar are the main hamlets of the higher altitude Chokial pasture. As per allotment of these hamlets the Inam Khel are allowed to use Dinki Bek, Habib Khel are allowed to use Poly Sar and Mainz Banda while Suleman Khel are allowed to use Danna Sar. The Gujars are allowed to bring their buffaloes, cows, sheep and goats to the higher altitude pasture of Chokail. When the resources at Chokial pasture exhausted after a passing a period of one month then they move to use the resources of the upper altitude pastures at Tres, Charoona and Pajja. The movement to these areas is on independent basis.

The right and left sides of Charoona and Tres is allowed to Inam Khel for grazing their livestock. The areas of Ramooso Takai, bela and Bar Takai are allowed to Habib Khel for grazing of their livestock. Some area been still reserved in chokail and that allotted to the clan of Suleman Khel for grazing their livestock.

As per settlement among the clans of Gujars sixteen (16) families of Inam Khel are allowed to utilize the right side of Charoona and Pajja. It is very interesting that Inam Khel families are allowed to stay for up to 20 days in any pasture owned by them but they have to shift from July 5-10.

From August 1st-10th they start movement for using the mid pastures of Banr, Birna, Bela, Kamar Khwa and Bagnoo as decided after finishing usage of previous

pasture. For curing the mid pastures local watchers are appointed to protect these mid pastures. The inhabitants of the valley collect fodder for the coming winter season and dry them called as “pashkaley”. The locals are busy during these 10-20 in harvesting their crops and they also graze their cattles while harvesting the crops. When they passed this period then they move towards the village of serai for maize harvesting. When they harvest their crops and make all the preparation for coming winter then 25% population stay at the valley while 75% of the population move towards Punjab and lower Khyber Pakhtunkhwa.

It is important to note that some pastures which are out of reach and present at very higher altitude at Mankial valley are sold out or leased to the nomads by generating an amount of Rs. 10,0000/- per year. The Lesse is allowed to sublet these pastures according to his convenience to the herders. Since no written agreement is signed between the Owner and the Purchaser therefore, the herders collect bark of Birch (*Betula utilis* D. Don) and collect medicinal plants in a very unsustainable way. They also cut the plants for fuel wood usage and are busy in trapping and hunting the precious fauna which in turn results into unsustainable practices of the ecosystem and wildlife inhabiting therein. It has been concluded that the pastures are under severe pressure and it is resulting in to a poor pasture and water shed managment that is destabilizing the natural ecosystem and leads towards extinction of many plants and animals species.

S #	Group	Com.	Ext.	End.	Vul.	Rar.	Ind.	Ins. Kn.	Com. Th.
1.	Monilophytes	16	-	-	1	1	-	2	-
2.	Gymnosperms	3	-	2	1	-	-	-	1
3.	Angiosperms	195	-	11	14	14	-	-	3
	Total	214	-	13	16	15	-	2	4

Table 3. Conservation status of various groups reported from the research area

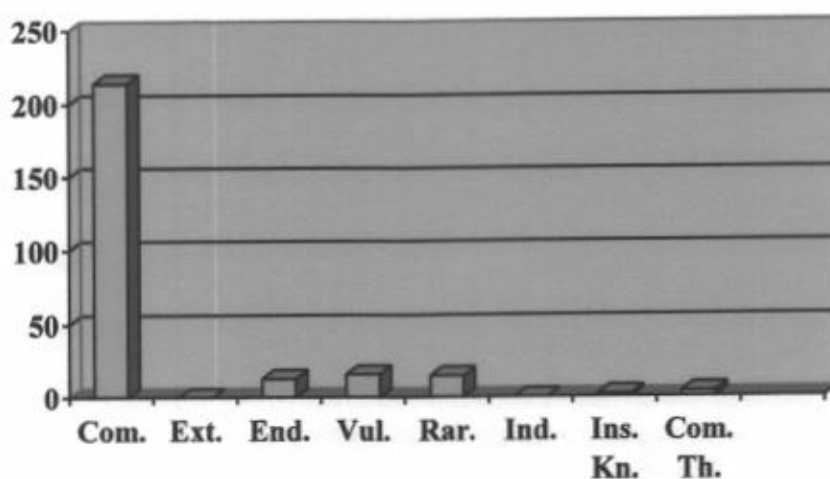


Figure 4. Conservation status of the species growing in the reasearch area.

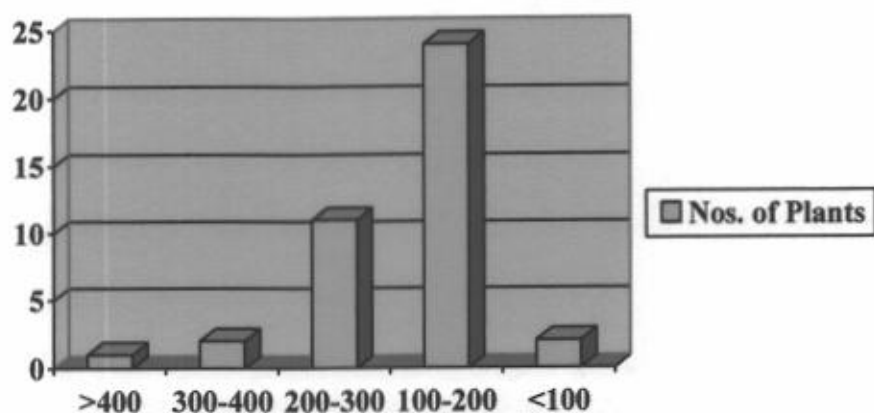


Figure 5. Marketable Medicinal Plants growing in Mankial Valley

Table 4. Families, scientific names, and their conservation status within the valley of species reported from the research area

S #	Family/scientific name	I. Monilophytes (Ferns and their allies)							
		Conservation status							
		Com.	Ext.	End.	Vul.	Rar.	Ind.	Ins. Kn.	Com. Th.
1.	Aspleniaceae								
	<i>Asplenium adiantum-nigrum</i> (L.) Hook.	+	-	-	-	-	-	-	-
	<i>Asplenium ceterach</i> L.	+	-	-	-	-	-	-	-
	<i>Asplenium septentrionale</i> (Sw.) Hook.	+	-	-	-	-	-	-	-
	<i>Asplenium trichomanes</i> (Huds.) Hook.	+	-	-	-	-	-	-	-
2.	Dennstaedtiaceae								
	<i>Pteridium aquilinum</i> (L.) Kuhr.	+	-	-	-	-	-	-	-
3.	Dryopteridaceae								
	<i>Dryopteris ramosa</i> (Hope) C. Chr.	+	-	-	-	-	-	-	-
	<i>Polystichum discretum</i> (D. Don) Diels	+	-	-	-	-	-	-	-
	<i>Polystichum thomsonii</i> (Hook.) Bedd.	+	-	-	-	-	-	-	-
4.	Equisetaceae								
	<i>Equisetum arvense</i> L.	-	-	-	-	+	-	-	-
5.	Marsileaceae								
	<i>Marsilea minuta</i> L.	-	-	-	-	-	-	+	-
6.	Polypodiaceae								
	<i>Adiantum capillus-veneris</i> L.	-	-	-	+	-	-	-	-
	<i>Adiantum venustum</i> D. Don	-	-	-	-	-	-	+	-
	<i>Allosorus stelleri</i> (Rupr.) Bedd	+	-	-	-	-	-	-	-
7.	Pteridaceae								
	<i>Pteris critica</i> L.	+	-	-	-	-	-	-	-
	<i>Pteris vitata</i> L.	+	-	-	-	-	-	-	-
8.	Thelypteridaceae								
	<i>Christella dentata</i> (Forssk.) Rownsey	+	-	-	-	-	-	-	-

I. Monilophytes (Ferns and their allies)

Conservation status

Com. Ext. End. Vul. Rar. Ind. Ins. Kn. Com. Th.

S # Family/scientific name

9. **Woodsiaceae**

Athyrium mackinnonii (Hope) C. Chr.

Athyrium rupicola (Hope) C. Chr.

Cystopteris dickieana R. Sim.

Cystopteris fragilis (L.) Bernh.

+	-	-	-	-	-	-	-	-
+	-	-	-	-	-	-	-	-
+	-	-	-	-	-	-	-	-
+	-	-	-	-	-	-	-	-

II. Lignophytes (Gymnosperms)

Conservation status

Com. Ext. End. Vul. Rar. Ind. Ins. Kn. Com. Th.

S # Family/scientific name

1. **Cupressaceae**

Juniperus communis L.

2. **Ephedraceae**

Ephedra gerardiana Wall. ex Stapf

3. **Pinaceae**

Abies pindrow Royle

Cedrus deodara (Roxb. ex D. Don) G. Don

Picea smithiana (Wall.) Boiss.

Pinus wallichiana A. B. Jackson

4. **Taxaceae**

Taxus fauna Non. Li & R. R. Mill.

-	-	+	-	-	-	-	-	-
-	-	-	+	-	-	-	-	-
+	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	+
+	-	-	-	-	-	-	-	-
+	-	-	-	-	-	-	-	-
-	-	+	-	-	-	-	-	-

II. Lignophytes (Angiosperms) Monocot

Conservation status

Com. Ext. End. Vul. Rar. Ind. Ins. Kn. Com. Th.

S # Family/scientific name

1. **Alliaceae**

Allium victorialis L.

2. **Araceae**

Arisaema jacquemontii Blume

+	-	-	-	-	-	-	-	-
+	-	-	-	-	-	-	-	-

S #	Family/scientific name	II. <u>Lignophytes (Angiosperms) Monocot</u>							
		<u>Conservation status</u>							
		Com.	Ext.	End.	Vul.	Rar.	Ind.	Ins. Kn.	Com. Th.
3.	Colchicaceae <i>Colchicum luteum</i> Baker	-	-	-	+	-	-	-	-
4.	Convallariaceae <i>Polygonatum verticillatum</i> All.	-	-	+	-	-	-	-	-
5.	Cyperaceae <i>Carex karoii</i> (Freyn.) Freyn. <i>Cyperus niveus</i> Retz. <i>Schoenoplectus litoralis</i> (Schrader.) Palla	+	-	-	-	-	-	-	-
		+	-	-	-	-	-	-	-
		+	-	-	-	-	-	-	-
6.	Dioscoreaceae <i>Dioscorea deltoidea</i> Wall. ex Kunth.	-	-	+	-	-	-	-	-
7.	Iridaceae <i>Iris hookeriana</i> Foster	+	-	-	-	-	-	-	-
8.	Juncaceae <i>Juncus membranaceus</i> Royle ex Don <i>Juncus sphacelatus</i> Decne.	+	-	-	-	-	-	-	-
		+	-	-	-	-	-	-	-
9.	Liliaceae <i>Northolirion thomsonianum</i> (D. Don) Stapf	+	-	-	-	-	-	-	-
10.	Orchidaceae <i>Dactylorhiza hatagirea</i> (D. Don) Soo. <i>Spiranthes sinensis</i> (Pers.) Ames	-	-	-	-	-	-	-	-
		-	-	-	-	+	-	-	-
11.	Trilliaceae <i>Trillium govanianum</i> Wall. ex Royle	+	-	-	-	-	-	-	-
12.	Poaceae <i>Arundo donax</i> L. <i>Dactylis glomerata</i> L. <i>Dichanthium annulatum</i> (Forssk.) Stapf. <i>Digitaria ciliaris</i> (Retz.) Koel. <i>Echinochloa crus-galli</i> (L.) P. Beauv.	+	-	-	-	-	-	-	-
		+	-	-	-	-	-	-	-
		+	-	-	-	-	-	-	-
		+	-	-	-	-	-	-	-
		+	-	-	-	-	-	-	-

S #	Family/scientific name	II. <u>Lignophytes (Angiosperms) Monocot</u>							
		<u>Conservation status</u>							
		Com.	Ext.	End.	Vul.	Rar.	Ind.	Ins.	Kn. Com. Th.
	<i>Pennisetum lanatum</i> Klotzsch	+	-	-	-	-	-	-	-
	<i>Piptatherum gracile</i> Mez.	+	-	-	-	-	-	-	-
	<i>Poa alpina</i> L.	+	-	-	-	-	-	-	-
	<i>Setaria pumila</i> (Poir.) Roem.	+	-	-	-	-	-	-	-

S #	Family/scientific name	II. <u>Lignophytes (Angiosperms) Dicot</u>							
		<u>Conservation status</u>							
		Com.	Ext.	End.	Vul.	Rar.	Ind.	Ins.	Kn. Com. Th.
1.	Adoxaceae								
	<i>Sambucus wightiana</i> Wall. ex Wight & Am.	+	-	-	-	-	-	-	-
	<i>Viburnum grandiflorum</i> Wall. ex DC.	-	-	-	-	+	-	-	-
2.	Amaranthaceae								
	<i>Achyranthes aspera</i> L.	+	-	-	-	-	-	-	-
	<i>Amaranthus viridis</i> L.	+	-	-	-	-	-	-	-
	<i>Amaranthus spinosus</i> L.	+	-	-	-	-	-	-	-
	<i>Chenopodium album</i> L.	+	-	-	-	-	-	-	-
	<i>Chenopodium botrys</i> L.	+	-	-	-	-	-	-	-
	<i>Chenopodium foliosum</i> Asch.	-	-	-	-	+	-	-	-
	<i>Chenopodium murale</i> L.	+	-	-	-	-	-	-	-
3.	Apiaceae								
	<i>Aegopodium burtitii</i> E. Nasir	+	-	-	-	-	-	-	-
	<i>Bupleurum lanceolatum</i> Wall.	+	-	-	-	-	-	-	-
	<i>Bupleurum nigrescens</i> E. Nasir	-	-	-	+	-	-	-	-
	<i>Bupleurum tenue</i> Buch.	+	-	-	-	-	-	-	-
	<i>Chaerophyllum reflexum</i> Lindl.	+	-	-	-	-	-	-	-
	<i>Eriocycla staintonii</i> Riedl & Kuber	+	-	-	-	-	-	-	-
	<i>Heracleum candicans</i> Wall. ex DC.	+	-	-	-	-	-	-	-

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S #	Family/scientific name	Com.	Ext.	End.	Vul.	Rar.	Ind.	Ins. Kn.	Com. Th.	
	<i>Ligusticum elatum</i> C. B. Clarke	+	-	-	-	-	-	-	-	
	<i>Ligusticum stewartii</i> (Hiroe) E. Nasir	-	-	-	+	-	-	-	-	
	<i>Oenanthe javanica</i> (Blume) DC.	+	-	-	-	-	-	-	-	
	<i>Pimpinella diversifolia</i> DC.	+	-	-	-	-	-	-	-	
	<i>Scaligeria aitchisonii</i> Wolff	+	-	-	-	-	-	-	-	
	<i>Scandix pecten-veneris</i> L.	+	-	-	-	-	-	-	-	
	<i>Sium latijugum</i> C. B. Clarke	+	-	-	-	-	-	-	-	
	<i>Torilis leptophylla</i> (L.) Reichb.	+	-	-	-	-	-	-	-	
	<i>Vicatia wolffiana</i> (Wolff ex Fedde) Norman	+	-	-	-	-	-	-	-	
4.	Araliaceae									
	<i>Aralia cachemirica</i> Dcne.	+	-	-	-	-	-	-	-	
	<i>Hedra nepalensis</i> K. Koch.	+	-	-	-	-	-	-	-	
5.	Asteraceae									
	<i>Achillea millefolium</i> L.	-	-	-	-	+	-	-	-	
	<i>Artemisia biennis</i> Willd.	+	-	-	-	-	-	-	-	
	<i>Artemisia elegantissima</i> Pamp.	+	-	-	-	-	-	-	-	
	<i>Artemisia japonica</i> Thunb.	+	-	-	-	-	-	-	-	
	<i>Artemisia moorcroftiana</i> Wall. ex DC.	+	-	-	-	-	-	-	-	
	<i>Artemisia persica</i> Boiss.	+	-	-	-	-	-	-	-	
	<i>Artemisia scoparia</i> Waldst. & Kit.	+	-	-	-	-	-	-	-	
	<i>Artemisia santolinifolia</i> Turcz. Ex Krasch.	+	-	-	-	-	-	-	-	
	<i>Handelia trichophylla</i> (Schrenk) Heimerl	+	-	-	-	-	-	-	-	
	<i>Leucanthemum vulgare</i> Lam.	+	-	-	-	-	-	-	-	
	<i>Aster altaicus</i> Willd.	+	-	-	-	-	-	-	-	
	<i>Aster molliusculus</i> (DC.) C. B. Clarke	+	-	-	-	-	-	-	-	
	<i>Conyza aegyptiaca</i> (L.) Ait.	+	-	-	-	-	-	-	-	

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	<i>Cirsium falconeri</i> (Hook. f.) Petrak	+	-	-	-	-	-	-	-	-	-
	<i>Cirsium verutum</i> (D. Don) Sprengel	+	-	-	-	-	-	-	-	-	-
	<i>Cousinia thomsonii</i> C. B. Clarke	+	-	-	-	-	-	-	-	-	-
	<i>Echinops cornigerus</i> DC.	+	-	-	-	-	-	-	-	-	-
	<i>Saussurea albescens</i> (DC.) Sch.	-	-	-	-	+	-	-	-	-	-
	<i>Anaphalis margaritacea</i> (L.) Benth.	+	-	-	-	-	-	-	-	-	-
	<i>Anaphalis triplinervis</i> (Sims.) C. B. Clarke.	+	-	-	-	-	-	-	-	-	-
	<i>Leontopodium himalayanum</i> DC.	+	-	-	-	-	-	-	-	-	-
	<i>Bidens cernua</i> L.	+	-	-	-	-	-	-	-	-	-
	<i>Sonchus asper</i> (L.) Hill	+	-	-	-	-	-	-	-	-	-
	<i>Taraxacum officinale</i> F. H. Wiggers	+	-	-	-	-	-	-	-	-	-
	<i>Senecio chrysanthemoides</i> DC.	+	-	-	-	-	-	-	-	-	-
6.	Balsaminaceae										
	<i>Impatiens balfourii</i> Hook.	+	-	-	-	-	-	-	-	-	-
	<i>Impatiens brachycentra</i> Kar. & Kir.	+	-	-	-	-	-	-	-	-	-
	<i>Impatiens edgeworthii</i> Hook.	+	-	-	-	-	-	-	-	-	-
	<i>Impatiens flemingii</i> Hook.	+	-	-	-	-	-	-	-	-	-
	<i>Impatiens glandulifera</i> Royle	+	-	-	-	-	-	-	-	-	-
	<i>Impatiens meeboldii</i> Hook.	+	-	-	-	-	-	-	-	-	-
	<i>Impatiens sulcata</i> Wall.	+	-	-	-	-	-	-	-	-	-
	<i>Impatiens thomsonii</i> Hook.	+	-	-	-	-	-	-	-	-	-
7.	Betulaceae										
	<i>Betula utilis</i> D. Don	-	-	-	-	+	-	-	-	-	-
8.	Berberidaceae										
	<i>Berberis lycium</i> Royle	-	-	-	+	-	-	-	-	-	-
	<i>Podophyllum hexandrum</i> Wall. ex. Royle	-	-	+	-	-	-	-	-	-	-
9.	Boraginaceae										
	<i>Cynoglossum glochidiatum</i> Wall.	+	-	-	-	-	-	-	-	-	-

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	<i>Cynoglossum lanceolatum</i> Forssk.	+	-	-	-	-	-	-	-
	<i>Lindolfia anchusoides</i> (Lindl.) Lehm.	+	-	-	-	-	-	-	-
	<i>Lindolfia stylosa</i> (Kar. & Kir.) Brand	+	-	-	-	-	-	-	-
	<i>Lindolfia longiflora</i> (Benth.) Baill.	+	-	-	-	-	-	-	-
10.	Brassicaceae								
	<i>Capsella bursa-pastoris</i> (L.) Medik.	+	-	-	-	-	-	-	-
	<i>Lepidium sativum</i> L.	+	-	-	-	-	-	-	-
	<i>Cardamine hirsuta</i> L.	+	-	-	-	-	-	-	-
	<i>Cardamine flexuosa</i> With.	+	-	-	-	-	-	-	-
	<i>Nasturtium officinale</i> R. Br.	+	-	-	-	-	-	-	-
	<i>Sisymbrium erysimoides</i> Desf.	+	-	-	-	-	-	-	-
	<i>Sisymbrium loeselii</i> L.	+	-	-	-	-	-	-	-
	<i>Sisymbrium orientale</i> L.	+	-	-	-	-	-	-	-
11.	Buxaceae								
	<i>Sarcococca saligna</i> (D. Don) Muell.	+	-	-	-	-	-	-	-
12.	Campanulaceae								
	<i>Campanula latifolia</i> L.	+	-	-	-	-	-	-	-
	<i>Campanula pallida</i> Wall.	+	-	-	-	-	-	-	-
	<i>Codonopsis clematidea</i> (Schrenk) C. B. Clarke	+	-	-	-	-	-	-	-
13.	Cannabaceae								
	<i>Cannabis sativa</i> L.	+	-	-	-	-	-	-	-
14.	Caprifoliaceae								
	<i>Dipsacus inermis</i> Wall.	+	-	-	-	-	-	-	-
	<i>Valeriana hardwickii</i> Wall.	+	-	-	-	-	-	-	-
	<i>Valeriana himalayana</i> Grub.	+	-	-	-	-	-	-	-

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	<i>Valeriana jatamansi</i> Jones	-	-	+	-	-	-	-	-
	<i>Valeriana stracheyi</i> Clarke	+	-	-	-	-	-	-	-
15.	Caryophyllaceae								
	<i>Arenaria neelgherrensis</i> Wight and Arn.	+	-	-	-	-	-	-	-
	<i>Arenaria orbiculata</i> Royle ex Edgew.	+	-	-	-	-	-	-	-
	<i>Arenaria serpyllifolia</i> L.	+	-	-	-	-	-	-	-
	<i>Cerastium fontanum</i> Baumg.	+	-	-	-	-	-	-	-
	<i>Dianthus jacquemontii</i> Edgew. ex Hook.	+	-	-	-	-	-	-	-
	<i>Minurtia kashmirica</i> (Edgew.) Mattf.	+	-	-	-	-	-	-	-
	<i>Silene gonosperma</i> (Rupr.) Bocquet	+	-	-	-	-	-	-	-
	<i>Silene vulgaris</i> (Moench) Gracke	+	-	-	-	-	-	-	-
	<i>Spergularia diandra</i> (Guss.) Heldr.	+	-	-	-	-	-	-	-
	<i>Stellaria monosperma</i> Buch. Ham. ex D. Don	+	-	-	-	-	-	-	-
16.	Celtidaceae								
	<i>Celtis australis</i> L.	+	-	-	-	-	-	-	-
17.	Convolvulaceae								
	<i>Convolvulus arvensis</i> L.	+	-	-	-	-	-	-	-
	<i>Cuscuta reflexa</i> Roxb.	+	-	-	-	-	-	-	-
18.	Crassulaceae								
	<i>Hylotelephium ewersii</i> (Ledeb.) H. Ohba	+	-	-	-	-	-	-	-
	<i>Sedum hispanicum</i> L.	+	-	-	-	-	-	-	-
19.	Ebenaceae								
	<i>Diospyros lotus</i> L.	+	-	-	-	-	-	-	-
20.	Elaeagnaceae								
	<i>Elaeagnus umbellata</i> Thunb.	-	+	-	-	-	-	-	-

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21.	Euphorbiaceae										
	<i>Euphorbia wallichii</i> Hook.	-	-	-	+	-	-	-	-	-	-
22.	Fabaceae										
	<i>Astragalus candolleanus</i> Royle ex Benth.	-	-	-	-	+	-	-	-	-	-
	<i>Colutea nepalensis</i> Sims	+	-	-	-	-	-	-	-	-	-
	<i>Desmodium elegans</i> DC.	+	-	-	-	-	-	-	-	-	-
	<i>Indigofera heterantha</i> Wall. ex Brandis	-	-	-	+	-	-	-	-	-	-
	<i>Lespedeza juncea</i> (L. f.) Persoon var. <i>juncea</i>	+	-	-	-	-	-	-	-	-	-
	<i>Lathyrus pratensis</i> L.	+	-	-	-	-	-	-	-	-	-
	<i>Medicago sativa</i> L.	+	-	-	-	-	-	-	-	-	-
	<i>Mellilotus indica</i> (L.) All.	+	-	-	-	-	-	-	-	-	-
	<i>Mellilotus officinalis</i> (L.) Pall.	+	-	-	-	-	-	-	-	-	-
	<i>Trigonella gracilis</i> Benth.	+	-	-	-	-	-	-	-	-	-
	<i>Trifolium repens</i> L.	+	-	-	-	-	-	-	-	-	-
23.	Fagaceae										
	<i>Quercus baloot</i> Griff.	+	-	-	-	-	-	-	-	-	-
	<i>Quercus incana</i> Roxb.	+	-	-	-	-	-	-	-	-	-
	<i>Quercus semecarpifolia</i> Smith	+	-	-	-	-	-	-	-	-	-
24.	Geraniaceae										
	<i>Geranium lambertii</i> Sweet	+	-	-	-	-	-	-	-	-	-
	<i>Geranium wallichianum</i> D. Don ex Sweet	-	-	-	-	-	-	-	-	+	-
25.	Gentianaceae										
	<i>Swertia longifolia</i> Boiss.	+	-	-	-	-	-	-	-	-	-
	<i>Swertia cordata</i> (G. Don) Clarke	+	-	-	-	-	-	-	-	-	-
	<i>Swertia paniculata</i> Wall.	+	-	-	-	-	-	-	-	-	-

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26.	Hamamelidaceae <i>Parrotiopsis jacquemontiana</i> (Dcne.) Rehder	-	-	-	+	-	-	-	-
27.	Juglandaceae <i>Juglans regia</i> L.	-	-	-	+	-	-	-	-
28.	Lythraceae <i>Punica granatum</i> L.	+	-	-	-	-	-	-	-
29.	Lamiaceae <i>Mentha longifolia</i> (L.) Huds.	+	-	-	-	-	-	-	-
	<i>Marrubium vulgare</i> L.	+	-	-	-	-	-	-	-
	<i>Nepeta cataria</i> L.	+	-	-	-	-	-	-	-
	<i>Nepeta clarkei</i> Hook.	+	-	-	-	-	-	-	-
	<i>Nepeta erecta</i> (Royle ex Benth.) Benth.	+	-	-	-	-	-	-	-
	<i>Nepeta govaniana</i> (Wall. ex Benth) Lab.	+	-	-	-	-	-	-	-
	<i>Nepeta juncea</i> Benth.	+	-	-	-	-	-	-	-
	<i>Nepeta laevigata</i> (D. Don) Hand.	+	-	-	-	-	-	-	-
	<i>Nepeta paulsenii</i> Briquet	+	-	-	-	-	-	-	-
	<i>Phlomis bracteosa</i> Royle ex Benth.	+	-	-	-	-	-	-	-
	<i>Stachys emodi</i> Hedge	+	-	-	-	-	-	-	-
	<i>Origanum vulgare</i> L.	+	-	-	-	-	-	-	-
	<i>Prunella vulgaris</i> L.	+	-	-	-	-	-	-	-
	<i>Thymus linearis</i> Benth.	-	-	-	-	+	-	-	+
	<i>Calamintha hydaspidis</i> (Falconer ex Benth.) Hedge	+	-	-	-	-	-	-	-
	<i>Isodon rugosus</i> (Wall. ex Benth.) Codd	+	-	-	-	-	-	-	-
	<i>Lamium album</i> L.	+	-	-	-	-	-	-	-

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	<i>Leonurus cardiaca</i> L.	+	-	-	-	-	-	-	-
30.	Moraceae								
	<i>Ficus carica</i> L.	+	-	-	-	-	-	-	-
31.	Malvaceae								
	<i>Malva neglecta</i> Wallr.	+	-	-	-	-	-	-	-
32.	Oxalidaceae								
	<i>Oxalis corniculata</i> L.	+	-	-	-	-	-	-	-
33.	Onagraceae								
	<i>Epilobium cylindricum</i> D. Don	+	-	-	-	-	-	-	-
	<i>Epilobium hirsutum</i> L.	+	-	-	-	-	-	-	-
	<i>Epilobium parviflorum</i> Schreber	+	-	-	-	-	-	-	-
	<i>Epilobium royleanum</i> Hausskn.	+	-	-	-	-	-	-	-
	<i>Oenothera rosea</i> L.	+	-	-	-	-	-	-	-
34.	Oleaceae								
	<i>Fraxinus xanthoxyloides</i> (G. Don) DC.	+	-	-	-	-	-	-	-
	<i>Jasminum humile</i> L.	+	-	-	-	-	-	-	-
35.	Orobanchaceae								
	<i>Euphrasia himalayica</i> Wettst.	+	-	-	-	-	-	-	-
	<i>Orobanche alba</i> Steph.	+	-	-	-	-	-	-	-
	<i>Pedicularis pectinata</i> Wall ex. Beth.	+	-	-	-	-	-	-	-
	<i>Pedicularis pyramidata</i> Royle	+	-	-	-	-	-	-	-
36.	Paeoniaceae								
	<i>Paeonia emodi</i> Wall. ex Royle	-	-	+	-	-	-	-	-
37.	Papaveraceae								
	<i>Corydalis diphylla</i> Wall.	-	-	-	-	+	-	-	-

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38.	Parnassiaceae								
	<i>Parnassia cabulica</i> Planch. ex Clarke	+	-	-	-	-	-	-	-
39.	Phytolacaceae								
	<i>Phytolacca latbenia</i> (Moq.) Walter	+	-	-	-	-	-	-	-
40.	Plantaginaceae								
	<i>Plantago amplexicaulis</i> Cav.	+	-	-	-	-	-	-	-
	<i>Plantago lanceolata</i> L.	-	-	-	-	-	-	-	+
	<i>Plantago depressa</i> Willd.	+	-	-	-	-	-	-	+
	<i>Plantago major</i> Willd.	-	-	-	-	+	-	-	-
41.	Polygonaceae								
	<i>Bistorta affinis</i> (D. Don) Green	+	-	-	-	-	-	-	-
	<i>Bistorta amplexicaulis</i> (D. Don) Green	-	-	+	-	-	-	-	-
	<i>Fagopyrum esculentum</i> Moench	+	-	-	-	-	-	-	-
	<i>Oxyria digyna</i> (L.) Hill	+	-	-	-	-	-	-	-
	<i>Persicaria barbata</i> (L.) Hara	+	-	-	-	-	-	-	-
	<i>Persicaria glabra</i> (Willd.) M. Gomes	+	-	-	-	-	-	-	-
	<i>Polygonum aviculare</i> L.	+	-	-	-	-	-	-	-
	<i>Polygonum plebejum</i> R. Br.	+	-	-	-	-	-	-	-
	<i>Rumex dentatus</i> L.	+	-	-	-	-	-	-	-
	<i>Rumex hastatus</i> D. Don	+	-	-	-	-	-	-	-
	<i>Rumex nepalensis</i> Spreng.	+	-	-	-	-	-	-	-
42.	Portulacaceae								
	<i>Portulaca oleracea</i> L.	+	-	-	-	-	-	-	-
43.	Primulaceae								
	<i>Primula minutissima</i> Jacquem. ex Duby	+	-	-	-	-	-	-	-
44.	Ranunculaceae								
	<i>Aconitum heterophyllum</i> Wall. ex Royle	-	-	-	+	-	-	-	-

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	<i>Anemone vitifolia</i> Bush.	+	-	-	-	-	-	-	-
	<i>Aquilegia pubiflora</i> Wall. ex Royle	+	-	-	-	-	-	-	-
	<i>Caltha alba</i> Camb.	-	-	-	-	+	-	-	-
	<i>Clematis grata</i> Wall.	+	-	-	-	-	-	-	-
	<i>Ranunculus arvensis</i> L.	+	-	-	-	-	-	-	-
	<i>Ranunculus laetus</i> Wall. ex Hook.	+	-	-	-	-	-	-	-
	<i>Thalictrum cultratum</i> Wall.	+	-	-	-	-	-	-	-
45.	Rhamnaceae								
	<i>Ziziphus jujuba</i> Mill.	-	-	-	-	+	-	-	-
46.	Rosaceae								
	<i>Cotoneaster affinis</i> var. <i>bacillaris</i> (Lindl.) Schneider	-	-	-	-	+	-	-	-
	<i>Crataegus songarica</i> C. Koch	-	-	+	-	-	-	-	-
	<i>Fragaria nubicola</i> Lindl. ex Lacaita	+	-	-	-	-	-	-	-
	<i>Potentilla microphylla</i> var. <i>microphylla</i> D. Don	+	-	-	-	-	-	-	-
	<i>Potentilla supina</i> L.	+	-	-	-	-	-	-	-
	<i>Rosa macrophylla</i> Lindl.	+	-	-	-	-	-	-	-
	<i>Rubus ellipticus</i> Smith	-	-	-	-	+	-	-	-
	<i>Sorbaria tomentosa</i> (Lindl.) Rehder	+	-	-	-	-	-	-	-
47.	Rubiaceae								
	<i>Galium hirtiflorum</i> Recquien ex DC.	+	-	-	-	-	-	-	-
48.	Salicaceae								
	<i>Pouplus alba</i> L.	-	-	+	-	-	-	-	-
49.	Sapindaceae								
	<i>Acer caesium</i> Wall. ex Brandis	-	-	-	+	-	-	-	-
	<i>Aesculus indica</i> (Wall. ex Camb.) Hook.	-	-	+	-	-	-	-	-

S #	Family/scientific name	II. <u>Lignophytes (Angiosperms) Dicot</u>							
		<u>Conservation status</u>							
		<u>Com.</u>	<u>Ext.</u>	<u>End.</u>	<u>Vul.</u>	<u>Rar.</u>	<u>Ind.</u>	<u>Ins. Kn.</u>	<u>Com. Th.</u>
50.	Saxifragaceae <i>Bergenia ciliata</i> (Haw.) Sternb.	-	-	+	-	-	-	-	-
51.	Scrophulariaceae <i>Scrophularia scabiosifolia</i> Bth. <i>Verbascum thapsus</i> L. <i>Veronica anagallis-aquatica</i> L.	+	-	-	-	-	-	-	-
52.	Solanaceae <i>Solanum nigrum</i> L. <i>Hyoscyamus niger</i> L.	+	-	-	-	-	-	-	-
53.	Tamaricaceae <i>Tamaricaria elegans</i> (Royle) Qaiser & Ali	+	-	-	-	-	-	-	-
54.	Thymeleaceae <i>Daphne mucronata</i> Royle	-	-	-	+	-	-	-	-
55.	Urticaceae <i>Urtica dioica</i> L.	+	-	-	-	-	-	-	-
56.	Verbenaceae <i>Verbena officinalis</i> L.	+	-	-	-	-	-	-	-
57.	Violaceae <i>Viola biflora</i> L. <i>Viola canescens</i> Wall. ex Roxb.	-	-	-	+	-	-	-	-
58.	Vitaceae <i>Vitis vinifera</i> L.	+	-	-	-	-	-	-	-

Key to the table:

Com= Common, End= Endangered, Ext= Extinct, Vul= Vulnerable, Rar= Rare, Ind= Indeterminate, Ins. Kn= Insufficiently Known,
Com. Th= Commercially threatened

Table 5. Threatened medicinal plants of Mankial Valley

S. No.	Endangered	Vulnerable	Rare	Insufficiently known	Commercially threatened
1.	<i>Aesculus indica</i>	<i>Aconitum heterophyllum</i>	<i>Achillea millefolium</i>	<i>Marsilea minuta</i>	<i>Cedrus deodara</i>
2.	<i>Bergenia ciliata</i>	<i>Acer caesium</i>	<i>Astragalus candolleanus</i>	<i>Adiantum venustum</i>	<i>Geranium wallichianum</i>
3.	<i>Bistorta amplexicaulis</i>	<i>Adiantum capillus-veneris</i>	<i>Betula utilis</i>		<i>Plantago lanceolata</i>
4.	<i>Crataegus songarica</i>	<i>Berberis lycium</i>	<i>Caltha alba</i>		<i>Plantago depressa</i>
5.	<i>Dioscorea deltoidea</i>	<i>Bupleurum nigrescens</i>	<i>Chenopodium foliosum</i>		
6.	<i>Hyoscyamus niger</i>	<i>Colchicum luteum</i>	<i>Corydalis diphylla</i>		
7.	<i>Juniperus communis</i>	<i>Daphne mucronata</i>	<i>Cotoneaster affinis</i>		
8.	<i>Paeonia emodi</i>	<i>Elaeagnus umbellate</i>	<i>Equisetum arvense</i>		
9.	<i>Podophyllum hexandrum</i>	<i>Ephedra gerardiana</i>	<i>Planta go major</i>		
10.	<i>Polygonatum verticillatum</i>	<i>Euphorbia wallichii</i>	<i>Rubus ellipticus</i>		
11.	<i>Pouplus alba</i>	<i>Indigofera heterantha</i>	<i>Saussurea albescens</i>		
12.	<i>Taxus fuana</i>	<i>Juglans regia</i>	<i>Spiranthus sinensis</i>		
13.	<i>Valeriana jatamansi.</i>	<i>Ligusticum stewartii</i>	<i>Thymus linearis,</i>		
14.		<i>Parrotiopsis jacquemontiana</i>	<i>Viburnum grandiflorum</i>		
15.		<i>Sambucus wightiana</i>	<i>Ziziphus jujuba</i>		
16.		<i>Viola biflora.</i>			

Table 6. Marketable Medicinal Plants of Mankial Valley

S #	Scientific name	Local name	Collection kg/year	Price per kg	Amount (Rs.)
1.	<i>Adiantum capillus-veneris</i> L.	Sumbal	400	100	40000
2.	<i>Adiantum venustum</i> D. Don	Sumbal	500	120	60000
3.	<i>Ephedra gerardiana</i> Wall. ex Stapf	Asmania	150	300	45000
4.	<i>Arisaema jacquemontii</i> Blume	Marjarai	120	140	16800
5.	<i>Colchicum luteum</i> Baker	Zair gulay	80	400	32000
6.	<i>Polygonatum verticillatum</i> All.	Nooryalam	90	200	18000
7.	<i>Dioscorea deltoidea</i> Wall. ex Kunth.	Ratalu/kanees	70	150	10500
8.	<i>Trillium govanianum</i> Wall. ex Royle	Tande jarri	60	180	10800
9.	<i>Viburnum grandiflorum</i> Wall. ex DC.	Guch	150	130	19500
10.	<i>Heracleum candicans</i> Wall. ex DC.	Skhwara	120	130	15600
11.	<i>Artemisia japonica</i> Thunb.	Tarkha	90	120	10800
12.	<i>Artemisia persica</i> Boiss.	Tarkha	120	150	18000
13.	<i>Artemisia scoparia</i> Waldst. & Kit.	Tarkha	110	120	13200
14.	<i>Senecio chrysanthemoides</i> DC.	Zairgulay	130	110	14300
15.	<i>Berberis lycium</i> Royle.	Zairlargay/korai	1200	250	300000
16.	<i>Podophyllum hexandrum</i> Royle.	Kakora	300	350	105000
17.	<i>Sisymbrium erysimoides</i> Desf.	Jenjaray	50	150	7500
18.	<i>Valeriana hardwickii</i> Wall.	Desi Mushke Bala	80	230	18400
19.	<i>Valeriana himalayana</i> Grub.	Desi Mushke Bala	75	170	12750
20.	<i>Valeriana jatamansi</i> Jones	Mushke Bala	200	180	36000
21.	<i>Valeriana stracheyi</i> Clarke	Desi Mushke Bala	90	150	13500
22.	<i>Diospyros lotus</i> L.	Daz Dana	3000	70	210000
23.	<i>Desmodium elegans</i> DC.	Sambar	80	160	12800
24.	<i>Quercus semecarpifolia</i> Smith	Seray	190	65	12350
25.	<i>Geranium lambertii</i> Sweet	Sra zeela	210	190	39900
26.	<i>Geranium wallichianum</i> D. Don	Sra zeela	250	210	52500
27.	<i>Juglans regia</i> L.	Ghuzz	3000	120	360000
28.	<i>Origanum vulgare</i> L.	Shamakay/majrom	80	130	10400
29.	<i>Thymus linearis</i> Benth.	Speerkay	120	150	18000
30.	<i>Paeonia emodi</i> Wall. ex Royle	Mamekh	250	200	50000
31.	<i>Bistorta affinis</i> (D. Don) Green	Anjabar	120	200	24000
32.	<i>Bistorta amplexicaule</i> (D. Don) Green	Masloon	150	210	31500
33.	<i>Primula denticulata</i> Smith	Mameera	80	220	17600
34.	<i>Aconitum heterophyllum</i> Wall.	Sarbawalay	170	230	39100
35.	<i>Caltha alba</i> Camb.	Baringu	65	120	7800
36.	<i>Crataegus songarica</i> C. Koch	Gony	50	250	12500
37.	<i>Bergenia ciliata</i> (Haw.) Sternb.	Zakhame Hayat	180	130	23400
38.	<i>Hyoscyamus niger</i> L.	Bange-dewana	80	250	20000
39.	<i>Viola biflora</i> L.	Benausha	140	160	22400
40.	<i>Viola canescens</i> Wall. ex Roxb.	Benausha	115	130	14950
	Total		13230	-	1796850

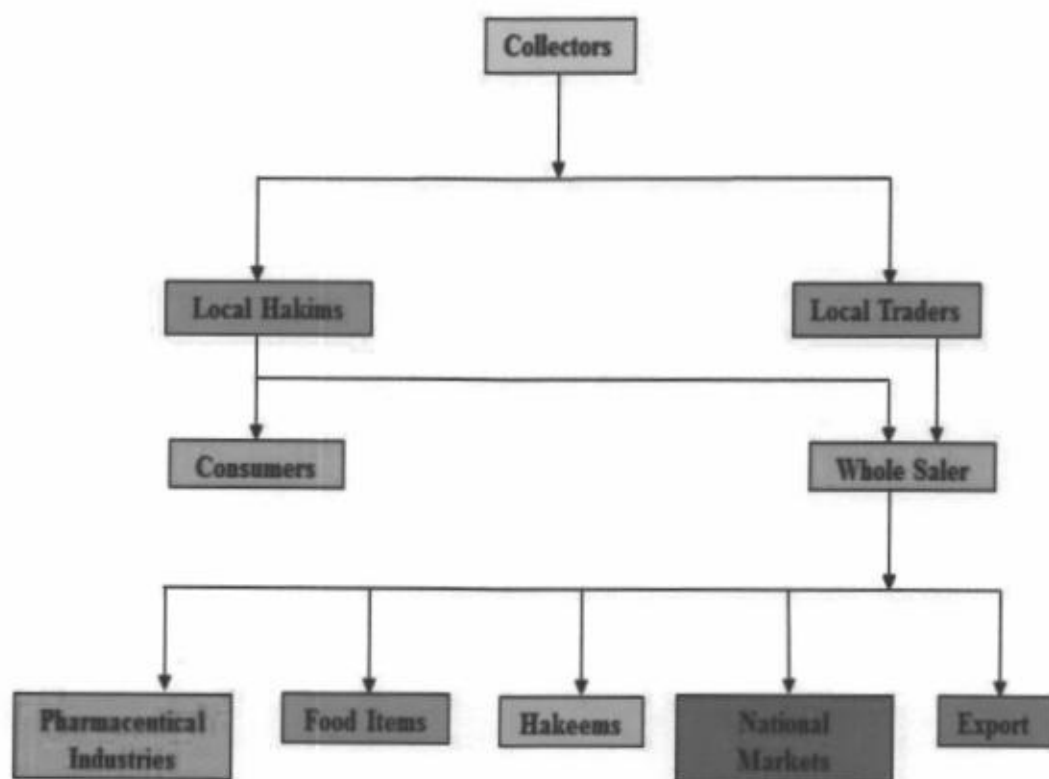


Figure 6. Collection chain of high valued marketable medicinal plants showing various relationship.

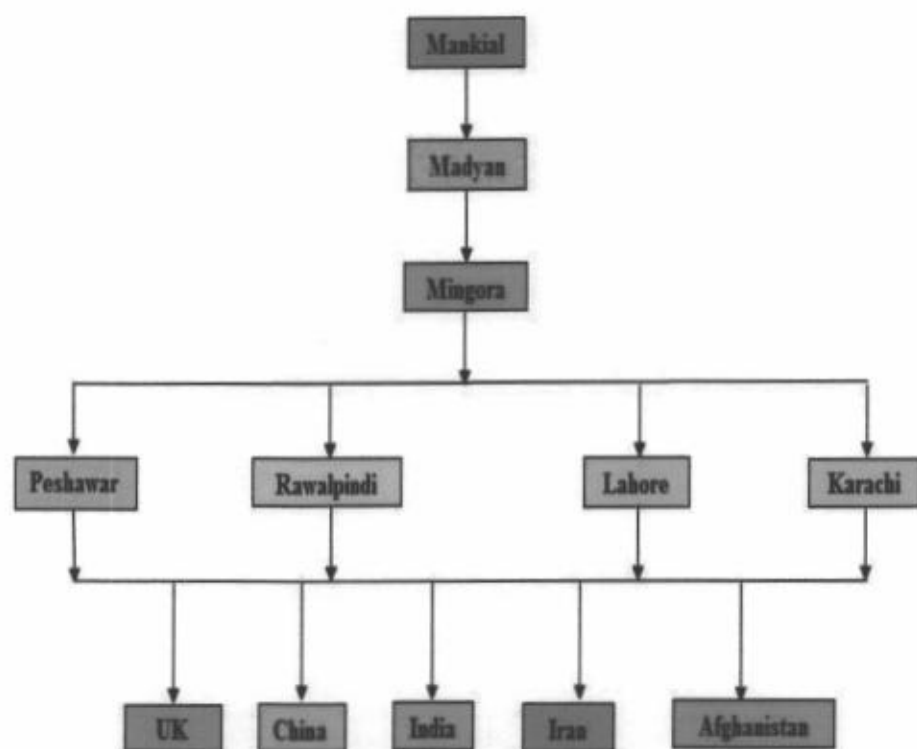


Figure 7. Trade Chain of high valued marketable medicinal plants showing national and international trade.

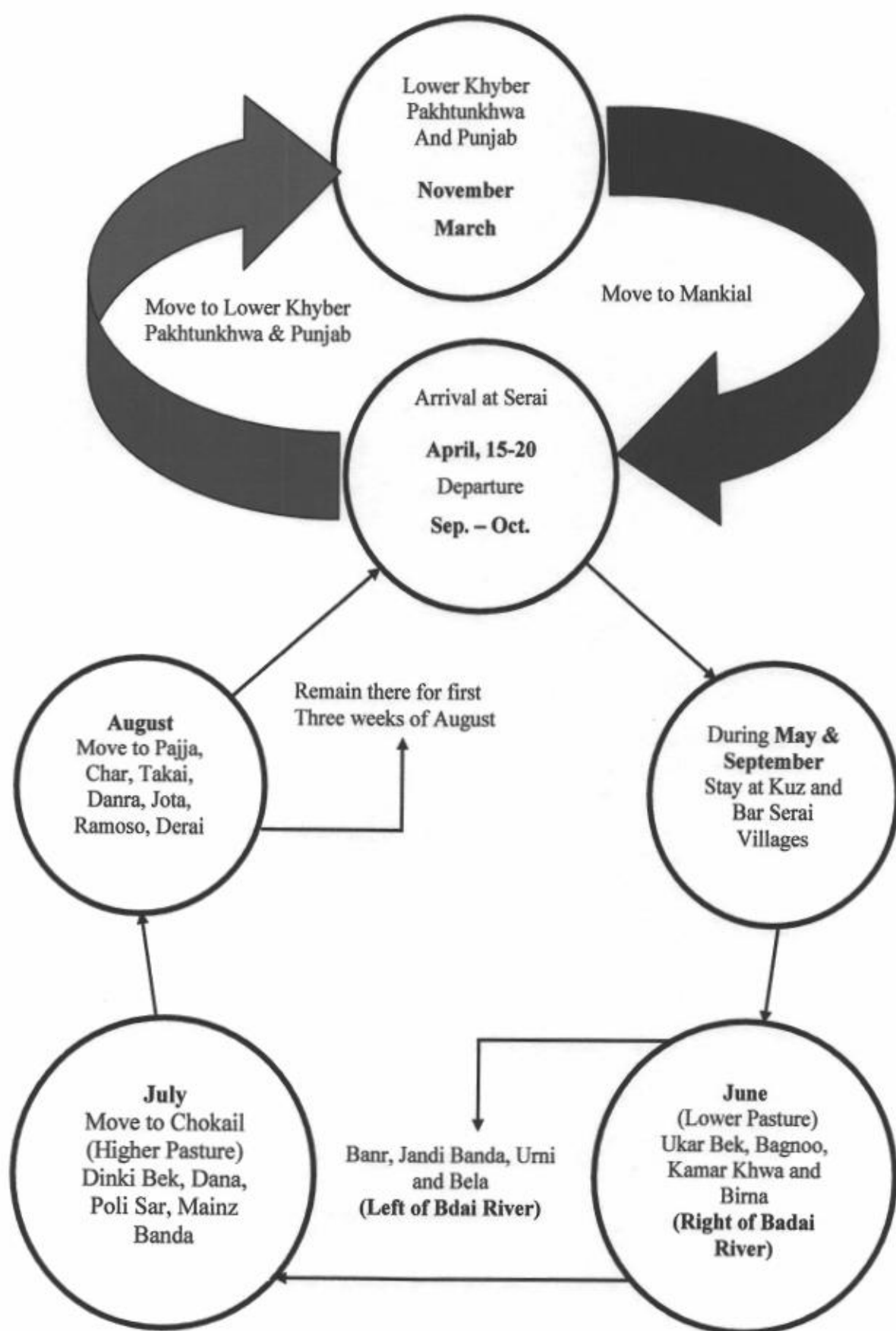


Figure 8. Pasture resource management, grazing and nomadism cycle in Mankial Valley.
Source: The pasture cycle has been adopted after Ahmad Khan 2004, retrieved from <http://www.snowleopardnetwork.org/GrantFinalReports/KhanFinal03.pdf> on 07.07.2013.

CHAPTER-6

RESULTS AND DISCUSSION

A. TAXONOMIC STUDIES

A total of 262 species representing 84 families, 190 genera belonging to Lychophytes, Monilophytes and Lignophytes have been reported during this research. Only one family, one genus and one species has been recorded from the "Lycophytes". A total of 20 species belonging to 12 genera and 9 families have been collected from "Monilophytes" or the fern families and 241 species from 170 genera and 74 families from "Lignophytes".

In Monilophytes, Aspleniaceae (1 genus and four species) was leading family, followed by Woodsiaceae (2 genera and 4 species), Dryopterideaceae and Polypodiaceae with 2 genera and 3 species each, Pteridaceae with (1 genus and 2 species), Equisetaceae, Marsileaceae, Dennstaedtiaceae and Thylpteridaceae (1 geuns and 1 species each). Equisetaceae was the most primitive and Polypodiaceae was the most advanced family.

The Lignophytes were further divided in to 3 groups viz., Gymnosperms, Monocots and Dicots. The Gymnosperms were represented by 4 families, 7 genera and 7 species. Among Gymnosperms Pinaceae was the leading one (with 4 genera and 4 species) followed by Cupressaceae, Taxaceae and Ephedraceae (with 1 genus and 1 species each). Pinaceae was the most primitive and Ephedraceae was the most advanced family.

The Monocots were represented by 12 families, 23 genera and 24 species. Among Monocots Poaceae was the leading one (with 9 genera and 9 species) followed by Cyperaceae (with 3 genera and 3 species), Orchidaceae (with 2 genera and 2 species) and Juncaceae (with 1 genus and 2 species). Araceae, Liliaceae, Convallariaceae, Colchicaceae, Trilliaceae, Alliaceae, Iridaceae, and Dioscoreaceae (with 1 genus and 1 species). It is concluded that family Araceae was the primitive one and Poaceae was the advanced family. The Dicots were represented by 58 families, 147 genera and 211 species.

Among the Dicots Asteraceae was the leading one (with 15 genera and 24 species), followed by Apiaceae (with 13 genera and 16 species), Lamiaceae (with 12 genera and 18 species, Fabaceae (with 10 genera and 11 species), while Ranunculaceae (with 7 genera and 8 species), Caryophyllaceae (with 7 genera and 10 species) and family Rosaceae (with 7 genera and 8 species). Polygonaceae (with 6 genera and 11 species), Brassicaceae with 8 species and 5 genera, Amaranthaceae with 7 species and 3 genera, Scrophulariaceae (with 3 genera and 3 species), family Orobanchaceae (with genera and 4 species). The rest of the families were represented by 2 or one genera.

B. ETHNOBOTANICAL USES

Among total 262 species of Ethnobotanical importance, 211 were Dicot, 24 were monocot, 20 were Monilophytes and 7 were Gymnosperms. The Ethnobotanical uses were divided in to 21 groups on the basis of their utility as under.

I. Ethnobotanical uses of Monilophytes

1. Beautiful/Ornamental

The species of *Asplenium trichomanes*, *Asplenium ceterach*, *Asplenium adiantum-nigrum*, *Asplenium septentrionale*, *Pteridium aquilinum*, *Dryopteris ramosa*, *Polystichum discretum*, *Polystichum nepalense*, *Equisetum arvense*, *Marsilea minuta*, *Adiantum capillus-veneris*, *Adiantum venustum*, *Allosorus stelleri*, *Pteris critica*, *Pteris vitata*, *Christella dentata*, *Athyrium mackinnonii*, *Athyrium rupicola*, *Cystopteris dickieana* and *Cystopteris fragilis* were found to be used as beautiful/ornamental plants.

2. Cash Plants

Equisetum arvense, *Adiantum capillus-veneris* and *Adiantum venustum* were found to be used as cash plants.

3. Medicinal

Asplenium adiantum-nigrum, *Equisetum arvense*, *Marsilea minuta*, *Adiantum capillus-veneris* and *Adiantum venustum* were found to be used as medicinal plants.

II. Ethnobotanical uses of Lignophytes (Gymnosperms)

1. Beautiful/Ornamental

Juniperus communis, *Abies pindrow*, *Cedrus deodara*, *Picea smithiana*, *Pinus wallichiana* and *Taxus fuana* were found to be used as beautiful/ornamental plants.

2. Cash Plants

The species of *Taxus fuana*, *Cedrus deodara*, *Pinus wallichiana*, *Abies pindrow* and *Picea smithiana* were found to be used as cash plants.

3. Fuel Plants

The species of *Pinus wallichiana*, *Taxus fuana*, *Picea smithiana*, *Abies pindrow*, and *Cedrus deodara* were found to be used as fuel plants.

4. Furniture

The species of *Pinus wallichiana*, *Taxus fuana*, *Picea smithiana*, *Cedrus deodara*, and *Abies pindrow* were found to be used for making furniture.

5. Medicinal

The species of *Juniperus communis*, *Ephedra gerardiana*, *Abies pindrow*, *Cedrus deodara*, *Taxus fuana* and *Pinus wallichiana* were found to be used as medicinal plants.

6. Shelter

The species of *Taxus fuana*, *Pinus wallichiana*, *Cedrus deodara*, *Abies pindrow* and *Picea smithiana* were found to be used for making shelters.

II. Ethnobotanical uses of Lignophytes (Angiosperms) Monocot

1. Beautiful/Ornamental

Allium victorialis, *Arisaema jacquemontii*, *Colchicum luteum*, *Carex karoii*, *Cyperus niveus*, *Schoenoplectus litoralis*, *Dioscorea deltoidea*, *Iris hookeriana*, *Juncus membranaceus*, *Juncus sphacelatus*, *Northolirion thomsonianum*, *Dactylorhiza hatagirea*, *Trillium govanianum*, *Arundo donax*, *Dactylis glomerata* and *Piptatherum gracile* were found to be used as beautiful/ornamental plants.

2. Brooms

Arundo donax and *Dichanthium annulatum* were found to be used as brooms plants.

3. Cash Plant

Arundo donax was found to be used as cash plants.

4. Fodder

Dichanthium annulatum, *Digitaria ciliaris*, *Echinochloa crus-galli*, *Pennisetum lanatum*, *Piptatherum gracile*, *Poa alpina* and *Setaria pumila* were found to be used as fodder plants.

5. Harmful/Poisonous

Arisaema jacquemontii was a poisonous plant.

6. House Holding Items

Arundo donax was found to be used for making various house holding items.

7. Invasive Plant

Arundo donax was found to be an invasive species.

8. Livestock Promoting

Dichanthium annulatum, *Digitaria ciliaris*, *Echinochloa crus-galli*, *Pennisetum lanatum*, *Piptatherum gracile* and *Setaria pumila* were found to be used as livestock promoting species.

9. Medicinal

Allium victorialis, *Arisaema jacquemontii*, *Colchicum luteum*, *Polygonatum verticillatum*, *Dioscorea deltoidea*, *Dactylorhiza hatagirea* and *Trillium govanianum* were found to be used as medicinal plants.

10. Soil Reclamation Plants

Carex karoii, *Cyperus niveus*, *Schoenoplectus litoralis*, *Arundo donax*, *Dactylis glomerata*, *Dichanthium annulatum*, *Digitaria ciliaris*, *Echinochloa crus-galli*, *Piptatherum gracile* and *Poa alpina* were found to be used as soil reclamation plants.

11. Thatching Plants

Arundo donax, *Dactylis glomerata* and *Dichanthium annulatum* were found to be used as thatching plants.

II. Ethnobotanical uses of Lignophytes (Angiosperms) Dicot

One hundred and twenty one (121) species were beautiful/ornamental, ten (10) beverages, six (6) brooms, twenty nine (29) cash plants, twenty four (24) fuel, eighty four (84) fodder, ten (10) food, two (2) furniture, thirteen (13) fruit plants, four (4) harmful/poisonous, seventy one (71) honey bee species, 11 house holding items, one (1) invasive, twenty (20) livestock promoting, one hundred and thirty seven (137) medicinal, four (4) sacred, six (6) soil reclamation, eighteen (18) shelter, ten (10) snuff ash, ten (10) thatching and nineteen (19) were vegetable. The detail of their Ethnobotanical uses are as under.

1. Beautiful/Ornamental: *Sambucus wightiana*, *Viburnum grandiflorum*, *Amaranthus viridis*, *Chenopodium foliosum*, *Bupleurum nigrescens*, *Bupleurum tenue*, *Heracleum candicans*, *Ligusticum elatum*, *Ligusticum stewartii*, *Oenanthe javanica*, *Torilis leptophylla*, *Vicatia wolffiana*, *Aralia cachemirica*, *Hedera nepalensis*, *Handelia trichophylla*, *Leucanthemum vulgare*, *Aster altaicus*, *Aster molliusculus*, *Cirsium falconeri*, *Cousinia thomsonii*, *Saussurea albescens*, *Anaphalis margaritacea*, *Anaphalis triplinervis*,

Leontopodium himalayanum, *Bidens cernua*, *Sonchus asper*, *Taraxacum officinale*, *Senecio chrysanthemoides*, *Impatiens balfourii*, *Impatiens brachycentra*, *Impatiens edgeworthii*, *Impatiens flemingii*, *Impatiens glandulifera*, *Impatiens meeboldii*, *Impatiens sulcata*, *Impatiens thomsonii*, *Berberis lycium*, *Cynoglossum glochidiatum*, *Cynoglossum lanceolatum*, *Lindolfia anchusoides*, *Lindolfia stylosa*, *Lindolfia longiflora*, *Capsella bursa-pastoris*, *Lepidium sativum*, *Cardamine hirsuta*, *Cardamine flexuosa*, *Sarcococca saligna*, *Codonopsis clematidea*, *Dipsacus inermis*, *Dianthus jacquemontii*, *Silene gonosperma*, *Silene vulgaris*, *Spergularia diandra*, *Stellaria monosperma*, *Convolvulus arvensis*, *Hylotelephium ewersii*, *Sedum hispanicum*, *Elaeagnus umbellata*, *Astragalus candolleanus*, *Colutea nepalensis*, *Desmodium elegans*, *Indigofera heterantha*, *Lespedeza juncea*, *Trifolium repens*, *Geranium lambertii*, *Geranium wallichianum*, *Swertia longifolia*, *Swertia cordata*, *Swertia paniculata*, *Swertia longifolia*, *Swertia cordata*, *Swertia paniculata*, *Parrotiopsis jacquemontiana*, *Punica granatum*, *Mentha longifolia*, *Marrubium vulgaris*, *Nepeta cataria*, *Nepeta erecta*, *Stachys emodi*, *Origanum vulgare*, *Prunella vulgaris*, *Thymus linearis*, *Isodon rugosus*, *Malva neglecta*, *Oxalis corniculata*, *Epilobium cylindricum*, *Epilobium hirsutum*, *Epilobium parviflorum*, *Epilobium royleanum*, *Oenothera rosea*, *Jasminum humile*, *Orobanche alba*, *Pedicularis pectinata*, *Pedicularis pyramidata*, *Corydalis diphyllo*, *Phytolacca latibenia*, *Plantago amplexicaulis*, *Plantago lanceolata*, *Plantago major*, *Bistorta affinis*, *Bistorta amplexicaulis*, *Persicaria glabra*, *Polygonum plebejum*, *Rumex dentatus*, *Rumex hastatus*, *Portulaca oleracea*, *Anemone vitifolia*, *Aquilegia pubiflora*, *Caltha alba*, *Clematis grata*, *Ranunculus laetus*, *Cotoneaster affinis*, *Fragaria nubicola*, *Potentilla microphylla*, *Rosa macrophylla*, *Sorbaria tomentosa*, *Bergenia ciliata*, *Verbascum thapsus*, *Solanum nigrum*, *Hyoscyamus niger*, *Tamaricaria elegans*, *Viola biflora*, *Viola canescens* and *Vitis vinifera*.

2. Beverages: *Viburnum grandiflorum*, *Berberis lycium*, *Sisymbrium erysimoides*, *Cannabis sativa*, *Elaeagnus umbellata*, *Juglans regia*, *Thymus linearis*, *Cotoneaster affinis*, *Solanum nigrum* and *Vitis vinifera*.

3. Brooms: *Arundo donax*, *Dichanthium annulatum*, *Berberis lycium*, *Cannabis sativa*, *Indigofera heterantha*, *Isodon rugosus*, *Sorbaria tomentosa* and *Tamaricaria elegans*.

4. Cash plants: *Betula utilis*, *Berberis lycium*, *Podophyllum hexandrum*, *Cannabis sativa*, *Valeriana hardwickii*, *Valeriana himalayana*, *Valeriana jatamansi*, *Valeriana stracheyi*, *Diospyros lotus*, *Elaeagnus umbellata*, *Indigofera heterantha*, *Geranium lambertii*, *Geranium wallichianum*, *Juglans regia*, *Punica granatum*, *Mentha longifolia*, *Thymus linearis*, *Ficus carica*, *Jasminum humile*, *Paeonia emodi*, *Aconitum heterophyllum*, *Ziziphus jujuba*, *Crataegus songarica*, *Viola biflora*, *Viola canescens* and *Vitis vinifera*.

5. Fuel plants: *Echinops cornigerus*, *Berberis lycium*, *Sarcococca saligna*, *Cannabis sativa*, *Celtis australis*, *Diospyros lotus*, *Indigofera heterantha*, *Quercus baloot*, *Quercus incana*,

Quercus semecarpifolia, *Parrotiopsis jacquemontiana*, *Juglans regia*, *Punica granatum*, *Marrubium vulgare*, *Stachys emodi*, *Isodon rugosus*, *Lamium album*, *Ficus carica*, *Ziziphus jujuba*, *Crataegus songarica*, *Pouplus alba*, *Verbascum thapsus*, *Tamaricaria elegans*, *Daphne mucronata* and *Urtica dioica*.

6. Fodder: *Achyranthes aspera*, *Amaranthus viridis*, *Amaranthus spinosus*, *Chenopodium album*, *Chenopodium murale*, *Aegopodium burtii*, *Bupleurum lanceolatum*, *Bupleurum nigrescens*, *Bupleurum tenue*, *Chaerophyllum reflexum*, *Eriocycla staintonii*, *Ligusticum elatum*, *Ligusticum stewartii*, *Sium latijugum*, *Hedra nepalensis*, *Conyza aegyptiaca*, *Cirsium verutum*, *Cousinia thomsonii*, *Saussurea albescens*, *Bidens cernua*, *Sonchus asper*, *Berberis lycium*, *Sisymbrium loeselii*, *Sisymbrium orientale*, *Campanula latifolia*, *Campanula pallida*, *Codonopsis clematidea*, *Valeriana himalayana*, *Valeriana jatamansi*, *Valeriana stracheyi*, *Arenaria neelgherrensis*, *Arenaria orbiculata*, *Arenaria serpyllifolia*, *Cerastium fontanum*, *Dianthus jacquemontii*, *Minertia kashmirica*, *Stellaria monosperma*, *Celtis australis*, *Convolvulus arvensis*, *Diospyros lotus*, *Elaeagnus umbellata*, *Indigofera heterantha*, *Lespedeza juncea*, *Lathyrus pratensis*, *Medicago sativa*, *Mellilotus indica*, *Mellilotus officinalis*, *Trigonella gracilis*, *Trifolium repens*, *Swertia longifolia*, *Swertia cordata*, *Swertia paniculata*, *Parrotiopsis jacquemontiana*, *Nepeta cataria*, *Nepeta clarkei*, *Nepeta govaniana*, *Nepeta juncea*, *Nepeta laevigata*, *Nepeta paulsenii*, *Phlomis bracteosa*, *Calamintha hydaspidis*, *Isodon rugosus*, *Leonurus cardiaca*, *Ficus carica*, *Malva neglecta*, *Fraxinus xanthoxyloides*, *Euphrasia himalayica*, *Bistorta amplexicaulis*, *Fagopyrum esculentum*, *Oxyria digyna*, *Polygonum aviculare*, *Polygonum plebejum*, *Rumex hastatus*, *Ranunculus arvensis*, *Rubus ellipticus*, *Sorbaria tomentosa*, *Galium hirtiflorum*, *Pouplus alba*, *Acer caesium*, *Aesculus indica*, *Scrophularia scabiosifolia*, *Veronica anagallis-aquatica*, *Tamaricaria elegans* and *Verbena officinalis*.

7. Food: *Amaranthus viridis*, *Nasturtium officinale*, *Medicago sativa*, *Trigonella gracilis*, *Trifolium repens*, *Mentha longifolia*, *Malva neglecta*, *Oxalis corniculata*, *Portulaca oleracea* and *Vitis vinifera*.

8. Furniture: *Juglans regia* and *Pouplus alba*.

9. Fruit plants: *Pouplus alba*, *Berberis lycium*, *Celtis australis*, *Diospyros lotus*, *Elaeagnus umbellata*, *Juglans regia*, *Punica granatum*, *Ficus carica*, *Ziziphus jujuba*, *Crataegus songarica*, *Rubus ellipticus*, *Daphne mucronata* and *Vitis vinifera*.

10. Harmful/Poisonous: *Cuscuta reflexa*, *Euphorbia wallichii*, *Astragalus candolleanus* and *Aquilegia pubiflora*.

11. Honey bee species: *Sambucus wightiana*, *Viburnum grandiflorum*, *Heracleum candicans*, *Oenanthe javanica*, *Pimpinella diversifolia*, *Scaligeria aitchisonii*, *Scandix pecten-veneris*, *Aralia cachemirica*, *Artemisia biennis*, *Artemisia elegantissima*, *Artemisia*

japonica, *Artemisia moorcroftiana*, *Artemisia persica*, *Artemisia scoparia*, *Artemisia santolinifolia*, *Leucanthemum vulgare*, *Aster altaicus*, *Aster molliusculus*, *Bidens cernua*, *Sonchus asper*, *Taraxacum officinale*, *Senecio chrysanthemoides*, *Impatiens balfourii*, *Impatiens brachycentra*, *Impatiens edgeworthii*, *Impatiens flemingii*, *Impatiens glandulifera*, *Impatiens meeboldii*, *Impatiens sulcata*, *Impatiens thomsonii*, *Berberis lycium*, *Sarcococca saligna*, *Cannabis sativa*, *Dipsacus inermis*, *Silene gonosperma*, *Silene vulgaris*, *Celtis australis*, *Hylotelephium ewersii*, *Diospyros lotus*, *Elaeagnus umbellata*, *Astragalus candolleanus*, *Desmodium elegans*, *Indigofera heterantha*, *Trigonella gracilis*, *Trifolium repens*, *Quercus baloot*, *Quercus incana*, *Quercus semecarpifolia*, *Parrotiopsis jacquemontiana*, *Juglans regia*, *Punica granatum*, *Mentha longifolia*, *Origanum vulgare*, *Prunella vulgaris*, *Thymus linearis*, *Malva neglecta*, *Jasminum humile*, *Phytolacca latbenia*, *Portulaca oleracea*, *Caltha alba*, *Clematis grata*, *Ziziphus jujuba*, *Cotoneaster affinis*, *Crataegus songarica*, *Rosa macrophylla*, *Rubus ellipticus*, *Sorbaria tomentosa*, *Aesculus indica*, *Daphne mucronata* and *Vitis vinifera*.

12. **House holdings items:** *Celtis australis*, *Diospyros lotus*, *Elaeagnus umbellata*, *Indigofera heterantha*, *Quercus baloot*, *Quercus incana*, *Quercus semecarpifolia*, *Parrotiopsis jacquemontiana*, *Juglans regia*, *Ficus carica* and *Fraxinus xanthoxyloides*.

13. **Invasive plants:** The only invasive species was *Cuscuta reflexa* which has been seen fastly spreading.

14. **Live stock promoting:** *Amaranthus viridis*, *Sonchus asper*, *Taraxacum officinale*, *Convolvulus arvensis*, *Trifolium repens*, *Origanum vulgare*, *Prunella vulgaris*, *Thymus linearis*, *Ficus carica*, *Malva neglecta*, *Paeonia emodi*, *Plantago amplexicaulis*, *Plantago lanceolata*, *Plantago depressa*, *Plantago major*, *Fagopyrum esculentum*, *Verbascum thapsus*, *Solanum nigrum*, *Hyoscyamus niger* and *Daphne mucronata*.

15. **Medicinal:** *Sambucus wightiana*, *Viburnum grandiflorum*, *Achyranthes aspera*, *Amaranthus viridis*, *Amaranthus spinosus*, *Chenopodium album*, *Chenopodium botrys*, *Chenopodium murale*, *Chaerophyllum reflexum*, *Eriocycla staintonii*, *Heracleum candicans*, *Oenanthe javanica*, *Pimpinella diversifolia*, *Torilis leptophylla*, *Hedera nepalensis*, *Artemisia biennis*, *Artemisia japonica*, *Artemisia moorcroftiana*, *Artemisia persica*, *Artemisia scoparia*, *Artemisia santolinifolia*, *Leucanthemum vulgare*, *Conyza aegyptiaca*, *Cirsium verutum*, *Echinops cornigerus*, *Saussurea albescens*, *Anaphalis margaritacea*, *Sonchus asper*, *Taraxacum officinale*, *Senecio chrysanthemoides*, *Betula utilis*, *Berberis lycium*, *Podophyllum hexandrum*, *Capsella bursa-pastoris*, *Lepidium sativum*, *Nasturtium officinale*, *Sisymbrium erysimoides*, *Sisymbrium loeselii*, *Sarcococca saligna*, *Campanula latifolia*, *Cannabis sativa*, *Dipsacus inermis*, *Valeriana hardwickii*, *Valeriana himalayana*, *Valeriana jatamansi*, *Valeriana stracheyi*, *Dianthus jacquemontii*, *Silene vulgaris*, *Celtis australis*, *Convolvulus arvensis*, *Cuscuta reflexa*, *Diospyros lotus*, *Elaeagnus umbellata*, *Euphorbia*

wallichii, *Astragalus candolleanus*, *Desmodium elegans*, *Indigofera heterantha*, *Lathyrus pratensis*, *Lespedeza juncea*, *Medicago sativa*, *Mellilotus indica*, *Mellilotus officinalis*, *Trigonella gracilis*, *Trifolium repens*, *Quercus incana*, *Quercus semecarpifolia*, *Geranium lambertii*, *Geranium wallichianum*, *Swertia longifolia*, *Swertia cordata*, *Swertia paniculata*, *Juglans regia*, *Punica granatum*, *Mentha longifolia*, *Marrubium vulgare*, *Nepeta cataria*, *Nepeta erecta*, *Stachys emodi*, *Origanum vulgare*, *Prunella vulgaris*, *Thymus linearis*, *Isodon rugosus*, *Lamium album*, *Leonurus cardiaca*, *Ficus carica*, *Malva neglecta*, *Oxalis corniculata*, *Epilobium hirsutum*, *Oenothera rosea*, *Fraxinus xanthoxyloides*, *Jasminum humile*, *Euphrasia himalayica*, *Paeonia emodi*, *Corydalis diphylla*, *Parnassia cabulica*, *Phytolacca latbenia*, *Plantago amplexicaulis*, *Plantago lanceolata*, *Plantago depressa*, *Plantago major*, *Bistorta affinis*, *Bistorta amplexicaulis*, *Fagopyrum esculentum*, *Persicaria barbata*, *Polygonum aviculare*, *Rumex dentatus*, *Rumex hastatus*, *Rumex nepalensis*, *Portulaca oleracea*, *Primula minutissima*, *Aconitum heterophyllum*, *Anemone vitifolia*, *Aquilegia pubiflora*, *Caltha alba*, *Thalictrum cultratum*, *Ziziphus jujuba*, *Cotoneaster affinis*, *Crataegus songarica*, *Fragaria nubicola*, *Potentilla supina*, *Rosa macrophylla*, *Rubus ellipticus*, *Sorbaria tomentosa*, *Galium hirtiflorum*, *Pouplus alba*, *Acer caesium*, *Aesculus indica*, *Bergenia ciliata*, *Verbascum thapsus*, *Solanum nigrum*, *Hyoscyamus niger*, *Daphne mucronata*, *Urtica dioica*, *Verbena officinalis*, *Viola biflora*, *Viola canescens* and *Vitis vinifera*.

16. Sacred Plants: *Ficus carica*, *Jasminum humile*, *Daphne mucronata* and *Vitis vinifera*.

17. Soil reclamation plants: *Berberis lycium*, *Sarcococca saligna*, *Trigonella gracilis*, *Trifolium repens*, *Isodon rugosus* and *Sorbaria tomentosa*.

18. Shelters: *Berberis lycium*, *Celtis australis*, *Diospyros lotus*, *Elaeagnus umbellata*, *Astragalus candolleanus*, *Desmodium elegans*, *Indigofera heterantha*, *Lespedeza juncea*, *Quercus baloot*, *Quercus incana*, *Quercus semecarpifolia*, *Juglans regia*, *Ficus carica*, *Sorbaria tomentosa*, *Pouplus alba*, *Acer caesium*, *Tamaricaria elegans* and *Vitis vinifera*.

19. Snuff ash plants: *Berberis lycium*, *Cannabis sativa*, *Indigofera heterantha*, *Quercus baloot*, *Quercus incana*, *Quercus semecarpifolia*, *Juglans regia*, *Punica granatum*, *Rumex dentatus* and *Rumex hastatus*.

20. Thatching plants: *Berberis lycium*, *Celtis australis*, *Diospyros lotus*, *Elaeagnus umbellata*, *Indigofera heterantha*, *Parritiopsis jacquemontiana*, *Ficus carica*, *Populus alba*, *Tamaricaria elegans* and *Vitis vinifera*.

21. Vegetables: *Amaranthus viridis*, *Artemisia japonica*, *Capsella bursa-pastoris*, *Lepidium sativum*, *Nasturtium officinale*, *Sisymbrium erysimoides*, *Sisymbrium orientale*, *Lathyrus pratensis*, *Medicago sativa*, *Trigonella gracilis*, *Malva neglecta*, *Oxalis corniculata*,

Fagopyrum esculentum, *Polygonum aviculare*, *Rumex dentatus*, *Rumex hastatus*, *Rumex nepalensis*, *Portulaca oleracea* and *Solanum nigrum*.

C. SPECIES OF MEDICINAL VALUE

I. Medicinal uses of Monilophytes

Among the five species of Monilophytes 1 was anti-cholesterol (*Marsilea minuta*), one was anti-lice (*Equisetum arvense*), one was astringent (*Adiantum capillus-veneris*), one was used in blood pressure (*Marsilea minuta*), one in cold (*Asplenium adiantum-nigrum*), 2 in cough (*Asplenium adiantum-nigrum* and *Marsilea minuta*), 3 were diuretic (*Asplenium adiantum-nigrum*, *Adiantum venustum* and *Adiantum capillus-veneris*), 3 were expectorant (*Asplenium adiantum-nigrum*, *Adiantum venustum* and *Adiantum capillus-veneris*), one was emetic (*Adiantum venustum*), one was febrifuge (*Adiantum capillus-veneris*), one was hair tonic (*Equisetum arvense*), one was used in jaundice (*Asplenium adiantum-nigrum*), one was laxative (*Asplenium adiantum-nigrum*), one was ophthalmic (*Marsilea minuta*), one was used in piles (*Adiantum venustum*), one was purgative (*Asplenium adiantum-nigrum*), one to reduce uric acid and triglycerol (*Marsilea minuta*), 2 in scorpion stings and bites (*Adiantum venustum* and *Adiantum capillus-veneris*). The medicinal uses of the Monilophytes are as under.

1. Anti-cholesterol: *Marsilea minuta*
2. Anti-lice: *Equisetum arvense*
3. Astringent: *Adiantum capillus-veneris*
4. Blood pressure: *Marsilea minuta*
5. Cold: *Asplenium adiantum-nigrum*
6. Cough: *Asplenium adiantum-nigrum* and *Marsilea minuta*.
7. Diuretic: The species of *Adiantum capillus-veneris*, *Asplenium adiantum-nigrum* and *Adiantum venustum* were diuretic.
8. Expectorant: The species of *Adiantum capillus-veneris*, *Adiantum venustum* and *Asplenium adiantum-nigrum* were expectorant.
9. Emetic: One specie i.e. *Adiantum venustum* was emetic.
10. Febrifuge: *Adiantum capillus-veneris*.
11. Hair tonic: *Equisetum arvense*
12. Jaundice: *Asplenium adiantum-nigrum*

13. Laxative: *Asplenium adiantum-nigrum*

14. Ophthalmic: *Marsilea minuta*

15. Piles: *Adiantum venustum*

16. Purgative: *Asplenium adiantum-nigrum*

17. Reduce uric acid and triglycerol: *Marsilea minuta*

18. Scorpion stings and bites: *Adiantum venustum* and *Adiantum capillus-veneris*.

II. Medicinal uses of Gymnosperms

Among the 6 species of Gymnosperms one was antispasmodic (*Abies pindrow*), three were used in asthma (*Abies pindrow*, *Pinus wallichiana* and *Taxus fuana*), one was astringent (*Abies pindrow*), 2 were used in acne (*Cedrus deodara* and *Pinus wallichiana*), one was antiseptic (*Taxus fuana*), one was aphrodisiac (*Taxus fuana*), 2 in bronchitis (*Abies pindrow* and *Taxus fuana*), 3 were carminative (*Abies pindrow*, *Juniperus communis* and *Cedrus deodara*), one in construction of blood vessels (*Ephedra gerardiana*), one in congestion (*Taxus fuana*), one in clumping of erythrocytes (*Taxus fuana*), 2 in cough (*Pinus wallichiana* and *Taxus fuana*), 2 were diuretic (*Juniperus communis* and *Cedrus deodara*), one in dropsy (*Cedrus deodara*), one in dilation of the pupil (*Ephedra gerardiana*), 2 were diaphoretic (*Cedrus deodara* and *Pinus wallichiana*), one expectorant (*Abies pindrow*), one in epilepsy (*Taxus fuana*), one in fever (*Cedrus deodara*), one in flatulence (*Cedrus deodara*), one in hair loss (*Cedrus deodara*), one in irritation (*Taxus fuana*), one in indigestion (*Taxus fuana*), one in piles (*Cedrus deodara*), 3 were stimulant (*Juniperus communis*, *Ephedra gerardiana* and *Pinus wallichiana*), one was stomachic *Abies pindrow*, one in skin irritation (*Pinus wallichiana*), one was sedative (*Taxus fuana*), one was tonic (*Abies pindrow*) and one in ulcer (*Pinus wallichiana*). The medicinal uses of the Gymnosperms are as under.

1. Antispasmodic: *Abies pindrow*

2. Asthma: *Abies pindrow*, *Pinus wallichiana* and *Taxus fuana*.

3. Astringent: *Abies pindrow*

4. Acne: *Cedrus deodara* and *Pinus wallichiana*.

5. Antiseptic: *Taxus fuana*

6. Aphrodisiac: *Taxus fuana*

7. Bronchitis: *Abies pindrow* and *Taxus fuana*.

8. Carminative: *Abies pindrow*, *Juniperus communis* and *Cedrus deodara*.
9. Construction of blood vessels: *Ephedra gerardiana*
10. Congestion: *Taxus fuana*
11. Clumping of erythrocytes: *Taxus fuana*
12. Cough: *Pinus wallichiana* and *Taxus fuana*.
13. Diuretic: *Juniperus communis* and *Cedrus deodara*.
14. Dropsy: *Cedrus deodara*
15. Dilation of the pupil: *Ephedra gerardiana*
16. Diaphoretic: *Cedrus deodara* and *Pinus wallichiana*.
17. Expectorant: *Abies pindrow*
18. Epilepsy: *Taxus fuana*
19. Fever: *Cedrus deodara*
20. Flatulence: *Cedrus deodara*
21. Hair loss: *Cedrus deodara*
22. Irritation: *Taxus fuana*
23. Indigestion: *Taxus fuana*
24. Piles: *Cedrus deodara*
25. Stimulant: *Juniperus communis*, *Ephedra gerardiana* and *Pinus wallichiana*.
26. Stomachic: *Abies pindrow*
27. Skin irritation: *Pinus wallichiana*
28. Sedative: *Taxus fuana*
29. Tonic: *Abies pindrow*
30. Ulcer: *Pinus wallichiana*

III. Medicinal uses of Monocot

Among 7 species of Monocot one was (antispasmodic *Colchicum luteum*), one was astringent (*Trillium govanianum*), 2 were aphrodisiac (*Polygonatum verticillatum* and

Dactylorhiza hatagirea), one was antiscorbutic (*Allium victorialis*), one was antitumor (*Allium victorialis*), one was anti gout (*Colchicum luteum*), 2 were (alterative *Colchicum luteum* and *Trillium govanianum*), one was anthelmintic (*Dioscorea deltoidea*), 2 were carminative (*Allium victorialis* and *Colchicum luteum*), one in colic (*Dioscorea deltoidea*), 2 were diuretic (*Allium victorialis* and *Dioscorea deltoidea*), 2 expectorant (*Dioscorea deltoidea* and *Dactylorhiza hatagirea*), one to expel tape worms (*Dioscorea deltoidea*), one was emetic (*Trillium govanianum*), one for increasing lactation (*Polygonatum verticillatum*), one in spleen and liver diseases (*Colchicum luteum*), one laxative (*Colchicum luteum*), one in menstruation (*Allium victorialis*), one as nervine (*Dactylorhiza hatagirea*), one was poisonous (*Arisaema jacquemontii*), 2 in rheumatism (*Colchicum luteum* and *Polygonatum verticillatum*), one as repellent (*Allium victorialis*), one as tonic (*Trillium govanianum*) and one as vermifuge (*Allium victorialis*). The medicinal uses of the monocots are as under.

1. Antispasmodic: *Colchicum luteum*
2. Astringent: *Trillium govanianum*
3. Aphrodisiac: *Polygonatum verticillatum* and *Dactylorhiza hatagirea*.
4. Antiscorbutic: *Allium victorialis*
5. Antitumor: *Allium victorialis*
6. Anti gout: *Colchicum luteum*
7. Alterative: *Colchicum luteum* and *Trillium govanianum*.
8. Anthelmintic: *Dioscorea deltoidea*
9. Carminative: *Allium victorialis* and *Colchicum luteum*.
10. Colic: *Dioscorea deltoidea*
11. Diuretic: *Allium victorialis* and *Dioscorea deltoidea*.
12. Expectorant: *Dioscorea deltoidea* and *Dactylorhiza hatagirea*.
13. Expel tape worms: *Dioscorea deltoidea*
14. Emetic: *Trillium govanianum*
15. Increase lactation: *Polygonatum verticillatum*
16. In spleen and liver diseases: *Colchicum luteum*
17. Laxative: *Colchicum luteum*
18. Menstruation: *Allium victorialis*
19. Nervine: *Dactylorhiza hatagirea*

20. Poisonous: *Arisaema jacquemontii*

21. Rheumatism: *Colchicum luteum* and *Polygonatum verticillatum*.

22. Repellent: *Allium victorialis*

23. Tonic: *Trillium govanianum*

24. Vermifuge: *Allium victorialis*

IV. Medicinal uses of Dicot

Among 137 species of Dicot used for curing 149 different health problems among them 15 were antispasmodic (*Viburnum grandiflorum*, *Chenopodium murale*, *Valeriana hardwickii*, *Valeriana jatamansi*, *Valeriana stracheyi*, *Mellilotus officinalis*, *Nepeta cataria*, *Stachys emodi*, *Origanum vulgare*, *Prunella vulgaris*, *Thymus linearis*, *Lamium album*, *Leonurus cardiaca*, *Malva neglecta*, *Viola biflora*), 2 were anti cholesterol (*Leonurus cardiaca* and *Plantago amplexicaulis*), 3 were used in anemia (*Astragalus candolleanus*, *Oenothera rosea* and *Rumex hastatus*), one in amenorrhea (*Celtis australis*), 10 in asthma (*Sisymbrium erysimoides*, *Valeriana himalayana*, *Quercus incana*, *Swertia cordata*, *Mentha longifolia*, *Ficus carica*, *Rumex nepalensis*, *Verbascum thapsus*, *Hyoscyamus niger* and *Vitis vinifera*).

Forty two (42) species were used as astringent (*Viburnum grandiflorum*, *Amaranthus viridis*, *Conyza aegyptiaca*, *Anaphalis margaritacea*, *Capsella bursa-pastoris*, *Elaeagnus umbellata*, *Mellilotus indica*, *Trigonella gracilis*, *Trifolium repens*, *Quercus incana*, *Geranium wallichianum*, *Juglans regia*, *Punica granatum*, *Nepeta cataria*, *Stachys emodi*, *Lamium album*, *Epilobium hirsutum*, *Fraxinus xanthoxyloides*, *Jasminum humile*, *Plantago amplexicaulis*, *Jasminum humile*, *Bistorta affinis*, *Fagopyrum esculentum*, *Persicaria barbata*, *Polygonum aviculare*, *Rumex dentatus*, *Rumex nepalensis*, *Portulaca oleracea*, *Cotoneaster affinis*, *Fragaria nubicola*, *Potentilla supina*, *Rosa macrophylla*, *Rubus ellipticus*, *Sorbaria tomentosa*, *Pouplus alba*, *Acer caesium*, *Aesculus indica*, *Bergenia ciliata*, *Hyoscyamus niger*, *Urtica dioica*, *Viola canescens* and *Vitis vinifera*).

One was acrid (*Fagopyrum esculentum*), 7 were antiseptic (*Oenanthe javanica*, *Anaphalis margaritacea*, *Mentha longifolia*, *Origanum vulgare*, *Prunella vulgaris*, *Isodon rugosus* and *Pouplus alba*), 7 were aphrodisiac (*Chaerophyllum reflexum*, *Cirsium verutum*, *Lepidium sativum*, *Valeriana hardwickii*, *Trigonella gracilis*, *Aconitum heterophyllum* and *Verbascum thapsus*), 11 were antipyretic (*Artemisia santolinifolia*, *Geranium lambertii*, *Origanum vulgare*, *Prunella vulgaris*, *Thymus linearis*, *Ficus carica*, *Plantago lanceolata*, *Plantago major*, *Rumex nepalensis*, *Pouplus alba* and *Viola canescens*).

Six (6) were antiscorbutic (*Capsella bursa-pastoris*, *Nasturtium officinale*, *Sisymbrium loeselii*, *Medicago sativa*, *Oxalis corniculata* and *Galium hirtiflorum*), 2 were

appetizer (*Nasturtium officinale* and *Cannabis sativa*), 2 were antitumor (*Nasturtium officinale* and *Lathyrus pratensis*), one was anti gout *Betula utilis*, 8 were alterative (*Cirsium verutum*, *Podophyllum hexandrum*, *Lepidium sativum*, *Origanum vulgare*, *Prunella vulgaris*, *Corydalis diphylia*, *Portulaca oleracea* and *Pouplus alba*), 9 were antirheumatic (*Trifolium repens*, *Mentha longifolia*, *Origanum vulgare*, *Prunella vulgaris*, *Thymus linearis*, *Aesculus indica*, *Solanum nigrum*, *Daphne mucronata* and *Verbena officinalis*).

Ten (10) were anthelmintic (*Chenopodium album*, *Chenopodium murale*, *Artemisia biennis*, *Artemisia moorcroftiana*, *Artemisia scoparia*, *Artemisia santolinifolia*, *Dianthus jacquemontii*, *Juglans regia*, *Punica granatum* and *Stachys emodi*), 5 were anodyne (*Anaphalis margaritacea*, *Cannabis sativa*, *Medicago sativa*, *Pouplus alba* and *Hyoscyamus niger*). One in anorexia (*Pouplus alba*), 7 were aromatic (*Chenopodium murale*, *Pimpinella diversifolia*, *Valeriana jatamansi*, *Mellilotus officinalis*, *Mentha longifolia*, *Isodon rugosus* and *Polygonum aviculare*) and one in AIDS (*Heracleum candicans*).

Three were anti-cancer/antitumor (*Podophyllum hexandrum*, *Lamium album* and *Daphne mucronata*), 6 were antibacterial (*Pimpinella diversifolia*, *Betula utilis*, *Dianthus jacquemontii*, *Indigofera heterantha*, *Medicago sativa* and *Primula minutissima*), 2 were anti-diabetic (*Hedera nepalensis* and *Plantago amplexicaulis*), one was antispasmodic: *Leucanthemum vulgare*. Seven (7) were anti-inflammatory (*Saussurea albescens*, *Quercus semecarpifolia*, *Swertia longifolia*, *Juglans regia*, *Bistorta affinis*, *Bistorta amplexicaulis* and *Pouplus alba*). Six (6) were aperient (*Lepidium sativum*, *Medicago sativa*, *Thalictrum cultratum*, *Cotoneaster affinis*, *Rosa macrophylla* and *Galium hirtiflorum*). One as anti malaria (*Cannabis sativa*) one in anthrax (*Cannabis sativa*), 2 as analgesic (*Cannabis sativa* and *Phytolacca latbenia*) and 4 in bronchitis (*Valeriana stracheyi*, *Plantago lanceolata*, *Rumex nepalensis* and *Ziziphus jujuba*). Two (2) in burns (*Leucanthemum vulgare* and *Anaphalis margaritacea*), 2 in boils (*Sonchus asper* and *Plantago major*) and 2 in blood pressure (*Capsella bursa-pastoris* and *Crataegus songarica*). Four are used as blood purifier (*Nasturtium officinale*, *Paeonia emodi*, *Ziziphus jujuba* and *Vitis vinifera*), 2 in backache (*Paeonia emodi* and *Pouplus alba*), one as blood poisoning (*Cannabis sativa*) and 5 as bitter (*Valeriana hardwickii*, *Trigonella gracilis*, *Swertia paniculata*, *Fraxinus xanthoxyloides* and *Corydalis diphylia*).

Eighteen (18) as carminative (*Chenopodium murale*, *Pimpinella diversifolia*, *Valeriana hardwickii*, *Valeriana jatamansi*, *Cuscuta reflexa*, *Diospyros lotus*, *Desmodium elegans*, *Mellilotus officinalis*, *Trigonella gracilis*, *Punica granatum*, *Mentha longifolia*, *Marrubium vulgare*, *Nepeta cataria*, *Nepeta erecta*, *Stachys emodi*, *Thymus linearis*, *Persicaria barbata* and *Caltha alba*). One (1) in cholera (*Valeriana jatamansi*), 16 in cough (*Chenopodium botrys*, *Heracleum candicans*, *Saussurea albescens*, *Valeriana himalayana*, *Indigofera heterantha*, *Geranium lambertii*, *Mentha longifolia*, *Marrubium vulgare*, *Nepeta cataria*, *Origanum vulgare*, *Prunella vulgaris*, *Thymus linearis*, *Euphrasia himalayica*,

Ziziphus jujuba, *Verbascum thapsus* and *Hyoscyamus niger*). Ten (10) in cold, (*Heracleum candicans*, *Saussurea albescens*, *Astragalus candolleanus*, *Geranium lambertii*, *Mentha longifolia*, *Marrubium vulgare*, *Nepeta erecta*, *Thymus linearis*, *Euphrasia himalayica* and *Ziziphus jujube*) and one as cardio suppressant (*Sarcococca saligna*). Eight (8) in colic (*Amaranthus spinosus*, *Artemisia biennis*, *Berberis lycium*, *Mentha longifolia*, *Nepeta cataria*, *Paeonia emodi*, *Persicaria barbata* and *Aesculus indica*), 4 in constipation (*Taraxacum officinale*, *Valeriana jatamansi*, *Swertia cordata* and *Plantago lanceolata*) and one as cholagogue (*Lamium album*). Nine (9) as cardiac (*Amaranthus viridis*, *Saussurea albescens*, *Elaeagnus umbellata*, *Astragalus candolleanus*, *Punica granatum*, *Leonurus cardiaca*, *Crataegus songarica*, *Solanum nigrum* and *Vitis vinifera*), one in Calcium and Vitamin A deficiency (*Amaranthus viridis*) and 3 as cathartic (*Hedera nepalensis*, *Euphorbia wallichii* and *Paeonia emodi*). Two (2) in chest infection (*Nasturtium officinale* and *Sisymbrium erysimoides*), 6 as cooling (*Punica granatum*, *Malva neglecta*, *Oxalis corniculata*, *Epilobium hirsutum*, *Rumex hastatus* and *Vitis vinifera*) and 19 as diuretic (*Sambucus wightiana*, *Achyranthes aspera*, *Amaranthus spinosus*, *Chenopodium album*, *Pimpinella diversifolia*, *Leucanthemum vulgare*, *Conyza aegyptiaca*, *Cirsium verutum*, *Taraxacum officinale*, *Betula utilis*, *Lepidium sativum*, *Nasturtium officinale*, *Valeriana hardwickii*, *Dianthus Jacquemontii*, *Cuscuta reflexa*, *Desmodium elegans*, *Medicago sativa*, *Mellilotus officinalis*, *Quercus incana*, *Geranium wallichianum*, *Marrubium vulgare*, *Stachys emodi*, *Lamium album*, *Leonurus cardiaca*, *Corydalis diphylla*, *Rumex dentatus*, *Rumex hastatus*, *Rumex nepalensis*, *Portulaca oleracea*, *Caltha alba*, *Thalictrum cultratum*, *Galium hirtiflorum*, *Pouplus alba*, *Bergenia ciliata*, *Solanum nigrum*, *Urtica dioica*, *Viola canescens* and *Vitis vinifera*).

Two (2) as depurative (*Trifolium repens* and *Lamium album*), 14 in diarrhea (*Conyza aegyptiaca*, *Anaphalis margaritacea*, *Capsella bursa-pastoris*, *Lepidium sativum*, *Mellilotus indica*, *Quercus incana*, *Quercus semecarpifolia*, *Geranium wallichianum*, *Punica granatum*, *Mentha longifolia*, *Stachys emodi*, *Epilobium hirsutum*, *Fragaria nubicola* and *Rubus ellipticus*) and 11 in dysentery (*Conyza aegyptiaca*, *Anaphalis margaritacea*, *Lepidium sativum*, *Cannabis sativa*, *Valeriana hardwickii*, *Valeriana jatamansi*, *Quercus semecarpifolia*, *Punica granatum*, *Mentha longifolia*, *Stachys emodi* and *Fragaria nubicola*). Three (3) in dyspepsia (*Swertia cordata*, *Thalictrum cultratum* and *Vitis vinifera*), 4 in dropsy (*Sambucus wightiana*, *Capsella bursa-pastoris*, *Paeonia emodi* and *Galium hirtiflorum*), one in debility (*Pouplus alba*) and 12 as diaphoretic (*Sambucus wightiana*, *Oenanthe javanica*, *Hedera nepalensis*, *Leucanthemum vulgare*, *Berberis lycium*, *Valeriana hardwickii*, *Dianthus Jacquemontii*, *Euphorbia wallichii*, *Nepeta cataria*, *Solanum nigrum*, *Viola biflora* and *Viola canescens*). One in dysuria (*Punica granatum*), one in dyspnoea (*Crataegus songarica*), one in dysmenorrhoea (*Cannabis sativa*), 6 as demulcent (*Ficus carica*, *Plantago amplexicaulis*, *Portulaca oleracea*, *Bergenia ciliata*, *Viola canescens* and *Vitis vinifera*) and one in diabetes (*Fragaria nubicola*). Four (4) as digestive (*Amaranthus viridis*, *Artemisia japonica*,

Parnassia cabulica and *Pouplus alba*), one in flu (*Heracleum candicans*) and 17 as expectorant (*Sambucus wightiana*, *Anaphalis margaritacea*, *Berberis lycium*, *Lepidium sativum*, *Sisymbrium erysimoides*, *Dipsacus inermis*, *Mellilotus officinalis*, *Marrubium vulgare*, *Stachys emodi*, *Origanum vulgare*, *Prunella vulgaris*, *Thymus linearis*, *Lamium album*, *Ziziphus jujuba*, *Cotoneaster affinis*, *Solanum nigrum* and *Hyoscyamus niger*).

Three (3) in epilepsy (*Celtis australis*, *Indigofera heterantha* and *Paeonia emodi*), 9 as emetic (*Anaphalis margaritacea*, *Podophyllum hexandrum*, *Campanula latifolia*, *Euphorbia wallichii*, *Medicago sativa*, *Stachys emodi*, *Paeonia emodi*, *Polygonum aviculare* and *Viola biflora*) and one in eczema (*Amaranthus spinosus*). Eight as emollient (*Amaranthus spinosus*, *Silene vulgaris*, *Mellilotus indica*, *Mellilotus officinalis*, *Rumex dentatus*, *Ziziphus jujuba*, *Viola biflora* and *Viola canescens*), 5 as emmenagogue (*Leucanthemum vulgare*, *Valeriana hardwickii*, *Nepeta cataria*, *Rumex nepalensis* and *Anemone vitifolia*) and 10 in eye diseases/ophthalmic (*Dianthus jacquemontii*, *Silene vulgaris*, *Lamium album*, *Primula minutissima*, *Leucanthemum vulgare*, *Mellilotus officinalis*, *Euphrasia himalayica*, *Corydalis diphylla*, *Plantago amplexicaulis* and *Caltha alba*). Four (4) in fever (*Oenanthe javanica*, *Cuscuta reflexa*, *Astragalus candolleanus* and *Nepeta erecta*), 14 as febrifuge (*Oenanthe javanica*, *Artemisia persica*, *Cirsium verutum*, *Dianthus jacquemontii*, *Diospyros lotus*, *Medicago sativa*, *Swertia longifolia*, *Fraxinus xanthoxyloides*, *Plantago amplexicaulis*, *Aconitum heterophyllum*, *Thalictrum cultratum*, *Potentilla supina*, *Pouplus alba* and *Verbena officinalis*) and one as fumigant (*Silene vulgaris*). Four (4) in gonorrhea (*Amaranthus spinosus*, *Sarcococca saligna*, *Quercus incana* and *Fragaria nubicola*), one in gleet (*Fragaria nubicola*), 5 in gynae problems (*Trigonella gracilis*, *Trifolium repens*, *Leonurus cardiaca*, *Oenothera rosea* and *Primula minutissima*), one as glactatagogue (*Fagopyrum esculentum*), one in gout (*Betula utilis*), 5 as haemostatic (*Viburnum grandiflorum*, *Conyza aegyptiaca*, *Dianthus jacquemontii*, *Medicago sativa* and *Malva neglecta*).

Seven (7) in headache/migraine (*Heracleum candicans*, *Anaphalis margaritacea*, *Valeriana stracheyi*, *Mentha longifolia*, *Nepeta erecta*, *Caltha alba* and *Vitis vinifera*), 8 in hepatitis/hepatic stimulant/liver (*Podophyllum hexandrum*, *Astragalus candolleanus*, *Indigofera heterantha*, *Swertia longifolia*, *Portulaca oleracea*, *Pouplus alba*, *Solanum nigrum* and *Vitis vinifera*), 2 in haematuria (*Capsella bursa-pastoris* and *Urtica dioica*), 2 as hypnotic (*Dipsacus inermis* and *Lamium album*), 2 in hysteria (*Valeriana jatamansi* and *Paeonia emodi*), one as heart tonic (*Crataegus songarica*), one in hypertrophy (*Crataegus songarica*), 4 in haemorrhoides (*Indigofera heterantha*, *Geranium wallichianum*, *Ficus carica* and *Fragaria nubicola*), one in hay fever (*Euphrasia himalayica*), 2 in irritation (*Rumex dentatus* and *Daphne mucronata*), 2 in indigestion (*Senecio chrysanthemoides* and *Quercus incana*), 2 in influenza (*Oenanthe javanica* and *Astragalus candolleanus*), one as

insecticides (*Dipsacus inermis*) and 4 in insomnia (*Valeriana hardwickii*, *Valeriana jatamansi*, *Valeriana stracheyi* and *Nepeta cataria*).

Two (2) in inflammation (*Dianthus jacquemontii* and *Plantago lanceolata*), one in increasing memory (*Valeriana himalayana*), 8 in jaundice (*Chenopodium botrys*, *Oenanthe javanica*, *Taraxacum officinale*, *Senecio chrysanthemoides*, *Berberis lycium*, *Cuscuta reflexa*, *Caltha alba* and *Urtica dioica*), 14 as laxative (*Achyranthes aspera*, *Chenopodium album*, *Chenopodium murale*, *Podophyllum hexandrum*, *Euphorbia wallichii*, *Ficus carica*, *Plantago amplexicaulis*, *Plantago depressa*, *Plantago major*, *Rosa macrophylla*, *Rubus ellipticus*, *Viola biflora*, *Viola canescens* and *Vitis vinifera*) and one in leprosy (*Solanum nigrum*). Two in laryngitis/lung diseases (*Bistorta amplexicaulis* and *Portulaca oleracea*), one in leukemia (*Heracleum candicans*), 3 in leucorrhoea (*Geranium wallichianum*, *Fragaria nubicola* and *Urtica dioica*), 6 in menstruation/menorrhagia/menorrhea (*Amaranthus spinosus*, *Oenanthe javanica*, *Artemisia biennis*, *Artemisia japonica*, *Nepeta cataria* and *Urtica dioica*) and 5 as narcotic (*Cannabis sativa*, *Mellilotus indica*, *Phytolacca latbenia*, *Verbascum thapsus* and *Hyoscyamus niger*). Five (5) as nervine (*Viburnum grandiflorum*, *Cirsium verutum*, *Valeriana himalayana*, *Nepeta cataria* and *Verbena officinalis*), 2 in neurosis (*Valeriana hardwickii* and *Valeriana jatamansi*), one as nutritive (*Medicago sativa*), 3 in psoriasis (*Heracleum candicans*, *Oenothera rosea* and *Verbascum Thapsus*), 7 as poultice (*Artemisia biennis*, *Leucanthemum vulgare*, *Anaphalis margaritacea*, *Sonchus asper*, *Sarcococca saligna*, *Convolvulus arvensis* and *Pouplus alba*) and one as poisonous (*Aquilegia pubiflora*).

Six (6) in piles (*Berberis lycium*, *Lepidium sativum*, *Origanum vulgare*, *Prunella vulgaris*, *Ficus carica* and *Rumex nepalensis*), 13 as purgative (*Sambucus wightiana*, *Amaranthus spinosus*, *Hedera nepalensis*, *Artemisia scoparia*, *Podophyllum hexandrum*, *Convolvulus arvensis*, *Cuscuta reflexa*, *Diospyros lotus*, *Malva neglecta*, *Plantago lanceolata*, *Polygonum aviculare*, *Rumex nepalensis* and *Thalictrum cultratum*), one in promoting secretion (*Diospyros lotus*), one in paralysis (*Valeriana himalayana*), one psychiatric problem (*Valeriana himalayana*), 6 in rheumatism (*Heracleum candicans*, *Saussurea albescens*, *Betula utilis*, *Juglans regia*, *Paeonia emodi* and *Anemone vitifolia*), 5 as pectoral (*Marrubium vulgare*, *Lamium album*, *Plantago amplexicaulis*, *Ziziphus jujuba* and *Viola biflora*), one in pulmonary diseases (*Marrubium vulgare*), 2 as purgative (*Ficus carica* and *Daphne mucronata*), one as repellent (*Lathyrus pratensis*), 2 as resolvent (*Lathyrus pratensis* and *Lamium album*) and 14 in removing stones from kidney/bladder/urine problems (*Achyranthes aspera*, *Chaerophyllum reflexum*, *Eriocycla staintonii*, *Taraxacum officinale*, *Betula utilis*, *Dianthus jacquemontii*, *Astragalus candolleanus*, *Ficus carica*, *Malva neglecta*, *Paeonia emodi*, *Portulaca oleracea*, *Galium hirtiflorum*, *Bergenia ciliata* and *Urtica dioica*).

Three (3) in ring worms (*Lespedeza juncea*, *Jasminum humile* and *Jasminum humile*), one as restorative (*Sisymbrium erysimoides*), 2 styptic (*Oenanthe javanica* and *Lamium*

album) and 12 as stimulant (*Chenopodium murale*, *Hedera nepalensis*, *Conyza aegyptiaca*, *Lepidium sativum*, *Sisymbrium erysimoides*, *Cannabis sativa*, *Dipsacus inermis*, *Elaeagnus umbellata*, *Medicago sativa*, *Mentha longifolia*, *Nepeta cataria* and *Leonurus cardiaca*). Five (5) as refrigerant (*Punica granatum*, *Nepeta cataria*, *Oxalis corniculata*, *Rumex hastatus* and *Portulaca oleracea*), 4 in sores (*Artemisia biennis*, *Anaphalis margaritacea*, *Euphrasia himalayica* and *Ziziphus jujuba*), 11 as stomachic (*Cirsium verutum*, *Saussurea albenscens*, *Berberis lycium*, *Nasturtium officinale*, *Swertia paniculata*, *Mentha longifolia*, *Nepeta cataria*, *Nepeta erecta*, *Thymus linearis*, *Oxalis corniculata* and *Cotoneaster affinis*), one in spleen enlargement (*Solanum nigrum*) and 3 in swelling (*Anaphalis margaritacea*, *Dianthus Jacquemontii* and *Celtis australis*). One (1) in skin irritation/diseases (*Convolvulus arvensis*), 9 as sedative (*Viburnum grandiflorum*, *Cannabis sativa*, *Dipsacus inermis*, *Valeriana stracheyi*, *Nepeta cataria*, *Lamium album*, *Leonurus cardiaca*, *Solanum nigrum* and *Hyoscyamus niger*), 2 in scabies (*Lespedeza juncea* and *Persicaria barbata*) and 3 in scurvy and scrofula (*Sisymbrium loeselii*, *Medicago sativa* and *Trifolium repens*). Thirty one (31) as tonic (*Viburnum grandiflorum*, *Artemisia persica*, *Leucanthemum vulgare*, *Taraxacum officinale*, *Nasturtium officinale*, *Cannabis sativa*, *Valeriana jatamansi*, *Desmodium elegans*, *Medicago sativa*, *Trigonella gracilis*, *Trifolium repens*, *Geranium lambertii*, *Geranium wallichianum*, *Juglans regia*, *Marrubium vulgare*, *Nepeta cataria*, *Origanum vulgare*, *Prunella vulgaris*, *Lamium album*, *Leonurus cardiaca*, *Fraxinus xanthoxyloides*, *Jasminum humile*, *Paeonia emodi*, *Corydalis diphyllo*, *Aconitum heterophyllum*, *Thalictrum cultratum*, *Potentilla supina*, *Rosa macrophylla*, *Pouplis alba*, *Aesculus indica* and *Hyoscyamus niger*).

One (1) in tonsillitis (*Mentha longifolia*), 2 in toothache (*Juglans regia* and *Potentilla supina*), 5 in throat infection (*Heracleum candicans*, *Sisymbrium erysimoides*, *Juglans regia*, *Euphrasia himalayica* and *Bistorta amplexicaulis*), one in tuberculosis (*Nasturtium officinale*), one as tracheal relaxant (*Sarcococca saligna*), 3 in ulcer (*Anaphalis margaritacea*, *Indigofera heterantha* and *Geranium wallichianum*), 3 in urolithiasis (*Amaranthus viridis*, *Chaerophyllum reflexum* and *Eriocycla staintonii*), 3 as vermifuge (*Chenopodium botrys*, *Artemisia persica* and *Portulaca oleracea*), 2 as vasodilator (*Sarcococca saligna* and *Fagopyrum esculentum*), one as vasoconstrictor (*Lamium album*) and 7 in wounds (*Artemisia biennis*, *Leucanthemum vulgare*, *Sonchus asper*, *Indigofera heterantha*, *Mellilotus officinalis*, *Plantago lanceolata* and *Ziziphus jujuba*). The details of the medicinal uses of the Dicot species are as under.

1. Antispasmodic: *Viburnum grandiflorum*, *Chenopodium murale*, *Valeriana hardwickii*, *Valeriana jatamansi*, *Valeriana stracheyi*, *Mellilotus officinalis*, *Nepeta cataria*, *Stachys emodi*, *Origanum vulgare*, *Prunella vulgaris*, *Thymus linearis*, *Lamium album*, *Leonurus cardiaca*, *Malva neglecta*, *Viola biflora*.

2. Anti cholesterol: *Leonurus cardiaca* and *Plantago amplexicaulis*.

3. **Anemia:** *Astragalus candolleanus*, *Oenothera rosea* and *Rumex hastatus*.
4. **Amenorrhea:** *Celtis australis*
5. **Asthma:** *Sisymbrium erysimoides*, *Valeriana himalayana*, *Quercus incana*, *Swertia cordata*, *Mentha longifolia*, *Ficus carica*, *Rumex nepalensis*, *Verbascum thapsus*, *Hyoscyamus niger* and *Vitis vinifera*.
6. **Astringent:** *Viburnum grandiflorum*, *Amaranthus viridis*, *Conyza aegyptiaca*, *Anaphalis margaritacea*, *Capsella bursa-pastoris*, *Elaeagnus umbellata*, *Mellilotus indica*, *Trigonella gracilis*, *Trifolium repens*, *Quercus incana*, *Geranium wallichianum*, *Juglans regia*, *Punica granatum*, *Nepeta cataria*, *Stachys emodi*, *Lamium album*, *Epilobium hirsutum*, *Fraxinus xanthoxyloides*, *Jasminum humile*, *Plantago amplexicaulis*, *Jasminum humile*, *Bistorta affinis*, *Fagopyrum esculentum*, *Persicaria barbata*, *Polygonum aviculare*, *Rumex dentatus*, *Rumex nepalensis*, *Portulaca oleracea*, *Cotoneaster affinis*, *Fragaria nubicola*, *Potentilla supina*, *Rosa macrophylla*, *Rubus ellipticus*, *Sorbaria tomentosa*, *Pouplus alba*, *Acer caesium*, *Aesculus indica*, *Bergenia ciliata*, *Hyoscyamus niger*, *Urtica dioica*, *Viola canescens* and *Vitis vinifera*.
7. **Acrid:** *Fagopyrum esculentum*
8. **Antiseptic:** (*Oenanthe javanica*, *Anaphalis margaritacea*, *Mentha longifolia*, *Origanum vulgare*, *Prunella vulgaris*, *Isodon rugosus* and *Pouplus alba*.
9. **Aphrodisiac:** *Chaerophyllum reflexum*, *Cirsium verutum*, *Lepidium sativum*, *Valeriana hardwickii*, *Trigonella gracilis*, *Aconitum heterophyllum* and *Verbascum Thapsus*.
10. **Antipyretic:** *Artemisia santolinifolia*, *Geranium lambertii*, *Origanum vulgare*, *Prunella vulgaris*, *Thymus linearis*, *Ficus carica*, *Plantago lanceolata*, *Plantago major*, *Rumex nepalensis*, *Pouplus alba* and *Viola canescens*.
11. **Antiscorbutic:** *Capsella bursa-pastoris*, *Nasturtium officinale*, *Sisymbrium loeselii*, *Medicago sativa*, *Oxalis corniculata* and *Galium hirtiflorum*.
12. **Appetizer:** *Nasturtium officinale* and *Cannabis sativa*.
13. **Antitumor:** *Nasturtium officinale* and *Lathyrus pratensis*.
14. **Anti-gout:** *Betula utilis*
15. **Alterative:** (*Cirsium verutum*, *Podophyllum hexandrum*, *Lepidium sativum*, *Origanum vulgare*, *Prunella vulgaris*, *Corydalis diphylla*, *Portulaca oleracea* and *Pouplus alba*.

16. **Antirheumatic:** *Trifolium repens*, *Mentha longifolia*, *Origanum vulgare*, *Prunella vulgaris*, *Thymus linearis*, *Aesculus indica*, *Solanum nigrum*, *Daphne mucronata* and *Verbena officinalis*.

17. **Anthelmintic:** *Chenopodium album*, *Chenopodium murale*, *Artemisia biennis*, *Artemisia moorcroftiana*, *Artemisia scoparia*, *Artemisia santolinifolia*, *Dianthus jacquemontii*, *Juglans regia*, *Punica granatum* and *Stachys emodi*.

18. **Anodyne:** *Anaphalis margaritacea*, *Cannabis sativa*, *Medicago sativa*, *Pouplus alba* and *Hyoscyamus niger*.

19. **Anorexia:** *Pouplus alba*

20. **Aromatic:** *Chenopodium murale*, *Pimpinella diversifolia*, *Valeriana jatamansi*, *Mellilotus officinalis*, *Mentha longifolia*, *Isodon rugosus* and *Polygonum aviculare*.

21. **AIDS:** *Heracleum candicans*.

22. **Anti-cancer/antitumor:** *Podophyllum hexandrum*, *Lamium album* and *Daphne mucronata*.

23. **Antibacterial:** *Pimpinella diversifolia*, *Betula utilis*, *Dianthus jacquemontii*, *Indigofera heterantha*, *Medicago sativa* and *Primula minutissima*.

24. **Anti-diabetic:** *Hedera nepalensis* and *Plantago amplexicaulis*.

25. **Antispasmodic:** *Leucanthemum vulgare*.

26. **Anti-inflammatory:** *Saussurea albescens*, *Quercus semecarpifolia*, *Swertia longifolia*, *Juglans regia*, *Bistorta affinis*, *Bistorta amplexicaulis* and *Pouplus alba*.

27. **Aperient:** *Lepidium sativum*, *Medicago sativa*, *Thalictrum cultratum*, *Cotoneaster affinis*, *Rosa macrophylla* and *Galium hirtiflorum*.

28. **Anti malaria:** *Cannabis sativa*

29. **Anthrax:** *Cannabis sativa*

30. **Analgesic:** *Cannabis sativa* and *Phytolacca latbenia*.

31. **Bronchitis:** *Valeriana stracheyi*, *Plantago lanceolata*, *Rumex nepalensis* and *Ziziphus jujuba*.

32. **Burns:** *Leucanthemum vulgare* and *Anaphalis margaritacea*.

33. **Boils:** *Sonchus asper* and *Plantago major*.
34. **Blood pressure:** *Capsella bursa-pastoris* and *Crataegus songarica*.
35. **Blood purifier:** *Nasturtium officinale*, *Paeonia emodi*, *Ziziphus jujuba* and *Vitis vinifera*.
36. **Backache:** *Paeonia emodi* and *Pouplus alba*.
37. **Blood poisoning:** *Cannabis sativa*
38. **Bitter:** *Valeriana hardwickii*, *Trigonella gracilis*, *Swertia paniculata*, *Fraxinus xanthoxyloides* and *Corydalis diphylla*.
39. **Carmininative:** *Chenopodium murale*, *Pimpinella diversifolia*, *Valeriana hardwickii*, *Valeriana jatamansi*, *Cuscuta reflexa*, *Diospyros lotus*, *Desmodium elegans*, *Mellilotus officinalis*, *Trigonella gracilis*, *Punica granatum*, *Mentha longifolia*, *Marrubium vulgare*, *Nepeta cataria*, *Nepeta erecta*, *Stachys emodi*, *Thymus linearis*, *Persicaria barbata* and *Caltha alba*.
40. **Cholera:** *Valeriana jatamansi*
41. **Cough:** *Chenopodium botrys*, *Heracleum candicans*, *Saussurea albescens*, *Valeriana himalayana*, *Indigofera heterantha*, *Geranium lambertii*, *Mentha longifolia*, *Marrubium vulgare*, *Nepeta cataria*, *Origanum vulgare*, *Prunella vulgaris*, *Thymus linearis*, *Euphrasia himalayica*, *Ziziphus jujuba*, *Verbascum thapsus* and *Hyoscyamus niger*.
42. **Cold:** *Heracleum candicans*, *Saussurea albescens*, *Astragulus candolleanus*, *Geranium lambertii*, *Mentha longifolia*, *Marrubium vulgare*, *Nepeta erecta*, *Thymus linearis*, *Euphrasia himalayica* and *Ziziphus jujuba*.
43. **Cardio suppressant:** *Sarcococca saligna*
44. **Colic:** *Amaranthus spinosus*, *Artemisia biennis*, *Berberis lycium*, *Mentha longifolia*, *Nepeta cataria*, *Paeonia emodi*, *Persicaria barbata* and *Aesculus indica*.
45. **Constipation:** *Taraxacum officinale*, *Valeriana jatamansi*, *Swertia cordata* and *Plantago lanceolata*.
46. **Cholagogue:** *Lamium album*
47. **Cardiac:** *Amaranthus viridis*, *Saussurea albescens*, *Elaeagnus umbellata*, *Astragulus candolleanus*, *Punica granatum*, *Leonurus cardiaca*, *Crataegus songarica*, *Solanum nigrum* and *Vitis vinifera*.
48. **Calcium & Vitamin A deficiency:** *Amaranthus viridis*

49. **Cathartic:** *Hedera nepalensis*, *Euphorbia wallichii* and *Paeonia emodi*.
50. **Chest infection:** *Nasturtium officinale* and *Sisymbrium erysimoides*.
51. **Cooling:** *Punica granatum*, *Malva neglecta*, *Oxalis corniculata*, *Epilobium hirsutum*, *Rumex hastatus* and *Vitis vinifera*.
52. **Diuretic:** *Sambucus wightiana*, *Achyranthes aspera*, *Amaranthus spinosus*, *Chenopodium album*, *Pimpinella diversifolia*, *Leucanthemum vulgare*, *Conyza aegyptiaca*, *Cirsium verutum*, *Taraxacum officinale*, *Betula utilis*, *Lepidium sativum*, *Nasturtium officinale*, *Valeriana hardwickii*, *Dianthus jacquemontii*, *Cuscuta reflexa*, *Desmodium elegans*, *Medicago sativa*, *Mellilotus officinalis*, *Quercus incana*, *Geranium wallichianum*, *Marrubium vulgare*, *Stachys emodi*, *Lamium album*, *Leonurus cardiaca*, *Corydalis diphylla*, *Rumex dentatus*, *Rumex hastatus*, *Rumex nepalensis*, *Portulaca oleracea*, *Caltha alba*, *Thalictrum cultratum*, *Galium hirtiflorum*, *Pouplus alba*, *Bergenia ciliata*, *Solanum nigrum*, *Urtica dioica*, *Viola canescens* and *Vitis vinifera*.
53. **Depurative:** *Trifolium repens* and *Lamium album*.
54. **Diarrhea:** *Conyza aegyptiaca*, *Anaphalis margaritacea*, *Capsella bursa-pastoris*, *Lepidium sativum*, *Mellilotus indica*, *Quercus incana*, *Quercus semecarpifolia*, *Geranium wallichianum*, *Punica granatum*, *Mentha longifolia*, *Stachys emodi*, *Epilobium hirsutum*, *Fragaria nubicola* and *Rubus ellipticus*.
55. **Dysentery:** *Conyza aegyptiaca*, *Anaphalis margaritacea*, *Lepidium sativum*, *Cannabis sativa*, *Valeriana hardwickii*, *Valeriana jatamansi*, *Quercus semecarpifolia*, *Punica granatum*, *Mentha longifolia*, *Stachys emodi* and *Fragaria nubicola*.
56. **Dyspepsia:** *Swertia cordata*, *Thalictrum cultratum* and *Vitis vinifera*.
57. **Dropsy:** *Sambucus wightiana*, *Capsella bursa-pastoris*, *Paeonia emodi* and *Galium hirtiflorum*.
58. **Debility:** *Pouplus alba*
59. **Diaphoretic:** *Sambucus wightiana*, *Oenanthe javanica*, *Hedera nepalensis*, *Leucanthemum vulgare*, *Berberis lycium*, *Valeriana hardwickii*, *Dianthus jacquemontii*, *Euphorbia wallichii*, *Nepeta cataria*, *Solanum nigrum*, *Viola biflora* and *Viola canescens*.
60. **Dysuria:** *Punica granatum*
61. **Dysporea:** *Crataegus songarica*
62. **Dysmenorrhoea:** *Cannabis sativa*

63. **Demulcent:** *Ficus carica*, *Plantago amplexicaulis*, *Portulaca oleracea*, *Bergenia ciliata*, *Viola canescens* and *Vitis vinifera*.
64. **Diabetes:** *Fragaria nubicola*
65. **Digestive:** *Amaranthus viridis*, *Artemisia japonica*, *Parnassia cabulica* and *Pouplus alba*.
66. **Flu:** *Heracleum candicans*
67. **Expectorant:** *Sambucus wightiana*, *Anaphalis margaritacea*, *Berberis lycium*, *Lepidium sativum*, *Sisymbrium erysimoides*, *Dipsacus inermis*, *Mellilotus officinalis*, *Marrubium vulgare*, *Stachys emodi*, *Origanum vulgare*, *Prunella vulgaris*, *Thymus linearis*, *Lamium album*, *Ziziphus jujuba*, *Cotoneaster affinis*, *Solanum nigrum* and *Hyoscyamus niger*.
68. **Epilepsy:** *Celtis australis*, *Indigofera heterantha* and *Paeonia emodi*.
69. **Emetic:** *Anaphalis margaritacea*, *Podophyllum hexandrum*, *Campanula latifolia*, *Euphorbia wallichii*, *Medicago sativa*, *Stachys emodi*, *Paeonia emodi*, *Polygonum aviculare* and *Viola biflora*.
70. **Eczema:** *Amaranthus spinosus*
71. **Emollient :** *Amaranthus spinosus*, *Silene vulgaris*, *Mellilotus indica*, *Mellilotus officinalis*, *Rumex dentatus*, *Ziziphus jujuba*, *Viola biflora* and *Viola canescens*.
72. **Emmenagogue :** *Leucanthemum vulgare*, *Valeriana hardwickii*, *Nepeta cataria*, *Rumex nepalensis* and *Anemone vitifolia*.
73. **Eye diseases/opthalmic:** *Dianthus jacquemontii*, *Silene vulgaris*, *Lamium album*, *Primula minutissima*, *Leucanthemum vulgare*, *Mellilotus officinalis*, *Euphrasia himalayica*, *Corydalis diphylla*, *Plantago amplexicaulis* and *Caltha alba*.
74. **Fever:** *Oenanthe javanica*, *Cuscuta reflexa*, *Astragalus candolleanus* and *Nepeta erecta*.
75. **Febrifuge:** *Oenanthe javanica*, *Artemisia persica*, *Cirsium verutum*, *Dianthus jacquemontii*, *Diospyros lotus*, *Medicago sativa*, *Swertia longifolia*, *Fraxinus xanthoxyloides*, *Plantago amplexicaulis*, *Aconitum heterophyllum*, *Thalictrum cultratum*, *Potentilla supina*, *Pouplus alba* and *Verbena officinalis*.
76. **Fumigent:** *Silene vulgaris*
77. **Gonorrhea:** *Amaranthus spinosus*, *Sarcococca saligna*, *Quercus incana* and *Fragaria nubicola*.
78. **Gleet :** *Fragaria nubicola*

79. **Gynae Problems:** *Trigonella gracilis*, *Trifolium repens*, *Leonurus cardiaca* *Oenothera rosea* and *Primula minutissima*.
80. **Glactatagogue:** *Fagopyrum esculentum*
81. **Gout:** *Betula utilis*
82. **Haemostatic:** *Viburnum grandiflorum*, *Conyza aegyptiaca*, *Dianthus jacquemontii*, *Medicago sativa* and *Malva neglecta*.
83. **Headache/migraine:** *Heracleum candicans*, *Anaphalis margaritacea*, *Valeriana stracheyi*, *Mentha longifolia*, *Nepeta erecta*, *Caltha alba* and *Vitis vinifera*.
84. **Hepatitis/Hepatic stimulant/liver:** *Podophyllum hexandrum*, *Astragulus candolleanus*, *Indigofera heterantha*, *Swertia longifolia*, *Portulaca oleracea*, *Pouplus alba*, *Solanum nigrum* and *Vitis vinifera*.
85. **Haematuria:** *Capsella bursa-pastoris* and *Urtica dioica*.
86. **Hypnotic:** *Dipsacus inermis* and *Lamium album*.
87. **Hysteria:** *Valeriana jatamansi* and *Paeonia emodi*.
88. **Heart tonic:** *Crataegus songarica*
89. **Hypertrophy:** *Crataegus songarica*
90. **Haemorrhoides:** *Indigofera heterantha*, *Geranium wallichianum*, *Ficus carica* and *Fragaria nubicola*.
91. **Hay fever:** *Euphrasia himalayica*
92. **Irritation:** *Rumex dentatus* and *Daphne mucronata*.
93. **Indigestion:** *Senecio chrysanthemoides* and *Quercus incana*.
94. **Influenza:** *Oenanthe javanica* and *Astragulus candolleanus*.
95. **Insecticides:** *Dipsacus inermis*
96. **Insomnia:** *Valeriana hardwickii*, *Valeriana jatamansi*, *Valeriana stracheyi* and *Nepeta cataria*.
97. **Inflammation:** *Dianthus jacquemontii* and *Plantago lanceolata*.
98. **Increasing memory:** *Valeriana himalayana*

99. **Jaundice:** *Chenopodium botrys*, *Oenanthe javanica*, *Taraxacum officinale*, *Senecio chrysanthemoides*, *Berberis lycium*, *Cuscuta reflexa*, *Caltha alba* and *Urtica dioica*.
100. **Laxative:** *Achyranthes aspera*, *Chenopodium album*, *Chenopodium murale*, *Podophyllum hexandrum*, *Euphorbia wallichii*, *Ficus carica*, *Plantago amplexicaulis*, *Plantago depressa*, *Plantago major*, *Rosa macrophylla*, *Rubus ellipticus*, *Viola biflora*, *Viola canescens* and *Vitis vinifera*.
101. **Leprosy:** *Solanum nigrum*
102. **Laryngitis/lung diseases:** *Bistorta amplexicaulis* and *Portulaca oleracea*.
103. **Leukemia:** *Heracleum candicans*
104. **Leucorrhoea:** *Geranium wallichianum*, *Fragaria nubicola* and *Urtica dioica*.
105. **Menstruation/Menorrhagia/menorrhea:** *Amaranthus spinosus*, *Oenanthe javanica*, *Artemisia biennis*, *Artemisia japonica*, *Nepeta cataria* and *Urtica dioica*.
106. **Narcotic :** *Cannabis sativa*, *Mellilotus indica*, *Phytolacca latbenia*, *Verbascum thapsus* and *Hyoscyamus niger*.
107. **Nervine:** *Viburnum grandiflorum*, *Cirsium verutum*, *Valeriana himalayana*, *Nepeta cataria* and *Verbena officinalis*.
108. **Neurosis:** *Valeriana hardwickii* and *Valeriana jatamansi*.
109. **Nutritive:** *Medicago sativa*
110. **Psoriasis:** *Heracleum candicans*, *Oenothera rosea* and *Verbascum thapsus*.
111. **Poultice:** *Artemisia biennis*, *Leucanthemum vulgare*, *Anaphalis margaritacea*, *Sonchus asper*, *Sarcococca saligna*, *Convolvulus arvensis* and *Pouplus alba*.
112. **Poisonous:** *Aquilegia pubiflora*
113. **Piles:** *Berberis lycium*, *Lepidium sativum*, *Origanum vulgare*, *Prunella vulgaris*, *Ficus carica*, *Rumex nepalensis*.
114. **Purgative:** *Sambucus wightiana*, *Amaranthus spinosus*, *Hedera nepalensis*, *Artemisia scoparia*, *Podophyllum hexandrum*, *Convolvulus arvensis*, *Cuscuta reflexa*, *Diospyros lotus*, *Malva neglecta*, *Plantago lanceolata*, *Polygonum aviculare*, *Rumex nepalensis* and *Thalictrum cultratum*.
115. **Promote secretion:** *Diospyros lotus*

116. Paralysis: *Valeriana himalayana*
117. Psychiatric problem: *Valeriana himalayana*
118. Rheumatism: *Heracleum candicans*, *Saussurea albescens*, *Betula utilis*, *Juglans regia*, *Paeonia emodi* and *Anemone vitifolia*.
119. Pectoral: *Marrubium vulgare*, *Lamium album*, *Plantago amplexicaulis*, *Ziziphus jujuba* and *Viola biflora*.
120. Pulmonary diseases: *Marrubium vulgare*
121. Purgative: *Ficus carica* and *Daphne mucronata*.
122. Repellent: *Lathyrus pratensis*
123. Resolvent: *Lathyrus pratensis* and *Lamium album*.
124. Remove stones from kidney/bladder/urine problems: *Achyranthes aspera*, *Chaerophyllum reflexum*, *Eriocycla staintonii*, *Taraxacum officinale*, *Betula utilis*, *Dianthus jacquemontii*, *Astragalus candolleanus*, *Ficus carica*, *Malva neglecta*, *Paeonia emodi*, *Portulaca oleracea*, *Galium hirtiflorum*, *Bergenia ciliata* and *Urtica dioica*.
125. Ring worms: *Lespedeza juncea*, *Jasminum humile* and *Jasminum humile*.
126. Restorative: *Sisymbrium erysimoides*
127. Styptic: *Oenanthe javanica* and *Lamium album*.
128. Stimulant: *Chenopodium murale*, *Hedera nepalensis*, *Conyza aegyptiaca*, *Lepidium sativum*, *Sisymbrium erysimoides*, *Cannabis sativa*, *Dipsacus inermis*, *Elaeagnus umbellata*, *Medicago sativa*, *Mentha longifolia*, *Nepeta cataria* and *Leonurus cardiaca*.
129. Refrigerant: *Punica granatum*, *Nepeta cataria*, *Oxalis corniculata*, *Rumex hastatus* and *Portulaca oleracea*.
130. Sores: *Artemisia biennis*, *Anaphalis margaritacea*, *Euphrasia himalayica* and *Ziziphus jujuba*.
131. Stomachic: *Cirsium verutum*, *Saussurea albescens*, *Berberis lycium*, *Nasturtium officinale*, *Swertia paniculata*, *Mentha longifolia*, *Nepeta cataria*, *Nepeta erecta*, *Thymus linearis*, *Oxalis corniculata* and *Cotoneaster affinis*.
132. Spleen enlargement: *Solanum nigrum*
133. Swelling: *Anaphalis margaritacea*, *Dianthus jacquemontii* and *Celtis australis*.

134. Skin irritation/diseases: *Convolvulus arvensis*
135. Sedative: *Viburnum grandiflorum*, *Cannabis sativa*, *Dipsacus inermis*, *Valeriana stracheyi*, *Nepeta cataria*, *Lamium album*, *Leonurus cardiaca*, *Solanum nigrum* and *Hyoscyamus niger*.
146. Scabies: *Lespedeza juncea* and *Persicaria barbata*.
137. Scurvy & scrofula: *Sisymbrium loeselii*, *Medicago sativa* and *Trifolium repens*.
138. Tonic: *Viburnum grandiflorum*, *Artemisia persica*, *Leucanthemum vulgare*, *Taraxacum officinale*, *Nasturtium officinale*, *Cannabis sativa*, *Valeriana jatamansi*, *Desmodium elegans*, *Medicago sativa*, *Trigonella gracilis*, *Trifolium repens*, *Geranium lambertii*, *Geranium wallichianum*, *Juglans regia*, *Marrubium vulgare*, *Nepeta cataria*, *Origanum vulgare*, *Prunella vulgaris*, *Lamium album*, *Leonurus cardiaca*, *Fraxinus xanthoxyloides*, *Jasminum humile*, *Paeonia emodi*, *Corydalis diphyllo*, *Aconitum heterophyllum*, *Thalictrum cultratum*, *Potentilla supina*, *Rosa macrophylla*, *Pouplus alba* *Aesculus indica* and *Hyoscyamus niger*.
139. Tonsillitis: *Mentha longifolia*
140. Toothache: *Juglans regia* and *Potentilla supina*.
141. Throat infection: *Heracleum candicans*, *Sisymbrium erysimoides*, *Juglans regia*, *Euphrasia himalayica* and *Bistorta amplexicaulis*.
142. Tuberculosis: *Nasturtium officinale*
143. Tracheal relaxant: *Sarcococca saligna*
144. Ulcer: *Anaphalis margaritacea*, *Indigofera heterantha* and *Geranium wallichianum*.
145. Urolithiasis: *Amaranthus viridis*, *Chaerophyllum reflexum* and *Eriocycla staintonii*.
146. Vermifuge: *Chenopodium botrys*, *Artemisia persica* and *Portulaca oleracea*.
147. Vasodilator: *Sarcococca saligna* and *Fagopyrum esculentum*.
148. Vasocontractor: *Lamium album*
149. Wounds: *Artemisia biennis*, *Leucanthemum vulgare*, *Sonchus asper*, *Indigofera heterantha*, *Mellilotus officinalis*, *Plantago lanceolata* and *Ziziphus jujuba*.

Table 7. Families, scientific names, and ethnobotanical uses of species reported from the within the valley

S #	Family/scientific name	I. Monilophytes (Ferns and their allies)																				
		Ethnobotanical Uses																				
		a	b	c	D	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u
1.	Aspleniaceae																					
	<i>Asplenium adiantum-nigrum</i> (L.) Hook.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
	<i>Asplenium ceterach</i> L.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Asplenium septentrionale</i> (Sw.) Hook.	+																				
	<i>Asplenium trichomanes</i> (Huds.) Hook.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.	Dennstaedtiaceae																					
	<i>Pteridium aquilinum</i> (L.) Kuhr.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3.	Dryopteridaceae																					
	<i>Dryopteris ramosa</i> (Hope) C. Chr.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Polystichum discretum</i> (D. Don) Diels	+																				
	<i>Polystichum thomsonii</i> (Hook.) Bedd.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4.	Equisetaceae																					
	<i>Equisetum arvense</i> L.	+	-	-	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
5.	Marsileaceae																					
	<i>Marsilea minuta</i> L.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
6.	Polypodiaceae																					
	<i>Adiantum capillus-veneris</i> L.	+	-	-	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
	<i>Adiantum venustum</i> D. Don	+	-	-	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
	<i>Allosorus stelleri</i> (Rupr.) Bedd	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7.	Pteridaceae																					
	<i>Pteris critica</i> L.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Pteris vitata</i> L.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8.	Thelypteridaceae																					
	<i>Christella dentata</i> (Forssk.) Rownsey	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

I. Monilophytes (Ferns and their allies)																						
S #	Family/scientific name	Ethnobotanical Uses																				
		a	b	c	D	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u
9.	Woodsiaceae																					
	<i>Athyrium mackinnonii</i> (Hope) C. Chr.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Athyrium rupicola</i> (Hope) C. Chr.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Cystopteris dickieana</i> R. Sim.	+																				
	<i>Cystopteris fragilis</i> (L.) Bernh.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
II. Lignophytes (Gymnosperms)																						
1.	Cupressaceae																					
	<i>Juniperus communis</i> L.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
2.	Ephedraceae																					
	<i>Ephedra gerardiana</i> Wall. ex Stapf	-	-	-	+	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
3.	Pinaceae.																					
	<i>Abies pindrow</i> Royle	+	-	-	+	+	-	-	+	-	-	-	-	-	-	+	-	-	+	-	-	-
	<i>Cedrus deodara</i> (Roxb.ex D. Don) G. Don	+	-	-	+	+	-	-	+	-	-	-	-	-	-	+	-	-	+	-	-	-
	<i>Picea smithiana</i> (Wall.) Boiss.	+	-	-	+	+	-	-	+	-	-	-	-	-	-	-	-	-	+	-	-	-
	<i>Pinus wallichiana</i> A. B. Jackson	+	-	-	+	+	-	-	+	-	-	-	-	-	-	+	-	-	+	-	-	-
4.	Taxaceae																					
	<i>Taxus fuana</i> Nan Li & R. R. Mill.	+	-	-	+	+	-	-	+	-	-	-	-	-	-	+	-	-	+	-	-	-
II. Lignophytes (Angiosperms) Monocot																						
1.	Alliaceae																					
	<i>Allium victorialis</i> L.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
2.	Araceae																					
	<i>Arisaema jacquemontii</i> Blume	+	-	-	-	-	-	-	-	-	+	-	-	-	-	+	-	-	-	-	-	-
3.	Colchicaceae																					
	<i>Colchicum luteum</i> Baker	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
4.	Convallariaceae																					
	<i>Polygonatum verticillatum</i> All.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-

S #	Family/scientific name	II. Lignophytes (Angiosperms) Monocot																				
		Ethnobotanical Uses																				
		a	b	c	D	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u
5.	Cyperaceae																					
	<i>Carex karoii</i> (Freyn.) Freyn.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-
	<i>Cyperus niveus</i> Retz.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-
	<i>Schoenoplectus litoralis</i> (Schrad.) Palla	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-
6.	Dioscoreaceae																					
	<i>Dioscorea deltoidea</i> Wall. ex Kunth.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
7.	Iridaceae																					
	<i>Iris hookeriana</i> Foster	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8.	Juncaceae																					
	<i>Juncus membranaceus</i> Royle ex Don	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Juncus sphacelatus</i> Decne.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9.	Liliaceae																					
	<i>Northolirion thomsonianum</i> (D. Don) Stapf	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10.	Orchidaceae																					
	<i>Dactylorhiza hatagirea</i> (D. Don) Soo.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
	<i>Spiranthes sinensis</i> (Pers.) Ames	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11.	Trilliaceae																					
	<i>Trillium govanianum</i> Wall. ex Royle	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
12.	Poaceae																					
	<i>Arundo donax</i> L.	+	-	+	+	-	-	-	-	-	-	-	+	+	-	-	-	+	+	-	+	-
	<i>Dactylis glomerata</i> L.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	+	-
	<i>Dichanthium annulatum</i> (Forssk.) Stapf.	-	-	+	-	-	+	-	-	-	-	-	-	-	+	-	-	+	-	-	+	-
	<i>Digitaria ciliaris</i> (Retz.) Koel.	-	-	-	-	-	+	-	-	-	-	-	-	-	+	-	-	+	-	-	+	-
	<i>Echinochloa crus-galli</i> (L.) P. Beauv.	-	-	-	-	-	+	-	-	-	-	-	-	-	+	-	-	+	-	-	-	-
	<i>Pennisetum lanatum</i> Klotzsch	-	-	-	-	-	+	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-
	<i>Piptatherum gracile</i> Mez.	+	-	-	-	-	+	-	-	-	-	-	-	-	+	-	-	+	-	-	-	-
	<i>Poa alpina</i> L.	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-
	<i>Setaria pumila</i> (Poir.) Roem.	-	-	-	-	-	+	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-

S #	Family/scientific name	II. Lignophytes (Angiosperms) Dicot																				
		Ethnobotanical Uses																				
		a	b	c	D	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u
1.	Adoxaceae																					
	<i>Sambucus wightiana</i> Wall. ex Wight & Am.	+	-	-	-	-	-	-	-	-	-	+	-	-	-	+	-	-	-	-	-	-
	<i>Viburnum grandiflorum</i> Wall. ex DC.	+	+	-	+	-	-	-	-	+	-	+	-	-	-	+	-	-	-	-	-	-
2.	Amaranthaceae																					
	<i>Achyranthes aspera</i> L.	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
	<i>Amaranthus viridis</i> L.	+	-	-	+	-	+	+	-	-	-	-	-	-	-	+	-	-	-	-	-	+
	<i>Amaranthus spinosus</i> L.	-	-	-	-	-	+	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-
	<i>Chenopodium album</i> L.	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
	<i>Chenopodium botrys</i> L.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
	<i>Chenopodium foliosum</i> Asch.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Chenopodium murale</i> L.	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
3.	Apiaceae																					
	<i>Aegopodium burtii</i> E. Nasir	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Bupleurum lanceolatum</i> Wall.	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Bupleurum nigrescens</i> E. Nasir	+	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Bupleurum tenue</i> Buch.	+	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Chaerophyllum reflexum</i> Lindl.	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
	<i>Eriocycla staintonii</i> Riedl & Kuber	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
	<i>Heracleum candicans</i> Wall. ex DC.	+	-	-	-	-	-	-	-	-	-	+	-	-	-	+	-	-	-	-	-	-
	<i>Ligusticum elatum</i> C. B. Clarke	+	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Ligusticum stewartii</i> (Hiroe) E. Nasir	+	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Oenanthe javanica</i> (Blume) DC.	+	-	-	-	-	-	-	-	-	-	+	-	-	-	+	-	-	-	-	-	-
	<i>Pimpinella diversifolia</i> DC.	-	-	-	-	-	-	-	-	-	-	+	-	-	-	+	-	-	-	-	-	-
	<i>Scaligeria aitchisonii</i> Wolff	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-
	<i>Scandix pecten-veneris</i> L.	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-

II. Lignophytes (Angiosperms) Dicot																						
S #	Family/scientific name	Ethnobotanical Uses																				
		a	b	c	D	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u
	<i>Sium latijugum</i> C. B. Clarke	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Torilis leptophylla</i> (L.) Reichb.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
	<i>Vicatia wolffiana</i> (Wolff ex Fedde) Norman	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4.	Araliaceae																					
	<i>Aralia cachemirica</i> Dcne.	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-
	<i>Hedra nepalensis</i> K. Koch.	+	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
5.	Asteraceae																					
	<i>Achillea millefolium</i> L.	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-
	<i>Artemisia biennis</i> Willd.	-	-	-	-	-	-	-	-	-	-	+	-	-	-	+	-	-	-	-	-	-
	<i>Artemisia elegantissima</i> Pamp.	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-
	<i>Artemisia japonica</i> Thunb.	-	-	-	-	-	-	-	-	-	-	+	-	-	-	+	-	-	-	-	-	+
	<i>Artemisia moorcroftiana</i> Wall. Ex DC.	-	-	-	-	-	-	-	-	-	-	+	-	-	-	+	-	-	-	-	-	-
	<i>Artemisia persica</i> Boiss.	-	-	-	-	-	-	-	-	-	-	+	-	-	-	+	-	-	-	-	-	-
	<i>Artemisia scoparia</i> Waldst. & Kit.	-	-	-	-	-	-	-	-	-	-	+	-	-	-	+	-	-	-	-	-	-
	<i>Artemisia santolinifolia</i> Turcz. Ex Krasch.	-	-	-	-	-	-	-	-	-	-	+	-	-	-	+	-	-	-	-	-	-
	<i>Handelia trichophylla</i> (Schrenk) Heimerl	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Leucanthemum vulgare</i> Lam.	+	-	-	+	-	-	-	-	-	-	+	-	-	-	+	-	-	-	-	-	-
	<i>Aster altaicus</i> Willd.	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-
	<i>Aster molliusculus</i> (DC.) C. B. Clarke	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-
	<i>Conyza aegyptiaca</i> (L.) Ait.	-	-	-	-	-	+	-	-	-	-	+	-	-	-	+	-	-	-	-	-	-
	<i>Cirsium falconeri</i> (Hook. f.) Petrak	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Cirsium verutum</i> (D. Don) Sprengel	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
	<i>Cousinia thomsonii</i> C. B. Clarke	+	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Echinops cornigerus</i> DC.	-	-	-	-	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
	<i>Saussurea albescens</i> (DC.) Sch.	+	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
	<i>Anaphalis margaritacea</i> (L.) Benth.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
	<i>Anaphalis triplinervis</i> (Sims.) C. B. Clarke.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

II. Lignophytes (Angiosperms) Dicot																						
S #	Family/scientific name	Ethnobotanical Uses																				
		a	b	c	D	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u
	<i>Leontopodium himalayanum</i> DC.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Bidens cernua</i> L.	+	-	-	-	-	+	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-
	<i>Sonchus asper</i> (L.) Hill	+	-	-	-	-	+	-	-	-	-	+	-	-	+	+	-	-	-	-	-	-
	<i>Taraxacum officinale</i> F. H. Wiggers	+	-	-	-	-	-	-	-	-	-	+	-	-	+	+	-	-	-	-	-	-
	<i>Senecio chrysanthemoides</i> DC.	+	-	-	-	-	-	-	-	-	-	+	-	-	-	+	-	-	-	-	-	-
6.	Balsaminaceae																					
	<i>Impatiens balfourii</i> Hook.	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-
	<i>Impatiens brachycentra</i> Kar. & Kir.	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-
	<i>Impatiens edgeworthii</i> Hook.	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-
	<i>Impatiens flemingii</i> Hook.	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-
	<i>Impatiens glandulifera</i> Royle	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-
	<i>Impatiens meeboldii</i> Hook.	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-
	<i>Impatiens sulcata</i> Wall.	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-
	<i>Impatiens thomsonii</i> Hook.	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-
7.	Betulaceae																					
	<i>Betula utilis</i> D. Don	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
8.	Berberidaceae																					
	<i>Berberis lycium</i> Royle	+	+	+	+	+	+	-	-	+	-	+	-	-	-	+	-	+	+	+	+	-
	<i>Podophyllum hexandrum</i> Wall. ex. Royle	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
9.	Boraginaceae																					
	<i>Cynoglossum glochidiatum</i> Wall.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Cynoglossum lanceolatum</i> Forssk.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Lindolfia anchusoides</i> (Lindl.) Lehm.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Lindolfia stylosa</i> (Kar. & Kir.) Brand	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Lindolfia longiflora</i> (Benth.) Baill.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10.	Brassicaceae																					
	<i>Capsella bursa-pastoris</i> (L.) Medik.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	+

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		a	b	c	D	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u
	<i>Lepidium sativum</i> L.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	+
	<i>Cardamine hirsuta</i> L.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Cardamine flexuosa</i> With.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Nasturtium officinale</i> R. Br.	-	-	-	-	-	-	+	-	-	-	-	-	-	-	+	-	-	-	-	-	+
	<i>Sisymbrium erysimoides</i> Desf.	-	+	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	+
	<i>Sisymbrium loeselii</i> L.	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
	<i>Sisymbrium orientale</i> L.	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
11.	Buxaceae																					
	<i>Sarcococca saligna</i> (D. Don) Muell.	+	-	-	-	+	-	-	-	-	-	+	-	-	-	+	-	+	-	-	-	-
12.	Campanulaceae																					
	<i>Campanula latifolia</i> L.	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
	<i>Campanula pallida</i> Wall.	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Codonopsis clematidea</i> (Schrenk) C. B. Clarke	+	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13.	Cannabaceae																					
	<i>Cannabis sativa</i> L.	-	+	+	+	+	-	-	-	-	-	+	-	-	-	+	-	-	-	+	-	-
14.	Caprifoliaceae																					
	<i>Dipsacus inermis</i> Wall.	+	-	-	-	-	-	-	-	-	-	+	-	-	-	+	-	-	-	-	-	-
	<i>Valeriana hardwickii</i> Wall.	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
	<i>Valeriana himalayana</i> Grub.	-	-	-	+	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
	<i>Valeriana jatamansi</i> Jones	-	-	-	+	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
	<i>Valeriana stracheyi</i> Clarke	-	-	-	+	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
15.	Caryophyllaceae																					
	<i>Arenaria neelgherrensis</i> Wight and Arn.	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Arenaria orbiculata</i> Royle ex Edgew.	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Arenaria serpyllifolia</i> L.	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Cerastium fontanum</i> Baumg.	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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		a	b	c	D	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u
	<i>Dianthus jacquemontii</i> Edgew. ex Hook.	+	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
	<i>Minurtia kashmirica</i> (Edgew.) Mattf.	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Silene gonosperma</i> (Rupr.) Bocquet	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-
	<i>Silene vulgaris</i> (Moench) Gracke	+	-	-	-	-	-	-	-	-	-	+	-	-	-	+	-	-	-	-	-	-
	<i>Spergularia diandra</i> (Guss.) Heldr.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Stellaria monosperma</i> Buch. Ham. ex D. Don	+	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16.	Celtidaceae																					
	<i>Celtis australis</i> L.	-	-	-	-	+	+	-	-	+	-	+	+	-	-	+	-	-	+	-	+	-
17.	Convolvulaceae																					
	<i>Convolvulus arvensis</i> L.	+	-	-	-	-	+	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-
	<i>Cuscuta reflexa</i> Roxb.	-	-	-	-	-	-	-	-	-	+	-	-	+	-	+	-	-	-	-	-	-
18.	Crassulaceae																					
	<i>Hylotelephium ewersii</i> (Ledeb.) H. Ohba	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-
	<i>Sedum hispanicum</i> L.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19.	Ebenaceae																					
	<i>Diospyros lotus</i> L.	-	-	-	+	+	+	-	-	+	-	+	+	-	-	+	-	-	+	-	+	-
20.	Elaeagnaceae																					
	<i>Elaeagnus umbellata</i> Thunb.	+	+	-	+	-	+	-	-	+	-	+	+	-	-	+	-	-	+	-	+	-
21.	Euphorbiaceae																					
	<i>Euphorbia wallichii</i> Hook.	-	-	-	-	-	-	-	-	-	+	-	-	-	-	+	-	-	-	-	-	-
22.	Fabaceae																					
	<i>Astragalus candolleanus</i> Royle ex Benth.	+	-	-	-	-	-	-	-	-	+	+	-	-	-	+	-	-	+	-	-	-
	<i>Colutea nepalensis</i> Sims	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Desmodium elegans</i> DC.	+	-	-	-	-	-	-	-	-	-	+	-	-	-	+	-	-	+	-	-	-
	<i>Indigofera heterantha</i> Wall. ex Brandis	+	-	+	+	+	+	-	-	-	-	+	+	-	-	+	-	-	+	+	+	-

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		a	b	c	D	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u
	<i>Lespedeza juncea</i> (L. f.) Persoon var. <i>juncea</i>	+	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	+	-	-	-
	<i>Lathyrus pratensis</i> L.	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	+
	<i>Medicago sativa</i> L.	-	-	-	-	-	+	+	-	-	-	-	-	-	-	+	-	-	-	-	-	+
	<i>Mellilotus indica</i> (L.) All.	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
	<i>Mellilotus officinalis</i> (L.) Pall.	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
	<i>Trigonella gracilis</i> Benth.	-	-	-	-	-	+	+	-	-	-	+	-	-	-	+	-	+	-	-	-	-
	<i>Trifolium repens</i> L.	+	-	-	-	-	+	+	-	-	-	+	-	-	+	+	-	+	-	-	-	+
23.	Fagaceae																					
	<i>Quercus baloot</i> Griff.	-	-	-	-	+	-	-	-	-	-	+	+	-	-	-	-	-	+	+	-	-
	<i>Quercus incana</i> Roxb.	-	-	-	-	+	-	-	-	-	-	+	+	-	-	+	-	-	+	+	-	-
	<i>Quercus semecarpifolia</i> Smith	-	-	-	-	+	-	-	-	-	-	+	+	-	-	+	-	-	+	+	-	-
24.	Geraniaceae																					
	<i>Geranium lambertii</i> Sweet	+	-	-	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
	<i>Geranium wallichianum</i> D. Don ex Sweet	+	-	-	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
25.	Gentianaceae																					
	<i>Swertia longifolia</i> Boiss.	+	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
	<i>Swertia cordata</i> (G. Don) Clarke	+	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
	<i>Swertia paniculata</i> Wall.	+	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
26.	Hamamelidaceae																					
	<i>Parrotiopsis jacquemontiana</i> (Dcne.) Rehder	+	-	-	-	+	+	-	-	-	-	+	+	-	-	-	-	-	-	-	+	-
27.	Juglandaceae																					
	<i>Juglans regia</i> L.	-	+	-	+	+	-	-	+	+	-	+	+	-	-	+	-	-	+	+	-	-
28.	Lythraceae																					
	<i>Punica granatum</i> L.	+	-	-	+	+	-	-	-	+	-	+	-	-	-	+	-	-	-	+	-	-
29.	Lamiaceae																					
	<i>Mentha longifolia</i> (L.) Huds.	+	-	-	+	-	-	+	-	-	-	+	-	-	-	+	-	-	-	-	-	-

II. Lignophytes (Angiosperms) Dicot																						
S #	Family/scientific name	Ethnobotanical Uses																				
		a	b	c	D	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u
	<i>Marrubium vulgare</i> L.	+	-	-	-	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
	<i>Nepeta cataria</i> L.	+	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
	<i>Nepeta clarkei</i> Hook.	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Nepeta erecta</i> (Royle ex Benth.) Benth.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
	<i>Nepeta govani</i> (Wall. ex Benth) Lab.	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Nepeta juncea</i> Benth.	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Nepeta laevigata</i> (D. Don) Hand.	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Nepeta paulsenii</i> Briquet	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Phlomis bracteosa</i> Royle ex Benth.	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Stachys emodi</i> Hedge	+	-	-	-	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
	<i>Origanum vulgare</i> L.	+	-	-	-	-	-	-	-	-	-	+	-	-	+	+	-	-	-	-	-	-
	<i>Prunella vulgaris</i> L.	+	-	-	-	-	-	-	-	-	-	+	-	-	+	+	-	-	-	-	-	-
	<i>Thymus linearis</i> Benth.	+	+	-	+	-	-	-	-	-	-	+	-	-	+	+	-	-	-	-	-	-
	<i>Calamintha hyssopifolia</i> (Falconer ex Benth.) Hedge	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Isodon rugosus</i> (Wall. ex Benth.) Codd	+	-	+	-	+	+	-	-	-	-	-	-	-	-	+	-	+	-	-	-	-
	<i>Lamium album</i> L.	-	-	-	-	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
	<i>Leonurus cardiaca</i> L.	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
30.	Moraceae																					
	<i>Ficus carica</i> L.	-	-	-	+	+	+	-	-	+	-	-	+	-	+	+	+	-	+	-	+	-
31.	Malvaceae																					
	<i>Malva neglecta</i> Wallr.	+	-	-	-	-	+	+	-	-	-	+	-	-	+	+	-	-	-	-	-	+
32.	Oxalidaceae																					
	<i>Oxalis corniculata</i> L.	+	-	-	-	-	-	+	-	-	-	-	-	-	-	+	-	-	-	-	-	+
33.	Onagraceae																					
	<i>Epilobium cylindricum</i> D. Don	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Epilobium hirsutum</i> L.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-

II. Lignophytes (Angiosperms) Dicot																						
S #	Family/scientific name	Ethnobotanical Uses																				
		a	b	c	D	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u
	<i>Epilobium parviflorum</i> Schreber	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Epilobium royleanum</i> Hausskn.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Oenothera rosea</i> L.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
34.	Oleaceae																					
	<i>Fraxinus xanthoxyloides</i> (G. Don) DC.	-	-	-	-	-	+	-	-	-	-	-	+	-	-	+	-	-	-	-	-	-
	<i>Jasminum humile</i> L.	+	-	-	+	-	-	-	-	-	-	+	-	-	-	+	+	-	-	-	-	-
35.	Orobanchaceae																					
	<i>Euphrasia himalayica</i> Wettst.	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
	<i>Orobanche alba</i> Steph.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Pedicularis pectinata</i> Wall ex. Beth.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Pedicularis pyramidata</i> Royle	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
36.	Paeoniaceae																					
	<i>Paeonia emodi</i> Wall. ex Royle	-	-	-	+	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-
37.	Papaveraceae																					
	<i>Corydalis diphylla</i> Wall.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
38.	Parnassiaceae																					
	<i>Parnassia cabulica</i> Planch. ex Clarke	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
39.	Phytolacaceae																					
	<i>Phytolacca latbenia</i> (Moq.) Walter	+	-	-	-	-	-	-	-	-	-	+	-	-	-	+	-	-	-	-	-	-
40.	Plantaginaceae																					
	<i>Plantago amplexicaulis</i> Cav.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-
	<i>Plantago lanceolata</i> L.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-
	<i>Plantago depressa</i> Willd.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-
	<i>Plantago major</i> Willd.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-
41.	Polygonaceae																					
	<i>Bistorta affinis</i> (D. Don) Green	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-
	<i>Bistorta amplexicaulis</i> (D. Don) Green	+	-	-	-	-	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-

II. Lignophytes (Angiosperms) Dicot																						
S #	Family/scientific name	Ethnobotanical Uses																				
		a	b	c	D	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u
	<i>Fagopyrum esculentum</i> Moench	-	-	-	-	-	+	-	-	-	-	-	-	-	+	+	-	-	-	-	-	+
	<i>Oxyria digyna</i> (L.) Hill	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Persicaria barbata</i> (L.) Hara	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
	<i>Persicaria glabra</i> (Willd.) M. Gomes	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Polygonum aviculare</i> L.	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	+
	<i>Polygonum plebejum</i> R. Br.	+	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Rumex dentatus</i> L.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	+	-	+
	<i>Rumex hastatus</i> D. Don	+	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	+	-	+
	<i>Rumex nepalensis</i> Spreng.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	+
42.	Portulacaceae																					
	<i>Portulaca oleracea</i> L.	+	-	-	-	-	-	+	-	-	-	+	-	-	-	+	-	-	-	-	-	+
43.	Primulaceae																					
	<i>Primula minutissima</i> Jacquem. ex Duby	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
44.	Ranunculaceae																					
	<i>Aconitum heterophyllum</i> Wall. ex Royle	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
	<i>Anemone vitifolia</i> Bush.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
	<i>Aquilegia pubiflora</i> Wall. ex Royle	+	-	-	-	-	-	-	-	-	+	-	-	-	-	+	-	-	-	-	-	-
	<i>Caltha alba</i> Camb.	+	-	-	-	-	-	-	-	-	-	+	-	-	-	+	-	-	-	-	-	-
	<i>Clematis grata</i> Wall.	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-
	<i>Ranunculus arvensis</i> L.	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Ranunculus laetus</i> Wall. Ex Hook.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Thalictrum cultratum</i> Wall.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
45.	Rhamnaceae																					
	<i>Ziziphus jujuba</i> Mill.	-	+	-	+	+	-	-	-	+	-	+	-	-	-	+	-	-	-	-	-	-
46.	Rosaceae																					
	<i>Cotoneaster affinis</i> var. <i>bacillaris</i> (Lindl.) Schneider	+	-	-	-	-	-	-	-	-	-	+	-	-	-	+	-	-	-	-	-	-

II. Lignophytes (Angiosperms) Dicot																						
S #	Family/scientific name	Ethnobotanical Uses																				
		a	b	c	D	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u
	<i>Crataegus songarica</i> C. Koch	-	-	-	+	-	-	-	-	+	-	+	-	-	-	+	-	-	-	-	-	-
	<i>Fragaria nubicola</i> Lindl. ex Lacaita	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
	<i>Potentilla microphylla</i> var. <i>microphylla</i> D. Don	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Potentilla supina</i> L.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
	<i>Rosa macrophylla</i> Lindl.	+	-	-	-	-	-	-	-	-	-	+	-	-	-	+	-	-	-	-	-	-
	<i>Rubus ellipticus</i> Smith	-	-	-	-	-	+	-	-	+	-	+	-	-	-	+	-	-	-	-	-	-
	<i>Sorbaria tomentosa</i> (Lindl.) Rehders	+	-	+	-	-	+	-	-	-	-	+	-	-	-	+	-	+	+	-	-	-
47.	Rubiaceae																					
	<i>Galium hirtiflorum</i> Recquien ex DC.	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
48.	Salicaceae																					
	<i>Pouplus alba</i> L.	-	-	-	-	+	+	-	+	-	-	-	-	-	-	+	-	-	+	-	+	-
49.	Sapindaceae																					
	<i>Acer caesium</i> Wall. ex Brandis	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	+	-	-	-
	<i>Aesculus indica</i> (Wall. ex Camb.) Hook.	-	-	-	-	-	+	-	-	-	-	+	-	-	-	+	-	-	-	-	-	-
50.	Saxifragaceae																					
	<i>Bergenia ciliata</i> (Haw.) Sternb.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
51.	Scrophulariaceae																					
	<i>Scrophularia scabiosifolia</i> Bth.	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<i>Verbascum thapsus</i> L.	+	-	-	-	+	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-
	<i>Veronica anagallis-aquatica</i> L.	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
52.	Solanaceae																					
	<i>Solanum nigrum</i> L.	+	+	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	+
	<i>Hyoscyamus niger</i> L.	+	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-
53.	Tamaricaceae																					
	<i>Tamaricaria elegans</i> (Royle) Qaiser & Ali	+	-	+	-	+	+	-	-	-	-	-	-	-	-	-	-	-	+	-	+	-

II. Lignophytes (Angiosperms) Dicot																						
S #	Family/scientific name	Ethnobotanical Uses																				
		a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u
54.	Thymeleaceae																					
	<i>Daphne mucronata</i> Royle	-	-	-	-	+	-	-	-	+	-	+	-	-	+	+	+	-	-	-	-	-
55.	Urticaceae																					
	<i>Urtica dioica</i> L.	-	-	-	-	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
56.	Verbenaceae																					
	<i>Verbena officinalis</i> L.	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
57.	Violaceae																					
	<i>Viola biflora</i> L.	+	-	-	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
	<i>Viola canescens</i> Wall. ex Roxb.	+	-	-	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
58.	Vitaceae																					
	<i>Vitis vinifera</i> L.	+	+	-	+	-	-	+	-	+	-	+	-	-	-	+	+	-	+	-	+	-

Key to the table:

a= Beautiful/Ornamental, b= Beverages, c= Brooms, d= Cash plants, e= Fuel plants, f= Fodder, g= Food, h= Furniture, i= Fruit plants, j= Harmful/Poisonous, k= Honey bee species, l= House holdings items, m= Invasive plants, n= Live stock promoting, o= Medicinal, p= Sacred Plants, q= Soil reclamation plants, r= Shelters, s= Snuff ash plants, t= Thatching plants, u= Vegetables

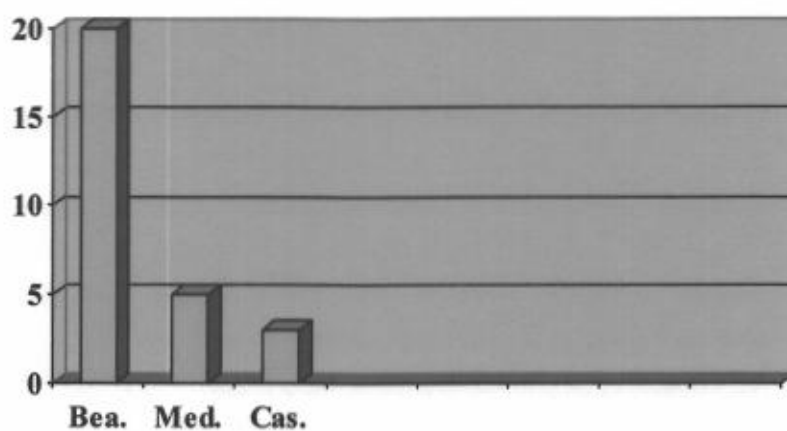


Figure 9. Utilitarian detail of Monilophytes growing in the research area

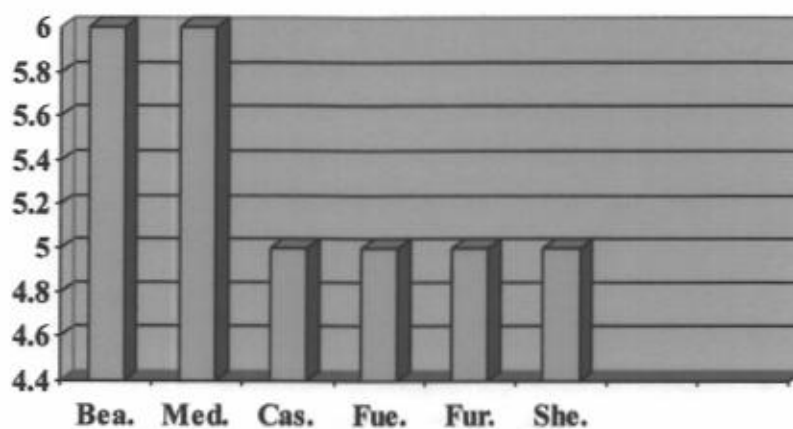


Figure 10. Utilitarian detail of Gymnosperms growing in the research area

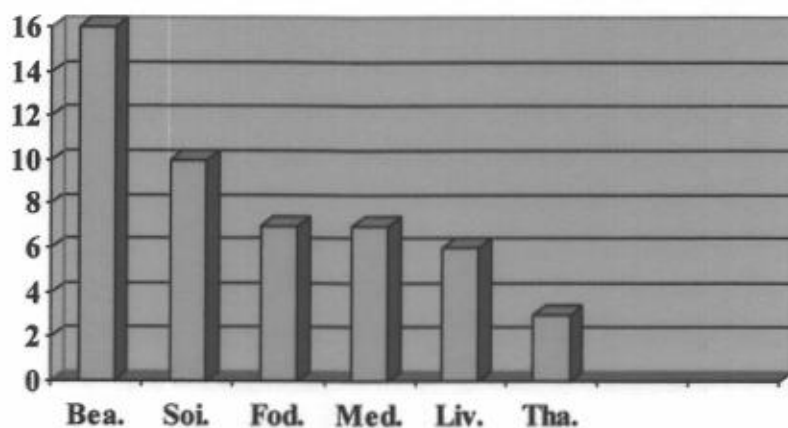


Figure 11. Utilitarian detail of Monocot growing in the research area

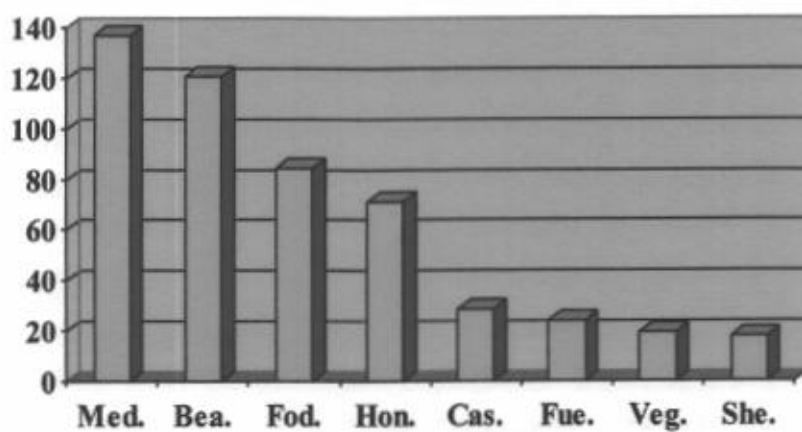


Figure 12. Utilitarian detail of Dicot growing in the research area

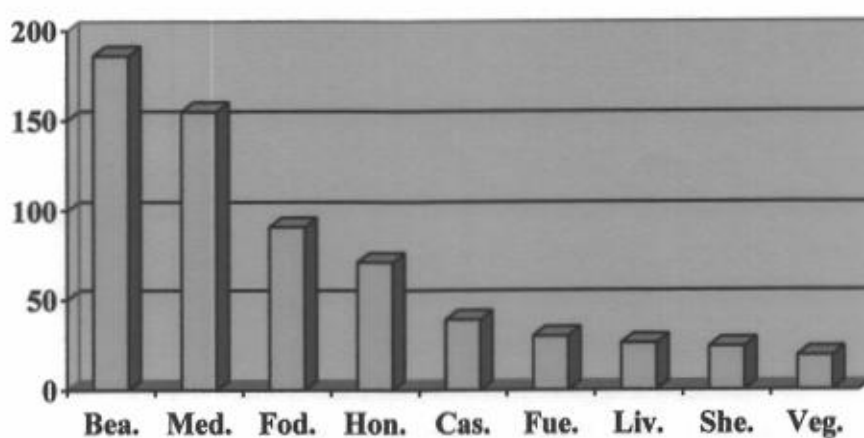


Figure 13. Overall utilitarian detail of all groups growing in the research area

ETHNOBOTANICAL USES KEY

a= Beautiful/Ornamental

b= Beverages

c= Brooms

d= Cash plants

e= Fuel plants

f= Fodder

g= Food

h= Furniture

i= Fruit plants

j= Harmful/Poisonous

k= Honey bee species

l= House holdings items

m= Invasive plants

n= Live stock promoting

o= Medicinal

p= Sacred Plants

q= Soil reclamation plants

r= Shelters

s= Snuff ash plants

t= Thatching plants

u= Vegetables

Table 8. Key for various utilitarian groups of Trachaeophytes of Mankial Valley

Table 9. Families, scientific names, vernacular names, part used, conservation status and medicinal uses of plant species reported from the research area

I. Monilophytes (Ferns and their allies)

S #	Family/scientific name	Vern. Name	Part used	Medicinal uses
1.	Aspleniaceae <i>Asplenium adiantum-nigrum</i> (L.) Hook.	Babrozay	Whole plant	Cold, cough, diuretic, expectorant, jaundice, laxative and purgative
2.	Equisetaceae <i>Equisetum arvense</i> L.	Bandakay	Whole plant	Antilice and hair tonic
3.	Marsileaceae <i>Marsilea minuta</i> L.	Shawtalay	Whole plant	Anti-cholesterol, balanced blood pressure, cough, ophthalmic, reduce uric acid and triglycerol
4.	Polypodiaceae <i>Adiantum capillus-veneris</i> L.	Sumbal	Fronds	Scorpion stings & bites, astringent, diuretic, expectorant & febrifuge
	<i>Adiantum venustum</i> D. Don	Sumbal	Fronds	Diuretic, emetic, expectorant and scorpion stings, bites and piles

II. Lignophytes (Gymnosperms)

S #	Family/scientific name	Vern. Name	Part used	Medicinal uses
1.	Cupressaceae <i>Juniperus communis</i> L.	Gugar	Berries	Carminative, diuretic and stimulant
2.	Ephedraceae <i>Ephedra gerardiana</i> Wall. ex Stapf	Asmania	Fruit/leaves	Constriction of blood vessels, dilation of the pupil and stimulant

II. Lignophytes (Gymnosperms)

S #	Family/scientific name	Vern. Name	Part used	Medicinal uses
3.	Pinaceae			
	<i>Abies pindrow</i> Royle	Achar	Leaves	Antispasmodic, asthma, astringent, bronchitis, carminative, expectorant, stomachic and tonic
	<i>Cedrus deodara</i> (Roxb.ex D. Don) G. Don	Deeyar	Oil/gum	Acne, carminative, diaphoretic, diuretic, dropsy, fever, flatulence, hair loss and piles
	<i>Pinus wallichiana</i> A. B. Jackson	Peeuch	Wood/resin	Asthma, cough, diaphoretic, skin irritation, stimulant, treatment of facial acne and ulceration
4.	Taxaceae			
	<i>Taxus fuana</i> Nan Li & R. R. Mill.	Banya	Whole plant	Antiseptic, aphrodisiac, asthma, bronchitis, congestion, clumping of erythrocytes, cough, epilepsy, fruits are poisonous causing irritation, indigestion and sedative

II. Lignophytes (Angiosperms) Monocot

S #	Family/scientific name	Vern. Name	Part used	Medicinal uses
1.	Alliaceae			
	<i>Allium victorialis</i> L.	Piazakay	Whole plant	Antiscorbutic, antitumor, carminative, diuretic, in profuse menstruation, repellent and vermifuge
2.	Araceae			
	<i>Arisaema jacquemontii</i> Blume	Marjarai	Rhizome/bulb	The rhizome of plant is poisonous
3.	Colchicaceae			
	<i>Colchicum luteum</i> Baker	Zair gulay	Dried corm	Anti-gout, aphrodisiac, alterative, carminative, in spleen and liver diseases, laxative and in rheumatism
4.	Convallariaceae			
	<i>Polygonatum verticillatum</i> All.	Nooryalam	Rhizome	Aphrodisiac, antirheumatic, increase lactation in cattle

II. Lignophytes (Angiosperms) Monocot

S #	Family/scientific name	Vern. Name	Part used	Medicinal uses
5.	Dioscoreaceae <i>Dioscorea deltoidea</i> Wall. ex Kunth.	Ratalu/kanees	Tubers	Colic, diuretic, expectorant and root powder is anthelmintic and useful to expel tape worms
6.	Orchidaceae <i>Dactylorhiza hatagirea</i> (D. Don) Soo.	Sala	Tubers	Aphrodisiac, expectorant and nervine
7.	Trilliaceae <i>Trillium govanianum</i> Wall. ex Royle	Tande jarri	Root	Astringent, alterative, emetic and tonic

II. Lignophytes (Angiosperms) Dicot

S #	Family/scientific name	Vern. Name	Part used	Medicinal uses
1.	Adoxaceae <i>Sambucus wightiana</i> Wall. ex Wight & Am. <i>Viburnum grandiflorum</i> Wall. ex DC.	Mushkiara Guch	Whole plant Fruits/branches	Diaphoretic, diuretic, expectorant, purgative and used in dropsy Antispasmodic, astringent, haemostatic, nervine, tonic and sedative
2.	Amaranthaceae <i>Achyranthes aspera</i> L. <i>Amaranthus viridis</i> L. <i>Amaranthus spinosus</i> L. <i>Chenopodium album</i> L. <i>Chenopodium botrys</i> L.	Gishkay Chalwairay Chalwairay Sarmay Skha kharawa	Whole plant Whole plant Whole plant Whole plant Whole plant	Diuretic, in removal of stones from kidney and laxative Astringent, cardiac, digestive, in calcium and vitamin A deficiency and urolithiasis Colic, diuretic, emollient, gonorrhea, in eczema, menorrhagia and purgative Anthelmintic, diuretic, in jaundice and laxative in cough, jaundice and vermifuge

II. Lignophytes (Angiosperms) Dicot

S #	Family/scientific name	Vern. Name	Part used	Medicinal uses
3.	<i>Chenopodium murale</i> L.	Binakai	Whole plant	Anthelmintic, antispasmodic, aromatic, carminative, laxative and stimulant
	Apiaceae			
	<i>Chaerophyllum reflexum</i> Lindl.	Not known	Whole plant	Aphrodisiac, used in kidney and urinary disorder
	<i>Eriocycla staintonii</i> Riedl & Kuber	Not known	Whole plant	Aphrodisiac, in kidney and urinary disorder
	<i>Heracleum candicans</i> Wall. ex DC.	Skhwara	Whole plant	AIDS, cold, cough, , flu, headache, leukemia, psoriasis, rheumatism and throat infections
	<i>Oenanthe javanica</i> (Blume) DC.	Not known	Whole plant	Antiseptic, depurative, febrifuge, fever, gynae problems, influenza, jaundice and styptic
	<i>Pimpinella diversifolia</i> DC.	Tarpakhi	Whole plant	Aromatic, carminative and diuretic
4. 5.	<i>Torilis leptophylla</i> (L.) Reichb.	Not known	Whole plant	The plant has shown antibacterial activities against some pathogens
	Araliaceae			
	<i>Hedra nepalensis</i> K. Koch.	Kurie/palul	Leaves/berries	Anti-diabetic, cathartic, diaphoretic, purgative and stimulant.
	Asteraceae			
	<i>Artemisia biennis</i> Willd.	Tarkha	Whole plant	Anthelmintic, colic, painful menstruation, poultice, sores and wounds
	<i>Artemisia japonica</i> Thunb.	Tarkha	Leaves	Digestive, gynae problems and juice is used in vaginitis
	<i>Artemisia moorcroftiana</i> Wall. Ex. DC.	Tarkha	Whole plant	The plant is anthelmintic
	<i>Artemisia persica</i> Boiss.	Tarkha	Whole plant	Febrifuge, tonic and vermifuge
	<i>Artemisia scoparia</i> Waldst. & Kit.	Tarkha	Whole plant	Anthelmintic and purgative
	<i>Artemisia santolinifolia</i> Turcz. Ex Krasch.	Tarkha	Whole plant	Anthelmintic and antipyretic
	<i>Leucanthemum vulgare</i> Lam.	Guli nazak	Whole plant	Antispasmodic, burns, decoction is used in eye problems
	<i>Conyza aegyptiaca</i> (L.) Ait.	Malooch	Whole plant	diaphoretic, diuretic, emmenagogue poultice, wounds and tonic
				Haemostatic, stimulant, astringent, diuretic, diarrhea and dysentery

II. Lignophytes (Angiosperms) Dicot

S #	Family/scientific name	Vern. Name	Part used	Medicinal uses
	<i>Cirsium verutum</i> (D. Don) Sprengel	Not known	Whole plant	Febrifuge and stomachache
	<i>Echinops cornigerus</i> DC.	Barum dandi	Whole plant	Nerve tonic, aphrodisiac, diuretic and alterative
	<i>Saussurea albescens</i> (DC.) Sch.	Azghakay	Whole plant	Anti-inflammatory, cardio tonic, cold, cough, rheumatism and stomachache
	<i>Anaphalis margaritacea</i> (L.) Benth.	Not known	Leaves	Anodyne, antiseptic, astringent, burns, diarrhea, dysentery, emetic, expectorant, infusion is steamed and inhaled for headache, poultice, sores, swellings and ulcer
	<i>Sonchus asper</i> (L.) Hill	Shodapai	Whole plant	Used in boils, as poultice and in wounds
	<i>Taraxacum officinale</i> F. H. Wiggers	Booda boodai	Leaves/root	Tonic, diuretic, constipation, jaundice, kidney and liver diseases
	<i>Senecio chrysanthemoides</i> DC.	Zairgulay	Whole plant	Leaves infusion is given in indigestion and liver diseases
6.	Betulaceae			
	<i>Betula utilis</i> D. Don	Birich	Leaves/bark	Antibacterial, diuretic, in gout, in kidney and bladder stones and in rheumatism
7.	Berberidaceae			
	<i>Berberis lycium</i> Royle.	Zairlargay/korai	Berries/rhizome	Diaphoretic, expectorant, intestinal colic, jaundice, piles and stomachic
	<i>Podophyllum hexandrum</i> Royle.	Kakora	Fruit/Rhizome	Alterative, anti-cancer, emetic, hepatic stimulant, laxative and purgative
8.	Brassicaceae			
	<i>Capsella bursa-pastoris</i> (L.) Medik.	Baimbaisa	Whole plant	Stimulant, astringent, antiscorbutic, haematuria, dropsy, diarrhoea, in blood pressure
	<i>Lepidium sativum</i> L.	Halim	Whole plant	Stimulant, alterative, aphrodisiac, aperient, dysentery, diarrhoea, in piles, diuretic and expectorant
	<i>Nasturtium officinale</i> R. Br.	Tarmera	Whole plant	Antiscorbutic, appetizer, diuretic, tonic for anemia, blood purifier, tuberculosis, in tumors, in chest infection and as stomachache

II. Lignophytes (Angiosperms) Dicot

S #	Family/scientific name	Vern. Name	Part used	Medicinal uses
	<i>Sisymbrium erysimoides</i> Desf.	Jenjaray	Seeds	Restorative, expectorant, asthma, stimulant, throat and chest infection
	<i>Sisymbrium loeselii</i> L.	Not known	Leaves/Flowers	Antiscorbutic, leaves and flowers are used in scurvy & scrofula
9.	Buxaceae <i>Sarcococca saligna</i> (D. Don) Muell.	Shenkaye	Leaves/Shoots	Cardio suppressant, roots and shoots poultice is applied in swollen joints in pain, root decoction is given in gonorrhea, vasodilator and tracheal relaxant
10.	Campanulaceae <i>Campanula latifolia</i> L.	Not known	Flowers/Leaves	The plant is emetic
11.	Cannabaceae <i>Cannabis sativa</i> L.	Bhang	Leaves	Narcotic, tonic, sedative, anodyne, anti-malaria, blood poisoning, anthrax, dysentery, analgesic, used in dysmenorrhoea, appetizer, sexual stimulant
12.	Caprifoliaceae <i>Dipsacus inermis</i> Wall.	Piazgulay	Root	The root powder is considered to be expectorant, hypnotic, insecticide, sedative and stimulant
	<i>Valeriana hardwickii</i> Wall.	Desi Mushke Bala	Rhizome	Aphrodisiac, antispasmodic, bitter, carminative, diaphoretic, diuretic, dysentery and emmenagogue, insomnia and neurosis
	<i>Valeriana himalayana</i> Grub.	Desi Mushke Bala	Rhizome	Asthma, cough, increasing memory, nerve problems, paralysis and psychiatric problems
	<i>Valeriana jatamansi</i> Jones	Mushke Bala	Rhizome	Antispasmodic, aromatic, carminative, cholera, constipation, dysentery, hysteria, in insomnia, neurosis and tonic
	<i>Valeriana stracheyi</i> Clarke	Desi Mushke Bala	Rhizome	Antispasmodic, bronchitis, headache, insomnia and sedative

II. Lignophytes (Angiosperms) Dicot

S #	Family/scientific name	Vern. Name	Part used	Medicinal uses
13.	Caryophyllaceae <i>Dianthus Jacquemontii</i> Edgew. ex Hook.	Not known	Whole plant	Antibacterial, anthelmintic, diaphoretic, diuretic, emmenagogue, febrifuge, haemostatic, leaves are used for eye sight, ophthalmic, skin inflammation, swellings and urinary stones
14.	<i>Silene vulgaris</i> (Moench) Gracke Celtidaceae <i>Celtis australis</i> L.	Manghotay Tagha	Whole plant Whole plant	Emollient, fumigant and ophthalmic Ammenorrhoea, in swelling and epilepsy
15.	Convolvulaceae <i>Convolvulus arvensis</i> L. <i>Cuscuta reflexa</i> Roxb.	Prewatai Maicha	Whole plant Whole plant	Purgative, skin diseases and poultice Purgative, fever, carminative, diuretic and jaundice
16.	Ebenaceae <i>Diospyros lotus</i> L.	Daz Dana	Whole plant	Carminative, purgative, antifebrile and promote secretion
17.	Elaeagnaceae <i>Elaeagnus umbellata</i> Thunb.	Ghanumranga	Fruits	Stimulent, cardiac and astringent
18.	Euphorbiaceae <i>Euphorbia wallichii</i> Hook.	Mandano	Whole plant	Emetic, cathartic, laxative and diaphoretic
19.	Fabaceae <i>Astragalus candolleanus</i> Royle ex Benth. <i>Desmodium elegans</i> DC. <i>Indigofera heterantha</i> Wall. ex Brandis <i>Lespedeza juncea</i> (L. f.) Persoon var. <i>juncea</i> <i>Lathyrus pratensis</i> L.	Ghorjakay Sambar Ghoreja Oormaray Zaira chilo	Dried roots/leaves Root Whole plant Whole plant Whole plant	Anemia, cold, fever, heart diseases, hepatitis, influenza, kidney diseases and hepatitis Carminative, diuretic and tonic Antibacterial, epilepsy, haemorrhoides, hepatitis, ulcer, whooping cough and wounds Used in ringworms and scabies Anti-tumor, repellant and resolvent

II. Lignophytes (Angiosperms) Dicot

S #	Family/scientific name	Vern. Name	Part used	Medicinal uses
	<i>Medicago sativa</i> L.	Peeshtaray	Whole plant	Antiscorbutic, anodyne, antibacterial, aperient, contain counteract scurvy, diuretic, emetic, febrifuge, haemostatic, nutritive, stimulant and tonic
	<i>Mellilotus indica</i> (L.) All.	Sahraye Peeshtaray	Whole plant	Astringent, diarrhea, emollient and narcotic
	<i>Mellilotus officinalis</i> (L.) Pall.	Not known	Whole plant	Antispasmodic, aromatic, carminative, diuretic, emollient, expectorant, heal wounds and ophthalmic
	<i>Trigonella gracilis</i> Benth.	Not known	Whole plant	Aphrodisiacs, astringent, bitter, carminative, gynae problems and tonic.
	<i>Trifolium repens</i> L.	Shoutal	Whole plant	Astringent, antirheumatic, antiscrophulatic, depurative, detergent, ophthalmic and tonic
20.	Fagaceae <i>Quercus incana</i> Roxb.	Banj	Whole plant	Astringent, diuretic, diarrhea, indigestion, gonorrhoea and asthma
	<i>Quercus semecarpifolia</i> Smith	Seray	Whole plant	Anti-inflammatory, diarrhea and dysentery
21.	Geraniceae <i>Geranium lambertii</i> Sweet	Sra zeela	Rhizome	Antipyretic, cold, cough and tonic
	<i>Geranium wallichianum</i> D. Don ex Sweet	Sra zeela	Rhizome	Ulcer, tonic, astringent, dysentery, diarrhea, hemorrhages and leucorrhoea
22.	Gentianaceae <i>Swertia longifolia</i> Boiss.	Skhwara	Whole plant	Anti-inflammatory, febrifuge and anti-hepatic
	<i>Swertia cordata</i> (G. Don) Clarke	Skhwara	Whole plant	Asthma, constipation and dyspepsia
	<i>Swertia paniculata</i> Wall.	Skhwara	Whole plant	Bitter and stomachache
23.	Juglandaceae <i>Juglans regia</i> L.	Ghuzz	Bark/leaves/fruit	Anthelmintic, anti-inflammatory, astringent, rheumatism, sore throat, toothache and tonic
24.	Lythraceae <i>Punica granatum</i> L.	Annangoray	Bark/leaves/fruit	Anthelmintic, astringent, cardiac, carminative, cooling, stomachic, diarrhea, dysentery, dysuria and refrigerant

II. Lignophytes (Angiosperms) Dicot

S #	Family/scientific name	Vern. Name	Part used	Medicinal uses
25.	Lamiaceae			
	<i>Mentha longifolia</i> (L.) Huds.	Veenalay	Whole plant	Antirheumatic, antiseptic, aromatic, carminative, colics, diarrhea, dysentery, stimulant, stomachache and in tonsillitis, the leaves are use as tea for asthma, cold, cough and headache
	<i>Marrubium vulgare</i> L.	Krachay	Whole plant	Carminative, expectorant, diuretic, pectoral, in cough, cold, pulmonary diseases and tonic
	<i>Nepeta cataria</i> L.	Jalbanga	Whole plant	Antispasmodic, astringent, carminative, colic, cough, diaphoretic, emmenagogue, insomnia, menstruation, nervine, refrigerant, sedative, stimulant, stomachache & tonic
	<i>Nepeta erecta</i> (Royle ex Benth.) Benth.	Jalbanga	Whole plant	Used in cold, fever, headache, as stomachache & carminative
	<i>Stachys emodi</i> Hedge	Kharbotay	Whole plant	Antispasmodic, anthelmintic, astringent, carminative, diuretic, diarrhea, dysentery, emetic and expectorant
	<i>Origanum vulgare</i> L.	Shamakay/majrom	Whole plant	Antispasmodic, astringent, carminative, diuretic, stimulant, stomachic and tonic
	<i>Prunella vulgaris</i> L.	Binoray	Whole plant	Antispasmodic, antiseptic, antipyretic, antirheumatic, alterative, cough, expectorant, piles and tonic
	<i>Thymus linearis</i> Benth.	SpeerKay	Whole plant	Antirheumatic, antipyretic, antispasmodic, carminative, cough, cold, flu and stomachache
	<i>Isodon rugosus</i> (Wall. ex Benth.) Codd	Sperkay	Branches	Aromatic and antiseptic
	<i>Lamium album</i> L.	Not known	Whole plant	Antispasmodic, astringent, cancer, cholagogue, depurative, diuretic, expectorant, hypnotic, opthalmic, pectoral,

II. Lignophytes (Angiosperms) Dicot

S #	Family/scientific name	Vern. Name	Part used	Medicinal uses
				resolvent, sedative, styptic, tonic and vaso contractor
	<i>Leonurus cardiaca</i> L.	Kharaye	Flowers heads	Anti-cholesterol, antispasmodic, cardiac, diuretic, gynae problems, sedative, stimulant and tonic
26.	Moraceae <i>Ficus carica</i> L.	Inzar	Fruit	Anti-asthmatic, aphrodisiac, demulcent, laxative, piles, and urinary problems
27.	Malvaceae <i>Malva neglecta</i> Wallr.	Samchal	Leaves	Antispasmodic, cooling, haemorrhoides, mild purgative and urinary problems
28.	Oxalidaceae <i>Oxalis corniculata</i> L.	Treewakay	Leaves	Anti-scorbic, cooling, refragant and stomachache
29.	Onagraceae <i>Epilobium hirsutum</i> L. <i>Oenothera rosea</i> L.	Aplum Palay	Leaves Seeds	Astringent, cooling and used in diarrhea Anemia, gynae problems and psoriasis
30.	Oleaceae <i>Fraxinus xanthoxyloides</i> (G. Don) DC.	Hanuz/Soom	Bark	Astringent, bitter, febrifuge and tonic
	<i>Jasminum humile</i> L.	Zair rambail	Flowers/roots	Astringent, used in ring worms and as a tonic
31.	Orobanchaceae <i>Euphrasia himalayica</i> Wettst.	Not known	Whole plant	Cold, cough, eye inflammation, hay fever and sore throat
32.	Paeoniaceae <i>Paeonia emodi</i> Wall. ex Royle	Mamekh	Rhizome/seeds	Backache, blood purifier, cathartic, colic, dropsy, emetic, epilepsy, hysteria, rheumatism, urinary problems and tonic
33.	Papaveraceae <i>Corydalis diphyllo</i> Wall.	Bhutkis	Whole plant	Alterative, bitter, diuretic, ophthalmic and tonic

II. Lignophytes (Angiosperms) Dicot

S #	Family/scientific name	Vern. Name	Part used	Medicinal uses
34.	Parnassiaceae <i>Parnassia cabulica</i> Planch. ex Clarke	Not known	Whole plant	Used in digestive disorders
35.	Phytolacaceae <i>Phytolacca latbenia</i> (Moq.) Walter	Thamakoo sag	Whole plant	Narcotic and pains of joints
36.	Plantaginaceae <i>Plantago amplexicaulis</i> Cav.	Isphaghhol	Leaves/seeds	Astringent, diabetes, demulcent, febrifuge, infusion is ophthalmic, laxative, low cholesterol and pectoral
	<i>Plantago lanceolata</i> L.	Warokay isphaghhol	Leaves/seeds	Bronchitis, purgative, antipyretic, inflammation, constipation and in wounds
	<i>Plantago depressa</i> Willd.	Isphaghhol	Leaves/seeds	The plant is laxative
	<i>Plantago major</i> Willd.	Ghat isphaghhol	Leaves/seeds	Antipyretic, boils and laxative
37.	Polygonaceae <i>Bistorta affinis</i> (D. Don) Green	Anjabar	Rhizome	Anti-inflammatory and astringent
	<i>Bistorta amplexicaule</i> (D. Don) Green	Masloon	Rhizome	Inflammation laryngitis and sore throat
	<i>Fagopyrum esculentum</i> Moench	Not known	Whole plant	Acrid, astringent, galactagogue and vaso dilator
	<i>Persicaria barbata</i> (L.) Hara	Palpulak	Root	Astringent, carminative, colic, paraciticide and root paste is used in scabies
	<i>Polygonum aviculare</i> L.	Bandakay	Whole plant	Anodyne, astringent, emetic and purgative
	<i>Rumex dentatus</i> L.	Shalkhay	Roots/leaves	Astringent, diuretic, irritant and emollient
	<i>Rumex hastatus</i> D. Don	Shalkhay	Roots	Anemia, cooling, diuretic and refrigerant
	<i>Rumex nepalensis</i> Spreng.	Shalkhay	Roots	Antipyretic, asthma, astringent, bronchitis, diuretic, emmenagogue, piles and purgative
38.	Portulacaceae <i>Portulaca oleracea</i> L.	Warkharay	Whole plant	Alterative, astringent, demulcent, diuretic, kidney and lungs diseases, liver, refrigerant and vermifuge

II. Lignophytes (Angiosperms) Dicot

S #	Family/scientific name	Vern. Name	Part used	Medicinal uses
39.	Primulaceae <i>Primula minutissima</i> Jacquem. ex Duby	Mameera	Rhizome	Antibacterial, gynae problems and ophthalmic
40.	Ranunculaceae <i>Aconitum heterophyllum</i> Wall. ex Royle <i>Anemone vitifolia</i> Bush. <i>Aquilegia pubiflora</i> Wall. ex Royle <i>Caltha alba</i> Camb. <i>Thalictrum cultratum</i> Wall.	Sarbawalay Rattan jot Chani Baringu Guljarai	Rhizome Roots/seeds Whole plant Flower/roots Root	Aphrodisiac, febrifuge and tonic Emmenagogue and rheumatism The plant highly poisonous Carminative, diuretic, headache, jaundice and ophthalmic Aperient, diuretic, dyspepsia, febrifuge, purgative and tonic
41.	Rhamnaceae <i>Ziziphus jujuba</i> Mill.	Markhanaray	Fruit/leaves	Bark is used for wounds and sores, blood purifier, bronchitis, cold, cough, emollient, expectorant, pectoral
42.	Rosaceae <i>Cotoneaster affinis</i> (Lindl) Schneider var. <i>bacillaris</i> (Lindl.) Schneider <i>Crataegus songarica</i> C. Koch <i>Fragaria nubicola</i> Lindl. ex Lacaita <i>Potentilla supina</i> L. <i>Rosa macrophylla</i> Lindl. <i>Rubus ellipticus</i> Smith <i>Sorbaria tomentosa</i> (Lindl.) Rehder	Mamanra Gony Balmangay Not known Jangali gulab Karwara Speenakay	Fruit Flowers/fruit Fruit Leaves Flowers/bark Fruit Whole plant	Aperient, astringent, expectorant and stomachache Dysporea, heart tonic, hypertrophy, improves blood flow and used as heart appression Astringent, diabetes, diarrhea, dysentery, hemorrhages, gonorrhoea, gleet and leucorrhoea Astringent, febrifuge, toothache (Odontalgic) and tonic Aperient, astringent, tonic and laxative Astringent, diarrhea and laxative Used as external and internal astringent
43.	Rubiaceae <i>Galium hirtiflorum</i> Recquien ex DC.	Jeeshkay	Whole plant	Aperient, anti-scorbic, diuretic, urinary problems & dropsy

II. Lignophytes (Angiosperms) Dicot

S #	Family/scientific name	Vern. Name	Part used	Medicinal uses
44.	Salicaceae <i>Pouplus alba</i> L.	Speerdad	Leaves/wood	Alterative, anodyne, anorexia, anti-inflammatory, antiseptic, antipyretic, astringent, backache, bark is used as poultice, debility, digestive, diuretic, febrifuge, liver disorder and tonic
45.	Sapindaceae <i>Acer caesium</i> Wall. ex Brandis <i>Aesculus indica</i> (Wall. ex Camb.) Hook.	Chinaray Binkhor	Fruit Fruit/seeds/bark	The fruits of this plant are astringent Astringent, colics, rheumatism and tonic
46.	Saxifragaceae <i>Bergenia ciliata</i> (Haw.) Sternb.	Zakhame Hayat	Rhizome	Astringent, demulcent, diuretic and urinary problems
47.	Scrophlariaceae <i>Verbascum thapsus</i> L.	Khardug	Whole plant	Anti-asthmatic, aphrodisiac, cough, narcotic and psoriasis
48.	Solanaceae <i>Solanum nigrum</i> L. <i>Hyoscyamus niger</i> L.	Karmachoo Bange-dewana	Whole plant Leaves/seeds	Diaphoretic, diuretic, expectorant, heart diseases, hepatitis laxative, liver, leprosy, rheumatism, sedative and in spleen enlargement Anodyne, astringent, asthma, expectorant, narcotic, sedative, tonic and whooping cough
49.	Thymeleaceae <i>Daphne mucronata</i> Royle	Leughonay	Whole plant	Anti-rheumatism, anti-tumour, irritant and purgative
50.	Urticaceae <i>Urtica dioica</i> L.	Seezonkay	Whole plant	Astringent, diuretic, haematuria, jaundice, kidney problems, leucorrhoea and menorrhoea
51.	Verbenaceae <i>Verbena officinalis</i> L.	Jeshkay	Whole plant	Used as febrifuge, nerve tonic and in rheumatism

II. Lignophytes (Angiosperms) Dicot

S #	Family/scientific name	Vern. Name	Part used	Medicinal uses
52.	Violaceae <i>Viola biflora</i> L.	Benausha	Whole plant	Anti-spasmodic, diaphoretic, emetic, emollient, laxative and pectoral
	<i>Viola canescens</i> Wall. ex Roxb.	Benausha	Whole plant	Astringent, anti-pyretic, demulcent, diaphoretic, diuretic, emollient and laxative
53.	Vitaceae <i>Vitis vinifera</i> L.	Angoor	Fruit/leaves	Activate hepatic function, asthma, astringent, cardiac, cooling, demulcent, dyspepsia, diuretic, excellent blood builder, stomachache, laxative and migraine

CHAPTER-7

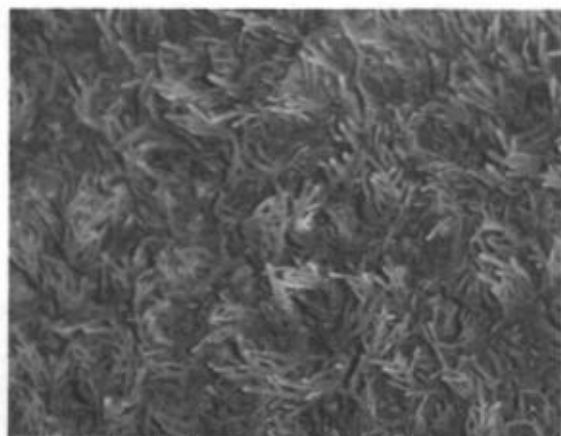
RECOMMENDATIONS

It has been concluded during the present research that efforts are needed for comprehensive taxonomic, medicinal, ethnobotanical and conservation studies to identify and explore the medicinal plants biodiversity, various threats, remedies and recommendations. It is also important to document the baseline information and identify threatened flora of the valley and point out remedies for conservation of the threatened species of the valley. The following recommendations are made for this purpose.

1. Intensive collection for documentation of baseline information in medicinal plants and pharmacognosy and further scientific studies.
2. Monitoring of activities that cause loss of medicinal plants biodiversity.
3. Unsustainable utilization, over exploitation, grazing, habitat loss, fuel wood usage, fodder usage must be controlled. Activities leading to these factors must be banned to provide natural environment for growth of various species.
4. The species conservation must be prioritized and legislation regarding threatened plants biodiversity is required. For this purpose formulation of policies that can play a role to regularize practices of trade, promote sustainable utilization and conservation of medicinal species and its diversity.
5. Research in new fields i.e. Biodiversity Conservation must be supported at Govt. level through funding various projects.
6. For Conservation of such valuable natural resources, seed bank establishment is important for ex-situ and in-situ conservation.
7. Proper training is required for the pastoralists for conservation of the pastures and water shed management. Rotational grazing is recommended to reduce habitat loss and deforestation.
8. Re forestation and regeneration projects must be launched for restoration of forest and natural habitat.
9. Plantation of indigenous tree species i.e. *Aesculus indica*, *Quercus incana*, *Quercus semecarpifolia*, *Betula utilis*, *Celtis australis*, *Populus alba*, *Acer caesium*, *Cedrus deodara*, *Abies pindrow*, *Juglans regia* and *Taxus fuana* is recommended to restore the natural flora of the valley.

10. *In-situ* and *ex-situ* conservation of some of the threatened medicinal plants like *Ephedra gerardiana*, *Colchicum luteum*, *Saussurea albescens*, *Geranium wallichianum*, *Thymus linearis*, *Paeonia emodi*, *Polygonatum verticillatum*, *Podophyllum hexandrum*, *Bergenia ciliata*, *Aconitum heterophyllum*, *Valeriana jatamansi*, *Viola biflora* and *Hyoscymus niger* is recommended. These high valued medicinal plants can also be brought in to cultivation for further marketability and enterprises development.
11. The livelihood of the inhabitants is dependent on Plant Biodiversity and medicinal plants and ethnobotany is a resource base in Mankial valley therefore, efforts are required for in-situ conservation. While nurseries should be established in valley by providing same environmental conditions.
12. Proper procedure must be adopted for streamlining the marketability of high valued medicinal plants biodiversity to avoid hurdles in its growth and trade.
13. Management of biodiversity through community participation and awareness programme should be initiated based on indigenous knowledge of the local inhabitants.
14. Community Based Organizations (CBOs) must be established for equitable share of benefits with the local communities.
15. Capacity building for conservation and sustainable utilization of plant biodiversity, sustainability of ecosystem, wild life and forest conservation is a pre requisite.
16. The inhabitants are uneducated, so awareness through formal and informal education must be brought among them through proper conservation education drive focused on awareness of adults and children.
17. Eco tourism must be encouraged to generate sufficient revenue for self-supportive conservation drives.
18. The Govt. Departments should play a leading role in conserving such valuable resources.
19. Experts must be involved from various fields including conservation biology, taxonomy, phytogeography, restoration ecology and ethnobotany to get sufficient data for conservation and sustainable utilization of flora of the valley.

PLATE NO. 1



1. *Selaginella jacquemontii* Spring.



2. *Selaginella jacquemontii* x 40 X



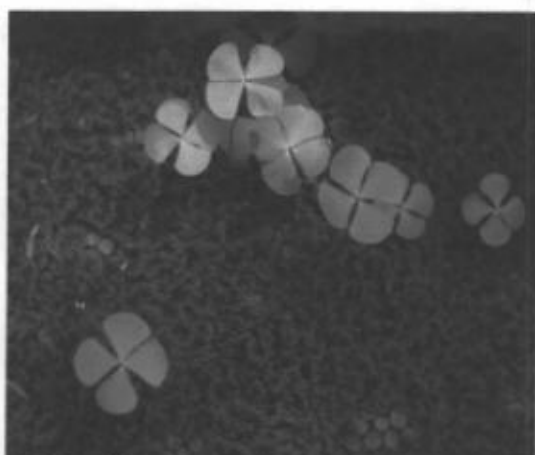
3. *Asplenium cetrach* L.



4. *Asplenium trichomanes* (Huds.) Hook.



5. *Equisetum arvense* L.



6. *Marsilea minuta* L.

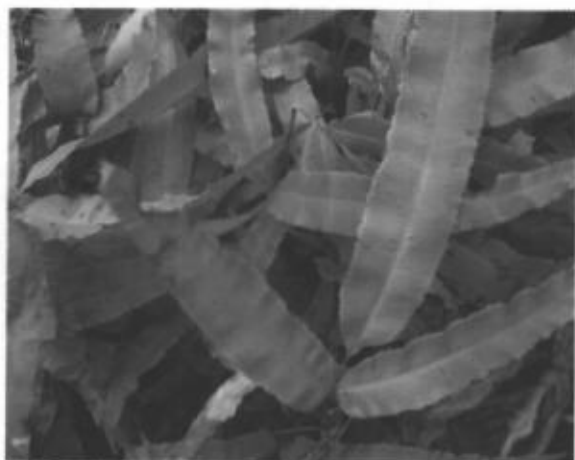
PLATE NO. 2



7. *Adiantum venustum* D. Don



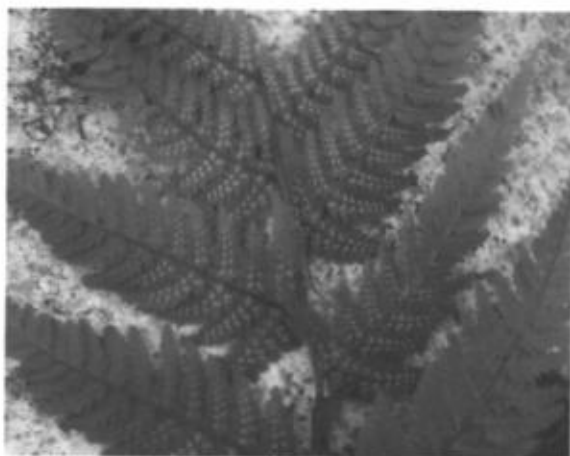
8. *Adiantum capillus veneris* L.



9. *Pteris cretica* L.



10. *Pteris vittata* L.



11. *Christella dentata* (Forssk.) Rownsey



12. *Athyrium mackinnonii* (Hope) C. Chr.

PLATE NO. 3



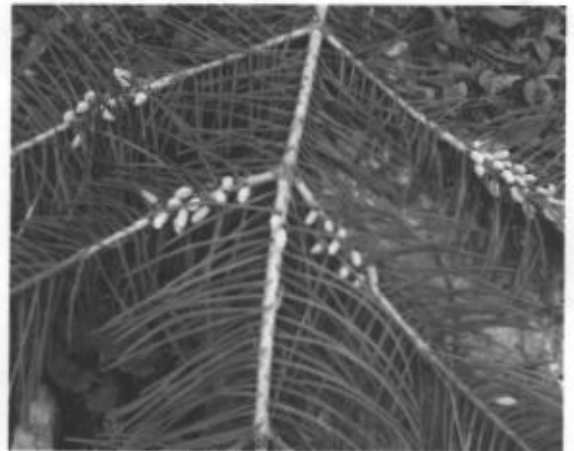
13. *Juniperus communis* L.



14. *Ephedra gerardiana* Wall. ex Stapf



15. *Abies pindrow* Royle (Female cone)



16. *Abies pindrow* Royle (Male cones)



17. *Cedrus deodara* (Roxb. ex D. Don) G. Don



18. *Pinus wallichiana* A. B. Jackson

PLATE NO. 4



19. *Taxus fuana* Nan Li & R. R. Mill.



20. *Arisaema jacquemontii* Blume



21. *Colchicum luteum* Baker



22. *Polygonatum verticillatum* All.



23. *Dioscorea deltoidea* Wall ex Kunth.

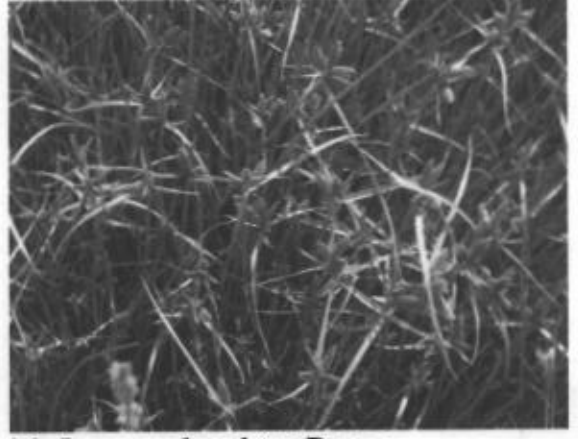


24. *Iris hookeriana* Foster

PLATE NO. 5



25. *Juncus membranaceus* Royle ex Don



26. *Juncus sphacelatus* Decne.



27. *Northolirion thomsonianum* (D. Don) Stapf.



28. *Dactylorhiza hatagirea* (D. Don) Soo.



29. *Trillium govanianum* Wall. ex Royle



30. *Poa alpina* L.

PLATE NO. 6



31. *Dactylis glomerata* L.



32. *Piptatherum gracile* Mez.



33. *Sambucus wightiana* Wall. ex Wight & Am.



34. *Viburnum grandiflorum* Wall. ex DC.



35. *Achyranthus aspera* L.

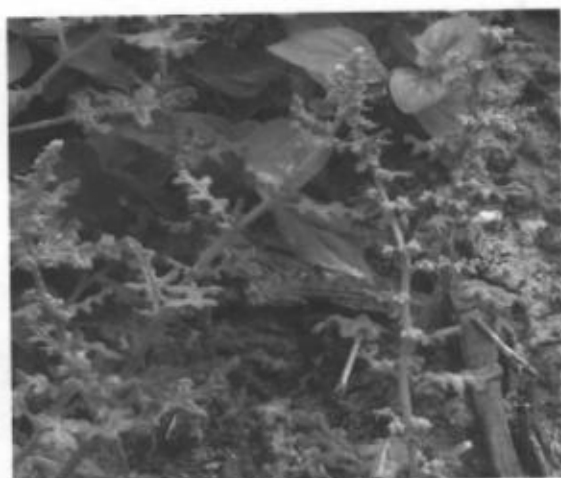


36. *Amaranthus viridis* L.

PLATE NO. 7



37. *Amaranthus spinosus* L.



38. *Chenopodium foliosum* Asch.



39. *Heracleum candicans* Wall ex. DC.



40. *Scandix pecten-veneris* L.



41. *Vicatia wolffiana* (Wolff ex Fedde) Norman

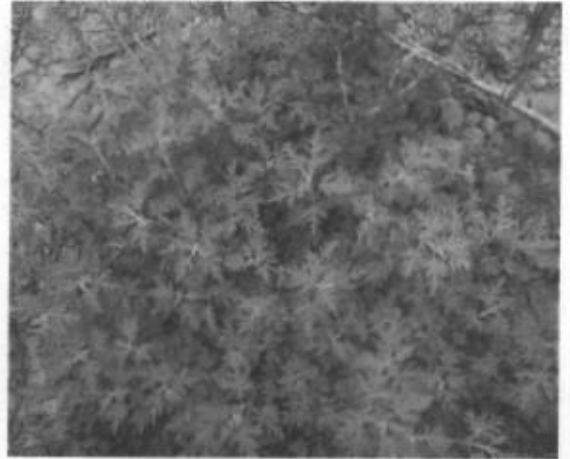


42. *Aralia cachemirica* Dcne.

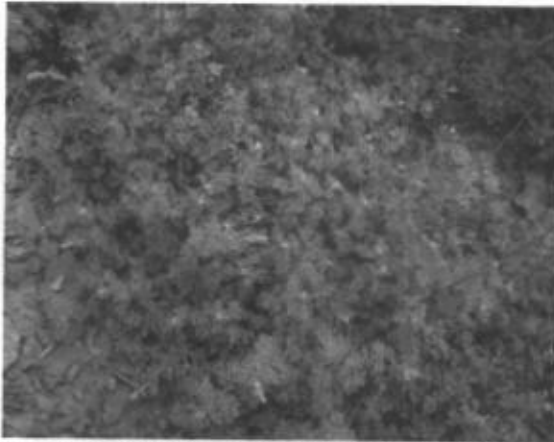
PLATE NO. 8



43. *Hedra nepalensis* K. Koch.



44. *Artemisia persica* Boiss.



45. *Artemisia scoparia* Waldst. & Kit.



46. *Artemisia bieenis* Willd.



47. *Leucanthemum vulgare* Lam.



48. *Aster altaicus* Willd.

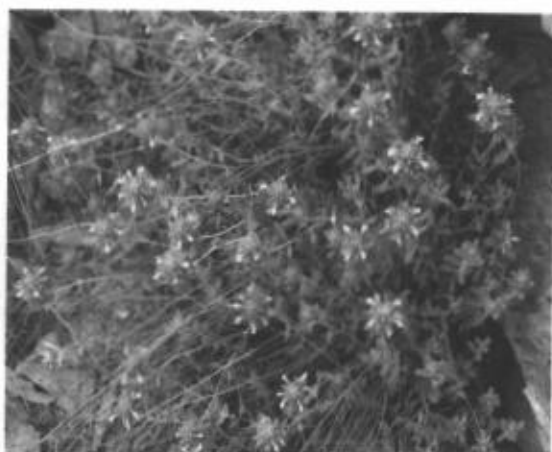
PLATE NO. 9



49. *Aster molliusculus* (DC.) C. B. Clarke



50. *Cirsium falconeri* (Hook. f.) Petrak



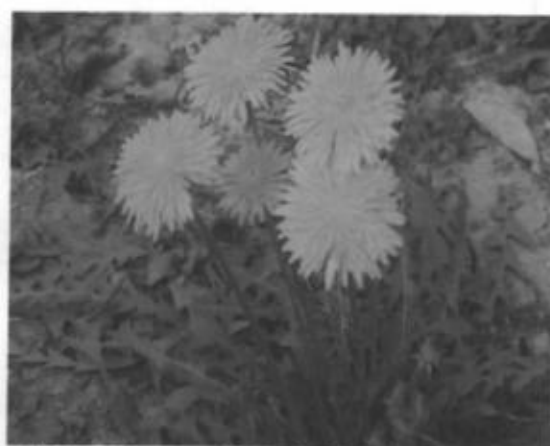
51. *Anaphalis triplinervis* (Sims.) C. B. Clarke



52. *Bidens cernua* L.

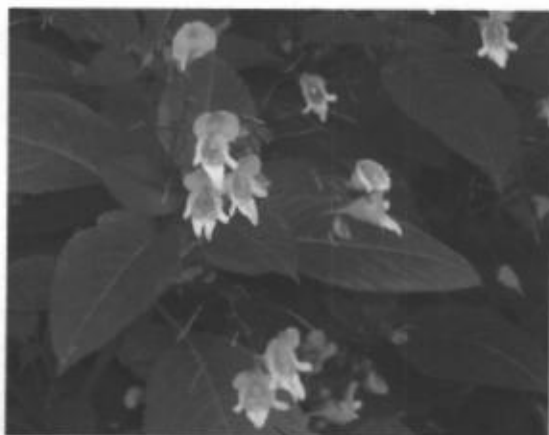


53. *Senecio chrysanthemoides* DC.



54. *Taraxicum officinale* F. H. Wiggers

PLATE NO. 10



55. *Impatiens edgeworthii* Hook.



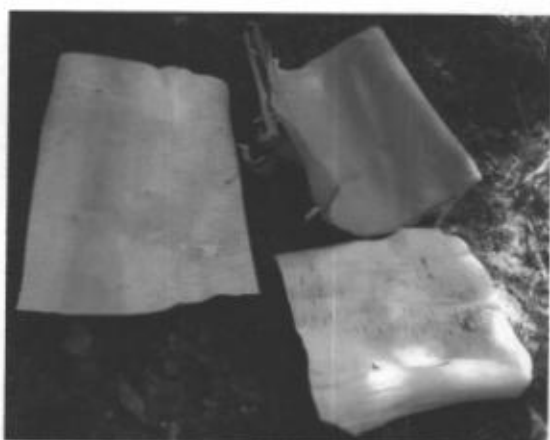
56. *Impatiens flemingii* Hook.



57. *Impatiens thomsonii* Hook.



58. *Betula utilis* D. Don (Tree)



59. *Betula utilis* D. Don (Bark)



60. *Berberis lycium* Royle

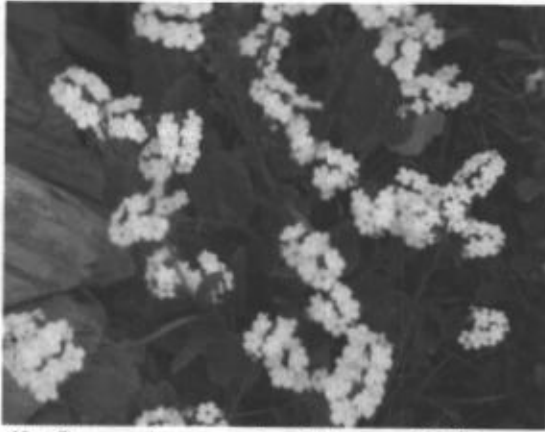
PLATE NO. 11



61. *Podophyllum hexandrum* Wall. ex Royle



62. *Podophyllum hexandrum* Wall. ex Royle



63. *Cyanoglossum glochidiatum* Wall.



64. *Lindolia longiflora* (Benth.) Baill.



65. *Nasturtium officinale* R. Br.



66. *Cardamine hirsuta* L.

PLATE NO. 12



67. *Sisymbrium loeselii* L.



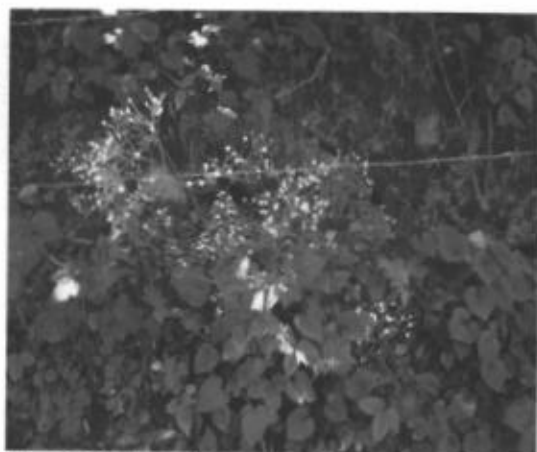
68. *Campanula latifolia* L.



69. *Cannabis sativa* L.



70. *Dipsacus inermis* Wall.



71. *Valeriana jatamansi* Jones



72. *Valeriana hardwicikii* Wall.

PLATE NO. 13



73. *Dianthus jacquemontii* Edge



74. *Silene vulgaris* (Moench) Gracke



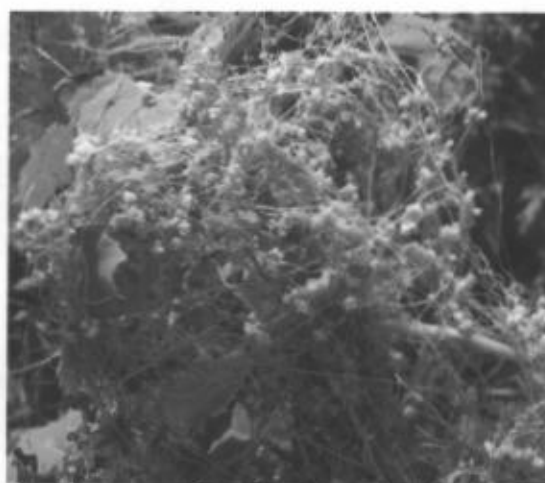
75. *Silene gonosperma* (Rupr.) Bocquet



76. *Spergularia diandra* (Guss.) Heldr.



77. *Convolvulus arvensis* L.



78. *Cuscuta reflexa* Roxb.

PLATE NO. 14



79. *Hylotelephium ewersii* (Ledeb.) H. Ohba



80. *Sedum hispanicum* L.



81. *Diospyros lotus* L.



82. *Euphorbia wallichii* Hook.



83. *Astragalus candolleanus* Royle ex Benth.



84. *Colutea nepalensis* Sims

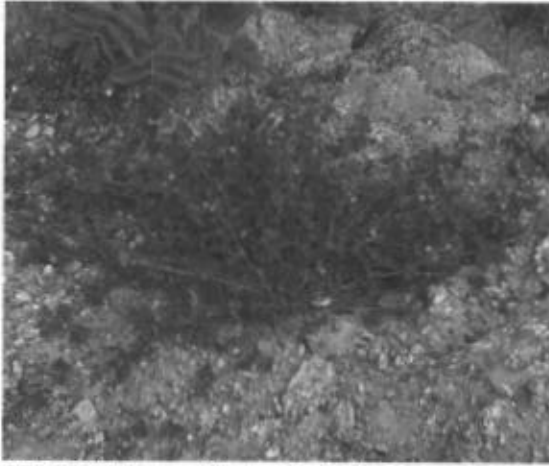
PLATE NO. 15



85. *Desmodium elegans* DC.



86. *Indigofera heterantha* Wall. ex Brandis



87. *Melilotus officinalis* (L.) Pall.



88. *Trignella gracilis* Benth.



89. *Trifolium repens* L.



90. *Quercus incana* Roxb. (Forest)

PLATE NO. 16



91. *Quercus incana* Roxb.



92. *Quercus semicarpifolia* Smith



93. *Geranium wallichianum* D. Don ex Sweet



94. *Geranium lambertii* Sweet



95. *Swertia cordata* (G. Don) Clarke



96. *Parrotiopsis jacquemontiana* (Dcne.) Rehder

PLATE NO. 17



97. *Juglans regia* L.



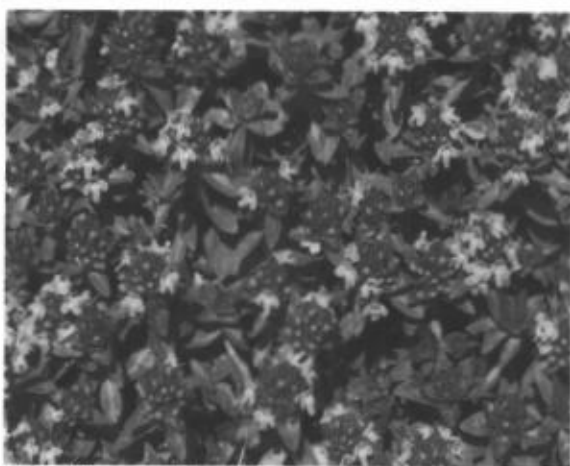
98. *Punica granatum* L.



99. *Mentha longifolia* (L.) Huds.



100. *Lamium album* L.



101. *Thymus linearis* Benth.



102. *Leonurus cardiaca* L.

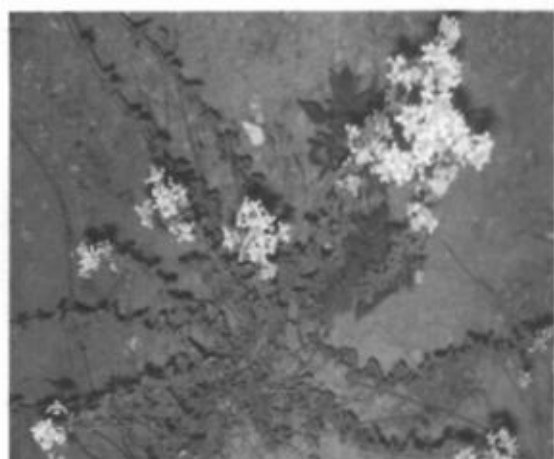
PLATE NO. 18



103. *Nepeta erecta* (Royle ex Benth) Benth.



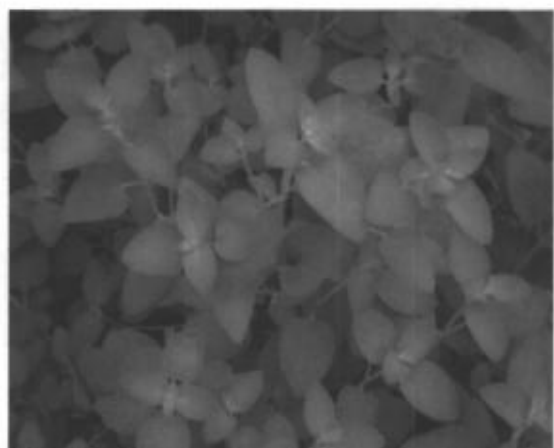
104. *Stachys emodi* Hedge



105. *Origanum vulgare* L.



106. *Prunella vulgaris* L.



107. *Isodon rugosus* (Wall ex Benth.) Codd



108. *Ficus carica* L.

PLATE NO. 19



109. *Malva neglecta* Waller.



110. *Oxalis corniculata* L.



111. *Oenothera rosea* L.



112. *Epilobium hirsutum* L.



113. *Orobanche alba* Steph.



114. *Pedicularis pectinata* Wall ex Benth.

PLATE NO. 20



115. *Paeonia emodi* Wall. ex Royle



116. *Paeonia emodi* Wall. ex Royle



117. *Corydalis diphylla* Wall.



118. *Parnassia cabulica* Planch. ex Clarke



119. *Phytolacca latbenia* (Moq.) Walter

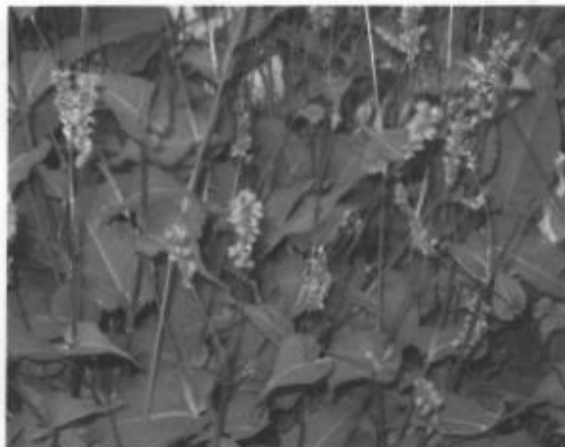


120. *Plantago major* Willd.

PLATE NO. 21



121. *Plantago amplexicaulis* Cav.



122. *Bistorta amplexicaulis* (D. Don) Green



123. *Fagopyrum esculentum* Moench



124. *Persicaria glabra* (Willd.) M. Gomes



125. *Oxyria digyna* (L.) Hill



126. *Rumex dentatus* L.

PLATE NO. 22



127. *Rumex hastatus* D. Don



128. *Rumex nepalensis* Spreng.



129. *Portulaca oleracea* L.



130. *Primula denticulata* Smith



131. *Aconitum heterophyllum* Wall. ex Royle

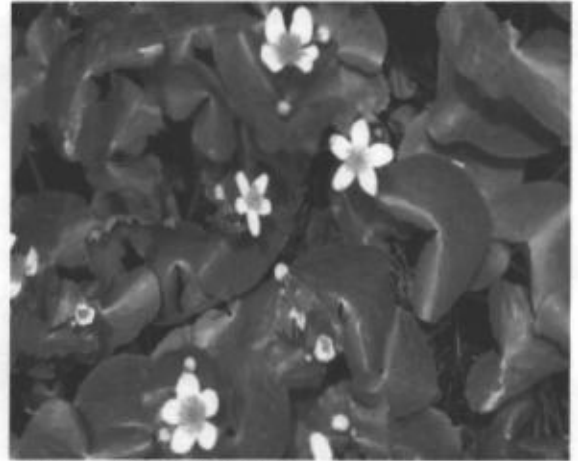


132. *Anemone vitifolia* Bush.

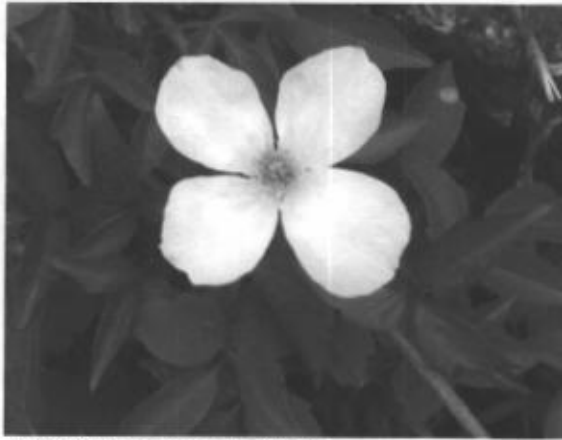
PLATE NO. 23



133. *Aquilegia pubiflora* Wall. ex Royle



134. *Caltha alba* Camb.



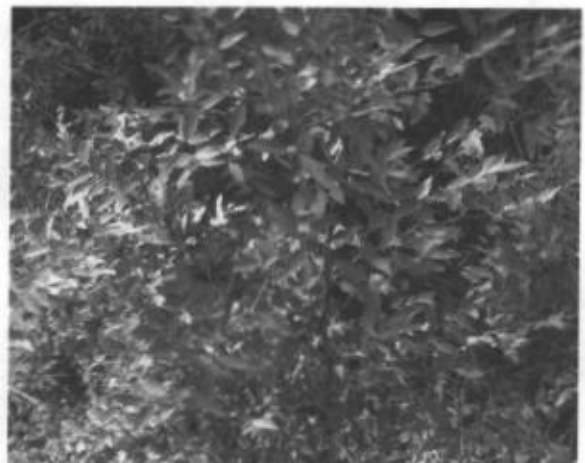
135. *Clematis grata* Wall.



136. *Ranunculus laetus* Wall. ex Hook.

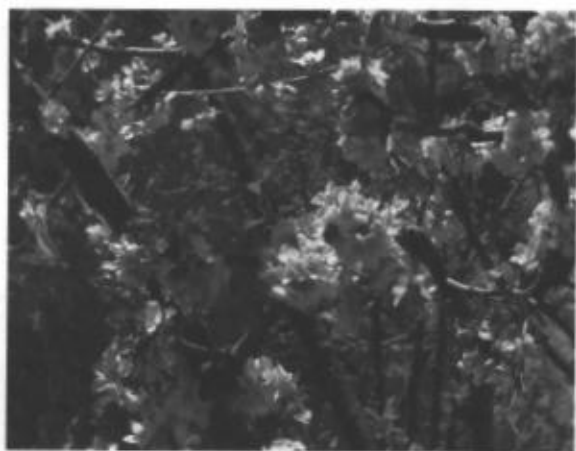


137. *Thalictrum cultratum* Wall.



138. *Ziziphus jujuba* Mill.

PLATE NO. 24



139. *Cotoneaster affinis* (Lindl) Schneider



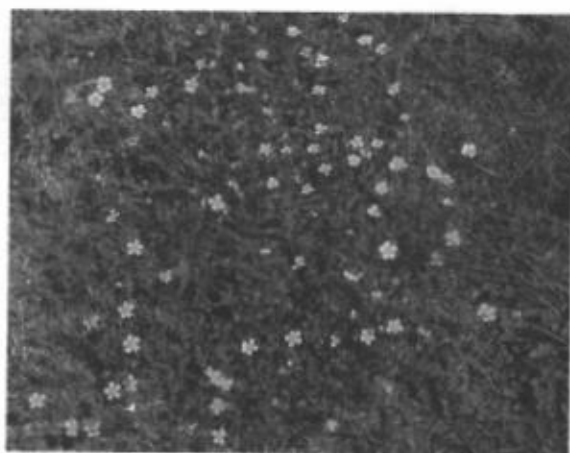
140. *Crataegus songarica* C. Koch (Tree)



141. *Crataegus songarica* C. Koch (Tree)



142. *Fragaria nubicola* Lindl. ex Lacaita



143. *Potentilla macrophylla* D. Don



144. *Rosa macrophylla* Lindl.

PLATE NO. 25



145. *Rubus ellipticus* Smith



146. *Sorbaria tomentosa* (Lindl.) Rehd.



147. *Galium hirtiflorum* Recquien ex DC.



148. *Populus alba* L.



149. *Acer caesium* Wall. ex Brandis



150. *Aesculus indica* (Wall. ex Camb.) Hook

PLATE NO. 26



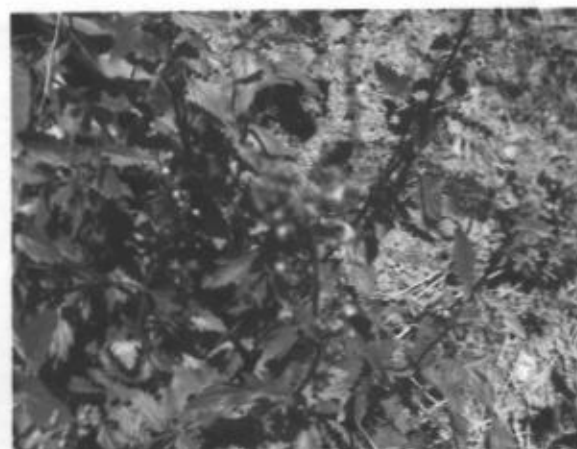
151. *Aesculus indica* (Wall. ex Camb.) Hook



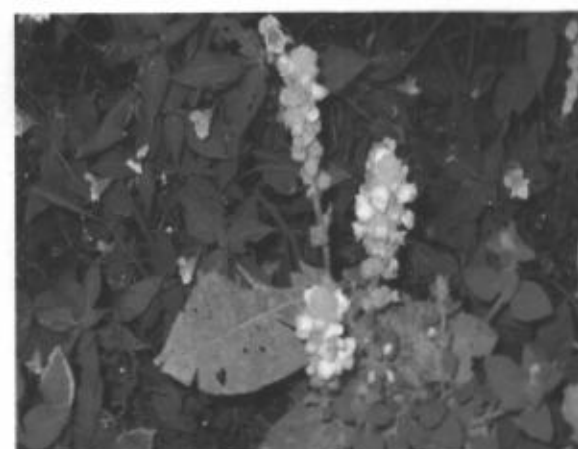
152. *Bergenia ciliata* (Haw.) Sternb.



153. *Bergenia ciliata* (Haw.) Sternb.



154. *Scrophularia scabiosifolia* Bth.



155. *Verbascum thapsus* L.



156. *Veronia anagalis-aquatica* L.

PLATE NO. 27



157. *Hyoscyamus niger* L.



158. *Daphne mucronata* Royle



159. *Urtica dioica* L.



160. *Viola canescens* Wall. ex Roxb.



161. *Viola biflora* L.



162. *Vitis vinifera* L.

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QUESTIONNAIRE-1

Section-A

Questionnaire No. _____

Date: _____

Personal information about the informant

1. Name _____
2. Age _____
3. Family or Tribe _____
4. Locality _____
5. Sub locality _____
6. Educational level _____
7. Type of Soil and Climatic condition _____
8. Altitude _____
9. GPS data _____
10. Informant's status a. Male _____ b. Female _____ c. Kid _____
11. Education of the Informant a: years of schooling _____ b: Illiterate c: other specify _____
12. Informant's status: a: Farmer: _____ b: Other: _____ (Specify)
 - a. If Farmer: Then Owner/ Tenant/ Others:
 - b. If tenant, tenancy arrangements.
 - i. Fixed (Cash/Kind) _____
 - ii. Share cropping _____
 - iii. Duration of tenancy _____
13. Land Holding: _____ Acres: Irrigated/rainfed _____
 - a. Agricultural land _____ Acres: Irrigated/rainfed _____
 - b. Forest owned _____ Acres: Irrigated/rainfed _____

Section-B

General information about the plants

1. Major crops sown in that area: _____
2. Major constraints of the locals: _____
3. What is your opinion about the plants growing in your surrounding? _____

4. Can you tell me the plants, which are normally used for some purpose in your daily life?

S #	Scientific name	Local name	Part use	Uses																			
				a	b	c	d	e	f	g	h	I	j	k	l	m	n	o	P	q	r	s	t
1.																							
2.																							
3.																							

KEY TO THE QUESTIONNAIRE:

a= Beautiful/Ornamental, b= Beverages, c= Brooms, d= Cash plants, e= Fuel plants, f= Fodder, g= Food, h= Furniture, i= Fruit plants, j= Harmful/Poisonous, k= Honey bee species, l= House holdings items, m= Invasive plants, n= Livestock promoting, o= Medicinal, p= Sacred plants, q= Soil reclamation plants, r= Shelters, s= Snuff ash plants, t= Thatching plants, u= Vegetables

Section-C

Information about medicinal Plants

1. Can you differentiate and specify name of plants which are used in your daily life?

If yes, then name of plants 1. _____ 2. _____ 3. _____

2. Data regarding family, scientific name, vernacular name, habit, flowering period, collection method, part used, constituents and medicinal uses of plant in the research area will be recorded in the following table.

S #	Family/Scientific name	Ver. name	Habit	Fl. Period	Collection Method	Part Used	Constituents	Preparation, doses and uses
1.								
2.								
3.								
4.								
5.								

Section-D

Data regarding conservation status of the species growing in the research area.

S. No.	Species	Conservation status							
		1	2	3	4	5	6	7	8
1.									
2.									
3.									
4.									
5.									
6.									
7.									
8.									
9.									
10.									
11.									
12.									
13.									
14.									
15.									
16.									
17.									
18.									
19.									
20.									

Key: 1= Common, 2= Extinct, 3= Endangered, 4= Vulnerable, 5=Rare, 6= Indeterminate, 7= Insufficiently Known, 8= Commercially threatened.

ANNEXURE-I

Itinerary for visits to the research area in spring and summer

April-June (Spring) each year			
S #	Months	Duration of visits	Areas to be visited
1.	April	i) 5-11 (7 days) ii) 20-30 (10 days)	i) Mankial, Bhadai, Mianshkon, Ghund Patai, Baik ii) Jabba, Kafar Banda, Kamar Khwah, Narra, Baik
2.	May	i) 7-15 (8 days) ii) 22-30 (9 days)	i) Mehnain, Serai, Bhadai Patay, Tapra, Char Banda, Baik ii) Chokail Banda, Kakora, Glacier, Char Banda, Baik
3.	June	i) 1-10 (10 days) ii) 18-26 (9 days)	i) Mankial, Bhadai, Mashkon, Ghund Patai ii) Chokail Banda, Kakora, Glacier, Char Banda, Baik
July-September (Summer) each year			
S #	Months	Duration of visits	Areas to be visited
1.	July	i) 4-10 (7 days) ii) 16-25 (11 days)	i) Jabba, Kafar Banda, Kamar Khwah, Narra ii) Chokail Banda, Kakora, Glacier, Char Banda, Baik
2.	August	i) 4-10 (7 days) ii) 21-30 (10 days)	i) Mehnain, Serai, Bhadai Patay, Tapra, Char Banda ii) Chokail Banda, Kakora, Glacier, Char Banda, Baik
3.	September	i) 3-10 (8 days) ii) 18-25 (8 days)	i) Mankial, Bhadai, Mashkon, Ghund Patai ii) Jabba, Kafar Banda, Kamar Khwah, Narra, Baik

Total duration of study period:

104 days/year

ANNEXURE-II

DETAIL OF DISTRIBUTION OF SPECIES AT MANKIAL VALLEY

S. No.	Locality	Facing	Altitude (m)	GPS Position
1.	Mankial	South	1764	35° 19' N 72° 36' E
2.	Gund Pati	North	1766	35° 19' N 72° 37' E
3.	Mehnain-I	North	1764	35° 19' N 72° 37' E
4.	Mehnain-II	North	1764	35° 19' N 72° 38' E
5.	Jabba-I	North	2563	35° 17' N 72° 40' E
6.	Gaider Jabba-I	South	2810	35° 18' N 72° 41' E
7.	Beer	North	1905	35° 19' N 72° 38' E
8.	Gaider Jabba-II	North	2818	35° 18' N 72° 41' E
9.	Gaider Jabba-III	North	2820	35° 18' N 72° 40' E
10.	Char Banda	South	3200	35° 18' N 72° 41' E
11.	Kakora	North	3035	35° 17' N 72° 40' E
12.	Takki Gaider-I	North	2641	35° 18' N 72° 39' E
13.	Takki Gaider-II	North	2645	35° 18' N 72° 39' E
14.	Takki Gaider-III	North	2830	35° 18' N 72° 39' E
15.	Kafar Banda	North	2835	35° 18' N 72° 39' E
16.	Bhadai-I	North	1886	35° 19' N 72° 38' E
17.	Bhadai-II	North	1890	35° 19' N 72° 38' E
18.	Bhadai-III	North	1894	35° 19' N 72° 38' E
19.	Bhadai Patti-I	South	2069	35° 20' N 72° 38' E
20.	Bhadai Patti-II	South	2054	35° 20' N 72° 38' E
21.	Bhadai Patti-III	South	2058	35° 20' N 72° 38' E
22.	Bhadai Patti-III	South	2075	35° 20' N 72° 38' E
23.	Tapra	South	2060	35° 20' N 72° 38' E
24.	Serai-I	South	2605	35° 21' N 72° 41' E
25.	Serai-II	South	2620	35° 21' N 72° 41' E

S. No.	Locality	Facing	Altitude (m)	GPS Position
26.	Kamar Khwa-I	South	2746	35° 22' N 72° 40' E
27.	Kamar Khwa-II	South	2750	35° 22' N 72° 40' E
28.	Nara-I	South	2764	35° 22' N 72° 40' E
29.	Nara-II	South	2768	35° 22' N 72° 40' E
30.	Kamar Khwa Banda-I	South	2770	35° 22' N 72° 46' E
31.	Kamar Khwa Banda-II	South	3300	35° 22' N 72° 46' E
32.	Chokail Banda-I	South	3088	35° 21' N 72° 39' E
33.	Chokail Banda-II	South	3275	35° 22' N 72° 40' E
34.	Chokail Banda-III	South	2950	35° 22' N 72° 39' E
35.	Baik-I	South	2580	35° 21' N 72° 39' E
36.	Baik-II	South	2606	35° 21' N 72° 39' E
37.	Serai-III	South	2400	35° 21' N 72° 40' E
38.	Serai-IV	South	2405	35° 21' N 72° 40' E

PUBLICATIONS

Full Length Research Paper

Conservation status of threatened medicinal plants of Mankial Valley Hindukush Range, Pakistan

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Conservation studies of 45 threatened medicinal plants were carried out for assessment of their conservation status, threats and recommendations growing in Mankial valley Hindukush Range Pakistan. Phytogeographically, the valley is present in the Sino Japanese floristic region and is a hot spot of endemism. A total of 45 taxa belonging to 35 families and 43 genera were collected and evaluated which include 13 (28.88%) vulnerable, 21 (46.66%) endangered and 11 (24.44%) critically endangered species. The number of plants scored with reference to its ecological amplitude and calculated historical distribution were compared with the IUCN criteria for threatened categories Version 3.1. The information regarding 'conservation status', threats and recommendations of the species were collected from the entire valley at different localities by filling questionnaire form 300 respondents including 260 male and 40 female. Mankial valley being naturally gifted with tremendous biodiversity, altitudinal and topographic variations is exposed to increasing human pressure, social injustice and low literacy rate that are destabilizing the biodiversity status especially species survival, habitat and ecosystem. According to the present studies, various parameters are contributing to make the important medicinal plants threatened including over exploitation (75.55%), fuel wood usage (35.55%), habitat loss (35.55%), over grazing (28.88%), deforestation (15.55%), use as timber (4.44%), bark usage (4.44%) and use as furniture (4.44%). Moreover, unsustainable utilization of plant natural resources and unscientific agricultural practices are the main threats to the 'plant biodiversity' growing in the valley. Therefore, studies regarding conservation status, threats and recommendations of threatened medicinal plants of Mankial Valley were proposed.

Key words: Conservation, deforestation, ecosystem, Hindukush Range, Mankial valley, over grazing.

INTRODUCTION

Biodiversity is the variability among living organisms from all sources including inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems (CBD, 2010). There are more than 270,000 vascular plant species supporting diverse kinds of ecosystem (Walter and Gillet, 1998). Due to severe anthropogenic activities, the natural flora is under stress and in many areas it is decreasing. Pakistan is presenting diverse climatic, topographic, altitudinal and phytogeographical variation

supporting more than 6000 species with 428 endemics (Ali and Kaiser, 2010). There is a little work carried out on the conservation studies and the available data is deficient. More than 580 plants are reported by Nasir (1991) as threatened. In another study, it has been reported that 709 plants species are threatened and endangered in Pakistan (Chaudhri and Qureshi, 1991). While according to Walter and Gillet (1998), 14 flowering plants are threatened in Pakistan. It has been reported by IUCN (1994) that 20 species are considered to be target species in Pakistan (Shah

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and Baig, 1999). According to the IUCN Red list (2008), 19 plants are threatened in Pakistan. While according to Ali and Qaiser (2010), it has been reported that 21 species are threatened. Intensive studies for the determination of the conservation status, threats and recommendations for various species and fluctuation in its population has never been carried out.

The total flora of District Swat is consisting of 1550 species. It has been estimated that flora of Swat contains 37 threatened plants. According to previous studies, it has been reported that 6.3% taxa in Swat are threatened, in which 1.7% is endangered, 2.7% is vulnerable and 1.6% is rare (Shinwari et al., 2003). Pakistan has nine ecological and five phytogeographical zones and has diverse microhabitat presenting more than 428 endemics. Therefore, species with narrow area of distribution needs more attention. During studies of the tropical and sub tropical sub humid forests up to alpine pastures, 380 species are reported. The area under study is a hot spot in representing some highly medicinal and endemic species to Swat including *Indigofera heterantha* and *Ligeticum stewartii*. The inhabitants are totally dependent upon the plant natural resources growing in the valley for themselves and their cattle. They are interacting directly or indirectly with various plants for keeping their livelihood living. Therefore, studies regarding conservation status of important medicinal plants were carried out by considering various parameters including over exploitation, fuel wood, habitat loss, over grazing, fodder collection, deforestation, timber, bark use and furniture. The present studies show that the current situation in the valley regarding conservation status of some important medicinal plants is not encouraging. Among the total 45 taxa, 13 are vulnerable, 21 are endangered and 11 are critically endangered. Similarly, various parameters have adversely contributed to make certain species vulnerable, endangered and critically endangered. It is observed that over exploitation of medicinal plants is the contributing 75.55%, due to unavailability of alternative energy sources, fuel wood is contributing 35.55%, and thus due to deforestation the habitat loss is contributing 35.55%, while the over grazing is contributing 28.88%.

It is noted during the present study that anthropogenic activities are the main contributor in the unsustainable utilization of the plant natural resources growing in the area. Therefore, studies regarding the conservation status, threats and recommendations for some threatened medicinal plants were planned.

Study area

Mankial Valley is one of the deepest Valleys of the Hindukush Range lies on 35°, 12' 24" North latitudes and 72°, 32' 15" East longitudes. It occurs 17 km short of Kalam on east side of the Kalam-Bahrain road. On

revenue index map, the area can be traced on Moza's (settlements units) bearing S. No. 18 and 19 (Badai and Mankial) with the land holdings of 20620 and 11658 acres. It is surrounded on the East by Kandya and Duber, on the West by Arayanai and Balakot, on the North by Boyoun and Shahoo and on the South by Ramet and Goornai. Altitude ranges from 1430 m at Mankial to 5726 m at Koohe Shaheen. The area is a mountainous terrain of high glaciated peaks, perennial snowfields, glaciers, falls, pastures, rivers, streams and intact forest. The percentage share by area of mountains, valleys/pastures and rivers is estimated to be 95, 45 and 0.5%, respectively. Pastures are at elevation of above 3000 m and come under alpine regions with severe long winters starting from September to end of March and a very mild summer from June till August. Floral diversity is very rich and economic potential are there. The area represents variety of micro habitats supporting a diversified biodiversity. The research area is present in northern Swat and the vegetation of Northern Swat is classified into cool temperate coniferous (1400 to 2000 m), cold temperate coniferous (2000 to 3000 m), sub alpine (3000 to 4000 m) and alpine zones (>4000 m). Mostly, these zones are away from the monsoon rains; therefore, usual rainfall is very low ranging from 160.6 to 660.4 mm and snowfall from 1.82 to 4.50 m. Sometimes more than 4.50 m snowfall has occasionally been reported.

Maximum temperature is about 10°C or less for 5 to 6 months. When the snow melts during June to August, ephemerals sprout. The temperature is below or 0°C during the period of December to March. Maximum temperature does not exceed beyond 15.9°C during winter recess. Due to short growing season, thick snow cover, intense solar radiation, high wind velocity and low temperature result in the prevalence of a xerophytic habitat for plants in the alpine, turning them dwarf, stunted, hairy and rosette leaves. The crooked and uneven appearance of the plants is resulted due to heavy snowfall in the area.

MATERIALS AND METHODS

Field study trips were arranged to the study area during 2010 to 2012. The information regarding 'conservation status', threats and recommendations was collected from 300 respondents including 260 male 40 female. Semi structured questionnaires and oral interviews methods were adopted after Croom (1983) and Lipp (1989). The informants were asked various questions for obtaining information regarding over exploitation, use as fuel wood, reasons for habitat loss, over grazing, fodder collection, deforestation, use as timber, use of specific bark and use as furniture species. Various areas of the Mankial valley including Mankial, Bhadai, Mianshkon, Ghund Patal, Baik, Jabba, Narra, Kamar Khwah, Chokial Banda, Kafar Banda, Kakora, Char Banda, Tapra, Serai and Mehnain. During the studies observation, GPS data, altitude, locality, and data regarding rate of consumption, uses, preference of use and major threats to the reduction in population size were obtained. The species were evaluated in the field for their distribution, historical background in the valley, use pattern, present frequency and they

were compared with the existing extent and its normal ecological habitat and nich. The information were collected from the local people regarding decline in the population size of these species, factors such as decline in the area of occupancy, extent of occurrence, loss of habitat, actual or potential level of exploitation, effects of introduced taxa and attack of pathogens. Each species was taxonomically described. The distribution and number of plants scored with reference to its ecological amplitude and calculated historical distribution were compared with the IUCN criteria for threatened categories Version 3.1 (IUCN, 2001) for evaluation of the conservation status of each species. The nine categories of IUCN (2001) were reduced to 3 categories. The plant species were then categorized into vulnerable, endangered and critically endangered species (IUCN, 2001).

The plant specimens were collected, documented, preserved and identified with the help of available literature (Nasir and Ali, 1970 to 1989; Ali and Nasir, 1989 to 1991; Ali and Qaiser, 1993 to 2012); and comparing with preserved herbarium specimens. The classification was carried out according to the most recent phylogenetic system of classification (APG) Angiosperm Phylogeny Group (Judd et al., 2002). The voucher specimens were deposited in the Herbarium Centre of Plant Biodiversity (CPB) University of Peshawar.

RESULTS

IUCN criteria for threatened categories Version 3.1 (IUCN, 2001) were used and category A of vulnerable, Categories A of endangered and Category A of critically endangered species was used for evaluation. A taxon is vulnerable when the best available evidence indicates that it meets any of criteria A, and it is therefore considered to be facing a high risk of extinction in the wild. Category-A reduction in population size based on, 1) An observed, estimated, inferred or suspected population size reduction of $\geq 50\%$ over the last 10 years or three generations, whichever is the longer, where the causes of the reduction are: clearly reversible and understood and ceased, based on (and specifying) any of the following; (a) direct observation, (b) an index of abundance appropriate to the taxon, (c) a decline in area of occupancy, extent of occurrence and/or quality of habitat, (d) actual or potential levels of exploitation and (e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites. A taxon is endangered when the best available evidence indicates that it meets any of criteria A, and it is therefore considered to be facing a very high risk of extinction in the wild. Category-A reduction in population size based on, 1) An observed, estimated, inferred or suspected population size reduction of $\geq 70\%$ over the last 10 years or three generations, whichever is the longer, where the causes of the reduction are clearly reversible and understood and ceased, based on (and specifying) any of the criteria a to e shown under vulnerable category.

A taxon is 'critically endangered' when the best available evidence indicates that it meets any of the criteria A, and it is therefore considered to be facing an extremely high risk of extinction in the wild. Category-A reduction in population size based on, 1) An observed,

estimated, inferred or suspected population size reduction of $\geq 90\%$ over the last 10 years or three generations, whichever is the longer, where the causes of the reduction are clearly reversible and understood and ceased, based on (and specifying) any of the criteria a to e shown under vulnerable category of IUCN (2001). A total of 45 taxa belonging to 35 families and 43 genera were collected and evaluated which include 13 vulnerable, 21 endangered and 11 critically endangered species. The gymnosperms were represented by 4 families, 4 genera and 4 species. The monocots were also represented by 4 families, 4 genera and 4 species. The dicots were represented by 27 families, 35 genera and 37 species. Family Plantaginaceae was the leading family among the dicot represented by 3 species each. While 8 families were presented by 2 species each and 18 families were presented by 1 species each. Based on the present studies and information given by the inhabitants of the area, the decline in population size and extent of occupancy of these species is a continuous practice. It is concluded that 34 (75.55%) species are suffering due to over exploitation, 16 (35.55%) species each are suffering due to fuel wood and habitat loss, 13 (28.88%) species are suffering from over grazing problems, 11 (24.44%) species are suffering due to fodder collection, 7 (15.55%) species are suffering from the deforestation and 2 (4.44%) species each are suffering due to their bark usage, furniture and timber species.

The detail of 'conservation status', threats and recommendations regarding each species has been given as follows:

Family: Cupressaceae

Scientific name: *Juniperus communis* L.

Vernacular name: Gugar

Voucher specimen: Mankial (Chokail Banda-I)

35° 21' N and 72° 39' E, 3088 m

Asad and Rashid 648 and 1574 (PUP and PMNH).

Conservation status, threats and recommendations

It is found at higher altitude after tree line in the valley distributed from 2100 to 3000 m. The main threats are its use as fuel wood and over grazing during the summer season by the pastoralists at higher altitude. The use as fuel wood and grazing may be controlled to insure the sustainable utilization and proper exploitation. The population is reduced by more than 30% over the last 10 years and it is falling under the category A (a and c) of vulnerable species.

Family: Ephedraceae

Scientific name: *Ephedra gerardiana* Wall.

ex Stapf

Vernacular name: Asmania

Voucher specimen: Mankial (Gaider Jabba-I)
35° 18' N and 72° 41' E, 2810 m
Asad and Rashid 1842 (PUP and PMNH).

Conservation status, threats and recommendations

It is found in the valley at an altitude of 2810 m. The main threat is over exploitation due to its high medicinal value, also used as fuel wood. The over exploitation and use as fuel wood must be controlled to insure the sustainable utilization and proper exploitation. The population size is considerably reduced by more than 70% over the last 10 years/three generations. It is falling under the category A (a and c) of endangered species.

Family: Pinaceae
Scientific name: *Cedrus deodara* Roxb. ex Lamb.
Vernacular name: Diyar
Voucher specimen: Mankial (Bhadai Patti-III)
35° 20' N and 72° 38' E, 2058 m
Asad and Rashid 1880 (PUP and PMNH).

Conservation status, threats and recommendations

It is distributed in the valley from 1764 to 3000 m within the wild. The main threats are its use as a commercial timber, fuel wood and furniture. Its use as timber, fuel wood and furniture must be banned to insure the sustainable utilization and proper exploitation. The decline in area of occupancy has been occurred and $\geq 50\%$ of the population has been reduced over the last 10 years/three generations. It is falling under category A (a and c) of vulnerable species.

Family: Taxaceae
Scientific name: *Taxus wallichiana* Zucc.
Vernacular name: Banya
Voucher specimen: Mankial (Takki Gaider-I)
35° 18' N and 72° 39' E, 2641 m
Asad and Rashid 1876 (PUP and PMNH).

Conservation status, threats and recommendations

It is found in the valley at an altitude of 2641 m. The main threats are its use for fuel wood, medicinal and timber purposes. Its use as fuel wood must be banned, while medicinal and timber use must be strictly checked. It has been observed by the local inhabitants that 80% of population has been reduced over the last 10 years and now it is very rarely distributed in the valley. It is falling under the category A (a and c) of critically endangered species.

Family: Colchicaceae

Scientific name: *Colchicum luteum* Baker
Vernacular name: Zairgulay
Voucher specimen: Mankial (Chokial Banda-II)
35° 22' N and 72° 40' E, 3275 m
Asad and Rashid 1891 (PUP and PMNH).

Conservation status, threats and recommendations

Important chemical colchicine is obtained from the underground corm of this species and it is also used as a medicinal plant. The main threat to this plant is over exploitation for medicinal purposes. Its over exploitation as a high value medicinal plant must be stopped to insure its conservation. It is found in the valley at 3275 m. According to the local inhabitants, the population has decreased up to 75% due to its unique life form and unsustainable collection. It is falling under the category A (a, c and d) of the endangered species.

Family: Convallariaceae
Scientific name: *Polygonatum verticillatum* All.
Vernacular name: Nooryalam
Voucher specimen: Mankial (Gaider Jabba-III)
35° 18' N and 72° 40' E, 2820 m
Asad and Rashid 1720 (PUP and PMNH).

Conservation status, threats and recommendations

The underground rhizome of this species has been used for medicinal purposes. The main threat to this plant is its over exploitation. Its over exploitation as a high value medicinal plant must be stopped to insure its conservation. More than 70% of the population has been decreased due to its commercial utilization and market value therefore; it is falling under the category A (a, c and d) of the endangered species.

Family: Dioscoreaceae
Scientific name: *Dioscorea deltoidea* Wall. ex Kunth.
Vernacular name: Ratalu/kanees
Voucher specimen: Mankial (Bhadai-III)
35° 19' N and 72° 38' E, 1894 m
Asad and Rashid 526 and 1420 (PUP and PMNH).

Conservation status, threats and recommendations

This plant is an indicator of moist temperate forest collected at an altitude of 1894 m. The main threat is over exploitation due to its high medicinal value of tubers and deforestation. The over exploitation must be stopped and deforestation must be banned to control its further population loss. The population has been decreased up to 80%. It is falling under the category A (a, c and d) of the endangered species.

Family: OrchidaceaeScientific name: *Dactylorhiza hatagirea* (D. Don) Soo.

Vernacular name: Sala

Voucher specimen: Mankial (Jabba-I)

35° 17' N and 72° 40' E, 2563 m

Asad and Rashid 446 (PUP and PMNH).

Conservation status, threats and recommendations

This species was collected from very few localities in the valley at an altitude of 3563 m. The main threats are over grazing and habitat loss. Over grazing must be banned to control habitat loss. The population has been decreased by more than 70% and decline in area of occupancy has also occurred. It is falling under the category A (a and c) of the endangered species.

Family: AdoxaceaeScientific name: *Sambucus wightiana* Wall. ex Wight & Arn.

Vernacular name: Mushkiara

Voucher specimen: Mankial (Bhadai-II)

35° 19' N and 72° 38' E, 1890 m

Asad and Rashid 6 (PUP and PMNH)

Conservation status, threats and recommendations

This species has been distributed in the valleys beds and collected at an altitude of 1890 m. The main threats are its use as over exploitation, fodder species, over grazing and gradual habitat loss. The over exploitation must be stopped, over grazing and use as a fodder must be banned and habitat loss must be controlled. The decline in area of occupancy has occurred and 50% of population loss has occurred. It is falling under the category A (a, c and d) of the vulnerable species.

Family: AdoxaceaeScientific name: *Viburnum cotinifolium* D. Don

Vernacular name: Guch

Voucher specimen: Mankial (Mankial village)

35° 19' N and 72° 37' E, 1764 m

Asad and Rashid 340 (PUP and PMNH)

Conservation status, threats and recommendations

The fruits of this species are edible and it is also used as fodder and fuel wood. The main threats are its use as fodder and fuel wood. Its use must be banned to reduce further decrease of its population. Distributed in the valley bottom and mountains slopes and collected from an altitude of 1764 m. The population has decreased by more than 75% and it is falling under the category A (a and c) of the endangered species.

Family: AmaranthaceaeScientific name: *Chenopodium foliosum* Asch.

Vernacular name: Angooray

Voucher specimen: Mankial (Bhadai-III)

35° 19' N and 72° 38' E, 1894 m

Asad and Rashid 741 (PUP and PMNH).

Conservation status, threats and recommendations

This species has been collected at an altitude of 1894 m from very few localities and the decrease in population has been occurred. The main threats are deforestation, habitat loss and over grazing. The deforestation and over grazing must be banned to overcome the habitat loss. About 80% of the population has been decreased. It is falling under the category A (a and c) of the endangered species.

Family: ApiaceaeScientific name: *Bupleurum nigrescens* E. Nasir

Vernacular name: Not known

Voucher specimen: Mankial (Ghund Patai)

35° 19' N and 72° 37' E, 1766 m

Asad and Rashid 559 (PUP and PMNH).

Conservation status, threats and recommendations

This species has been collected from an altitude of 1766 m and it has been observed that the population has been reduced by more than 60%. The main threats are over grazing, habitat loss and deforestation. The deforestation and over grazing must be banned. It is falling under the category A (a and c) of the vulnerable species.

Family: ApiaceaeScientific name: *Ligusticum stewartii* (Hiroe) E. Nasir

Vernacular name: Not known

Voucher specimen: Mankial (Bhadai-II)

35° 19' N and 72° 38' E, 1890 m

Asad and Rashid 688 (PUP and PMNH).

Conservation status, threats and recommendations

This species is endemic to Swat and found in the valley from 1800 to 3000 m having a narrow geographic distribution due to its endemism. The main threats are over grazing, deforestation and habitat loss. The deforestation and over grazing must be banned to control the habitat loss. It is observed that about 85% of the population has been lost. It is falling under the category A (a, c and d) of the critically endangered species.

Family: AsteraceaeScientific name: *Achillea millefolium* L.

Vernacular name: Jasifa/Jarai
Voucher specimen: Mankial (Serai-III)
35° 21' N and 72° 40' E, 2400 m
Asad and Rashid 661 (PUP and PMNH)

Conservation status, threats and recommendations

It is a very important medicinal and honey bee species. The main threat is its' over exploitation as a high value medicinal plant. Its collection and over exploitation must be banned. It has been observed that more than 60% of population has been reduced and decline in area of occupancy has been occurred. It is falling under the category A (a, c and d) of the vulnerable species.

Family: Asteraceae
Scientific name: *Saussurea albescens* (DC.) Sch.
Vernacular name: Azghakay
Voucher specimen: Mankial (Kafar Banda)
35° 18' N and 72° 39' E, 2835 m
Asad and Rashid 488 (PUP and PMNH).

Conservation status, threats and recommendations

It is distributed in the valley at higher altitudes and collected at an altitude of 2835 m. It has been observed that 75% of the population of this species has been decreased. The main threats are over grazing, deforestation and habitat loss. Deforestation and over grazing must be banned to control the habitat loss. It is falling under the category A (a, c and d) of the endangered species.

Family: Berberidaceae
Scientific name: *Berberis lycium* Royle
Vernacular name: Zairfargay/korai
Voucher specimen: Mankial (Bhadai Patti-II)
35° 20' N and 72° 38' E, 2054 m
Asad and Rashid 1825 (PUP and PMNH).

Conservation status, threats and recommendations

It is distributed scarcely in this Valley and the rhizome has a great medicinal value. It has been observed that more than 80% of the population has been decreased. The main threat is its' over exploitation as a medicinal plant, grazing, use as fuel wood, habitat loss and deforestation. Its' over exploitation must be controlled, its use as a fuel wood and grazing species must be banned. It is falling under the category A (a, c and d) of the endangered species.

Family: Berberidaceae
Scientific name: *Podophyllum hexandrum* Royle.

Vernacular name: Kakora
Voucher specimen: Mankial (Kafar Banda)
35° 18' N and 72° 39' E, 2835 m
Asad and Rashid 1873 (PUP and PMNH)

Conservation status, threats and recommendations

It is found in the Valley under the canopy of thick forest, collected at an altitude of 2835 m and the rhizome is highly medicinal. Due to its medicinal value, 85% of population has been decreased and now it is available from very few localities in the Valley. The main threat is over exploitation as a high value medicinal plant. Its' over exploitation must be banned. It is falling under the category A (a and c) of the endangered species.

Family: Betulaceae
Scientific name: *Betula utilis* D. Don
Vernacular name: Birich
Voucher specimen: Mankial (Char Banda)
35° 18' N and 72° 41' E, 3200 m
Asad and Rashid 1680 (PUP and PMNH)

Conservation status, threats and recommendations

It is found at the tree line in higher altitude and collected from 3200 m. The main threats are its usage as fuel wood at higher altitude and the bark is used as paper for spiritual curing. This plant is seen at very few places and the population size is reduced by 95%. Its use as fuel wood and paper bark species must be banned. It is falling under the category A (a, c and d) of the critically endangered species.

Family: Caprifoliaceae
Scientific name: *Valeriana jatamansi* Jones
Vernacular name: Mushke bala
Voucher specimen: Mankial (Serai-II)
35° 21' N and 72° 41' E, 2620 m
Asad and Rashid 1466 (PUP and PMNH).

Conservation status, threats and recommendations

It is distributed in the fertile beds of the forests and collected at an altitude of 2620 m in the Valley. The main threats are unsustainable collection and over exploitation as a medicinal species. The population has been reduced by 65% and decline in area of occupancy has occurred. Its collection and over exploitation must be banned. It is falling under the category A (a and c) of the vulnerable species.

Family: Elaeagnaceae
Scientific name: *Elaeagnus umbellata* Thunb.

Vernacular name: Ghanumranga
 Voucher specimen: Mankial (Ghund Patti)
 35° 19' N and 72° 37' E, 1766 m
 Asad and Rashid 46 (PUP and PMNH).

Conservation status, threats and recommendations

It is found in the valley at lower altitude, found at only three localities in the valley and collected at an altitude of 1766 m. The main threats are its over exploitation as a medicinal species, fuel wood and fodder. The population has been reduced by 97% in the valley. Its over exploitation as a medicinal species, fuel wood and fodder must be banned. It is falling under the category A (a, c and d) of the critically endangered species.

Family: Euphorbiaceae
 Scientific name: *Euphorbia wallichii* Hook.
 Vernacular name: Mandano
 Voucher specimen: Mankial (Kamar Khwa Banda-I)
 35° 22' N and 72° 46' E, 3088 m
 Asad and Rashid 1038 (PUP and PMNH).

Conservation status, threats and recommendations

It is found sporadically in the Valley at higher altitude and collected from 3088 m. The main threats are its over exploitation, habitat loss and deforestation. The deforestation and its over exploitation must be banned to control the habitat loss. The population size has been considerably reduced by more than 60%. It is falling under the category A (a and c) of the endangered species.

Family: Fabaceae
 Scientific name: *Astragalus candolleanus* Royle ex Benth.
 Vernacular name: Ghorjakay
 Voucher specimen: Mankial (Bhadai-III)
 35° 20' N and 72° 38' E, 2058 m
 Asad and Rashid 1845 (PUP and PMNH).

Conservation status, threats and recommendations

It is found in the Valley at lower altitude, found at only four localities in the valley and collected at an altitude of 2058 m. The main threats are over exploitation, habitat loss and over grazing. Its collection must be banned, over grazing must be banned to control habitat loss. The population has been reduced by 90% and the area of occupancy is also reduced considerably. It is falling under the category A (a, c and d) of the critically endangered species locally in the valley.

Family: Fabaceae

Scientific name: *Indigofera heterantha* Wall. ex Brandis
 Vernacular name: Ghoreja
 Voucher specimen: Mankial (Mehnain-II)
 35° 19' N and 72° 38' E, 1764 m
 Asad and Rashid 874 (PUP and PMNH).

Conservation status, threats and recommendations

This species is endemic to Pakistan and distributed in the Valley at lower altitude and collected from 1764 m. The main threats are over exploitation, fodder value and extensive usage as fuel wood. Its collection and usage must be banned. The population size has been considerably reduced by more than 85%. It is falling under the category A (a, c and d) of the endangered species.

Family: Geraniaceae
 Scientific name: *Geranium wallichianum* D. Don ex Sweet
 Vernacular name: Sra zeela
 Voucher specimen: Mankial (Bhadai Patti-III)
 35° 20' N and 72° 38' E, 2058 m
 Asad and Rashid 766 (PUP and PMNH).

Conservation status, threats and recommendations

A high value medicinal plant distributed scarcely in the Valley and collected from an altitude of 2058 m. The population has been reduced by more than 75%. The main threats are its over exploitation and unsustainable collection of the rhizome. Its over exploitation and unsustainable collection must be banned. It is falling under the category A (a and c) of the endangered species.

Family: Hamamelidaceae
 Scientific name: *Parrotiopsis jacquemontiana* (Dcne.) Rehder
 Vernacular name: Pastaoonay
 Voucher specimen: Mankial (Mehnain-I) 35° 19' N and 72° 37' E, 1764 m
 Asad and Rashid 1874 (PUP and PMNH).

Conservation status, threats and recommendations

It is distributed at lower altitude along the river banks of north facing slope collected at an altitude of 1764 m. The main threats are its use as fodder and fuel wood species. Its use must be banned. The population has been reduced by more than 80% in the Valley due to over exploitation. It is falling under the category A (a and c) of the endangered species.

Family: Juglandaceae
 Scientific name: *Juglans regia* L.

Vernacular name: Ghuzz
Voucher specimen: Mankial (Bhadai-I)
35° 19' N and 72° 38' E, 1886 m
Asad and Rashid 2270 (PUP and PMNH)

Conservation status, threats and recommendations

This is sporadically distributed in the Valley and collected at an altitude of 1886 m. The main threats are its use for making furniture and the bark is used locally used as "Dandasa". Its use for making furniture must be banned. It has been observed that more than 60% population has been reduced. It is falling under the category A (a and c) of the vulnerable species.

Family: Lamiaceae
Scientific name: *Thymus linearis* Benth.
Vernacular name: Speerkay
Voucher specimen: Mankial (Serai-II)
35° 21' N and 72° 41' E, 2620 m
Asad and Rashid 810 (PUP and PMNH).

Conservation status, threats and recommendations

A high value medicinal and aromatic herb collected in the valley at 2620 m altitude. The main threat is its over exploitation as a high value medicinal herb. Its' over exploitation must be banned. The population has been decreased considerably up to more than 80%. It is falling under the category A (a and c) of the vulnerable species.

Family: Papaveraceae
Scientific name: *Corydalis diphylla* Wall.
Vernacular name: Bhutkis
Voucher specimen: Mankial (Mankial village)
35° 19' N and 72° 36' E, 1764 m
Asad and Rashid 353 (PUP and PMNH).

Conservation status, threats and recommendations

It is distributed at very few localities in the valley and collected at an altitude of 1764 m. The main threats are over exploitation as a medicinal plant, over grazing and habitat loss in the valley. Its' over exploitation must be banned and the over grazing must be banned to control the habitat loss. The population has been reduced up to more than 80%. It is falling under the category A (a and c) of the endangered species.

Family: Paeoniaceae
Scientific name: *Paeonia emodi* Wall. ex Royle
Vernacular name: Mamekh
Voucher specimen: Mankial (Kakora)
35° 17' N and 72° 40' E, 3035 m

Asad and Rashid 1072 (PUP and PMNH).

Conservation status, threats and recommendations

A high value medicinal plant present at only 8 localities in the valley collected at an altitude of 3035 m on north facing slope. The main threats are its unsustainable collection and over exploitation. Its unsustainable collection and over exploitation must be banned. More than 80% population and area of occupancy has been reduced. It is falling under the category A (a, c and d) of the critically endangered species.

Family: Plantaginaceae
Scientific name: *Plantago depressa* Willd.
Vernacular name: Isphaghol
Voucher specimen: Mankial (Jabba)
35° 17' N and 72° 40' E, 2563 m
Asad and Rashid 240 (PUP and PMNH).

Conservation status, threats and recommendations

This plant is distributed at the open places in the valley especially at south facing slope and collected from 2563 m altitude. The main threats are over grazing, over exploitation and habitat loss. Its' over exploitation must be banned and deforestation must be stopped to control the habitat loss. The population has been decreased by more than 60%. It is falling under the category A (a and c) of the vulnerable species.

Family: Plantaginaceae
Scientific name: *Plantago lanceolata* L.
Vernacular name: Warokay isphaghol
Voucher specimen: Mankial (Ghund Patai)
35° 19' N and 72° 37' E, 1766 m
Asad and Rashid 58 (PUP and PMNH).

Conservation status, threats and recommendations

It is found at lower altitude in the valley, collected at 1766 m. Found on south facing slopes at open places. The main threats are its' over exploitation, fodder value and habitat loss. Its' over exploitation and use must be banned; measures should be taken to minimize habitat loss. More than 55% of population has been decreased. It is falling under the category A (a and c) of the vulnerable species.

Family: Plantaginaceae
Scientific name: *Plantago major* Willd.
Vernacular name: Ghat isphaghol
Voucher specimen: Mankial (Mehnain-I)
35° 19' N and 72° 37' E, 1764 m

Asad and Rashid 175 (PUP and PMNH).

Conservation status, threats and recommendations

It is collected from lower altitude at 1764 m and found at open places on south facing slope. The main threat is its over exploitation as high value medicinal and fodder value. Its over exploitation must be banned. More than 70% of the population has been reduced. It is falling under the category A (a and c) of the vulnerable species.

Family: Polygonaceae

Scientific name: *Bistorta amplexicaulis* (D. Don) Green

Vernacular name: Masloon

Voucher specimen: Mankial (Baik-II)

35° 21' N and 72° 39' E, 2606 m

Asad and Rashid 787 (PUP and PMNH).

Conservation status, threats and recommendations

This plant is distributed in the valley at few localities and collected at an altitude of 2606 m. The main threats are its over exploitation, over grazing and habitat loss. Its over exploitation must be banned and the over grazing must be controlled to overcome the habitat loss. More than 60% population has been reduced. It is falling under the category A (a and c) of the endangered species.

Family: Ranunculaceae

Scientific name: *Aconitum heterophyllum* Wall. ex Royle

Vernacular name: Sarbawalay

Voucher specimen: Mankial (Chokial Banda-II)

35° 22' N and 72° 40' E, 3275 m

Asad and Rashid 189 (PUP and PMNH).

Conservation status, threats and recommendations

A very popular medicinal plant, collected at 3275 m, the rhizome is extensively collected for various medicinal purposes. The main threats are its unsustainable utilization and over exploitation. To conserve this species, the unsustainable utilization and over exploitation must be banned. The population has been reduced by more than 85% in the valley. It is falling under the category A (a, c and d) of the critically endangered species.

Family: Ranunculaceae

Scientific name: *Caltha alba* Camb.

Vernacular name: Baringu

Voucher specimen: Mankial (Gaider Jabba-III)

35° 18' N and 72° 40' E, 2820 m

Asad and Rashid 64 (PUP and PMNH).

Conservation status, threats and recommendations

Distributed at higher altitude and collected from 2820 m. The main threats are its over exploitation as a medicinal plant and habitat loss. The over exploitation must be banned and habitat loss must be controlled. The population is reduced by 65% in the valley. It is falling under the category A (a and c) of the vulnerable species.

Family: Rhamnaceae

Scientific name: *Ziziphus jujuba* Mill.

Vernacular name: Markhanaray

Voucher specimen: Mankial (Mankial bazar)

35° 19' N and 72° 36' E, 1764 m

Asad and Rashid 789 (PUP and PMNH).

Conservation status, threats and recommendations

This plant is collected from only one locality Mankial Bazar at 1764 m. The main threats are over exploitation as a medicinal species and fuel wood. Its over exploitation as medicinal and fuel wood species must be banned. About 98% population has been eliminated due to its medicinal, fodder and fuel wood use. It is falling under the category A (a, c and d) of the critically endangered species.

Family: Rosaceae

Scientific name: *Cotoneaster affinis* (Lindl) Schneider

Vernacular name: Mamanra

Voucher specimen: Mankial (Nara-II)

35° 22' N and 72° 40' E, 2768 m

Asad and Rashid 557 (PUP and PMNH).

Conservation status, threats and recommendations

It is collected from only 4 localities in the valley at 2768 m; it is observed that 90% population has been decreased and the area of occupancy has been shrunk. The main threats are its exploitation as a medicinal and fuel wood species. Its over exploitation as medicinal and fuel wood species must be banned. It is falling under the category A (a, c and d) of the critically endangered species.

Family: Rosaceae

Scientific name: *Crataegus songarica* C. Koch

Vernacular name: Gony

Voucher specimen: Mankial (Tapra)

35° 20' N and 72° 41' E, 2060 m

Asad and Rashid 562 (PUP and PMNH).

Conservation status, threats and recommendations

It is collected from only two localities in the entire valley

at 2060 m; the main threats includes its over exploitation as a highly medicinal plant, fuel wood and fodder species. The over exploitation as a medicinal, fuel wood and fodder species must be banned. The population has been reduced by 98% and the area of occupancy has considerably decreased. It is falling under the category A (a, c and d) of the critically endangered species.

Family: Salicaceae

Scientific name: *Pouplus alba* L.

Vernacular name: Speedad

Voucher specimen: Mankial (Bhadai-II)

35° 19' N and 72° 38' E, 1890 m

Asad and Rashid 1845 (PUP and PMNH).

Conservation status, threats and recommendations

It is collected from only one locality in Bhadai at 1890 m. The main threats are its over exploitation as medicinal, fuel wood and fodder value. Its over exploitation must be banned. The area of occupancy has decreased and the population has been reduced by 98% in the valley. It is falling under the category A (a, c and d) of the critically endangered species.

Family: Sapindaceae

Scientific name: *Acer caesium* Wall. ex Brandis

Vernacular name: Chinaray

Voucher specimen: Mankial (Kafar Banda)

35° 18' N and 72° 39' E, 2835 m

Asad and Rashid 732 (PUP and PMNH)

Conservation status, threats and recommendations

It is only found at 2 localities on north facing slope and collected at an altitude of 2835 m. The main threats are its over exploitation as medicinal, fodder and fuel wood species. The over exploitation must be banned. The population has been decreased by 97% and the area of occupancy is considerably decreased. It is falling under the category A (a, c and d) of the critically endangered species.

Family: Sapindaceae

Scientific name: *Aesculus indica* (Wall. ex Camb.) Hook.

Vernacular name: Binkhor

Voucher specimen: Mankial (Jabba-I)

35° 17' N and 72° 40' E, 2563 m

Asad and Rashid 340 and 540 (PUP and PMNH).

Conservation status, threats and recommendations

The species has been reported from only six localities in the valley and collected from 2563 m. The main threats

are over exploitation, fodder and fuel wood species. The over exploitation as a medicinal, fodder and fuel wood species must be banned. The area of occupancy is decreased and the population has been reduced up to 95% in the valley. It is falling under the category A (a, c and d) of the critically endangered species.

Family: Saxifragaceae

Scientific name: *Bergenia ciliata* (Haw.) Sternb.

Vernacular name: Zakhame Hayat

Voucher specimen: Mankial (Serai-II)

35° 21' N and 72° 41' E, 2620 m

Asad and Rashid 581 (PUP and PMNH).

Conservation status, threats and recommendations

It is collected at 2620 m from the valley and it is distributed on moist rocky habitat. The main threats are its over exploitation as a medicinal species and habitat loss. The over exploitation must be banned and habitat loss must be controlled. The population has been decreased by 60%. It is falling under the category A (a and c) of the vulnerable species.

Family: Solanaceae

Scientific name: *Solanum nigrum* L.

Vernacular name: Tambako

Voucher specimen: Mankial (Gaider Jabba-I)

35° 18' N and 72° 41' E, 2810 m

Asad and Rashid 299 (PUP and PMNH).

Conservation status, threats and recommendations

It is collected from the valley at 2810 m altitude. The main threats are over exploitation, unsustainable collection, habitat loss and over grazing. The over exploitation and unsustainable collection must be banned and habitat loss and over grazing must be controlled. The plant is highly medicinal and 80% population has been reduced. It is falling under the category A (a and c) of the endangered species.

Family: Thymeleaceae

Scientific name: *Daphne mucronata* Royle

Vernacular name: Leughonay

Voucher specimen: Mankial (Mehnain-I)

35° 19' N and 72° 37' E, 1764 m

Asad and Rashid 1350 (PUP and PMNH).

Conservation status, threats and recommendations

It is collected from 1764 m in the valley. The main threat is over exploitation as medicinal species. The over exploitation must be banned. About 80% of the

population has been decreased in the valley. It is falling under the category A (a and c) of the endangered species.

Family: *Violaceae*

Scientific name: *Viola biflora* L.

Vernacular name: Benausha

Voucher specimen: Mankial (Serai-IV)

35° 21' N and 72° 40' E, 2405 m

Asad and Rashid 400 (PUP and PMNH).

Conservation status, threats and recommendations

Found in the valley at 2405 m altitude. The main threat is over exploitation as a medicinal species. Its over exploitation must be banned. About 75% population has been reduced and the area of occupancy is decreased. It is falling under the category A (a and c) of the endangered species.

DISCUSSION

The Mankial valley is naturally gifted with tremendous floral diversity and medicinal plants, therefore, conservation and sustainable utilization of the threatened medicinal flora is mandatory. Certain factors are severely affecting plant natural resources and traditional knowledge associated with them. Haq (2011) carried out conservation studies of 37 critically endangered and endangered species and concluded that 14 species were critically endangered and 23 species are endangered. He opined that over exploitation, loss of habitat, pathogens attack, invasive species and climate change are the main reasons of threatening these species. According to some other workers, extensive grazing, deforestation, forest fragmentation and habitat loss are causing species extinction in the wild. Conservation of threatened medicinal plants in the higher altitude is important because people living in isolated and far flung areas are mainly depended on plants and this may lead to extinction of many medicinally important species. Along with that timber use for mafia, fuel wood, fodder, medicinal uses, cutting, overgrazing, habitat loss and deforestation are the main reasons for elimination of important medicinal plants. The present study was designed to evaluate the threatened medicinal plants in the valley and among the total of 45 species evaluated against IUCN criteria Version 3.1 (2001). It is concluded that 13 (28.88%) species were vulnerable, 21 (46.66%) were endangered and 11 (24.44%) were critically endangered. These studies were based on category A (a and c) as mentioned in Version 3.1 for vulnerable (VU), endangered (EN) and critically threatened (CR) species.

It has been concluded that the main reasons for reduction of population of these important medicinal plants are over exploitation (75.55%), fuel wood

(35.55%), habitat loss (35.55%), grazing (28.88%), fodder (24.44%), deforestation (15.55%), timber (4.44%), bark use (4.44%) and furniture (4.44%). Similarly, the unsustainable utilization of plant natural resources, unscientific agricultural practices and terrace farming; these medicinally important species are turning into threatened flora. The people in the valley are completely dependent upon plants and rely upon plants and plants products for their livelihood and curing different ailments. Conservation of these precious plants and the local knowledge associated with them are extremely important for the future planning, sustainable utilization and exploitation of these species. It is important to carry out concrete steps for the conservation of this natural wealth and to protect the genetic erosion of the threatened medicinal plants growing in the valley. Therefore, proper documentation, training of local inhabitants, controlling over exploitation, overgrazing, habitat loss and deforestation will be helping in conserving these resources. Further, *in-situ* conservation in the wild and *ex-situ* conservation in botanical gardens will help in conserving these threatened medicinal plants. For sustainability of such activities, legislation and monitoring will be of immense importance to conserve the threatened medicinal plants growing in the valley.

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**A CHECKLIST OF THE WEEDS GROWING IN THE MAIZE CROP AT
MANKIAL VALLEY HINDUKUSH RANGE, PAKISTAN**

Asad Ullah¹* and Abdur Rashid

ABSTRACT

Distributions of 31 weed species belonging to 15 families were recorded in maize fields from five sites in Mankial valley from June to September, 2012. Poaceae was the leading family with 7 species, followed by Polygonaceae with 4 species and Amaranthaceae with 3 species. Asteraceae, Brassicaceae, Chenopodiaceae, Plantaginaceae and Lamiaceae had 2 species each. Balsaminaceae, Caryophyllaceae, Convolvulaceae, Equisetaceae, Malvaceae, Onagraceae and Portulacaceae were each represented by one species. The composition of the weed species differed at each site. Amaranthus was among the top three species at three sites; Portulaca, Pennisetum, Rumex and Equisetum were each among the top three species in two fields. Communities' formation was Fagopyrum-Portulaca-Amaranthus (with IVI of 56.02, 50.87 and 44.78 respectively), Pennisetum-Rumex-Portulaca (with IVI 40.41, 32.43, 30.63 respectively), Sorghum-Equisetum-Portulaca (with IVI 54.95, 46.26 and 34.95 respectively), Pennisetum-Rumex-Amaranthus (with IVI 63.87, 42.87 and 38.75 respectively) and Equisetum-Amaranthus-Malva (with IVI 99.05, 32.73 and 25.81 respectively).

Key words: Distribution, Mankial valley, maize crop, weeds.

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INTRODUCTION

Mankial valley is situated in the Upper Swat and is locally known as Sooko Sar or Kohee Shaheen. This area lies on 35° 12' 24" N to 72° 32' 15" E on the globe. Mankial has 32278 acres of land about 70 km north east of Swat valley with high glacial peaks. On the revenue index map of Swat District, the area is traced on Mozas (Settlement units) bearing S. No. 18 & 19 (Badai and Mankial) with the landholdings of 20620 and 11658 acres, respectively. The area has a very steep relief in a couple of Kilometers and varies from 1430 m at

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Mankial to 5726 m at Koohe Shaheen. The area represents a mountainous terrain of the high-glaciated peaks, perennial snowfields, glaciers, falls, pastures, river, stream and intact forests. Physically the area can be divided into mountains, valleys, pastures and the dendritic drainage network of the river Mankial. The %age share by area of mountains, valleys/pastures and river is estimated to be at 95%, 4.5% and 0.5% respectively. Pastures are located above 3000 m and have alpine conditions come under the alpine regions in nature with severe winters staring from mid September to the end of March and a mild summer from June till August.

After wheat and rice, maize (*Zea mays* L.) is the third cereal crop accounts for 4.8% of total cropped and 3.5% of the value of agricultural output in Pakistan. It is cultivated on 0.9 m hectares with annual production of 1.3 m tons in Khyber Pakhtunkhwa. With a share of 57% in the total production in the country, Khyber Pakhtunkhwa province is the leader in maize production in Pakistan. Maize is rich in protein and starch 70-80% (Muhammad, 1998). Weeds are plants growing in undesirable places. Weeds compete with crops resulting in reduction of yield. Generally 20-30% losses in grain yield are quite usual and may be as high as 50% if the crop management practices are not properly followed. Many workers have attempted studies on various weeds-crops interaction in various areas (Khan and Haq, 2004; Hamayun, 2003; Bhatti and Memon, 2003; Khan et al., 2004; Hoffman and Regnier, 1993; Hussain and Rashid, 1989; Johnson and Deflice, 1993; Rashid and Hussain, 1989; Ullah and Rashid, 2007; Khan et al, 2012; Khan et al, 2013). For maize the critical weed crop competition period is 3-6 weeks after sowing that has adverse effects on the productivity (Chatta, 1988). Maize is the only cereal grown in Mankial valley. The inhabitants are dependent on it for food and fodder. Weeds reduce the productivity of the crops and are also a major component of natural ecosystem. Further, it is observed that the weeds growing in high elevation maize fields are different from those in the maize fields at lower altitudes. Some of the weed species reported are phytogeographically restricted to this particular area. The goal of this study was initiated to prepare a checklist and assess the relative importance of different weed species in maize fields of Mankial valley as the first step in developing better weed management strategies.

MATERIALS AND METHODS

Studies were carried out at five maize growing sites of Mankial valley from June to September, 2012 viz. Mankial Bazar 1700 m., Mehnain 1730 m., Ghund Patai 1766 m., Bhadaï Baba 1894 m., and Bhadaï Patai 2075 m (Fig. 1 and 2). Plants were collected, preserved, documented and identified with the help of available literature

(Stewart, 1972; Nasir and Ali, 1970-1989; Ali and Nasir, 1989-1991; Ali and Qaiser, 1993-2007). Voucher specimens were deposited in the University of Peshawar Herbarium (PUP). Botanical names, vernacular names and family of weeds were recorded (Table I). The quadrates each measuring 0.5 x 0.5m were randomly examined from each site, while number of quadrates in all sites were 20 (Malik, 1986). The density, frequency, canopy coverage, relative density, relative frequency, relative canopy coverage and importance value index of each weed species were determined by using the following formulae (Hussain, 1989).

$$\text{Density} = \frac{\text{Total No. of individuals of a species}}{\text{Total No. of quadrates}}$$

$$\text{Relative density} = \frac{\text{Density for a species} \times 100}{\text{Density for all species}}$$

$$\text{Frequency} = \frac{\text{No. of times in which a sp. occur} \times 100}{\text{Total no. of quadrates}}$$

$$\text{Relative frequency} = \frac{\text{Frequency value of species} \times 100}{\text{Total frequency for all species}}$$

Canopy Cover (C.C.)

It is defined as the volume of space occupied (Oosting, 1956). Herbs coverage was calculated after cover classes of Daubenmire by the following formula (Daubenmire, 1959).

$$\text{C. C.} = \frac{\text{Total canopy cover of a species}}{\text{Number of quadrate} \times \text{Quadrate size}}$$

Relative Canopy Cover (R.C.C.)

This was calculated from the cover value of a species as a proportion of the total cover values for all species (Brower and Zar, 1977).

$$\text{R.C.C.} = \frac{\text{Canopy cover of a species} \times 100}{\text{Total canopy cover of all species}}$$

Importance Value Index (IVI)

It is the sum of all relative values of density, frequency and canopy coverage (Curtis and McIntosh, 1950).

$$\text{I.V.I.} = \text{Relative density} + \text{Relative frequency} + \text{Relative canopy cover}$$

RESULTS AND DISCUSSION

Five communities of weed species were established in Mankial valley at five different sites (1, 2, 3, 4 and 5). Communities' formation was as follows: *Fagopyrum*, *Portulaca*, *Amaranthus* Community, *Pennisetum*, *Rumex*, *Portulaca* Community, *Sorghum*, *Equisetum*, *Portulaca* Community, *Pennisetum*, *Rumex*, *Amaranthus* Community and *Equisetum*, *Amaranthus*, *Malva* Community (Tables 2, 3, 4, 5 and

6). A total of 15 families were recorded, Poaceae was the leading family with 7 species, followed by Polygonaceae with 4 species; Amaranthaceae with 3 species. Asteraceae, Brassicaceae, Chenopodiaceae, Plantaginaceae and Lamiaceae with 2 species each. While Balsaminaceae, Caryophyllaceae, Convolvulaceae, Equisetaceae, Malvaceae, Onagraceae and Portulacaceae having one species each.

Density

At site No. 1, density of *Fagopyrum esculentum* was 18%, *Portulaca oleracea* 9.6% and *Amaranthus gracilis* 9.2%. At site No. 2, density of *Pennisetum elatum* was 12.3%, *Portulaca oleracea* 9.6% and *Rumex hastatus* 9.5%. At site No. 3, density of *Sorghum halepense* was 24%, *Equisetum arvense* 16.3% and *Portulaca oleracea* 6.8%. At site No. 4, density of *Pennisetum elatum* was 16.2%, *Rumex hastatus* 10.1% and *Amaranthus viridis* 4.7%. At site No. 5, density of *Equisetum arvense* was 43.8%, *Portulaca oleracea* 5.7% and *Amaranthus viridis* 5.3%.

Frequency

At site No. 1, frequency of *Portulaca oleracea* was 90%, *Bidens cernua* 80% and *Fagopyrum esculentum* 70%. At site No. 2, frequency of *Malva neglecta* and *Amaranthus viridis* was 90% each, *Chenopodium murale* & *Pennisetum elatum* 80% each and *Eragrostis poaeoides* and *Portulaca oleracea* 70% each. At site No. 3 frequency of *Portulaca oleracea* was 90%, *Sorghum halepense*, *Amaranthus viridis* and *Chenopodium botrys* 80% each and *Equisetum arvense* 70%. At site No. 4 frequency of *Amaranthus viridis* was 90%, *Pennisetum elatum* 80% and *Eragrostis poaeoides*, *Malva neglecta* and *Plantago major* 70% each. At site No. 5 frequency of *Amaranthus viridis* was 90%, *Malva neglecta* 80%, *Equisetum arvense* and *Impatiens thomsonii* 70% each.

Canopy Cover (C. C.)

At site No. 1 C. C. of *Portulaca oleracea* was 40.5%, *Fagopyrum esculentum* 34.5% and *Pennisetum elatum* 31.5%. At site No. 2 C. C. of *Equisetum arvense* was 44%, *Pennisetum elatum* 40.2% and *Rumex hastatus* 36%. At site No. 3 C. C. of *Equisetum arvense* was 44%, *Sorghum halepense* 39.5% and *Amaranthus viridis* 28.5%. At site No. 4 C. C. of *Pennisetum elatum* was 42.04%, *Amaranthus viridis* and *Rumex hastatus* 33% each and *Eragrostis poaeoides* 21%. At site No. 5 C. C. of *Equisetum arvense* was 77.5%, *Amaranthus viridis* 27% and *Malva neglecta* 21.5%.

Relative Density (R. D.)

At site No. 1 the R. D. of *Fagopyrum esculentum* was 25.74%, *Portulaca oleracea* 13.72% and *Amaranthus gracilis* 13.15%. At site No. 2 R. D. of *Pennisetum elatum* was 18.24%, *Portulaca oleracea* 14.24% and *Rumex hastatus* 14.09%. At site No. 3 R. D. of *Sorghum*

halepense was 28.03%, *Equisetum arvense* 19.04% and *Portulaca oleracea* 7.94%. At site No. 4 R. D. of *Pennisetum elatum* was 32%, *Rumex hastatus* 19.96% and *Amaranthus viridis* 9.28%. At site No. 5 R. D. of *Equisetum arvense* was 56.58%, *Amaranthus viridis* 7.36% and *Portulaca oleracea* 6.84%.

Relative Frequency (R. F.)

At site No. 1 R. F. of *Portulaca oleracea* was 18.36%, *Amaranthus gracilis* 16.32% and *Fagopyrum esculentum* 14.28%. At site No. 2 R. F. of *Amaranthus viridis* and *Malva neglecta* was 11.11% each, *Chenopodium murale* and *Pennisetum elatum* 9.87% each and *Eragrostis poaeoides* and *Portulaca oleracea* 8.64% each. At site No. 3 R. F. of *Portulaca oleracea* was 13.04%, *Amaranthus viridis*, *Chenopodium botrys* and *Sorghum halepense* 11.59% each and *Equisetum arvense* 10.14%. At site No. 4 R. F. of *Amaranthus viridis* was 14.75%, *Pennisetum elatum* 13.11% and *Eragrostis poaeoides*, *Malva neglecta* and *Plantago major* 11.47% each. At site No. 5 R. F. of *Amaranthus viridis* was 14.51%, *Malva neglecta* 12.90%, *Equisetum arvense* and *Impatiens thomsonii* 11.29% each.

Relative Canopy Cover (R. C. C.)

At site No. 1 R. C. C. of *Portulaca oleracea* was 18.79%, *Amaranthus gracilis* 15.31% and *Fagopyrum esculentum* 14.61%. At site No. 2 R. C. C. of *Equisetum arvense* was 13.37%, *Pennisetum elatum* 12.30% and *Rumex hastatus* 10.94%. At site No. 3 R. C. C. of *Equisetum arvense* was 17.08%, *Sorghum halepense* 15.33% and *Portulaca oleracea* 13.97%. At site No. 4 R. C. C. of *Pennisetum elatum* and *Amaranthus viridis* was 14.72% each and *Eragrostis poaeoides* 9.37%. At site No. 5 R. C. C. of *Equisetum arvense* was 31.18%, *Amaranthus viridis* 10.86% and *Malva neglecta* 8.65%.

Important Value Index (I. V. I.)

At site No. 1 the IVI of *Fagopyrum esculentum* was 56.02%, *Portulaca oleracea* 50.87% and *Amaranthus gracilis* 44.78%. At site No. 2 IVI of *Pennisetum elatum* was 40.41%, *Rumex hastatus* 32.43% and *Portulaca oleracea* 30.63%. At site No. 3 IVI of *Sorghum halepense* was 54.95%, *Equisetum arvense* 46.26% and *Portulaca oleracea* 34.95%. At site No. 4 IVI of *Pennisetum elatum* was 63.87%, *Rumex hastatus* 42.87% and *Amaranthus viridis* 38.75%. At site No. 5 IVI of *Equisetum arvense* was 99.05%, *Amaranthus viridis* 32.73% and *Malva neglecta* 25.81%.

CONCLUSION

Maize is the only cereal crop in Mankial valley which is consumed as food and fodder. As compared to the world leading countries, the production of maize is less in Pakistan. It has been observed that the maize fields in Mankial valley are highly infested by

various weeds including broad leaved herbs and grasses like other crops. It is also noted that the loss of yield is dependent upon weed infestation, growth habit, duration of competition, land type, soil fertility and soil moisture. The losses may vary from crop to crop and from farm to farm within a season (Tanveer and Ali, 2003).

Some of the weeds species like *Amaranthus viridis*, *Equisetum arvense*, *Fagopyrum esculentum*, *Portulaca oleracea*, *Pennisetum elatum*, *Rumex dentatus*, *Sorghum halepense* and *Malva neglecta* are frequent. It has also been noted that some of the weed species are known to be used for various purposes by the local inhabitants. Based on present findings biological control of the weeds is recommended for conservation of natural gene pool, enhanced yield of the crop and sustainable weed management practices.



Figure 1. Maize fields in the valley Figure 2. Using quadrat method

Table-1. Checklist of families, botanical names and vernacular names of weed species

collected from the research area

S #	Family	S #	Botanical name	V. name
1	Amaranthaceae	1.	<i>Amaranthus gracilis</i> Desf.	Ghata chalway
		2.	<i>Amaranthus viridis</i> L.	Wara chalway
		3.	<i>Fagopyrum esculentum</i> Moench.	Chalway
2	Asteraceae	4.	<i>Bidens cernua</i> L.	Zair guly
		5.	<i>Sonchus asper</i> (L.) Hill.	Shodapai
3	Balsaminaceae	6.	<i>Impatiens thomsonii</i> Hk. f.	Nazak boty
4	Brassicaceae	7.	<i>Cardamine hirsuta</i> L.	Tarukay
		8.	<i>Lepidium sativum</i> L.	Sharshamay
5	Caryophyllaceae	9.	<i>Arenaria neelgherrensis</i> W. & A.	Khar booti

6	Chenopodiaceae	10.	<i>Chenopodium botrys</i> L.	Skha booty
		11.	<i>Chenopodium murale</i> L.	Ganda booty
7	Convolvulaceae	12.	<i>Convolvulus arvensis</i> L.	Pairwaty
8	Equisetaceae	13.	<i>Equisetum arvense</i> L.	Bandakai
9	Labiatae	14.	<i>Mentha longifolia</i> (L.) Huds.	Wenaly
		15.	<i>Nepeta erecta</i> (Bth.) Bth.	Skha podina
10	Malvaceae	16.	<i>Malva neglecta</i> Wallr.	Pandirak
11	Onagraceae	17.	<i>Epilobium cylindricum</i> D. Don	Abi guly
12	Plantaginaceae	18.	<i>Plantago depressa</i> Willd.	Waroky sat
		19.	<i>Plantago major</i> L.	Ghat Sat
13	Poaceae	20.	<i>Dactylis glomerata</i> L.	Wakha
		21.	<i>Digitaria ciliaris</i> (Retz.) Koel.	Shamokha
		22.	<i>Eragrostis poaeoides</i> P. Beauv.	Wakha
		23.	<i>Pennisetum elatum</i> L.	Wakha
		24.	<i>Piptatherum gracilis</i> Mez.	Wakha
		25.	<i>Sorghum halepense</i> (L.) Pers.	Wakha
		26.	<i>Setaria glauca</i> (L.) P. Beauv.	Wakha
14	Polygonaceae	27.	<i>Polygonum glabrum</i> Willd.	Soor palpoluk
		28.	<i>Polygonum plebejum</i> R.Br.	Palpoluk
		29.	<i>Rumex dentatus</i> L.	Shalkhy
		30.	<i>Rumex hastatus</i> D. Don	Tarooky
15	Portulacacaeae	31.	<i>Portulaca oleracea</i> L.	Warkhare

Table-2. Ecological attributes of *Fagopyrum-Portulaca-Amaranthus* community at Mankial Bazar 1700 m (site 1)

No	Scientific name	Den.	Freq.	C. C.	R. D.	R. F.	R.C.C	IVI
1	<i>Amaranthus gracilis</i> Desf.	9.2	80	33	13.15	16.32	15.31	44.78
2	<i>Bidens cernua</i> L.	6	20	15.5	8.58	4.08	7.19	19.85
3	<i>Chenopodium murale</i> L.	3.2	60	18	4.57	12.24	8.35	25.16
4	<i>Equisetum arvense</i> L.	4	10	12.5	5.72	2.04	5.80	13.56
5	<i>Eragrostis poaeoides</i> P. Beauv.	7.1	40	21	10.15	8.16	9.74	28.05
6	<i>Fagopyrum esculentum</i> Moench.	18	70	34.5	25.74	14.28	16	56.02
7	<i>Nepeta erecta</i> (Bth.) Bth.	0.2	10	3	0.02	2.04	1.39	3.45
8	<i>Pennisetum elatum</i> L.	6.3	60	31.5	9.01	12.24	14.61	35.86
9	<i>Portulaca oleracea</i> L.	9.6	90	40.5	13.72	18.36	18.79	50.87
10	<i>Sorghum halepense</i> (L.) Pers.	6.2	50	6	8.86	10.20	2.78	21.84
Total		69.92	490	215.5				

Table-3. Ecological attributes of *Pennisetum-Rumex-Portulaca* community at Mehnain 1730 m (site 2)

No	Scientific name	Den.	Freq.	C. C.	R. D.	R. F.	R.C.C	IVI
1	<i>Amarantus viridis</i> L.	4.8	90	28.52	7.12	11.11	7.27	25.5
2	<i>Arenaria neelgherrensis</i> W. & A.	1.3	40	12	1.92	4.93	3.64	10.49
3	<i>Chenopodium murale</i> L.	4.9	80	28.5	2.27	9.87	8.66	20.8
4	<i>Convolvulus arvensis</i> L.	3.6	50	19.5	5.34	6.17	5.92	17.43
5	<i>Dactylis glomerata</i> L.	6	20	15.5	8.90	2.46	4.71	16.07
6	<i>Eragrostis poaeoides</i>	2.9	70	25.5	4.30	8.64	7.75	20.69
7	<i>Equisetum arvense</i> L.	4.0	60	44	5.93	7.40	13.37	26.7
8	<i>Malva neglecta</i>	4.4	90	23.5	6.52	11.11	7.14	24.77

	Wallr.							
9	<i>Mentha longifolia</i> (L.) Huds.	1.5	20	6	2.22	2.46	1.82	6.5
10	<i>Pennisetum elatum</i> L.	12.3	80	40.5	18.24	9.87	12.30	40.41
11	<i>Piptatherum gracilis</i> Mez.	1.3	40	12	1.92	4.93	3.64	10.49
12	<i>Portulaca oleracea</i> L.	9.6	70	25.5	14.24	8.64	7.75	30.63
13	<i>Rumex hastatus</i> D. Don	9.5	60	36	14.09	7.40	10.94	32.43
14	<i>Sonchus asper</i> (L.) Hill.	1.3	40	12	1.92	4.93	3.64	10.49
Total		67.4	810	329.0 2				

Table-4. Ecological attributes of *Saccharum-Equisetum-Portulaca* community at Ghund Patai 1766 m (site 3)

No	Scientific name	Den.	Freq.	C. C.	R. D.	R. F.	R.C.C	IVI
1	<i>Amaranthus viridis</i> L.	5.6	80	28.5	6.54	11.59	11.06	29.19
2	<i>Chenopodium botrys</i> L.	4.8	80	16.1	5.60	11.59	6.25	22.84
3	<i>Chenopodium murale</i> L.	1.5	30	9.0	1.72	4.34	3.49	9.55
4	<i>Digitaria ciliaris</i> (Retz.) Koel.	6	20	15.5	7.0	2.89	6.01	15.9
5	<i>Equisetum arvense</i> L.	16.3	70	44	19.04	10.14	17.08	46.26
6	<i>Eragrostis poaeoides</i> P. Beauv.	4.5	60	19.5	5.25	8.69	7.56	21.5
7	<i>Malva neglecta</i> Wallr.	2.2	40	16.5	2.57	5.79	6.40	14.76
8	<i>Pennisetum elatum</i> L.	4.5	30	9.0	5.25	4.34	3.49	13.08
9	<i>Polygonum glabrum</i> Willd.	3.2	60	18	3.73	8.69	6.98	19.4
10	<i>Portulaca oleracea</i> L.	6.8	90	36	7.94	13.04	13.97	34.95
11	<i>Sorghum halepense</i> (L.) Pers.	24	80	39.5	28.03	11.59	15.33	54.95
12	<i>Setaria glauca</i> (L.) P. Beauv.	6.2	50	6	7.24	7.24	2.32	16.8
Total		85.6	690	257.6				

Table-5. Ecological attributes of *Pennisetum-Rumex-Amaranthus* community at Bhadai Baba 1894 m (site 4)

No	Scientific Name	Den	Freq.	C. C.	R. D.	R. F.	R.C.C.	IVI
1	<i>Amaranthus viridis</i> L.	4.7	90	33	9.28	14.75	14.72	38.75
2	<i>Epilobium cylindricum</i> D. Don	3.6	50	19.5	7.11	8.19	8.70	24.0
3	<i>Equisetum arvense</i> L.	3.6	50	19.5	7.11	8.19	8.70	24.0
4	<i>Eragrostis poaeoides</i> P. Beauv.	4.0	70	21	7.90	11.47	9.37	28.74
5	<i>Malva neglecta</i> Wallr.	2.9	70	16	5.73	11.47	7.14	24.34
6	<i>Pennisetum elatum</i> L.	16.2	80	42.04	32.0	13.11	18.76	63.87
7	<i>Plantago depressa</i> Willd.	1.3	40	12	2.56	6.55	5.35	14.46
8	<i>Plantago major</i> L.	2.9	70	16	5.73	11.47	7.14	24.34
9	<i>Rumex dentatus</i> L.	3.6	50	19.5	7.11	8.19	8.70	24.0
10	<i>Rumex hastatus</i> D. Don	10.1	50	33	19.96	8.19	14.72	42.87
11	<i>Sorghum halepense</i> (L.) Pers.	1.3	40	12	2.56	6.55	5.34	14.45
Total		50.6	610	224.0				

Table-5. Ecological attributes of *Equisetum-Amaranthus-Malva* community at Bhadai Patai 2075 m (site 5)

No	Scientific name	Den.	Freq.	C.C.	R. D.	R. F.	R.C.C.	IVI
1	<i>Amaranthus viridis</i> L.	5.7	90	27	7.36	14.51	10.86	32.73
2	<i>Cardamine hirsuta</i> L.	3.6	50	19.5	4.65	8.06	7.84	12.71
3	<i>Chenopodium murale</i> L.	1.5	20	6	1.93	3.22	2.41	7.56
4	<i>Equisetum arvense</i> L.	43.8	70	77.5	56.58	11.29	31.18	99.05
5	<i>Impatiens thomsonii</i> Hk. f.	2.9	70	16	3.74	11.29	7.32	22.35
6	<i>Lepidium sativum</i> L.	3.6	50	19.5	4.65	8.06	7.84	20.55
7	<i>Malva neglecta</i> Wallr.	3.3	80	21.5	4.26	12.90	8.65	25.81
8	<i>Pennisetum elatum</i> L.	3.6	40	12	4.65	6.45	4.82	15.92
9	<i>Polygonum plebejum</i> R. Br.	1.5	20	6	1.93	3.22	2.41	7.56
10	<i>Portulaca oleracea</i> L.	5.3	30	13.5	6.84	4.83	5.43	17.1
11.	<i>Rumex dentatus</i> L.	2.6	60	18	3.35	9.67	7.24	20.26
12.	<i>Rumex hastatus</i> D. Don	1.3	40	12	1.67	6.45	4.82	12.94
Total		77.4	620	248.5				

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MEDICINAL REMEDIES PRACTICED BY THE TORWAL AND GUJARS COMMUNITIES OF MANKIAL VALLEY SWAT, HINDUKUSH RANGE, PAKISTAN

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ABSTRACT

Mankial Valley is located at 35° 12' N and 72° 32' E in the Hindukush range of Northern Pakistan. Its area is 13063 ha and its elevation range is 1430-5800 m. The landscape includes snow covered peaks, barren rocky mountain slopes; alpine and sub alpine pastures glaciated tracts and forested slopes. The valley floor is the site of irrigated agricultural fields, waterfalls, and small villages of the local communities. Most of the inhabitants of the valley are Torwal (67%) who remain in the valley for all year. The remainder are Gujars (33%), who migrate seasonally. Both groups rely on the local plants and plant products for almost all their medicinal needs. We interviewed people in eight communities, asking which plants were used, how they prepared various remedies and what dosage was used for curing various ailments. In addition, we asked what part of the plant was used, what it was used for, how it was administered, and when and where it was collected. We divided the interviewees into four age groups (15-30 years, 30-45 years, 45-60 years, 60+ years) to determine how effectively knowledge is being transmitted. Twenty plant species are regularly used for medicinal purposes by the Torwal and Gujars of Mankial Valley, seven as a tonic, five for stomach problems, three each for diarrhoea and as pain killer, blood purifier, and stimulant, two each for dysentery, wounds, carminative, antiseptic, and one each for cholera, dropsy, emetic, cathartic, ulcer, coolant, kidney problems, asthma, purgative, fever, vomiting, eye problems, toothache, milk production, fever, jaundice and throat infections. People in the two older age groups knew more than those in the younger groups. The Torwal and Gujars communities have a rich ethnobotanical heritage, but traditional medicinal knowledge is disappearing rapidly.

Key words: Mankial valley, Torwal, Gujars, local plants, cathartic, purgative, heritage

INTRODUCTION

Mankial valley is located in the Hindukush mountainous ranges 70 km in the Northeast in Swat valley on the main Saidu-Kalam road. It is located on 35° 12' 24" N to 72° 32' 15" E. The total area of the Mankial valley is 32278 acres varying greatly in the elevation ranges from 1430m at Mankial to 5726m at Chokail (Koohe Shaheen). The area is represented by mountain terrain of high-glaciated peaks, perennial snowfields, falls, glaciers, pastures, rivers, streams and intact forests. Koohe Shaheen or Sooko Sar is the Second highest peak of the Swat valley, first being the Falak Ser. The percentage share by area of mountains, valleys/pastures and river is estimated to be at 95, 4.5 and 0.5 % respectively. The pastures are at high elevation ranges in height up to 3000 m and fall under the alpine region. Precipitation and temperature for the Valley has not been recorded for the valley so far. Most of the precipitation occurs in the form of snowfall and rainfall. The summer temperature does not rise above 35°C. Winter season is long and severe lasting from September to April. The summer is very short and pleasant lasting from June to August. The area is very rich in plant natural resources. Many plants are collected and used by the local for various purposes.

Agricultural is the main occupation of the area. Maize, turnip, potato, tomato and pea are the main crops. Keeping livestock, collection and selling of the medical plants are the other income resources of the inhabitants of the area. The locals belong mainly to Kohistan and Gujar community. During the winter season most of the population migrate to the plains of the down country for 5-6 months due to severe snowfall in the area.

Though some information on the local uses of the plants have been reported in Swat Kohistan and joining areas (Hussain *et al.*, 1995; Ahmad and Sirajuddin, 1996; Gul *et al.*, 1999; Shinwari *et al.*, 2000 a & b; Khan, 2001; Din *et al.*, 2003; Ghafoor *et al.*, 2003; Haider *et al.*, 2003; Iqbal *et al.*, 2003; Muhammad *et al.*, 2003; Shinwari *et al.*, 2003; Thomas and Shengji, 2003; Hussain *et al.* 2006) but so far no one has carried out such kind of studies in the Mankial valley. The present studies will highlight the indigenous knowledge of the local regarding how various plants remedies are prepared and used in the health care system.

MATERIALS AND METHODS

Field visits were made from May to September, 2010. Eight villages viz. Mankial Bazaar, Ghund Patay, Badai, Miashkoon, Jabba, Char Banda, Serai, and Chokail were visited in the area and information regarding preparation of various remedies were collected from a broad range of people ranging in age from 25-120 years using simple questionnaire. Plants specimens were collected and preserved. All the relevant information such as local name, growing season, collection, preparation, and ways of administration and uses was collected. Plants identified with

the help of available literature (Nasir and Ali, 1970-1989; Polunin and Stainton, 1990; Ali and Qaiser, 1993-2006) and comparing with specimens of Peshawar University Herbarium (PUP).

Table 1. Information regarding various remedies using by the Torval and Gujar communities at Mankial Valley Swat, Hindukush Range Pakistan.

Botanical Name/Voucher No. and Family	Local Name	Season	Locality	Part used	Collection	Preparation	Administrative	Quantity	Uses
1. <i>Peperomia emodi</i> Wall. (Peperoniaceae)	Mamre-cha	April-June	Jabba, Miankhoun	R, S	Digging	Dried, grinded and powdered. Mixed with flour, ghee or milk.	Orally	One chalang (70 g) for adults. Half chalang (35 g) for children. After every two days at night.	For diarrhea, dropsy, epilepsy and pain killer. Seeds emetic, blood purifier, cathartic pain killer and as a tonic.
2. <i>Berberis lycium</i> Royle (Berberidaceae)	Quaray/ Zair-largay	April-July	Chokail	R, B	Root by digging & bark by cutter.	Boiled in water and then filtered. The bark is dried, grinded, and mixed with milk.	Orally, also can be used externally.	One glass before breakfast every day. One thalay three times a day. Small amount for wounds three times a day.	Used for blood purification, ulcers, coolant, and tonic, kidney problems and cutting.
3. <i>Rheum emodi</i> Wall. ex Meisner (Polygonaceae)	Choidal	June-July	Kafar banda	R	Digging	Collected, dried and grinded.	Orally, once in a day before meal.	¼ chalang (17 g)	Stomach problems
4. <i>Trillidum gavalanum</i> (Royle) Karth (Trilliaceae)	Mathi Jari	June-July	Kafar banda	R	Digging	Dried, grinded and powdered.	Orally, once in a day at morning before are after meal everyday.	Half swollen roots is used, once.	For children, especially in weakness (Nary Maraz) as tonic.
5. <i>Calina alba</i> L. (Ranunculaceae)	Makarpash	May-Aug.	Jabba, Miankhoun.	R	Digging	Dried, grinded, and powdered.	Orally, one either at morning or evening after meal.	One chalang (70 g) for adults and half chalang (35 g) for children.	Used for asthma
6. <i>Aconitum voliacum</i> Stapf (Ranunculaceae)	Zarimora	July-Aug.	Char Banda	WT	Digging	Dried, grinded and powdered.	Orally, used only by the adults once a day at morning before breakfast.	Wheat grain size amount is used.	Used for pain (Body dard)
7. <i>Valeriana jatamansi</i> Jones (Valerianaceae)	Mushk-e-Bala	April-July	Jabba, Kafar banda	R	Digging	Dried, grinded and powdered.	Orally	Small amount	Used in Cholera and dysentery, also carminative and stimulant.
8. <i>Podophyllum emodi</i> Wall. (Podophyllaceae)	Kakora	April-May	Kafar banda, Jabba	R	Digging	Dried, grinded and powdered.	Orally	One thalay (10g) is used at night.	Purgative, used for pain killer.
9. <i>Moricheila</i> spp. (Heliellaceae)	Gochay/ Gochay	March-Apr.	Miankhoun, Badni	WP	Hands	Dried, and grinded. Fresh is also used.	Orally	No specific quantity.	Highly nutritive, used as nutrition.
10. <i>Nepeta raphanostiza</i> Bth. (Labiatae)	Kagool/ Thor body	June-July	Seri	L	Sickle/Cutter	Make small pieces	Externally	A small amount is used.	For curing cuttings.

11. <i>Mentha viridula</i> L. (Labiatae)	Podina	May-July	Badai	L	Knife/Sickle	Dried, grinded and powdered. Mixed with small amount of salt.	Orally, three times a day after meal or before meal	one teaspoon is used at a time for adult and ½ teaspoon for children	For vomiting, stomach pain, fever etc
12. <i>Pyrenula denticulata</i> Aitch (Primulaceae)	Marmara	April-July	Jabba, Serei,	F, R	Cutter	Dried and powdered	Externally, at night	Three Salinan at night	Used for eye infections
13. <i>Juglans regia</i> L. (Juglandaceae)	Ghoz	June-July	Badai, Serei, Ghund Patai	S, B, Fr	Cutter & hands	Collected, dried and small bundles are made. Seeds dried	Endosperm of the seeds is used orally. Bark is used externally	About 10 g of bark is used daily at night. Small amount of seeds are used	Bark is used as antiseptic and for beautification. Endosperm of the seeds are used as tonic
14. <i>Mentha longifolia</i> L. (Labiatae)	Veinalay, Ben	June-July	Ghund Patai	L	Sickle	Collected, dried and grinded and are mixed with onion.	Orally	One thalay (20g) is used at two-hour interval.	Used for diarrhea, stomach problems, stimulant, and antiseptic.
15. <i>Arisaema flavum</i> (Forssk.) Schott. (Araceae)	Mar Jacai	June-July	Serei	R	Digging	Mixed with Roots <i>Malva parviflora</i> (Sonchal) & <i>Litsea monopetala</i> (Khadang) boiled with ghar and milk of either goat or buffalo	Orally	One liter once a day and at a time	For animals: It is used as tonic and for more milk production
16. <i>Rumex nepalensis</i> Spreng. (Polygonaceae)	Shakhay, Voola	June-July	Ghund Patai	R	Digging	Dried, grinded, mixed with water and boiled	Orally	One liter is once	As tonic to animals
17. <i>Stemodia lauroleia</i> (DC.) Sieb. & Zucc. Ex Walp. (Rutaceae)	Nazar Para	June-July	Badai, Serei, Jabba	R	Digging	Dried, grinded, mixed with water and boiled	Orally	One liter bottle is used once	As tonic to animals
18. <i>Thymus serpyllum</i> L. (Labiatae)	Bedai	June-July	Badai, Serei, Jabba	L, F	Cutter/sickle	Dried and grinded	Orally	One teaspoon in tea for human. One chalang for animal	For warmth and more milk production
19. <i>Ajuga bracteosa</i> Wall. Ex Bth. (Labiatae)	Bootee	June-July	Badai, Serei, Jabba	L	Cutter/sickle	Grinded-mixed with water-kept at night in open place	Orally,	One glass, every day in the morning before breakfast	Decoction is used for purification of blood, curative, used for jaundice and throat problems
20. <i>Litsea monopetala</i> (Roxb.) Pers (Lauraceae)	Khadang	June-August	Badai, Serei, Jabba	B	Cutter/sickle	Grinded and powdered	Orally	Small amount every day in the morning before breakfast	Used in diarrhoea and dysentery and tonic.

Key: R=Roots, B=Bark, L=Leaves, F=Flower, S=Seeds, WP= Whole plant, WT= White tubers.

RESULTS AND DISCUSSION

The remedies prepared from the plants were found to be used for various purposes (Table 1). Out of the 20 plants seven were used as general body tonic. These included *Paevonia emodi*, *Berberis lycium*, *Trillidium gavanianum*, *Morchella* spp., *Juglans regia*, *Rumex nepalensis* and *Litsea monopetala*. Five plants *Rheum emodi*, *Mentha viridis*, *Mentha longifolia*, *Arisaema flavum* and *Rumex nepalensis* were used for stomach problems. Three plants *Paevonia emodi*, *Mentha longifolia* and *Litsea monopetala* are used for treating diarrhoea and *Paevonia emodi*, *Aconitum volaceum*, *Podophyllum emodi* are used as pain killer. *Paevonia emodi*, *Berberis lycium* and *Litsea monopetala* are used as blood purifier. *Valeriana jatamensi*, *Podophyllum emodi* and *Mentha longifolia* are used as stimulant. Two plants each such as *Valeriana jatamensi* and *Litsea monopetala*; *Berberis lycium* and *Nepeta raphnorhiza*; *Valeriana jatamensi* and *Litsea monopetala*; *Juglans regia* and *Mentha longifolia* are used for dysentery, cutting, carminative and antiseptic respectively. *Paevonia emodi* is used as emetic, for dropsy and cathartic while *Valeriana jatamensi* is used for treating cholera. *Berberis lycium* is used for treating ulcer, as coolant and kidney problems. *Mentha viridis* is used in vomiting and fever while *Caltha alba* is used for asthma and *Podophyllum emodi* is purgative. *Thymus serpyllum* is given to animals for more milk production and body warmth. *Litsea monopetala* is used for jaundice and throat problems while the bark of *Juglans regia* is used for beautification (Dandasa).

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WEEDS AND LIVELIHOOD IN MANKIAL VALLEY, HINDUKUSH RANGE, PAKISTAN

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ABSTRACT

An important step in the livelihood planning and improvement of the locals in an extremely isolated far-flung area of Mankial Valley of district Swat which is entirely dependent upon plant natural resources was investigated. Diverse age groups ranging from 25-120 years were interviewed about the role of common weed species growing wild in their crop fields in the study area. Twenty three weed species of ethno medicinal importance were collected from different crops i.e. maize, turnip, potato, cabbages and tomatoes. Out of the twenty three species, eleven (47.82%) were used as fodder, six (26.08%) as pot-herb, two (8.69%) each as purgative, diuretic, antiseptic, carminative, healing wounds, athlete's foot, and one (4.34%) each as flatulence, stimulant, antirheumatic, emollient, refrigerant, skin healer, liver, lungs disease and as stomachache. However, due to the rapid increase in population of the valley and to meet the growing demand for more food, the people use different herbicides for the removal of these weeds from their crop fields. Instead of the use of hazardous herbicides, proper weed management is proposed for the sustainability of ecosystem, conservation of plant natural resources and preservation of the indigenous knowledge of the local communities of this remote area of the country for the upcoming generations.

Key words: District Swat, ethnomedicinal uses, pot herb.

INTRODUCTION

Mankial valley is situated in Upper Swat and is lying at 35° 12', 24.1" N to 72° 32', 15.1" E. On the revenue Index map of Swat District, the area is traced on Mozas (Settlement units) bearing S. No. 18 & 19 (Bhadai and Mankial) with the landholdings of 20620 and 11658 acres, respectively. The area has a very steep relief in a couple of Kilometers and varies from 1430 m at Mankial to 5726 m at Koohe Shaheen. The area represents a mountainous terrain of the high-glaciated peaks, perennial snowfields, glaciers, falls,

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pastures, river, stream and intact forests. Physically the area can be divided into the mountains, valleys, pastures and dendrotic drainage network of the river Mankial. Generally weed is an unwanted plant growing in the crops fields. Though, almost all weeds are responsible for lower productions of agricultural crops, some of them are used directly or indirectly by the locals for various purposes (Shinwari *et al.*, 2003; Ahmad and Sirajuddin, 1996; Din *et al.*, 2003; Muhammad *et al.*, 2003; Ullah and Rashid, 2004). While Naeem *et al.*, 2004; reported eleven weed species of Ethnobotanical importance from District Bannu. Similarly locals of the socio-economically backward area like Mankial are also dependent on weeds for their livelihood. The inhabitants of the valley fulfill their requirements of the day to day life by utilization of Plant Natural Resource. The present study will correlate the weed flora, livelihood improvement, sustainable utilization and conservation of the Plant Natural Resources of the valley.

MATERIALS AND METHODS

This study was conducted in summer 2004 by using questionnaire method (Martin, 2004) in five different localities viz. Mankial Bazar 1700 m; Mehnain 1730 m; Ghund Patai 1766 m; Bhadai Baba 1894 m; and Bhadai Patai 2075 m. Plants were collected from various agricultural crops pressed and documented in the field. Habit, habitat, altitude and other related information were noted (Table-1). Identification was carried out with the help of herbarium specimens of Peshawar University Herbarium (PUP) and the available literature (Stewart, 1972; Beg and Khan, 1977; Nasir and Ali, 1970-1989; Ali and Nasir, 1989-1991; Ali and Qaiser, 1993-2003). Voucher specimens were deposited in the University of Peshawar Herbarium (PUP).

RESULTS AND DISCUSSION

The results of the present study (Table-1) show that weeds found in Mankial Valley play an important role in the livelihood of the people in the valley. Twenty three different weeds were reported from the area belonging to twelve families. Out of these eleven plant species namely, *Amaranthus gracilis* Desf., *Amaranthus viridis* L., *Convolvulus arvensis* L., *Dactylis glomerata* L., *Digitaria ciliaris* (Retz.) Koel., *Eragrostis poaeoides* P.Beauv., *Pennisetum elatum* L., *Piptatherum gracilis* Mez., *Saccharum halepense* L., *Setaria glauca* (L.) P. Beauv. and *Sonchus asper* (L.) Hill. were used as fodder both in fresh and dry form. Most of the weeds have medicinal values and are locally used for various body disorders. The leaves of *Chenopodium botrys* are used for healing of wounds. *Convolvulus arvensis* L. is purgative and used in skin disorders. Extracts of the *Equisetum arvense* L. is mixed with oil (mustard oil) and is used as hair tonic and also used to kill lice. The seeds of *Lepidium sativum* L. are given orally as a decoction to all livestock to treat flatulence. Decoction of *Malva neglecta* Wallr. is antispasmodic. Powder of the

dry leaves of *Mentha longifolia* (L.) Huds. are used as stimulant and antirheumatic. Leaves of *Nepeta erecta* (Bth.) are used for curing cuttings and wounds. Dried powder of the leaves of *Plantago depressa* Willd. and *Plantago major* L. are used as antiseptic. Seeds are swallowed with water and used in diarrhea. Fresh leaves are crushed for athlete's foot. *Portulaca oleracea* L. is used as pot-herb, refrigerant and alternative. Also used for kidney, liver, urinary bladder and lung problems. *Rumex dentatus* L. is pot-herb, and is used as diuretic, astringent and demulcent. It soothes the irritation caused by *Urtica dioica* L. which grows in association with *Rumex dentatus* L. Roots are astringent. *Rumex hastatus* D. Don. is used as flavoring agent, carminative, purgative, astringent, diuretic and stomach cure. Some of the specimens are shown in Plates 1-4.

Though most of the weeds have some adverse effects on the crop plants, yet many of them are used by the farmers for various purposes in their routine life. It is foreseen that proper weeds management and sustainable utilization will improve the livelihood of the local inhabitants.



Plate No. 1 *Amaranthus viridis* L.



Plate No. 2 Collection in Progress



Plate No. 3 *Equisetum arvense* L.



Plate No. 4 *Portulaca oleracea* L.

Table-1. Diverse information of weed species regarding their botanical, local, Urdu and English names, family and ethnobotanical uses.

S.No.	Family/Botanical Name	Local, Urdu & English Names	Crop Field	Ethnobotanical Importance
1.	Amaranthaceae i. <i>Amaranthus gracilis</i> Desf. ii. <i>Amaranthus viridis</i> L.	Gata Chalway, Ganher, Amaranth Wara chalway, Ganher, Amaranth	Maize, potato Maize, potato	Fodder and pot- herb Pot-herb and emollient
2.	Asteraceae i. <i>Sonchus asper</i> (L.) Hill.	Shodapai, Sow thistle	Garwa, Potato, tomato	Fresh plant is used as fodder for cattle.
3.	Brassicaceae i. <i>Lepidium sativum</i> L.	Sharsham, Halim, Garden cress	Turnip, cabbage	The decoction seeds are given to live stock for flatulence treatment.
4.	Chenopodiaceae i. <i>Chenopodium botrys</i> L. ii. <i>Chenopodium murale</i> L.	Sakha booty, Sakha Kharawa, Jerualem Ganda booty, Chalwairay, Goose foot	Maize, potato Maize, potato	The leaves are used for the healing of wounds, and discharge of pus. The young shoots are used as pot-herb and as a fresh fodder.
5.	Convolvulaceae i. <i>Convolvulus arvensis</i> L.	Pairwaty, Pohli, Field bind weed	Turnip, tomato	Fresh fodder, purgative and skin disorders
6.	Equisetaceae i. <i>Equisetum arvense</i> L.	Bandakai, Horse tail	Methi, Maize, turnip	Extracts of the plant is mixed with oil (mustard oil) and is used as hair tonic and lice killer.
7.	Lamiaceae i. <i>Mentha longifolia</i> (L.) Huds. ii. <i>Nepeta erecta</i> (Bth.) Bth.	Denali, Jangali podina, Horse mint Skha podina, Desi Jibing, Ground Ivy Pandirak, Kauai, Dwarf mallow	Maize, turnip Maize, turnip Maize, potato	Powdered dried leaves are used as a stimulant and antirheumatic. For cuttings and wounds
8.	Malvaceae i. <i>Malva neglecta</i> Wallr.			Pot-herb, ornamental. Leaf decoction is antispasmodic.
9.	Plantaginaceae i. <i>Plantago depressa</i> Willd. ii. <i>Plantago major</i> L.	Waroky sat, Ispaghole, Semen Plantaginis Ghat sat, Ispaghole, plantain	Cabbage, potato Cabbage, potato	Dried powdered of the leaves are used as antiseptic. Seeds are swallowed with water in diarrhea. Fresh leaves are crushed for athlete's foot. Dried powdered of the leaves are used as antiseptic. Seeds are swallowed with water in diarrhea. Fresh leaves are crushed for athlete's foot.
10.	Poaceae			

i. <i>Dactylis glomerata</i> L.	Wakha, Cock's foot	Maize	Fresh and dry fodder
ii. <i>Digitaria ciliaris</i> (Retz.) Koel.	Shamokha, Henry's Crabgrass	Maize	Fresh and dry fodder
iii. <i>Eragrostis poaeoides</i> P. Beauv.	Wakha, Allamanda, Climber of Garden	Maize	Fresh and dry fodder
iv. <i>Pennisetum elatum</i> L.	Wakha, Pearl millet	Maize	Dry and fresh fodder for cattle
v. <i>Piptatherum gracilis</i> Mez.	Wakha, Rye grass	Maize	Used as dry and fresh fodder for cattle
vi. <i>Saccharum halepense</i> L.	Wakha, Khati Buti, Hedge Grass	Potato	Fodder both dry and fresh
vii. <i>Setaria glauca</i> (L.) P. Beauv.	Wakha, Knot root fox tail	Maize	Used as fodder for cattle
11. Polygonaceae			A pot-herb, diuretic, astringent and demulcent. It soothes the irritation caused by <i>Urtica dioica</i> .
i. <i>Rumex dentatus</i> L.	Shalkhy, Ambarati, Duck	Potato, turnip	Used as flavoring agent, carminative, purgative, astringent and diuretic. Used as stomachache.
ii. <i>Rumex hastatus</i> D. Don.	Tarooky, Khati buti, Dock sorrel	Potato, turnip	
12. Portulacaceae			
i. <i>Portulaca oleracea</i> L.	Warkhare, Gaozaban, Purslane	Maize	A pot-herb, refrigerant and alternative. Also used for kidney, liver, urinary bladder and lung problems.

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