RESEARCH ARTICLE

FLORISTIC DIVERSITY AND ETHNOBOTANY OF DISTRICT UDHAMPUR (J&K) INDIA-A PART OF NW HIMALAYA

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Abstract: A floristic study was conducted in the District Udhampur (Jammu & Kashmir) to learn about the importance of plants that local inhabitants use for numerous purposes. Semi-structured interviews were used to acquire ethnobotanical data from local key informants. A total of 210 plant species were recorded in this study belonging to 75 families and 175 genera. Lamiaceae was the dominant family represented by 19 species followed by Fabaceae with 18 species, Asteraceae represented by 14 species, Rosaceae 9 species, Moraceae 8 species while Polygonaceae and Ranunculaceae represented by 6 species each. Similarly, Acanthaceae, Euphorbiaceae and Solanaceae were presented by 5 species each; Apiaceae, Apocynaceae, Araceae, Pinaceae, Plantaginaceae and Sapindaceae contributed 4 species each; Amaranthaceae, Caprifoliaceae, Convolvulaceae, Liliaceae, Malvaceae, Meliaceae, Oleaceae, Rutaceae and Violaceae were represented by 3 species each, and the rest 50 families have contributed one and two species each. The largest proportion of plant species (153 species, 72.87%) were used in medicine, followed by food(63 species, 30.04%), timber (15 species, 7.14%), fodder (14 species, 6.66%), fuel wood (11 species, 5.33%), religious purposes (13 species, 6.19%) and dye (3 species, 1.42%).The growth form analysis revealed that herbs made the highest proportion with 117 species (55.71%) followed by tree 54 species (25.71%), shrubs 27 species (12.85%), and climbers 12 species (5.71%). The most frequently used plant parts were leaves 88 species (43.34%), followed by fruits 39 species (19.21%), whole plants 36 species (11.88%), flowers 22 species (10.83%),rhizomes13 species (6.40%), bark 12 species (5.91%), wood 8 species (3.94%), shoot 6 species (2.95%), root and stem 5 species each (2.46%).Frequency Index ranges between 4.28 to 57.14. *Berberis lyceum* was the most used plant species having a frequency index of 57.14, while *Ampelocisuss tomentosa* Planch, *Biden alba*, *Nepeta racemosa*, *Sarcococcasaligna*, *Stachys alpina* were the least utilized with a frequency index of 4.28. Plants such as *Senegalia catechu*, *Aeglemarmelos*, *Butea monosperma*, *Quercus leucotrichophora*, *Cynodondactylon*, *Phyllanthus emblica*, *Pistacia integerrima*, *Olea ferruginea*, and *Juglans regia* were used for more than three uses in the research region, while 48 species were used for more than one purpose, and the remaining 150 species had a single use.

Keywords: Ehnobotanical studies, Fodder, Food, Medicinal, Semi-structured, Indigenous, Inhabitants life forms

INTRODUCTION

Ethnobotany is the study of the interaction between plants and people in a wide sense (Mc Clatchey, 2009). Ethnobotanical studies look at the intricate relationship that exists between local people and local plants, including the activities and cultural beliefs that are associated with various forms of use (Tomar & Singh, 2005; Verpoorte *et al*., 2005; Tomar & Singh 2006; Tomar, 2007; Tomar, 2008; Tomar, 2009; Silva *et al*., 2011; Tomar, 2012; Tomar, 2013; Arshad*et al*., 2014; Tomar, 2014; Tomar, 2015; Tomar, 2016; Tomar, 2017; Tomar, 2018; Tomar, 2019; Tomar, 2020; Tomar, 2021 and Tomar, 2022). These studies are crucial in emphasising the importance of native plant species in various fields, such as drug discovery (Cox, 2000). It is also important in the creation of health-care and conservation programmes in many parts of the world (Kanchan, 2011).

420,000 flowering plants have been identified worldwide among Angiospermic plants (Govaerts, 2001), with many tropical species still unnamed. For therapeutic purposes, more than 50,000 plants have been employed (Schippmann *et al*., 2002). With ten biogeographic areas and significant endemism and genetic variety, India is among the top 12 mega-diversity countries in the world (Rodgers and Panwar, 1990: Nayar, 1996). Over 17,500 species of higher plants, 64 gymnosperms, 1,200 pteridophytes, 2,850 bryophytes, 2,021 lichens, 15,500 fungi, and 6,500 algae have been reported in India, accounting for about 7% of the world's flora and covering 2% of the earth's area (Ali et al., 2008).India has a diverse flora, including 5,725 species of angiosperms, 10 gymnosperms, 193 pteridophytes, 678 bryophytes, 260 liverworts, 466 lichens, 3,500 fungi, and 1,924 algae, all of which are endemicto the country (Sanjappa, 2005).

The Indian Himalayan Region (IHR) encompasses around 5,91,000 km^2, or 11 percent of the country's geographical area, and is one of the world's 12 megadiversity countries, accounting for more than half of the country's forest cover and 40 percent of

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the country's endemic species (Ignacimuthu *et al*., 2006). The IHR's diverse natural habitats serve as significant storehouse of plant diversity (Pant *et al*., 2009). The inhabitants make use of the abundant biodiversity in a variety of ways, including for grazing, fuel wood, wild foods, medicine, house construction, religious, and other purposes (Sharma *et al*., 2013).

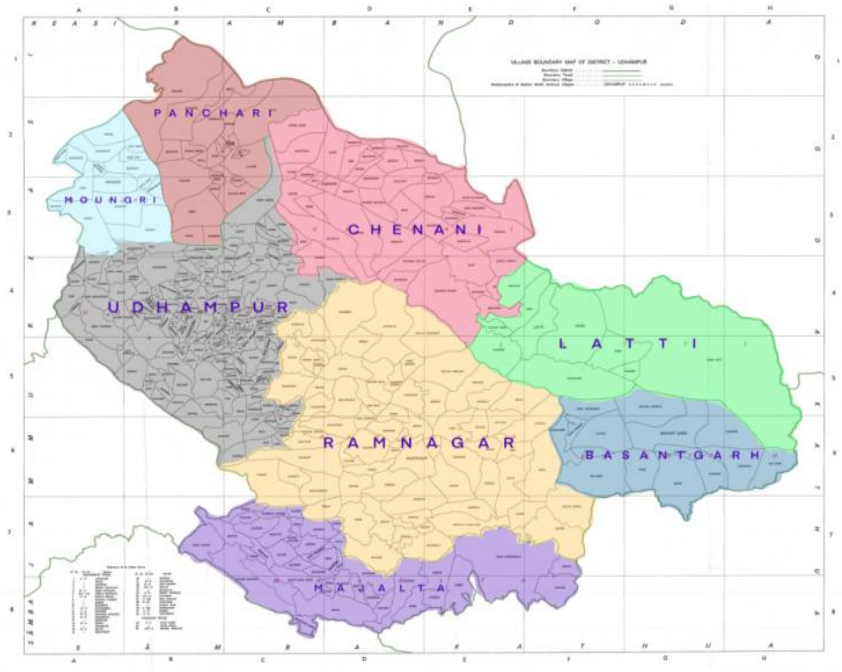
Jammu and Kashmir is located in the north-western Himalayan region and is regarded as one of the biodiversity hotspots due to its unique topography, which supports a broad range of habitats, species, populations, communities, and ecosystems. Various studies on ethnobotanical and ethnomedicinal uses of floristic variety in J&K have been conducted despite the disturbing political and social conditions throughout the past three decades (Abrol and Chopra, 1962; Kiran *et al*., 1999; Kaul *et al*, 1987; Sarver *et.al*, 2013; Sarver *et al*., 2016).

Except for a few fragmentary reports, no work has been done in the research region, i.e., Distt. Udhampur (Khan and Dubey, 2015; Tarun *et al*., 2017; Bhattia*et al*., 2018). Although the area contains a rich repository of ethnobotanically important plants, many tribal people, such as Gujjar Bakerwal, Gaddis, and Pahirs, rely on them to meet their daily needs. District Udhampur is one of the Himalayan region's most remote and rugged mountainous terrains, which remains ethno botanically undiscovered. The residents' principal sources of income are agriculture and cattle. However, due to a lack of significant land holdings and the fact that agriculture is predominantly rain-fed, food grain output is far from satisfactory. Because their economic condition is typically precarious, providing their basic survival needs is difficult. As a result, forest resources are their sole source of income. The majority of the people are Gujjars, Bakerwals and Gaddis. They live in a nomadic lifestyle, grazing their sheep, goats, and cattle from the study area's foothills in the south to Seojdhar's alpine meadows in the north, relying mostly on forest resources for food, fodder, forage, shelter, fuel wood, fibre, and medicine. Other than these three tribes, those who reside in hilly locations follow a semi-nomadic lifestyle. They also have a temporary home in the forest in the higher elevations, which they call Dok/Dhar/dowaar, and where they spend the entire summer season from April to September. The people and tribes who live in this area rely heavily on trees and forest products, and they have amassed a wealth of expertise in this sector of potential interest. Due to changes in lifestyle, accidental developmental programs, and growing contemporary civilization, natural wealth, as well as secret ethnopharmacological information and tribal culture, has lost dramatically at an alarming rate. Traditional wisdom is also influenced by youth negligence. As a result, it is critical to identify and document this unique, original, and traditional information about the ethnic people before it is lost to informed individuals (Samantand Joshi, 2005). This study provides up to date data and information regarding the ethnobotanical significance of plants that are used by inhabitants.

METHODOLOGY

Study Area

The District Udhampur lies between $75^0 7'$ to $75^o 10'$ east longitude and $32^0 2'$ N to $32^0 58'$ N latitude in union territory of J&K, India. The total area of the district stand at 4549 sq.km, having a hilly topography with altitude ranging from 600m from lower Shivalik ranges to 4310m above sea level in Himalayan mountain ranges. The area is bounded in the north by Ramban District and in the northeast by Doda District. On the southeast it is bounded by Kathua District and in the southwest by Jammu District. On the west it has main boundary with Reasi District. The eight Tehsils of the district are – Udhampur, Ramnagar, Chenani, Majalta, Pancheri, Latti, Basantgarh and Moungri. The climate of the area varies from subtropical in Udhampur, Majalta, Chenani and Ramnagar towns to temperate in Pancheri, Basantgarh and Latti-Dudu valley and even some areas in higher altitude represented by subalpine zone. The climate is hot in summer and tolerably cold in winter with an exception of being very cold in the vicinity of high snowy ranges. The district has average rainfall slightly over 1551 mm. Most of the rainfall takes place during July and August in summer and December to February accompanied by snow and sleet in winter. Twenty five percent of the area in higher reaches of the district remains snow bounded during winter. The mean maximum temperature of the year is 38.7^o C and mean minimum temperature of the year is 2^o C. The majority of the population is dogras in the district but there are many other tribes like Gujjars, Bakerwals and Gaddis present in the areas as well.



Map of Study Area

Google map of study area

Ethnobotanical data collection

The data was gathered by conducting a survey throughout the year from 2019 to 2021, with quick sampling. The nomadic and semi-nomadic tribes, as well as residents of roughly 40 villages in all eight tehsils (Latti, Basantgarh, Chenani, Ramnagar, Majalta, Pancheri, Moungri, and Udhampur) were chosen to gather information on traditional plant applications in the research area. From the 40 representative communities, 70 knowledgeable people were chosen at random as key informants. The quality of explanation given by certain participants during an interview was also taken into account while selecting crucial participants. To document indigenous knowledge of the local community on the utilization of wild plant species for various purposes, standard data gathering methods (Martin, 1995; Alexiades, 1996; Cotton, 1996) were used. Semi structured interviews, group discussions, guided field walks, and participant observation were used to obtain data. Semi-structured interviews were conducted using a list of questions written in English and translated into local dialects such as Dogri, Gojjri, and Hindi. Men, women, youth, and elders ranging in age from 20 to 85 were among the informants. Majority of them were farmers, herders, shepherds, and housewives who rely on agriculture and animals for a living. People in their later years had a wealth of information about how to use plants.

Information on botanical name, local name, plants part/s used, habit and habitat/s and use values were

gathered. Prior to the interviews, the participants gave their verbal assent to the study's aims, and all data was collected with their permission. Frequency index was calculated and recorded in Table 1. Frequency index is a mathematical expression of the percentage of frequency of mentioning for a single botanical species by informants. The following formula was used to calculate frequency index:

$$FI = FC/N \times 100$$

Where FC is the number of informants who mentioned the use of the species, and N is the total informant (Madikizela *et al*., 2012) N=70 in this study. When there were numerous informants who cited a specific plant, the frequency index was high, and when there were few reports, it was low.

Identification

The collected plants were identified with the help of published floras and literature i.e., Flora of British India by Hooker (1906); Flora of Udhampur by Swami and Gupta (1998); Flora of Jammu and Plants of the neighborhood by Sharma and Kachroo (1983); Forest Flora of Srinagar and Plants of neighbourhood. Further cross-checked and confirmed the identification from the Herbarium of the Department of Botany, University of Jammu, Jammu (J&K).

Table 1. List of plant species along with their Botanical name, Local Name, family, Life forms, Part used and utilization pattern.

Family	Botanical Name of Plant species	Local Name	Life forms	Part used	Utilization pattern	Frequency Index
Acanthaceae	*Barleria noctiflora* L.f	Kandabrakhand	S	L	M	22.8
	Diclipterabupleuroides Nees	Kaaluka	H	L	M	10.0
	Eranthemumpulchellum Andrews	Kali branker	H	Fl	M	8.5
	Justicia adhatoda L.	Branker	S	Fl, L	M	25.7
	Lepidagathis cuspidate Wall.ex Nees	Bendyakaah	H	L	M	8.5
Acoraceae	*Acorus calamus* L.	Barian	H	Rz	M	28.57
Amaranthaceae	*Achyranthes aspera* L.	Putkanda	H	L,	M, Sd	17.14
	Aervasanguinolenta (L.) Blume	Basau	H	St	M	5.51
	Chenopodium ambrosioides L.	Janglibajarpang	H	L	F	22.85
Apiaceae	*Centella asiatica (*L.) Urban	Brahmi	H	L	M	32.8
	Heracleum candicans Wall.ex DC	Kiandel	H	Wp,	M	11.4
	Scandix pecten-veneris L.	Indusag	H	Sh	F	20.0
	Torilis arvensis (Huds.) Link	Indhli	H	Sh	F	27.14
Apocynaceae	*Calotropis procera (*Aiton) W.T.	Desi akk	H	Lt	M	17.1
	Carrisaspinarium L.	Garna	S	Fr,L	F, Fd	40.0
	Nerium indicum Mill.	Lal gandila	T	L	M	7.1
	Vinica major L.		H	Wp	M	8.5
Araceae	*Arisaema dracontium* (L.) Schott.	Leel	H	R	M	12.8
	Arisaema tortuosum (Wall.) Schott	Neel	H	R	M	14.2
	Sauromatum venosum (Dryand.ex Aiton) Kunth	Leel	H	Wp	M	12.8
Araliaceae	*Hedera nepalensis* K.Koch	Katimberi	C	L	M	10.0
Arecaceae	*Phoenix sylvestris* (L.) Roxb.	Khajoor	T	Fr	M,F	17.1
Asparagaceae	*Asparagus adscendens* Roxb.	Satawari	S	R, F	M	42.85
Asteraceae	*Achillea millefolium* L.	Dadhpeede di Jadhi	H	L	M	42.85
	Ageratum conyzoides L.	Neelijadi	H	L	M	5.51
	Biden alba (L.) DC	Kumbru	H	L	M	4.2
	Bidens chinensis L.	Lamb	H	Wp	M	5.51
	Cichorium intybus L.	Kasni	H	Wp	M, F	25.7
	Crepiscapillaris (L.) Wallr.	Darilli	H	L, Sh	F	11.4
	Echinopsniveus Wall. Ex DC	Taaripous	H	L	M	11.4
	Gerbera gossypina (Royle) Beauverd	Purjali	H	L	M	5.5
	Saussureaheteromalla (D.Don) Hand.-Mazz	kuth	H	Wp	M	12.8
	Sonchus oleraceus L.	Dodhli	H	L,Latex	M, F	11.4
	Synedrellanodiflora (L) Gaertn.	Jadi	H	Wp	F	8.5
	Synedrellavialis (Less.) A. Gray	Pili jadi	H	Wp	Fd	8.5
	Taraxacum officinalis Weber	Dandelion	H	Rh	M	25.7
	Xanthium strumarium L.	Jojda	H	L	M	17.1
Athyriaceae	*Diplazium esculentum (*Retz.) Sw.	Kasroor	H	Fond	F	50.0
Balsaminaceae	*Impatiens glandulifera* Royle	Allu	H	Wp	M, dye	15.7
Berberidaceae	*Berberis lycium* Royle	Kamble	S	Bk, Fr	M, F	51.4
Betulaceae	*Alnus nitida* (Spach) Endl.	Chaamp	T	St	Tm	17.14

Boraginaceae	*Ehreticalaevis*Roxb.	Datranga	T	R, Bk	M	8.5
	Trichodesma indicum L. R. Br	Dholi	H	Wp	M	17.1
Brassicaceae	*Capsella-bursa pastoris* (L.) Medik		H	Wp	F	15.7
	Lepidium virginicum L.	Charwa	H	L,R	F	11.4
Buxaceae	*Sarcococcasaligna*(D.Don)Mull.Arg.	Sangli	S	L	M	4.28
Cannabiaceae	*Cannabis sativa* L.	Pang	H	Fl, L	M	31.4
	Celtis australis L.	Khidak	T	L,Fl,Wd	M, Tm	30.0
Caprifoliaceae	*Lonicera quinquelocularis*Hardw		S	L	M	5.5
	*Lonicera xylosteum*L.	Bakdu	S	Fr,L	M	8.5
	*Valerianajatamansi*Jones ex Roxb.	Mushikbala	H	R	M	21.4
	Viburnum grandiflorum Wall. exDC.	Teldi	S	Fr, S	M, F	40.0
Caryophyllaceae	*Stellaria media* (L.) Vill	Kokku	H	Wp, L	M, F	11.4
Celastraceae	*Maytenusroyleana*(Wall.ex M.A. Lawson) Cufod	Leeya	T	L,F	M	8.5
Combretaceae	*Terminalia chebula*Retz	Reeda	T	Fr	M	25.7
Convolvulaceae	*Cuscutareflexa*Roxb.	Aandel	C	Wp	M, F	20.5
	*Ipomea carnea*Jacq.	Akk	H	Fl	M	5.5
	Ipomea purpurea (L.) Roth.	Jajnu	H	S	M	5.5
Cucurbitaceae	*Diplocyclus palmata* (L.) C. Jeffrey	Tudangle bel	C	L, Fr	M, F	20.0
	Solenaamplexicaulis(Lam.) Gandhi	Bankakru	C	Fr	F	17.1
Cupressaceae	*Juniperus horizontalis*Moench	Beethal	S	Sh	Thatching hut	8.5
Dennstaedtiaceae	*Pteridium aquilinum* (L.)Kuhn	Kayi	H	Wp	Thatching hut	17.1
Dioscoreaceae	*Dioscoreadeltoidea*Wall. ex Griseb.	Kinse	C	Rh	M	17.1
Ebenaceae	*Diospyros lotus* L.	Malook	T	F	F	42.8
Elaeagnaceae	*Eleaegnusparvifolia*Royle	Kawaankothi	S	Fr	F	40.0
Euphorbiaceae	*Euphorbia heliscopia*.	Dudhli	H	Wp	Fd	11.42
	*Euphorbiahirta*L.	Doodhi	H	Wp	M	7.1
	*Euphorbia royleana*Boiss.	Sulyan	H	L	M	5.5
	Mallotusphillippensis(Lam) Muell.Arge	Kamela	T	Fr	M, Dye	22.8
	Ricinus communis L	Ghee plant	S	Sd	M, F	22.8
Fabaceae	*Senegalia catechu*(L.f.) P.J.H. Hurter &Mabb.	Khair	T	Fl, Bk	M,Fd, Fw	17.14
	Senegaliamodesta (Wall.) P.J.H. Hurter	Flai	T	L	Fd,Fw,	11.42
	Vachellianilotica (L.) P.J.H. Hurter &Mabb.	Kikar	T	St,L	Fw, Fd	42.85
	*Astragalus adscendens*Boiss. &Hausskn		S	R	M	8.57
	Bauhinia variegata L.	Kachnar	T	Bk	M	21.4
	Butea monosperma(Lam.) Kuntze	Plah	T	Wd, Bk	Tm, M, Sd	20.0
	Cassia fistula L.	Karangal	T	Wd, Bk	M, Tm	17.1
	Dalbergia sissoo Roxb	Taali	T	Wd,	Tm	42.8
	Indigofera tinctoria L.	Kathi	S	Fl, Sh	M, dye	15.7
	Leucaena leucocephala(Lam.) deWit.	Lucinia	T	L, Sd	Fw, Fd	25.7
	Medicago polymorpha L.	Ammi	H	L	F	8.5
	Medicago sativa L.	Sareeri	H	Wp	M	22.8
	Melilotus indica (L.)Ait.	Sariri	H	L	F	12.8
	*Mimosa pudica*L.	Chuimuhi	T	R, L	M	17.1
	*Senna tora (*L.) Roxb.	Haedma	H	L	M, F	8.5
	Trifolium pratense L.	Shaatala	H	L	F, Fd	14.2
	Trifolium repens L.	Kaa	H	L	M, F	8.5
	Vicia sativa L.	Jawaal	H	L	F	11.4
Fagaceae	*Quercus leucotrichophora* A.Camus	Bhanj	T	W, Bk, L	M, F, Fd	31.4
	*Quercus. floribunda*Lindl.exA.Cammus.	Maaru	T	W, L	Fw, Fd	30.0
Gentianaceae	*Swertia cordata* Wall ex G. Don)C.B. Clarke	Chriyata	H	Wp	M	12.8
Geraniaceae	*Geranium sibiricum*L.		H	L	M	5.5
	*Geranium wallichianum*Oliv.	Rattan jot	H	Wp,	M	15.7
Hypericaeae	*Hypericum perforatum* L.	Basantu	H	F, L	M	10.0
Juglandaceae	*Juglans regia* L.	Akhroot	T	Fr, Wd	M, Tm, F, Sd	57.1
Lamiaceae	*Leucas ciliate* Benth.	Malbedhu	H	L	M	5.5
	*Ajuga bracteosa*Wall ex Benth.	Phuljadi	H	L	M	42.85
	*Ajuga parvifolia*L.	Neelkanthi	H	Wp	M	38.57

	Caryopteris odorata (Ham.) B.L.Robinson	Neelkanthi	S	L,Br	M	17.1
	Clerodendrumchinense (Osbeck.) Mabb.	Sagvan	H	R, L	M	11.42
	*Colebrookeaoppositifolia*Sm.	ChittiSuhali	H	L	M	18.5
	Lamium amplexicaule L.	Jawaan	H	L, Sh	M, F	8.5
	*Leucusbiflora (*Vahl)R. Br.ex Sm.		H	L	M	5.5
	Micromeriabiflora(Buch. - Ham.exD.Don) Benth.	Tande	H	R	M	11.4
	*Nepeta racemosa*Lam.	Dhaaripettu	H	Wp	M	4.2
	*Plectranthusrugosis*Wall.	Solei	H	L	F	12.8
	Pogostemon bengalensis (Burm.f.)Kuntze	Kali suaali	S	L	M	11.4
	Prunella vulgaris L.	Nilijadhi	H	L	F	5.5
	*Salvia divinorum*Epling&Jativa	Kotrey	H	L	M	7.1
	*Salvia verbenaca*L.	Kokku	H	L	M	5.5
	*Stachys alpina*L.	Taarijadhi	H	L	M	4.2
	Stachys arvensis L.	Jadi	H	Wp	M	5.5
	Tectona grandis L.f.	Saagun	T	Wd	Tm	5.5
	*Thymus serpyllum*L.	Mirchi	H	Fl, L	M	5.5
	Vitex negundo L.	Bana	T	L, Fl	M	35.7
Liliaceae	*Colchicum luteum* Baker	Suranjna	H	Rh	M	31.4
	*Tulipa clusiana*Redoute	Kayalu	H	Rh	M	11.42
Linaceae	*Reinwardtia indica* Dumort	Balbasanth	H	Fl	M	20.0
Lythraceae	*Punica granatum* L.	Darooni	T	Fr	M, F	42.8
	Woodfordiafruticosa(L.)S.Kurz	Dhain	S	L, Fr	M	20.0
Malvaceae	*Bombax ceiba* L.	Simbal	T	Bk, Fl	M	17.1
	*Grewia optiva*J.R.DrummexBurret	Tamman	T	L, St	Fd	17.1
	*Malva neglecta*Wallr	Sounchal	H	L	F	18.5
	Malvastrum coromandelianum(L.) Garcke	Badi baryaad	H	L	F	11.4
Meliaceae	*Azadirachta indica* A. Juss.	Neem	T	L	M, Sd	45.7
	Cedrela toona Roxb. ex wild	Toonu	T	St,	Tm	38.5
	Melia azedarach L.	Draink	T	L,Fr	M	24.28
Menispermaceae	*Cissampelos pariera*L.	Battal bel	C	L	M	11.4
	Tinosporacardifolia(Thunb.)Miers	Giloyi	C	Wp	M	22.8
Moraceae	*F. carica*L.	Cheermafagori	T	Fr	F, Sd	21.4
	Ficus glomerata Roxb.	Gular	T	Fr,Bk	M, F	17.1
	*Ficus hispida*L.f.	fagwari	T	Fr	F	15.7
	Ficus palmata Forssk.	Fagwara	T	Fr	F	22.8
	Ficus religiosa L.	Barh	T	L, Fr	M, Sd	35.7
	Ficusbenghalensis L.	Borhi	T	L, St	M, Sd	34.28
	Morus nigra L.	Toot	T	Fr	F	31.4
Morchellaceae	*Morchella esculenta* Fr.	Guchi	H	Wp	F	50.0
Myrtaceae	*Syzygiumcumini*(L.) Skeels	Talan	T	Bk,Fr	M, Sd	31.42
Nyctaginaceae	*Boerhaviadiffusa*L.	Itt-sitt	H	R	M	12.8
Oleaceae	*Jasminum grandiflorum* L.	Malti	T	Fl	M, Sd	22.8
	Jasminum multiflorum(Burm.f.) Andrews	Malti	C	R,Fl,L	M	50.0
	*Olea ferruginea*Royle	Kahu	T	L,Wd	M,Fd,Fw, Tm	51.42
Onagraceae	*Oenothera rosea* L.'H'er.exAiton.	Phulru	H	L, Fl	M	8.5
Oxalidaceae	*Oxalis corniculata*L.	Ammi	H	L	M, F	22.8
Papaveraceae	*Argemone mexicana*L.	Kardah	S	Wp	M	12.8
	Fumaria parviflora Lam.	Pittpapda	H	Wp	M	11.4
Phyllanthaceae	*Phyllanthus emblica* L.	Amla	T	Fr	M, F, Sd	47.1
	Phytolacca acinose Roxb	Meethakafal	H	L	M, Fd	25.7
Pinaceae	*Cedrus deodara (*Roxb.) G. Don.	Diyaar	T	Wd,Oil	M, Tm	45.7
	*P. wallichiana*A.B.Jacks	Kail	T	W	Tm, Fw	38.5
	Piceasmithiana(Wall.) Boiss	Tous	T	W	Tm, Fw	22.8
	*Pinus roxburgii*Sarg.	Chir	T	W,Wo	Tm, Fw	42.8
Plantaginaceae	*Bacopa monnieri*(L.) Pennell	Jal neem	H	Wp	M	25.7
	Digitalis purpurea L.	Zirilijadi	H	Fl	M	8.5
	Plantago lanceolata L.	Isabgol	H	Wp	M	17.1

	Plantago ovata Forssk	Chhalla, Isbghul	H	Wp	M	31.4
Plumbaginaceae	*Plumbgozeylenica*L.			L,R	M	15.7
Poaceae	*Cynodondactylon*L.	Drub	H	Wp,	M, F, Sd	20.0
Polygonaceae	*Fagopyrum esculentum* Moench	Darau	H	L, Sd	F	25.7
	Polygonum amplexicaule D.Don	Mashreen	H	Rh	M	20.0
	Rumex dentatus L.	Dandalak	H	L	M, F	18.5
	*Rumex hastatus*L.	Khatti imbli	H	L,R	M, F	20.0
	*Rumex nepalensis*Spreng	Ulbul	H	L	M, F	25.1
	Rumex obtusifolius L.	Ulbul	H	L	M, F	20.0
Portulaceae	*Portulaca oleracea* L.	Kulfa	H	L	F	15.7
Primulaceae	*Anagallis arvensis* L.	Changara, Angaari	H	Fl	M	11.4
	Androsace rotundifolia Hardw	Phulnu	H	Fl	M	22.8
Pteridaceae	*Adiantum capillus-veneris* L.		H	DryFond	F	11.42
Pyronemataceae	*Geoporarenicola (*Lev.) Kers	Kundi	H	Wp	F	17.1
Ranunculaceae	*Anemonastrumnemorosa* (L.) Holub)	Kakdi	H	L	M	11.4
	Aquilegia vulgaris L.	Chidiya di beth	H	Wp	M	5.51
	Clematis graveolens Lindl.	tettal	C	L	M	8.57
	Clematis montana Buch. -Ham.ex DC	Chanda, kuoj	C	Fl	M	8.5
	Climatisvitalba L.	Phule di bel	C	Wp	M	7.1
	*Thalictrum paniculatum*Besser ex Link.	Mamera	H	Wp	M	8.5
Rhamnaceae	*Rhamnus triquetra* Wall.	Galodan	T	Bk	M	11.4
	*Ziziphus mauritiana*Lam.	Ber	S	Fr	F	42.8
Rosaceae	*Cotoneaster microphyllus*Wall.exLindl.	Riyu	S	Wd, Fr	F, Fw	8.5
	*Duchesnea indica (*Andrew) Teschem.	Ankhe	H	Fr	F	37.1
	Prinsepia utilis Royle	Rowari	S	S, Stem	M,F	17.1
	Pyrus Pashia L.	Kainth	T	Fr, W	F, Fw	22.8
	*Rosa brunonii*Lindley	Kareer	S	Fl	M	17.1
	*Rosa moschata*Herrm	Jungligulab	S	Fl, Fr	M, F	12.8
	*Rubus ellipticus*Sm.	Akhe	S	Fr	F	22.8
	*Rubus niveus*Thunb	khiaadi	S	Fr	F	31.4
	Sorbariasorbifolia(L.) A. Braun	Badi khiayari	S	L	Fd	7.1
Rubiaceae	*Galium aparine* L.	shudri	H	L	M	8.5
	Wendlandiaheynei(Schult) Santapau& Merchant	Tilak	T	L,R	M	17.1
Rutaceae	*Aegle marmelos*(L.) Correa	Bill	T	L, F	M,F,Sd	38.57
	Murrayakoenigii(L.) Sprenge	Curry pata	T	L, S	M	15.7
	*Zanthoxylum armatum*DC.	Timbru	T	Fr	M	45.7
Sapindaceae	*Aesculus indica* (Wall.exCambess.)Hook.	Goon	T	Fr, L	M, Fd	11.42
	Dodoneaviscosa L.	Santha	S	L	M	5.5
	*Pistacia integerrima*J.L.Stewari ex Brandis	Kadkaoi,kikkadsinghi	T	Wd, L, Sd	M, Tm, Fd	31.4
	*Sapindusmukorossi*Gaertn.	Reetha	T	Fr	M	27.1
Saxifragaceae	*Bergenia ciliata* (Haw.)Sternb	Sargotri	H	Rh	M	50.0
Scrophulariaceae	*Verbascum Thapsus* L.	Bantamaku	H	Fl	M	22.8
Simaroubaceae	*Ailanthus altissima*(Mill.) Swingle	Arrua	T	Wd	Tm	8.57
Solanaceae	*Datura stramonium* L.	Datur	H	Wp	M	20.0
	Physalis minima L.	Fufdu, patakka	H	Fr	M	8.5
	Solanum nigrum L.	Kawakothi	H	Fr	M, F	40.0
	*Solanum surrattense*Burm.f.	Kanderi	H	Fr, L	M	17.1
	*Solanum villosum*Mill.	Kawainkhoti	H	Fr	M, F	31.42
Urticaceae	*Girardiniadiversifolia*(Link) Fris	Saddar	H	R, L	M, F	25.7
	Urtica dioica L.	Kali Saddar	H	Rh, L	M, F	18.5
Verbenaceae	*Lantana camara* L.	Panchfully	H	Fl	M,	8.5
Violaceae	*Viola canescens*Wall. ex. Roxb.	Banafsha,Fullnu	H	Wp	M	42.8
	Viola odorata L.	Banaksha	H	Wp	M	42.8
	*Viola pilosa*Blume	Banaksha	H	Wp	M	31.4
Vitaceae	*Ampelocissus tomentosa* (Heyne ex Roth.) Planch	Naberey di bel	C	R	M	4.28

Abbreviations: H=Herb, S=Shrub, T=Tree, Sh=Shoot, Bk=Bark, Wp=Whole plant, Lt= Latex, C=Climber, L=Leaves,R=Root, St=Stem, Fl=Flower, M=Medicinal, F=Food, Tm=Timber, Fw=Fuel wood, W=Wood, Rh=Rhizome, Fr=Fruit, Sd=Seed, Sd=Sacred, Fd=Fodder

RESULTS AND DISCUSSION

Demography of informants:
A total of 70 well-informed informants (54 men and 16 women) from 40 different villages in the study region were interviewed. The informants interviewed ranged in age from 21 to 85 years old. Male informants were 40.7 percent illiterate, whereas female informants were 81.25 percent illiterate. The number of informants in the 51-60 age range was high because they were likely to be readily available for an interview. The results reveal that traditional knowledge and informant age are proportional and that a highly educated person does not necessarily have a more indigenous understanding of plant utilization.

Informants Age	**Female** 16 (22.85%)	**Males** 54(77.14%)
21-30	2	2
31-40	2	7
41-50	3	8
51-60	3	15
61-70	4	11
71-80	2	10
81-90	0	1

Education Level:	Female	Male
Never attended the school	13	22
Attended school for 1-5 classes	2	12
Attended school for 6-10 classes	0	15
Attended school for 12 class	1	4
Graduate and above	0	1

Composition analysis:
A total of 210 plant species from 75 families and 175 genera have been found in the research area. Each species' botanical name, family, local name, habitat, part(s) used, and utilization pattern are listed in Table 1. Angiosperms dominated with 199 species divided into 166 genera and 68 families, followed by Gymnosperms with 5 species divided into 4 genera and 2 families, Pteridophytes with 4 species divided into 4 genera and 3 families, and Fungi with 2 species divided into 2 genera and 2 families (Fig.1). Dicotyledons had 189 species across 156 genera and 63 families, whereas Monocotyledons comprised 10 species across 9 genera and 5 families.

Table 2. Overall Plant composition in terms of the number of families, genera and species

Division	**Group**	**Families**	**Genera**	**Species**
Angiosperms	Dicotyledons	63	156	189
	Monocotyledons	5	9	10
Gymnosperms		2	4	5
Pteridophytes		3	4	4
Fungi		2	2	2
		75	175	210

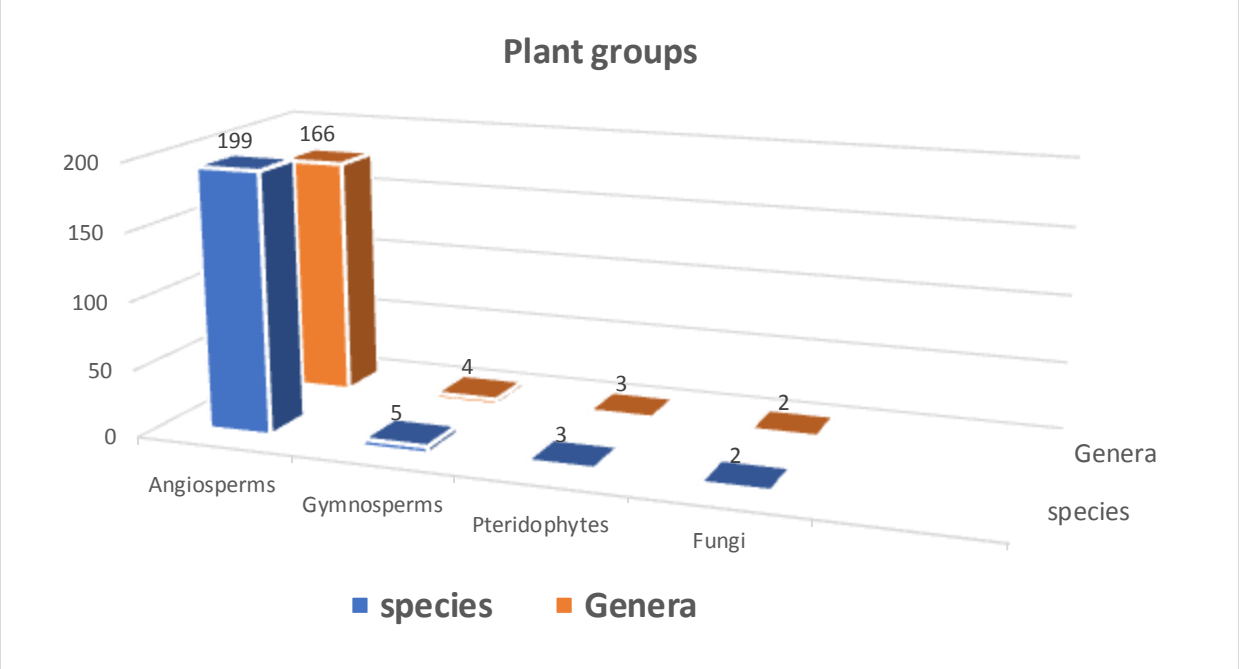


Fig: 1. Composition analysis of various plant groups in study area

Family Contribution:
In terms of a number of species, Lamiaceae was the dominant family represented by 19 species followed by Fabaceae with 18 species, Asteraceae represented by 14 species, Rosaceae 9 species, Moraceae 8 species while Polygonaceae and Ranunculaceae represented by 6 species each. Similarly, Acanthaceae, Euphorbiaceae and Solanaceae were presented by 5 species each; Apiaceae, Apocynaceae, Araceae, Pinaceae, Plantaginaceae and Sapindaceae contributed 4 species each; Amaranthaceae, Caprifoliaceae, Convolvulaceae, Liliaceae, Malvaceae, Meliaceae, Oleaceae, Rutaceae and Violaceae were represented by 3 species each, and the rest 50 families have contributed one and two species each(Fig:2). Among the genera, *Ficus* (6 species), *Rumex* (4 species), *Acacia*, *Clematis*, *Euphorbia*, *Viola* and *Solanum*(3 species each) were the dominant genera.

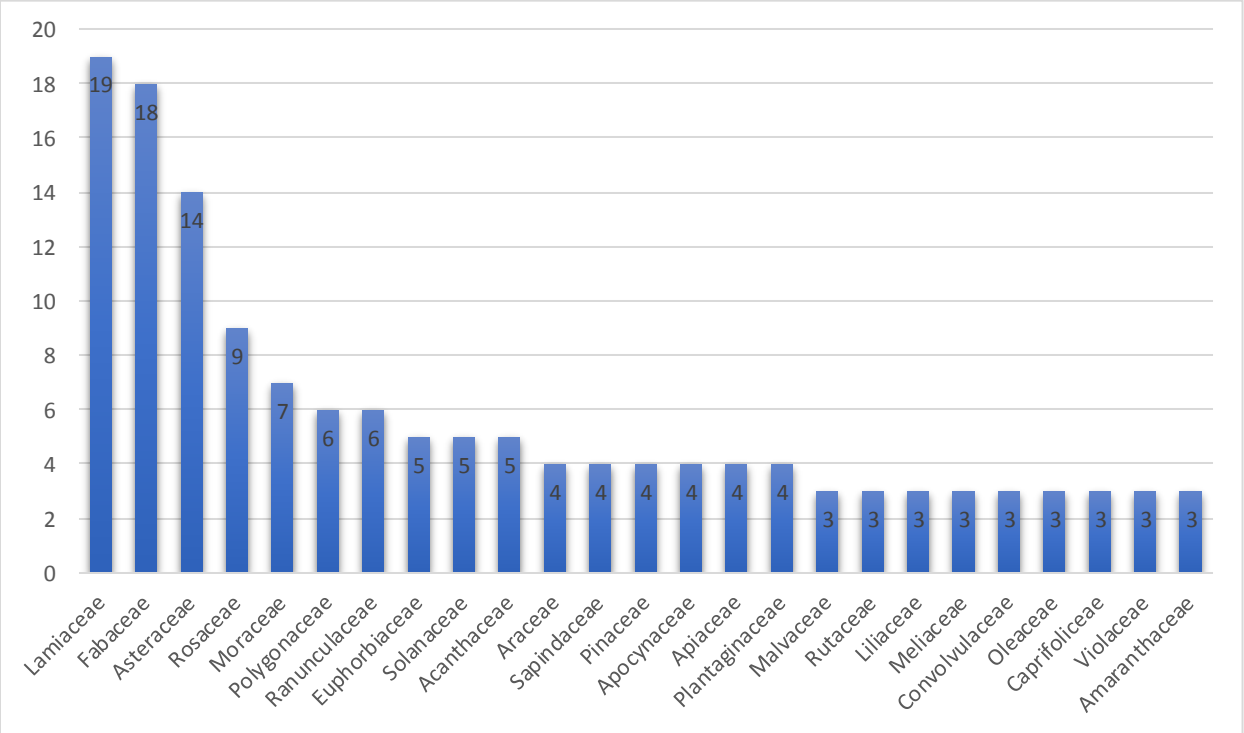


Fig 2. Dominant families in terms of number of species

Growth forms:
The growth form analysis of plant species revealed that herbs constituted the highest proportion being represented by 117 species (55.71%) followed by trees 54 species (25.71%), shrubs represented by 27 species (12.85%),climber 12 species (5.71%) while there were 4 species (1.90%) of fern and 2 species (0.95%) of fungi (Fig. 3).

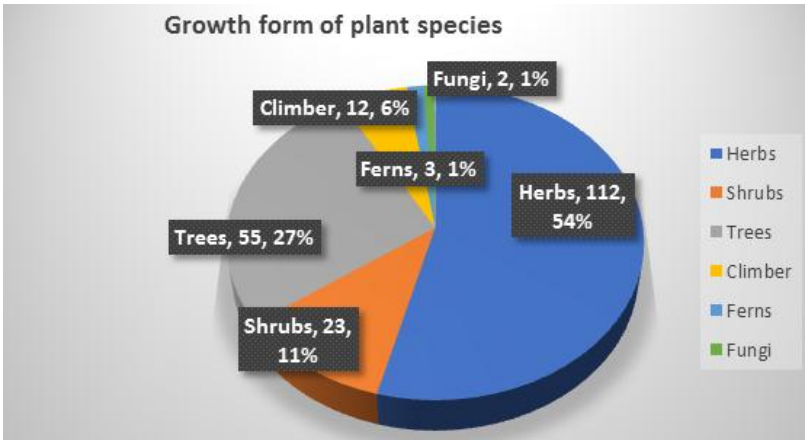


Fig. 3. Growth forms of recorded Plant species in the study area

Availability of Plant species and climatic conditions:
Climate conditions range from subtropical to acute temperate. About 95 plant species (45.23 percent) belonging to 75 genera and 41 families were collected from temperate zones, 73 species (34.76 percent) belonging to 63 genera and 34 families were collected from subtropical areas, i.e., lower Shivalik ranges of the District Udhampur, 42 plant species (20.0 percent) belonging to 34 genera and 23 families were growing in both climatic conditions and available for indigenous use for the inhabitants of both temperate and subtropical zones (Fig.4).

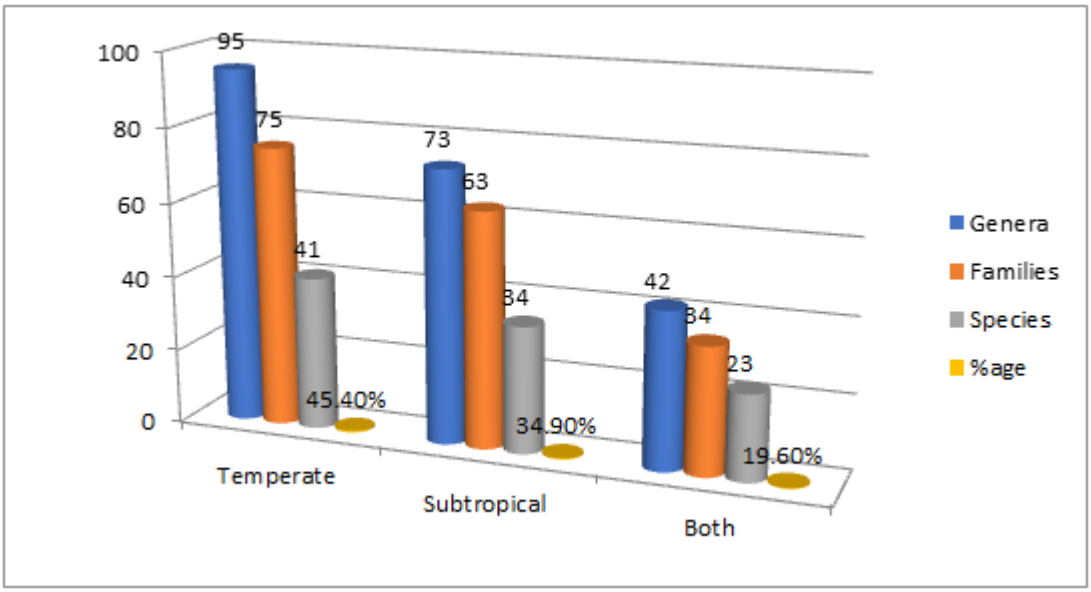


Fig. 4. Plant species collected in different climatic region

Plant Part(s) used:
The most frequently used plant parts were Leaves(88 species, 43.34%), followed by raw fruits (39 species, 19.21%), whole plants (36 species, 17.7%), flowers (22 species, 10.83%), rhizomes (13 species, 6.40%), Bark (12 species, 5.91%), wood (8 species, 3.94%), shoots (6 species, 2.95%), seeds, stem and roots(5 species, 2.46% each), Latex and fond (2 species, 0.98% each) (Fig. 5).

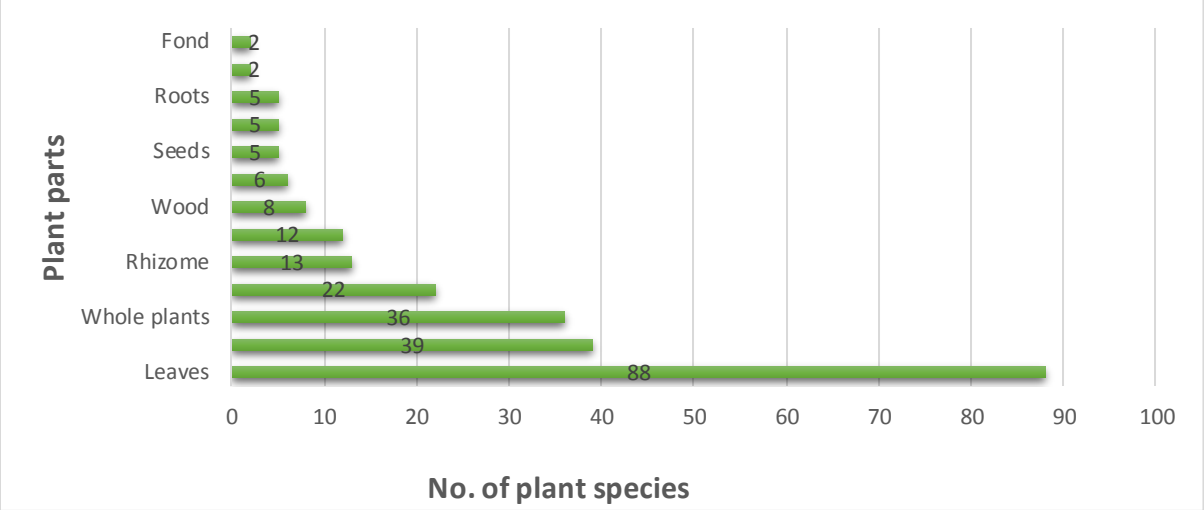


Fig. 5. Use frequencies of different parts of plant

Utilization pattern:
The largest proportion of plant species (153 species, 72.87%) were used in medicine, followed by food (63 species, 30.04%), timber (15 species, 7.14%), fodder (14 species, 6.66%), fuel wood (11 species, 5.33%), religious purposes (13 species, 6.19%) and dye (3 species, 1.42%) (Fig. 4.). Plants such as *Senegalia catechu*, *Aegle marmelos*, *Butea monosperma*, *Quercus leucotrichophora*, *Cynodondactylon*, *Phyllanthus emblica*, *Pistacia integerrima*, *Olea ferruginea*, and *Juglans regia* were used for more than three uses in the research region, while 48 species were used for more than one purpose, and the remaining 150 species had a single use.

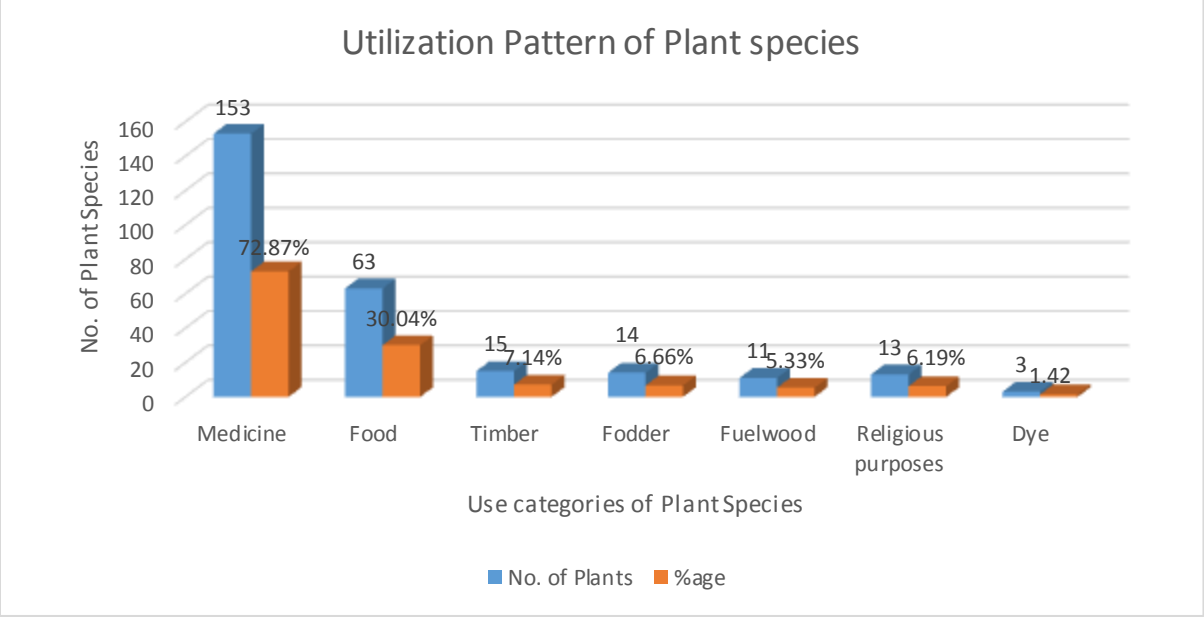


Fig. 6. Use categories of Plant Species

Frequency Index (FI):
According to the frequency index, *Berberis lyciumwas* the most used plant species having a frequency index of 57.14, followed by *Olea ferrugineawith* 51.42, *Bergeniaciliata*, *Diplazium esculentum*, *Morchella esculenta*50.0 each while *Ampelocisuss tomentosa*, *Biden alba*, *Nepeta racemosa*, *Sarcococcasaligna*, *Stachys alpina* were the least utilized with a frequency index of 4.28 (Table. 1)

During the survey, it was observed that the locals of the study area are dependent on forests for their daily needs. Plants like *Morchella esculenta*, *Violaodorata*, *V. canescens*, *Diplazium esculentum*, *Geoporarenicola*, *Polygonum amplexicaule*, *Colchicum luteum* and *Bergenia ciliata* are gathered by shepherds from forests while they are with their herd of cattle. They are easily sold in the local market and become the source of livelihood for locals, especially the womenfolk. Some other

identified plant species or their products sold in the market are *Acorus calamus*, *Cannabis sativa*, thewood of *Alnus nitida*. *Cedrusdeodara*, *Piceasmithiana*, *Pinus roxburgii*, *P. wallichiana*, *Quercus leucotrichophora*, *Q.floribunda*, *Cassia fistula and Juglansregia, the fruit of Diospyros lotus*, *Phyllanthus emblica*, *Punica granatum*, *Morusnigra*, *Juglans regia*, *Aegle marmelos*, *Terminalia chebula and Sapindusmukorossi*, etc. and provide an opportunity to additional household income. Many of these wild plant species may not freely available in the future due to various human activities. Overexploitation of forest products, habitat degradation, uncontrolled fires, overgrazing, and the invasion of exotic plant species are the greatest threats to the flora of the study region. As a result, efforts can be made to cultivate some of them in order to ensure a steady supply and minimise the demand on natural habitats.


A


B


C


D


E


F


G


H

 I

Fig. A) Frond of *Diplaziumesculentum* used as a vegetable, B) Leave of *Phytolacca acinosa* collected from the forest for use as a vegetable, C) Women folk collecting rhizome of *Polygonum amplexicaule* from the forest area, D-F) Interaction with local knowledgeable informants during field visit for ethnobotanical data information, G) Home of a tribal family in the vicinity of forest areas, H) Local man cutting the branches of *Cedrus deodara* for firewood, I) Rhizome of *Colchicum luteum*.

DISCUSSION

The history of humans is incomplete without plants (Amjad 2015). As civilization starts, people used plants for completing numerous routine life needs. The plant resources use creates their imperativeness in the area (Amjad and Arshad 2014). The inhabitant's dependent upon the native plants for various necessities like as a fodder, vegetables, roof, thatching, fuel etc. (Akhtar et al. 2013). Rahman et al. (2022) in their studies appraise the floristic diversity and ethno-ecological knowledge of the Manoor Valley (Pakistan), and documented 354 plant species belonging to 93 families. Majority of the plants were herbs and Asteraceae was the dominant family. They conclude that most of the inhabitants use plants to meet their healthcare requirements. Abbas et al. (2019) in another study on Gilgit Baltistan also assessed the floristic diversity of 114 plant species. Inferences exhibited that Asteraceae family and genus Artemisia was the dominant family and genera, with six species, respectively.The floristic studies are regarded as backbone for evaluation of phytodiversity, conservation management and sustainable utilization of bioresources of an area. They are useful in providing information allied to altering floristic pattern, new invasions, rare, endemic etc., in a phytogeographical area (Ravi et al. 2016).

CONCLUSION

The rural population of District Udhampur lives in the forest or wild areas in the majority of the district. According to this, the flora of District Udhampur has a significant impact on the daily lives of the locals. Because of the lack of advanced forms of resources in the area and the high cost of market products, they received many of the fundamental essentials from these plant species to survive their lives. Many of these species are used for a variety of purposes in various villages and ethnic communities, including medicine, timber, fuel wood, food, fodder and pasture, and so on. The most common plant species utilized in medicine were 72.87 percent, followed by food supplements (30.04 percent), lumber (7.14 percent), fodder (6.66 percent), fuelwood (6.66 percent), and religious purposes (6.19%).*Berberis lycium* was found to be the most commonly utilized ethnobotanical plant in the study area, with a frequency index of 57.14, followed by *Olea ferruginea* with 51.42, and *Ampelocisuss tomentosa, Biden alba*, *Nepeta racemosa*, *Sarcococcasaligna*, *Stachysalpina* with frequency index 4.28 were the least used ethnobotanically. The study area's regularly used flora is in desperate need of conservation since it supplies inhabitants with a variety of ethnobotanical and folkloric herbal therapies for treating various diseases.

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REFERENCES

Abrol, B.K. and Chopra, I.C. (1962). Some vegetable drug resources of Ladakh. *Current Sciences,* 31:324-325.

Google Scholar

Abbas, Q., Hussain, A., Khan, S. W., Hussain, A., Shinwari, S., Hussain, A. and Ali, K. (2019). Floristic Diversity, Ethnobotany and Traditional Recipes of Medicinal Plants of Maruk Nallah, Haramosh Valley, District Gilgit, Gilgit Baltistan: Traditional recipes of Maruk Nallah, Haramosh

Valley, District Gilgit. Proceedings of the Pakistan Academy of Sciences: B. Life and Environmental Sciences, 56(3), 97-112.
Google Scholar

Akhtar, N., Rashid A., Murad, W. and Bergmeier, E.(2013).Diversity and use of ethno-medicinal plants in the region of Swat, North Pakistan. *Journal of ethnobiology and ethnomedicine*, *9*(1), 1-14.
Google Scholar

Alexiades, M. (1996).“Collecting ethnobotanical data. An introduction to basic concepts and techniques,” in *selected Guideline for Ethnobotanical Research: Afield Manual*, Eds., 1996, pp58-94, Botanical Garden, New York, USA.
Google Scholar

Ali, S.S., N. Kasoju, A. Luthra, A. Singh, H. Sharanabasava, Sahu, A. and Bora,U. (2008). Indian Medicinal herbs as sources of antioxidants. *Food Research International*, 4: 1-15.
Google Scholar

Amjad, M. S. and Arshad, M. (2014). Ethnobotanical inventory and medicinal uses of some important woody plant species of Kotli, Azad Kashmir, Pakistan. *Asian Pacific Journal of Tropical Biomedicine*, *4*(12), 952-958.
Google Scholar

Amjad, M.S. (2015). Ethnobotanical profiling and floristic diversity of Bana Valley, Kotli (Azad Jammu and Kashmir), Pakistan. *Asian Pacific Journal of Tropical Biomedicine*, *5*(4), 292-299.
Google Scholar

Arshad, M., Ahmad, M., Ahmed, E., Saboor, A., Abbas, A. and Sadiq, S. (2014). An ethnobiological study in Kala Chitta hills of Pothwar region, Pakistan: multinomial logit specification. *J Ethnobiol. Ethnomed*.;10,13.
Google Scholar

Bhatia, H., Sharma, Y.P., Manhas, R.K. and Kumar, K. (2018). Traditionally used wild edible plants of District Udhampur, J&K, India. *Journal of Ethnobiology and Ethnomedicine* 14:73 PP 1-13.
Google Scholar

Cotton, C.M. (1996). *Ethnobotany, Principles and Applications*, John Wiley & Sons, Chichister, UK.
Google Scholar

Cox, PA. (2000). Will tribal knowledge survive the millennium? Science. 287(5450):44-55.
Google Scholar

Ford, R.I. (1978). The nature and status of ethnobotany. Michigan: Museum of Anthropology, University of Michigan.
Google Scholar

Govaerts, R. (2001). How many species of seed plants are there? Taxonomy, 50: 1085-1090.
Google Scholar

Hooker, J.D. (1906). *A sketch of the Flora of British India*, Oxford Publication.
Google Scholar

Ignacimuthu, S., Ayyanar, M. and Sankara, S.K. (2006). Ethnobotanical investigations among tribes in Madurai District of Tamil Nadu (India).*J. of Ethnobiology and Ethnomedicine*, Pp2-25.
Google Scholar

Kanchan, L.V. (2011). Nutritional analysis of indigenous wild herbs used in eastern Chhattisgarh India. *Emir. J. Food Agric*; 23(6):554-560.
Google Scholar

Kaul, A.K., Karihaloo, J.L. and Hamal I.A. (1982).Wild edible plants of Kashmir-some less known vegetable substitutes and beverages.*Bulletin of Botanical Survev of India*. 24(1-4)67-69.
Google Scholar

Kaul, M.K., Sharma, P.K. and Singh, V.(1987). Ethnobotanical studies in North-west and trans-Himalaya Iv. Some traditional teas substitutes from J&K State, *Himalayan Plant J.*, 4:23-28.
Google Scholar

Kiran, H.S., Kapahi, B.K. and Srivastava, T.N. (1999). Non- Timber forest wealth of Jammu and Kashmir State (India).*Journal of Non-Timber Forest Product*s, 6(1 and 2): 1-18.
Google Scholar

Kumar, S. (2009).Wild edible plants of Kishtwar High Altitude National Park. *Ethnobotanical Leaflets.*
Google Scholar

Madikizela, B., Ndhlala, A.R., Finnie, J.F. and Van Staden, J. (2012).Ethnopharmacological study of plants from Pondoland used against diarrhea. *Journal of Ethnopharmacology*. 141(1), 61-71.
Google Scholar

Martin, G.J. (1995). Ethnobotany: A Method Manual. A “People and Plants” *Conservation Manual, Champman and Hall, London*, UK.
Google Scholar

McClatchey, W.C., Mahady, G.B., Bennett, B.C., Shiels, L. and Savo, V. (2009). Ethnobotany as a pharmacological research tool and recent developments in CNS-active natural products from ethnobotanical sources. Pharmacology & Therapeutics, 123: 239-254.
Google Scholar

Nayar, M.P. (1996).Hotspots of Edemic Plants of India, Nepal and Bhutan, Thiruvananthapuram, TBGRI, *Vedams eBooks*, New Delhi, India pp 1-252.
Google Scholar

Pant, S., Samant, S.S. and Arya, S.C.(2009). Diversity and indigenous household remedies of inhabitants surrounding Mornaula reserve forest in West Himalaya. *Ind. J. Trad. Know*. 8(4): 606-610.
Google Scholar

Rahman, I. U., Afzal, A., Ali, N. and Ijaz, F. (2022). Floristic Diversity and Ethnobotanical Knowledge of Manoor Valley in the Himalayas of Pakistan. In *Biodiversity, Conservation and Sustainability in Asia* (pp. 873-885). Springer, Cham.
Google Scholar

Ravi, S., Arumugam, R. and Ariyan, S. (2016). Floristic diversity and ethnobotanical uses of

Vedhagiri hills in Bhavani, Erode district, Tamil nadu. *Open Access Library Journal*, 3(1), 1-12.
Google Scholar

Rodgers, W.A. and Panwar, H.S. (1990). A Biogeographical Classification for Conservation Planning. *Wildlife Institute of India*, Dehradun.
Google Scholar

Samant, S.S. and Joshi, H.C. (2005). Plant diversity and conservation status of Nanda Devi National Park and comparison with highland National Parks of the Indian Himalayan Region, The International Journal of Biodiversity Science and Management, 1:1, 65-73.
Google Scholar

Sanjappa, M. (2005). Plant diversity in India—status, conservation and challenges (P. Maheshwari Medal Award Lecture). In: XXVIII Conference of Indian Bot. Soc., Oct. 24(26): 5-6.
Google Scholar

Sarver, J., Kumar, S., Ara, M. and Anand, V.K. (2009). Diversity, Distribution and Utilization Pattern of Economically Important Woody Plants Associated with Agro-forestry in District Rajouri, J&K (Northwest Himalaya). *Ethnobotanical Leaflets* 13:801-09.
Google Scholar

Sarver, J., Atri, R.K. and Sharma, A.(2013). Threatened Medicinal Plants Of Jammu Region-A Part of North West Himalayas, J&K, India. *Journal of Plant Development Sciences*, Vol. 5(4): 443-446.
Google Scholar

Sarver, J., Dubey, S. and Atri, R.K. (2016). Diversity and Ethnomedicinal uses of flowering plants of District Reasi of J&K- North West Himalayas (India). *Environment Conservation Journal* 17(1&2),1-11.
Google Scholar

Schippmann, U., Cunningham, A.B., Leaman, D.J. (2002). Impact of cultivation and gathering of medicinal plants on biodiversity: global trends and issues. *In: Biodiversity and the ecosystem approach in agriculture, forestry and fisheries*. Rome FAO.
Google Scholar

Sharma, B.M. and Kachroo, P. (1983).*Flora of Jammu and plants of neighbourhood*. Bishen Singh Mahinder Pal Singh. Dehradun, India.
Google Scholar

Sharma, P., Patti, P. and Agnihotry, A. (2013). Ethnobotanical and ethnomedicinal uses of floristic diversity in Murari Devi and surrounding areas of Mandi district in Himachal Pradesh, India, *Pakistan Journal of Biological Sciences*, 16(10): 451-468.
Google Scholar

Silva, F.S., Ramos, M.A., Hanazaki, N., and Al`buquerque, F.S. (2011). Dynamics of traditional knowledge of medicinal plants in a rural community in the Brazilian semi-arid region. *Revista Brasileira de Farmacognosia*. 21(3):382–91.
Google Scholar

Swami, A. and Gupta, B.K. (1998).*Flora of Udhampur*.Dehradun, India: Bishen Singh Mahinder Pal Singh.
Google Scholar

Tomar, A. and Singh, H. (2005). Folk medicinal uses of some indigenous plants of Baghpat district of Uttar Pradesh, India. *Journal of Non-Timber Forest Products*, 12 (3): 167-170.
Google Scholar

Tomar, A. and Singh, H. (2006). Exotic Medicinal Plants from Baghpat district, Uttar Pradesh, India. *Journal of Non-Timber Forest Products*, 13 (4): 273-280.
Google Scholar

Tomar, A. (2007). Folk medicinal uses of some indigenous plants of Hastinapur block in Meerut District, (Uttar Pradesh) India. *Journal of Medicinal and Aromatic Plant Sciences*, 29 (4): 186-190.
Google Scholar

Tomar, A. (2008). Folk medicinal plants in Muzaffarnagar district of Western Uttar Pradesh, India. *Journal of Indian Botanical Society*, 87 (3 & 4): 200-208.
Google Scholar

Tomar, A. (2009). Folk medicinal uses of plant roots from Meerut district, Uttar Pradesh. *Indian Journal of Traditional Knowledge*, 8 (2): 298-301.
Google Scholar

Tomar, A. (2012). Use of *Gloriosa superbha* Linn. (Kalihari) to cure Arthritis. *The Indian Forester*, 138(12): 1171-1172.
Google Scholar

Tomar, A. (2013). Method and composition for treatment of Eczema in Uttar Pradesh, India. *Journal of Non-Timber Forest Products*, 20(4): 281-284.
Google Scholar

Tomar, A. (2014). Use of *Adenocalymma alliaceum* (Lam.) Miers (Lehsunbel) to cure gastric trouble. *Journal of Non-Timber Forest Products*, 21(2): 127-128.
Google Scholar

Tomar, A. (2015). Medicinal use of *Calendula officinalis* L. to cure Chronic Urticaria. *Journal of Non-Timber Forest Products*, 22 (4):233-234.
Google Scholar

Tomar, A. (2016). Folk medicinal use of *Alstonia scholaris* R.Br. *Journal of Non-Timber Forest Products*, 23(1):59-60.
Google Scholar

Tomar, A. (2017). Medicinal use of *Acorus calamus* L. (Bach) to cure fever. *Journal of Non-Timber Forest Products*, 24(1):47-48.
Google Scholar

Tomar, A. (2018). Swine flu infection inhibition by *Mansoa alliacea* (Lam.) A.H. Gentry (Lehsunbel). *Journal of Non-Timber Forest Products*, 25(3):181-183.
Google Scholar

Tomar, A. (2019). Antidiabetic activity of *Andrographis paniculata* (Burm. f.)Wall.ex Nees

(Kalmegh). *Journal of Non-Timber Forest Products*, 26(4):207-209.

Google Scholar

Tomar, A. (2020). Covid-19 infection inhibition by *Andrographis paniculata* (Burm.f.) Wall.Ex Nees (Kalmegh) infusion, decoction and tincture.*The Indian Forester*, Vol. 146(8): 782-784.

Google Scholar

Tomar, A. (2021). Covid-19 infection inhibition by *Nimbu* (*Citrus limon* Linn.) infusion, decoction and tincture. *International Journal of Plant and Environment*, 7(2):179-181.

Google Scholar

Tomar, A. (2022). *Natural Medicines: Ailments Inhibition by Teas, Infusions and Decoctions in Meerut Region of Uttar Pradesh, India*. Bishen Singh Mahendra Pal Singh, Dehradun, India.

Google Scholar

Verpoorte, R., Choi, Y.H. and Kim, H.K. 2005. Ethnopharmacology and systems biology: a perfect holistic match. *J Ethnopharmacol*.; 100(1-2):53–6.

Google Scholar