

Phytotherapeutic and Ethno-botanical Importance of Plant Biodiversity of Dachigam National Park, Kashmir

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Abstract

Objectives: A rich plant diversity is being supported by Himalayan mountain ecosystems including many endemic and endangered species that which has been used by the indigenous populations for traditional health care remedies for many years. These communities also depend on mountain resources for their livelihood in terms of collection and sale of medicinal plants and other basic requirements. A study on the important plant communities of scrub ecosystems was carried out with special aim of phytosociological evaluation, preparation of ethnobotanical, ethnomedicinal, ethnoveterinary and ethnocosmetic inventory and evaluation of conservation status of important medicinal plants.

Materials and methods: Data was collected by semi structured, structured interviews and questionnaire methods coupled with group meetings, field discussions on different topics with the people especially local vaid, households, herbal healers and pastoralists.

Results and discussion: Data collected from the present investigation indicate that 80 plants belonging to 38 families with Rosaceae the dominant family were exclusively used in traditional healthcare system. The knowledge on medicinal plant distribution, habitat, uses, part used and mode of preparation for use is like a prized ancient wisdom preserved within elders and women folk of the ethnic groups. Different degrees of threats were observed to different valuable medicinal plants during the period of investigation.

Conclusion: The people of the area are exclusively dependent on medicinal plants using traditional knowledge that provide them the best therapeutic and economic benefits. Such traditional knowledge could be valuable for developing local and regional conservation strategies for these fragile ecosystems. There is an urgent need to thoroughly analyze the secondary metabolite properties of such plants in order to validate their authenticity in the local health care systems. Recommendations are also given for monitoring and sustainable collection of medicinal plant resources so as to avoid their overexploitation and to preserve such dwindling plant wealth along with unique ecosystems.

Keywords: Ethnobotany; Traditional knowledge; Scrub; Medicinal plants; Conservation; Dachigam

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Introduction

Ethnobotany is one of the valuable cultural heritages of an area that involves the interaction between plants and people and foremost among these are the traditional use of medicinal plants

and sustainable management of plant biodiversity by these indigenous communities [1]. The recent gradual shift to the natural medicine worldwide has also highlighted the importance of compiling information about medicinal plant species used by ethnic and indigenous communities [2,3]. A plant that possesses

therapeutic properties naturally synthesizes and accumulates some secondary metabolites like alkaloids, glycosides, volatile oils, vitamins and minerals in different body parts such as leaves, fruits, seeds, rhizome etc., Ahmad et al. [4] and Ahmad et al. [5] possesses a special importance in these mountain ecosystems [6]. These plants play a significant role in providing health care and improving economy of the country [7].

Traditional knowledge is a cultural asset which can be used for the recognition and preservation of valuable species as well as habitats in long-term management [1,8]. As increased market demand for herbal medicine and recent controversies regarding biopiracy, such documentation and compilation of ethno ecological knowledge is of top priority [9,10]. Moreover, integrating traditional knowledge is gaining importance in many parts of the world Ahmad, et al. [2] Mutenje, et al. [11] and people having long term associations with vegetation can provide a valuable observation Tarrason [12] for conservation and management plans for vegetation of these ecosystems that give food security to indigenous as well as people of low lands Rasul [13] and Sharma, et al. [14] Apart from plants being social and ecological indicators when employed together with traditional knowledge can play a significant role in conservation strategy designing [15]. Ethno ecological knowledge if supplemented with the latest scientific insights can provide new dimensions of sustainable development that environmentally, economically and socially acceptable Murtem [16] and Shinwari [7] and effective tools against the scenario of climate change and economic instability [17].

Since only a few studies have been carried out regarding ethnobotanical uses of plants growing in the Kashmir Himalaya Akhtar, et al. [18] and Khan [19] and particularly no such work has been carried out on scrub ecosystems. Hence, the current study was undertaken to prepare an ethnobotanical inventory of the plant resources of the study area that will prove to be beneficial for both traditional communities as well as sustainable ecosystem functioning.

Materials and Methods

Study area

Dachigam National Park is located within the heart of Kashmir Himalaya located at the North West tip of the Himalayan biodiversity hotspot. The study was conducted during Jan-Dec 2010.

Regular field trips were organized in the study area from Jan-Dec, 2010 to document the ethnobotanical uses of plants of scrub areas of Dachigam National Park, Jammu and Kashmir, India. The plant species growing in different months were collected in different months in different flowering/fruitlet stages and the plant material was processed as per standard herbarium technique [20]. The preliminary identification was done with the help of local flora and rests of the specimens were identified at center of taxonomy department of Botany, University of Kashmir.

Regular trips were made on monthly basis throughout the year in different altitudinal zones and the ethnobotanical information

was collected by semi structured, unstructured, formal and informal interviews and questionnaire to compile information about different aspects of plants such as local name, local uses, part used, method of collection, collection time, mode of administration, curative properties and method of preparation etc. Generally, the respondents were elderly people especially women, local vaid and herbal healers in the neighborhood of the study area. About 150 households and 100 vaid and herbal healers were interviewed and the information was documented through questionnaire. In addition, the pastoralists migrating to the area during summer for grazing were also contacted and interviewed about the plant resources they use during their stay in the area.

Results

Vegetation analysis

Variation in the vegetation pattern of the area was observed due to change in aspect, altitude and microclimatic conditions. The existence of five plant communities being the result of interaction of biotic and abiotic factors within the microhabitats.

All these were shrub-herb communities which are the true representatives of a typical scrub ecosystem. **Table 1.** reveals that three communities viz *Plectranthus rugosa*-*Rosa webbiana*-*Thymus linearis*, *Indigofera heterantha*-*Clematis Montana*-*Themeda anathera*, *Jumiprus wallichiana*-*Juniprus communis*-*Poa astraguinia* were south facing and two communities viz *Plectranthus rugosa*-*Ziziphus jujube*-*Filago arvensis*, *Indigofera heterantha*-*Berberis lyceum*-*Filago arvensis* were west facing slopes which indicates a complex relationship of vegetation to the position, altitude and aspect of the landscape.

Vegetation types of south facing slopes

Plectranthus rugosa-*Rosa webbiana*-*Thymus linearis*: This community faces south slopes at an elevation of 1944 m and ranges from 2 cm to 6 feet in height. It covers 89% of the ground (45% by herbs and 44% by shrubs) and showed the presence of other species such as *Berberis lyceum*, *Daphne mucronata*, *Rosa webbiuana*, *Artemesia Scoparia*, *Anemone obtusiloba*, *Colchicum lutiim* and *Ajuga parviflora* among the medicinally important plants.

Indigofera heterantha-Clematis Montana-Themeda anathera: This community occurs at an elevation of 2630 m facing south slope. It is characterized by *Jasminum humile*, *Rubus niveus*, *Sarbaria tomentosa*, *Adiantum cappilus-venris*, *Dioscorea deltoids* and *Hypericum perforatum* as important medicinal plants. It covers 95% of ground (75% by herbs and 20% by shrubs) and attains a height from 8 cm to 11 feet.

Jumiprus wallichiana-Juniprus communis-Poa astraguinia: This community occurs at alpine area and is characterized by *Rhododendron*, *Iris hookriana*, *podophyllum hexandrum*, *Sassurea lappa* and *Rheum webbianum* as commercially important medicinal plants. The community occurs in south facing slopes at an elevation of 3810 m. The height of the community ranges from 3 cm to 4 feet covering 92% of ground (70% by herbs and 22% by shrubs).

Table 1 Ethnobotanical uses of plants.

| S. No | Species | Local Name | Family | Part Used | Name of the disease/other medicinal importance |
|-------|------------------------------------|--------------------|----------------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | <i>Adiantum capillus veneris</i> | Gew theer | Pteridaceae | Shoot | Shoot is boiled for one hour with sugar and the decoction is used for treatment of prolonged cough and asthma. |
| 2 | <i>Artemesia scoparia</i> | Tethwen | Asteraceae | leaves | Extract from leaves mixed with water taken orally to treat uneven menstrual cycles |
| 3 | <i>Artemesia vulgare</i> | Teth wen | Asteraceae | Shoot | Extracts from crushed leaves are used against endoparasites in children |
| 4 | <i>Acillia millefolium</i> | Berguer | Asteraceae | Leaves | Dried leaves are taken to relieve headache and constipation, fresh leaves are chewed to relieve toothache, extract mixed with wheat flour is used to treat snake bites |
| 5 | <i>Anemona obtusiloba</i> | NA | Ranunculaceae | | Paste made from tender dried leaves is occasionally taken to relieve menstrual pain in teen agers |
| 6 | <i>Berberis lyceum</i> | Kawduchh | Berberidaceae | Fruits, roots, leaves | Fruits are eaten, roots used in piles and leaves are used in jaundice, Fruit juice is used to relieve gum and tooth ache |
| 7 | <i>Cotoneaster nummularia</i> | Leun | Rosaceae | Whole plant | Fuel/Art and craft |
| 8 | <i>Capsella bursa pastrolis</i> | Kralmond | Brassicaceae | Tender leaves | Leaves are cooked and taken with meals |
| 9 | <i>Crategus songarica</i> | NA | Capridaceae | Fruits | Edible fruits used in jams and jellies, fruit extract is used as cardiac tonic |
| 10 | <i>Clematis grata</i> | NA | Ranunculaceae | Leaves | Leaves used as fresh fodder, chopped leaves when smelled cause nausea |
| 11 | <i>Colchicum leuteum</i> | Janglikong/ Verkin | Lilliaceae | Bulbs | Powder of the ground corms mixed with ghee is used to treat inflammation and joint pain, stigma of flowers is used as a dye in local tea-kehwa |
| 12 | <i>Codonopsis ovate</i> | NA | Campanulaceae | Leaves, Roots | Roots and leaves are said to be used in the form of poultices for the treatment of ulcers and wounds |
| 13 | <i>Dipsacus inermis</i> | Wopalhawk | Dipsacaceae | Leaves | Religious ceremonies, shade dried leaves are used as vegetables and sexual tonic |
| 14 | <i>Dioscorea deltoids</i> | Kraeth | Dioscoreaceae | Rhizome | Dried rhizome fried in ghee is taken before breakfast to treat kidney problems, mixed with milk and taken orally to treat menstrual cramps |
| 15 | <i>Elaeagnus spp.</i> | NA | Elaeagnaceae | Fruits | Fruits being edible are eaten |
| 16 | <i>Fragaria nubicola</i> | Jangli Istaber | Rosaceae | Ripe Fruits | People take this fruit as it is delicious when ripe |
| 17 | <i>Galium aparine</i> | NA | Rubiaceae | Seeds | Seeds are grinded and substituted for coffee |
| 18 | <i>Geranium wallichianum</i> | NA | Geraniaceae | Rhizome | Rhizomes are powdered and mixed with sugar and prepared in ghee and the preparation is given as tonic for backache |
| 19 | <i>Hypericum perforatum</i> | NA | Hypericaceae | Leaves | Leaves are used to make local tea to reduce burning sensation during urine infection |
| 20 | <i>Indigofera heterantha</i> | Kats | Papilionaceae | Stem | Art and craft, sweeping material, firewood, mouth blisters, Powdered roots taken with milk to treat headache |
| 21 | <i>Iris hookriana</i> | Besal | Iridaceae | Rhizome | Powdered rhizome is mixed with milk to treat constipation |
| 22 | <i>Juniperus communis</i> | Wethur | Juniperaceae | Whole plant | Fuelwood, Fruit helps in digestion and relieves gas |
| 23 | <i>Jasminum humile</i> | Chamayli | Oleaceae | Shoot | Ornamental, extracts from flowers is used as mouth freshener |
| 24 | <i>Jurinea ceratocarpa</i> | Gogaldhup | Asteraceae | Leaves | Religious ceremonies |
| 25 | <i>Lavetera kashmiriana</i> | Sozposh | Malvaceae | Flowers | Powder of dried flowers is mixed with milk and used for the treatment of mumps in children |
| 26 | <i>Lonicera quinquelocularis</i> | Pakhur | Caprifoliaceae | Leaves, branches | Fodder, earlier branches were used to make arrow shafts |
| 27 | <i>Malva neglecta</i> | Sotsal | Malvaceae | Shoot | Leaves and young shoots are cooked as vegetable, seeds boiled in sugar water are used against cough and fever |
| 28 | <i>Marubium vulgare</i> | | Lamiaceae | Leaves | Leaf extract is used as eye drop, to treat ophthalmic infections |
| 29 | <i>Nasturtium officinale</i> | Kulhaak | Brassicaceae | Young leaves | Leaves are cooked and taken as vegetables and used in salad, leaf juice used in stomach ulcers |
| 30 | <i>Oxalis corniculata</i> | choak chin | Oxalidaceae | Whole plant | Whole plant is as vegetable, extract from leaves is mixed with sugar and used in jaundice, juice used for making cheese |
| 31 | <i>Parrotiopsis jacquemontiana</i> | Hatab | Hamemelidaceae | Whole plant | Firewood, Leaves used as fodder, stem used for making handles of plough, axes, sickle and saw |

| S. No | Species | Local Name | Family | Part Used | Name of the disease/other medicinal importance |
|-------|--------------------------------|--------------|----------------|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| 32 | <i>Polygonum plebeum</i> | Drouba | Polygonaceae | Leaves | Young leaves are cooked and used as vegetable |
| 33 | <i>Polygonum alpinum</i> | NA | Polygonaceae | Above ground parts | Tender leaves and stem are cooked after washing with hot water |
| 34 | <i>Poa bulbosa</i> | NA | Poaceae | Shoot | Fodder |
| 35 | <i>Podophyllum hexandrum</i> | Wanwangun | Podophyllaceae | Fruits | Fruits are eaten, Rhizome is used in the treatment of cancer |
| 36 | <i>Prunella vulgaris</i> | Kalveoth | Lamiaceae | Flowers | Religious ceremonies |
| 37 | <i>Prunus prostrata</i> | Gurdaal | Rosaceae | Fruits | Fruits (rich in vitamin c) are eaten |
| 38 | <i>Plectranthus rugosa</i> | NA | Lamiaceae | Whole plant | fuelwood, antiseptic, anti-inflammatory, used in jaundice |
| 39 | <i>Plantago major</i> | Gulla | Plantaginaceae | Leaves | Tender leaves are cooked as vegetables, leave infusion used to reduce excessive bleeding during periods. |
| 40 | <i>Rheum webbianum</i> | Pambhaak | Polygonaceae | Leaves | Tender leaves are used in chutney and salad and stalks are cooked and used as vegetable, Rhizome is used to treat burned skin |
| 41 | <i>Rhododendron anthopogon</i> | Vethur | Ericaceae | Leaves | Leaves are sometimes used for making tea |
| 42 | <i>Rumex acetosella</i> | Obj | Polygonaceae | Young leaves and stem | Washed with hot water to remove sour taste and then cooked like spinach and taken as vegetable. Leaves used in chutney |
| 43 | <i>Rumex patientia</i> | Jangli Obuj | Polygonaceae | Leaves | Occasionally it is an ingredient of Chutney |
| 44 | <i>Rosa webbiana</i> | Jangli gulab | Rosaceae | Fruits | Fruits are eaten rarely |
| 45 | <i>Rubus fruticosus</i> | Chanch | Rosaceae | Fruits | Fruits are eaten to improve digestion power |
| 46 | <i>Rubus ellipticus</i> | Allaj | Rosaceae | Whole plant | Fruits are edible, plant used for hedges and fences |
| 47 | <i>Salvia moorcraftiana</i> | NA | Lamiaceae | Leaves | Leaves are warmed with oil and applied on swollen areas to release pus, honey bee plant |
| 48 | <i>Setaria viridis</i> | NA | Poaceae | Shoot | Fresh and dried fodder |
| 49 | <i>Sibbaldia cunneata</i> | NA | Rosaceae | Leaves | Juice of the leaves is used for making tea rarely |
| 50 | <i>Sorborea tomentosa</i> | NA | Rosaceae | Flower | Inflorescence is mixed with mustard oil and applied on skin to remove rashes |
| 51 | <i>Taraxicum officinale</i> | Handh | Asteraceae | Leaves | Cooked and used as vegetable, flowers are boiled and mixed with honey to treat cough, special diet for ladies who have undergone abortion |
| 52 | <i>Trifolium pretense</i> | Batak Neur | Papilionaceae | Leaves | Fodder, leaves are rarely cooked as vegetables |
| 53 | <i>Trifolium repens</i> | Batak Neur | Papilionaceae | Shoot | Fodder, dried flowers and seeds are used to treat cough and cold |
| 54 | <i>Thymus linearis</i> | Ujwain | Lamiaceae | Whole plant | Used to add flavour to Achar, flowers used to make tea, decoction of leaves used against dysentery |
| 55 | <i>Verbascum thapsus</i> | Tamokh | Plantigenaceae | Leaves | Inflorescence is used as tobacco and leaves are used to make bedi-a local cigarette |
| 56 | <i>Viburnum grandiflorum</i> | Kulmauch | Caprifoliaceae | Leaves and fruits | Fodder, fruits are eaten |
| 57 | <i>Viola betanosifolia</i> | Bunafsha | Violaceae | Flowers | Flowers are eaten and its soup is used as substitute for tea |
| 58 | <i>Viola biflora</i> | Bunafsha | Violaceae | Flowers | Its soup is used as a substitute for tea, used in making khameer(a type of jam), for treatment of cough and cold |
| 59 | <i>Ziziphus jujuba</i> | Bar Kund | Rhamnaceae | Berries | Fruits are eaten, dried fruits are used as blood purifier |

Where NA: Not Available.

Vegetations of west facing slopes

Plectranthus rugosa-Ziziphus jujube-Filago arvensis: The community is present in the west facing slope at an elevation of 1620 m and attains a height ranging from 1 cm to 4.5 feet covering 85% of area (52% by herbs and 33% by shrubs). Some commercially important plants are *Jurenia ceratocarpa*, *Oxalis corniculata*, *Marubium vulgare*, *Verbascum Thapsus*, *Salvia moorcraftiana* and *Plantago major*.

Indigofera heterantha-Berberis lyceum-Filago arvensis: The community is reported from the west facing slope with an altitude

of 1818 m and covers about 91% of ground (52% by herbs and 33% by shrubs). It attains a height from 3 cm to 9 feet with *Rubus lasiocarpus*, *Viburnum grandiflorum*, *Corrydalis rotifolis*, *Malwa neglecta* and *Taraxicum officinale* as important medicinal plants being commercially used.

Distribution and availability: The scrub area is a rich abode of medicinal plants which are decreasing day by day due to increasing biotic pressures such as deforestation, grazing, unregulated collection and overexploitation by pastoralists. Although the thorny and prickly species are resistant to grazing pressures but

rest of the herbs are sensitive to it. Species like *Berberis lyceum* and *Artemesia Scoparia* were present in most of the areas while as *Podophyllum hexandrum*, *Iris hookriana*, *Bergenia ciliata*, *Sassurea lappa*, *Dioscorea deltoids* were reported at few places of the study area with *Dryopteris balanfordii* and *Adiantum capillus-veneris* being restricted to moist locations.

Ethnobotanical Survey

The study revealed that scrub ecosystem harbor a diverse plant

wealth valuable for ethnoecological knowledge. **Tables 2 and 3.** The present investigation revealed the presence of 187 plant species of which 182 are angiosperms, 2 are gymnosperms and 3 are pteridophytes. The survey reveals that 78 species belonging to 39 families are exclusively being used by locals for ethnobotanical purposes. The plant species were grouped into Ethnobotanical (54), Ethnomedicinal (38), Ethnoveterinay (08) and Ethnocosmetic (10). Most of the species are used for both ethnobotanical as well as ethnomedicinal purposes.

Table 2 Ethnomedicinal uses of plants.

| S. No | Species | Family | Part Used | Name of the disease/other medicinal use |
|-------|-------------------------------|---------------|----------------------|-------------------------------------------------------------------------------------------|
| 1 | <i>Achillea millefolium</i> | Asteraceae | Leaves | Tonic |
| 3 | <i>Ajuga parviflora</i> | Lamiaceae | Whole plant | Diuretic, antispasmodic and tonic, mouth blisters, cataract |
| 4 | <i>Asparagus filicinus</i> | Asparagaceae | Whole plant | Indigestion and gastric problems |
| 5 | <i>Anemone obtusiloba</i> | Ranunculaceae | Aerial parts | Nasal troubles |
| 6 | <i>Artemesia absinthium</i> | Astereaceae | Whole plant | Antihelmenthic, anti-inflammatory |
| 7 | <i>Berberis lyceum</i> | Berberidaceae | Root and bark | Urethral splenic troubles, febrifuge, intestinal colic, antispasmodic. Bark is astringent |
| 8 | <i>Bergenia ciliata</i> | Saxifragaceae | Root | Roots are laxative, astringent, diuretic and tonic |
| 9 | <i>Bupleurum longicanle</i> | Apiaceae | Aerial parts | Abdominal inflammation, indigestion, malarial fever |
| 10 | <i>Cardamine impatiens</i> | Brassicaceae | Aerial parts | Nervous diseases |
| 11 | <i>Codonopsis ovate</i> | Campanulaceae | Roots | Antiseptic |
| 12 | <i>Colchicum luteum</i> | Lilliaceae | Corm | Rheumatism and antigout |
| 13 | <i>Dioscorea deltoids</i> | Dioscoreaceae | Rhizome | Rheumatic, ophthalmic disorders and expelling worms |
| 14 | <i>Elaeagnus spp.</i> | Elaeagnaceae | Above ground parts | Eye diseases |
| 15 | <i>Fragaria nubicola</i> | Rosaceae | Whole plant | External parasites |
| 16 | <i>Geranium pretense</i> | Geraniaceae | Aerial parts | Fever, urinary troubles |
| 17 | <i>Geranium wallichianum</i> | Geraniaceae | Root | Stomach disorders, gonorrhoea and ophthalmic, bone fractures |
| 18 | <i>Hypericum perforatum</i> | Hypericaceae | Leaves | Antiviral, inhibits leukemia viruses |
| 19 | <i>Lavatera kashmiriana</i> | Malvaceae | Whole plant | Laxative |
| 20 | <i>Lotus corniculatus</i> | Fabaceae | Whole plant | Asthma |
| 21 | <i>Malva neglecta</i> | Malvaceae | Leaf/petioles | Laxative and demulcent |
| 22 | <i>Origanum vulgare</i> | Lamiaceae | Whole plant | Carminative, diuretic and diaphoretics, relieves dairrhoea and dysentery |
| 23 | <i>Oxalis corniculata</i> | Oxalidaceae | Aerial parts | Pimple, swelling, eye diseases |
| 24 | <i>Pimpnella diversifolia</i> | Apiaceae | Whole plant | Lactation, indigestion and stomach disorders |
| 26 | <i>Plectranthus rugosa</i> | Lamiaceae | Leaves | Antiseptic , anti-inflammatory, used in jaundice |
| 27 | <i>Prunella vulgaris</i> | Lamiaceae | Whole plant | Antiseptic, expectorant, antirheumatic and antispasmodic |
| 28 | <i>Rheum webbiana</i> | Polygonaceae | Rhizome, roots | Laxative, purgative and tonic |
| 29 | <i>Rosa brunoni</i> | Rosaceae | Seeds, fruits | Diarrhoea and abortion |
| 30 | <i>Rubus ellipticus</i> | Rosaceae | Fruits | Haematuria |
| 31 | <i>Rubia cardifolia</i> | Rubiaceae | Whole plant | Rheumatism and antihelmenthic |
| 32 | <i>Taraxacum officinale</i> | Asteraceae | Roots/leaves/flowers | Tonic used in fractures, used in kidney and liver disorders |
| 33 | <i>Thymus linearis</i> | Lamiaceae | Leaves | Scalp conditioner |
| 34 | <i>Torollis japonica</i> | Apiaceae | Seeds | during retention of urine |
| 35 | <i>Trifolium repens</i> | Papilionaceae | Whole plant | Nervous diseases |
| 37 | <i>Viola odorata</i> | Violaceae | Whole plant | Bronchitis |
| 38 | <i>Viola biflora</i> | Violaceae | Flowers | Skin and heart diseases, liver disorders |

Table 3 Community types characterized by the physical features of the study area.

| Community type | Landscape Nature | Plant stand | Altitude(m) | Aspect | Vegetation Cover (%) |
|-------------------------------------|------------------|----------------|-------------|--------|----------------------|
| <i>Plectranthus- Rosa-Thymus</i> | Steep Slope | Shrub and Herb | 1944 | S | 89 |
| <i>Indigofera -Clematis-Themeda</i> | Mild Slope | Shrub and Herb | 2630 | S | 95 |
| <i>Jumiprus-Juniprus-Poa</i> | Steep Slope | Shrub and Herb | 3810 | S | 92 |
| <i>Plectranthus-Ziziphus-Filago</i> | Steep Slope | Shrub and Herb | 1620 | W | 85 |
| <i>Indigofera- Berberis-Filago</i> | Flat Slope | Shrub and Herb | 1818 | W | 91 |

Discussion

The present investigation states that topography, edaphic features and biotic stresses determine the shape, distribution pattern and community setup within a given climatic zone. Our study confirms that the scrub vegetation offer valuable ecosystem services to ethnic groups of the region. The questionnaire and RAA analyses indicate that the inhabitants of Kashmir Himalaya possess prized knowledge about the local plant biodiversity and the services it provides are significantly important to them. The plant species are utilized by the ethnic groups as per their traditional knowledge. Different plant parts such as leaves, roots, seeds, flowers, rhizome etc., are used to cure common human ailments while as few others are either used to treat livestock diseases or used as cosmetic substitutes [21]. Absence of market, poverty and climatic constraints make the ethnic groups chiefly dependent on many different species to supplement their diet in terms of vegetables and wild edibles [22].

As most of the herb species are sensitive to grazing and harvesting; their existence in the community may provide a significant indication of presence of other keystone species such as thorny and prickly shrub species that provide (nurse effect) conducive habitat for such herbs Sher H [23] Plants provide food, fodder, fiber, medicines etc, and these global resources are used ruthlessly especially in Kashmir Himalaya where the quality as well as quantity of such resources is deteriorating more rapidly [1,24]. Besides poverty, ignorance, unemployment, lack of awareness; human interferences have exerted enormous stresses on vegetation and caused environmental degradation [25,26]. Due to their economic and medicinal valuability, these plant species are ruthlessly being collected that has threatened the survival of certain plant species such as *Podophyllum hexandrum* and *Sassurea lappa* etc., which are endangered while as *Iris hookriana*, *Rheum webbianum* etc., are threatened species. Among medicinal plants *Bergenia celiata*, *Podophyllum hexandrum*, *Dioscorea deltoids*, and *Rheum webbianim* were once widely used but now they are restricted in occurrence due to overexploitation for their unique medicinal properties [23].

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There is a lack of proper management structure for sustainable collection and utilization of medicinal plants which has put the regeneration potential of these plants at risk and ultimately not only the conservation status of many plants is under threat but also the livelihood of thousands of indigenous people who depend upon gathering and sale of medicinal plants [27,28]. However, it is a high time to realize that traditional knowledge coupled with modern innovative approaches are important for sustainable development and management of biodiversity to sustain the livelihood of traditional communities [18,29].

Conclusion

The study concluded that locals are highly dependent on medicinal plants but many plants need to be clinically tested for their secondary metabolites and additional investigation on the ethnobotanical studies of the plants will strive to elucidate specific uses, mode of preparation and administration for future economic and cultural uses [30-36]. Further, the intensity and acquisition of such knowledge is fading away among youth due to their changed lifestyle and reliance on chemical medicines [37-39]. Documentation of such prized knowledge could be useful to formulate popular conservation technique-ethno conservation. Moreover, the present protocol was used as a technique to form a base for making useful recommendations to both public and private sectors for rising an awareness at local and country level with an urge to conserve such unique ecosystems.

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