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Traditional, medicinal and food uses of Pteridophytes of district Mansehra (Pakistan) and their some adjacent areas

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Abstract

Mansehra is one of the floristically rich and most varied districts of Pakistan, gifted with plentiful pteridophytes diversity. Various ethnic communities residing in district Mansehra and its adjacent localities exhibits unique tradition, dialect and culture. They collect pteridophytes from the wild especially for medicinal purposes, general healthcare, food uses and to meet daily life requirements. An inventory survey was conducted in order to assess the traditional uses of pteridophytes by the local inhabitants of the study area. Ethno botanical information and Ornamental potential of the taxa of wild pteridophytes was documented through field trips during 2013-2014. First-hand Information and data was collected through structured questionnaire and in-depth interviews were conducted from the natives in the hilly regions. A univariate level of analysis of the collected data such as percentage and frequency distribution was performed. 60 taxa are traditionally used, distributed in 16 families, and 26 genera. This figure meets about 32 % of the total known pteridophytes taxa of Pakistan. 56 taxa (93.34%) are widely used as medicines while 55 taxa having ornamental potential and may be cultivated for commercial purpose. 15 taxa are of great economic values i.e. a good source of vegetables and bio fertilizers. Our study concluded that, elders of the area have more knowledge than youngers in the population, an ethno medicinal practice of pteridophyte species by various indigenous people for treating various diseases and food use is prominent and may be considered as potential source for pharmaceutical industries to prepare new drugs to fight against various diseases.

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Introduction

Human depends on medicines secondary to food. Traditional recipes of phytomedicines are used for a long time around the world especially in developed countries. Unfortunately modern medicines rapidly replacing the old practices associated with numerous cultures around the world. However, still 80% population of the world depends on the traditional system of health care (Ahmad, 1999).Large populations of developing countries rely on traditional medicine in this context(Nair, 1957).In Pakistan due to limited health care services, high cost, inaccessibility of allopathic medicines coupled withpoverty, majority of the people rely on traditional uses of medicinal plants. About 700 plant species are used as medicinal and aromatic plants (Pei, 1992).

There is an estimation of 10-15,000 known species of pteridophytes, classified under about 40 families (Swale, 2001).In North America, 420 ferns and fern allies have been recorded. Some Asian countries are rich in pteridophyte diversity. For instance, 639 species of ferns occur in Japan, about 1000 in the Philippines, 550 in Malaysia, more than 700 in Thailand, and about 600 in India. (Tryon, 1983, Schneider *et al.,* 2004, Lu, 2007,). Currently 250 taxa are known to Pakistan and 130 to district Mansehra. (Gul *et al.,* 2016).Medicinally, these plants also play an important role in the human society and the medicinal value is known to man for more than 2000 years. Theophrastus (327-287B.C.) and Discorides (100 A.D).

Ferns have been used to treat fever, cough, tonic, skin problems and wounds, reproductive problems and also as insect repellent (Nair, 1959; Dixit, 1974).Ferns remedies were used by early locals throughout Jammu and Kashmir (Razdan, 1986). About66, to105pteridophytes are traditionally used in India including these regions (May, 1978, Kumar *et al.,* 2003). Ferns remedies were used to treat cuts, ulcer, and dysentery and as protective medicine after childbirth (Perry & Metzger, 1980; Kamaruddin Salleh & Latif 2002; Jaman & Kalsom, 2010).

Medicinal aspects of these taxa are also highlighted by many other workers (Dixit, 1975, Khuller *et al*., 1994; Kaushik 1995; Singh *et al.,* 1996; Vasudeva, Sullivan & Shealy 1997; 1999; Khuller *et al*., 2000; Singh, 2002; Singh, 2003; Benjamin& Manickam, 2007; Benniamin, 2011).In addition, ferns are also the source of fiber, craft, and fuel, building material, decoration and heavy metal removers. Ferns screens heavy metals from the soil especially arsenic (Croft, 1985; Benjamin and Manickam, 2007). *Pterisvittata* (brake fern), is used to absorb arsenic from the soil and *Microsorum pteropus* (Java fern), is one of the most popular freshwater aquarium plants (May, 1978; Lord, 2006).Ferns also contribute a great deal to environment beauty and man pleasure. Ferns enhance the beauty of gardens, parks, streets and houses; improve the environment of offices, schools and even hospitals (Oloyede *et al*., 2010, 2012; Kochhar, 2009; Biplab and Subir, 2007; Jim, 1999).

Materials and methods

The study area

Mansehra is one of the floristically rich and most varied districts of Pakistan, situated in the Khyber Pakhtunkhwa province with about 4579 sq. km area. Its geographical directs arebetween34°-14' to 35°-11' N and, 72° 49' to 74° -08' E. The altitude varies from 400 m in the foot-hill regions to more than 4000 m high thick snow covered peaks of Malaika Parbath. District Mansehra comprises of three tehsils: Balakot, Mansehra and Oghi. Mansehra segments its borders with many other districts: the Kohistan and Diamir districts to the northern boundary, District Abbottabad to the south, District Muzaffarabad of Azad Jammu and Kashmir to the west, and District Swatto the east. District Haripur is located in the southwest, District Shangla and Batagram to the northwest and District Diamar to the northeast. Many tribes residing in the District, broadly divisible into like Gujars and Kohistanies and the Pathans of the area. Abbasseis, Awans, Gujars, Swatis, Syeds, Kabli and Tanolies are the most prominent ethnic groups of the district and surroundings. Pashto, Gojri, Hindko, Pahari and Kohistani, are the local languages of Mansehra, while Urdu is spoken as a national language (Anon., 1998; Ghulam, 2003).

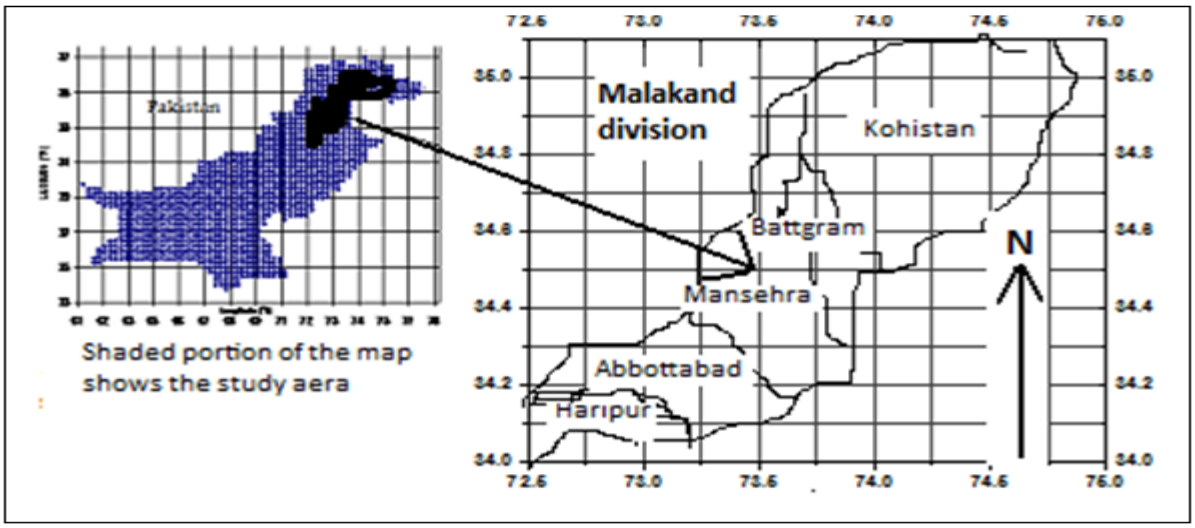

Fig. 1. Map of the study area (District Mansehra) (Ahmad *et al.*, 2004).

By advantage of exclusive climatic backgrounds, this district and surrounding area is a homeland for many pteridophyte species. According to a typical classification of forest types of Pakistan (Champion *et al.*, 1965), the forests fall under the chief type "Montane temperate forests" These forests are predominately coniferous with some broad-leaved species. These lush forest canopies support rich fern flora of the district.

About 250taxa (200 of known locality) of pteridophytes are currently known to Pakistan. Of these 130 (67%) taxa have been recorded from Mansehra district and its adjacent areas. Many indigenous people use several species to meet daily life needs. However, unfortunately, traditional uses of these taxa could not be documented yet including the study area .In the present study an attempt has been made to document traditional uses of this unique plant group. (Map of the study area is provided in Fig.1.)

Ethnobotanical information collection

Ethnobotanical information of wild pteridophytes being used by tribal was documented through field trips during 2013-2014.

Structured questionnaire survey method, in depth interviews with the locals was conducted to document the traditional ethno-medicinal knowledge in the area. Surveys were conducted in different villages' local hujras (meeting places), mosques, marriage houses, and bazaars.

The village and nesses were selected based on the broad socioeconomic setup and cultural diversity. The interviews were carried out in local community, to investigate local people and knowledgeable persons (hakims, women and herdsmen, traders, and herbalists) who are the main user of medicinal plants. About 200 informants have been interviewed on random basis in this connection. Female students of various localities were involved under supervision of the first author to interview the women community of the area and male interviewed males. The already identified specimens were taken in the field to show them to various tribes, ethnic groups, to identify the potential medicinally important taxa of the study area.

Data analysis

The collected data was then put in SPSS sheet for analysis through percentages and frequency distribution. Moreover, data was analyzed to obtain information regarding traditional uses i.e. medicinal, vegetable, and ornamental and other uses across gender and different age cohort and different professions.

Important localities of the study area

The main targeted sites were: Shinkiari, Baffa, Dadar, Jacha, Jabbar, Jabori, Mandagucha, Shaheed Pani, Panjul, Kund Bungla, and Musa-Ka-Musallah, Ber Kund, Balakot, Gari Habibulah, Naddi Bangla, Jarid, Shogran, Siri Paya, Makra, Sharan Forest,

Kamalban forest, Shogran, Narran, Jheel Saiful Maluk, Manoor, Batakundi, Jalkhad, Lulusar, Dodipathsar Lake, Malaika Parbath, Babusar pass, Rajwal, Paris, Jaraid, Kiwai, Behali, Ghazikot, Oghi Khabbal, Chitthar Plain, Batal, Kotli, and the surrounding of the district.

Collection and identification

Pteridophytes used in traditional way were collected and specimens were carefully observed. GPS coordinates were taken (with GPS Model ETrex20). Field data was recorded in field note books. Photographs were taken especially focusing habit. Collected specimens were pressed, dried, mounted. Each specimen was mountedon herbarium sheet and labeled properly with the help of already taken field data. Ferns were identified through the relevant available literature and classified according to Smith *et al.,* (2006). Magnifying lenses, stereo microscope, light microscopes, compound microscopes with micrometer and microphotographs were used for critical examination of the material. The voucher's numbers are provided in Anexture 1.

Finally, these specimens were deposited in the Hazara University Herbarium (HUH), Pakistan.

Fidelity level (FL) Value

The fidelity level (FL),

The percent tage of informants claiming the use of the taxa for the medicinal purpose was calculated according to the following formula (Alexiades, 1996):

$$FL(\%) = \frac{Ip}{Iu\ 100}$$

Where:

Ip is the number of informants who independently suggested the use of the species for a particular disease; Iuis the total number of informants who mentioned the species for medicinal purpose.

Results and discussions

District Mansehra falls in the sinojapanese region of Pakistan having rich floristic and culture diversity. Two hundred locals of various ethnic communities were approached to get data about the use of the taxa in District Mansehra but valuable information's were obtained from 185 respondents only.

Frequency and percentage of various ethnic groups in the study area has been shown in Table 1. Hindko, Gujri, Urdu, Kohistani and Pushtoo remain the dominant language of 185 respondents. More males 60% as compared to females 40% responded to our interviews and questionnaire about the use of the taxa due to social set up of the study area. Education significantly changes the awareness level and informants with high level of education residing in hilly areas. Hindko speakers have been known more regarding medicinal uses of the taxa. Teachers, Hakims and local wound healers found to be more informative as compared to other professions.

Gender based analysis of the taxa

Gender based analysis of the taxa uses by the frequency and percentage has been given in Table2.High percentage of males knew more common names of the taxa used for medicinal, ornamental and other purpose. Most of the locals used the edible species in hilly and rural areas i.e. 64%, as compared to suburban i.e. 26 % as well as in urban area, while ornamental aspect was more known to suburban inhabitant i.e. 66%, followed by rural and hilly areasi.e.36%. Most of them used the taxa for many purposes but only know 1- 5 or more taxa common names and in many case no name of those species.

Locality wise uses of the taxa

Uses of the taxa in hilly, rural, suburban and urban area have been given in Table 3. Among 185 respondents, 174 (94%) have knowledge about the taxa, while the remaining 11 persons (6%) have no idea about the uses. Further majority i.e. 105 (56.76%) of the people used 1-5 taxa, while only 8 person (4.3%) have knowledge of more than 20 taxa. The highest number of medicinal and vegetables taxa 1-20, hilly areas residents (7%) had more knowledge, followed by rural (1%). 1-5 taxa were frequently used (41%) as vegetables by hilly, rural and suburban people. However, urban people used more taxa (66%) as ornamentals, followed by rural (46%) and hilly areas people (46%). Rural and hilly area's people known more common names (55%), followed by suburban and urban (30%).

Like-wise rural and hilly areas people known about the use of 1-5 taxa (54%) for multi purposes, while urban used less comparatively (20%) taxa only. The other uses are i.e. forage, thatching, source of fiber for ropes, making baskets, as insulating layer on ground in winter and, summer, packing materials and washing utensils with its fibers.

Table 1. Frequency and Percentage Distribution of the Respondents.

Gender		Male		Female	
Frequency/%		132/71.4		53/28.6	
Age	20-30	31-40	41-50	51-60	Above
Frequency/%	88/47.6	43/23.2	25/13.5	22/11.9	7/3.8
Education	Non-Primary	Secondary Higher	Under Graduates	Post Graduates- Above	
Frequency %	31/16.8	41/22.2	43/23.2	70/37.8	
Profession	Teacher	Mullah	Hakim	Healer	other
Frequency %	51/27.6	13/7.0	13/7.0	10/5.4	98/53.0
Place of Origin	Hilly	Rural	Sub Urban	Urban	
Frequency/%	39/21.1	100/54.1	15/8.1	31/16.8	
Ethnicity	Hindko	Pashto	Punjabi	Others	
Frequency/%	93/50.3	78/42.2	1/.5	13/7.0	

Ethnomedicinal importantance

Large number of ferns are medicinal and they are commonly practiced to treat various ailments in the area. Table 4. shows ethnomedicinally important 56 taxa in the study area distributed in 27 generaand17 families. Pteridaceae is the largest medicinal family having 4 medicinal genera and 16 taxa while Dryopteridaceae having three medicinal genera and 4 taxa. 59 remedies are commonly practiced against 20 different diseases like hepatitis, diabetes, infertility, skin problems, hair care and general tonics. Edible species are *Diplazium polypodioides* (Kunjie), *Diplazium esculentum, Marsilea minuta, Marsilea quadrifolia, Pteridium aquilinum* var. *latiusculum Nephrolepishi rsutula, Osmunda cinnamonea*, *Asplenium ensiforme* and *Nephrolepis biserrata*. The young fronds are used as vegetables source or as a pot herb. The voucher's numbers are provided in Anexture 2.

Table 2. Gender based analysis of the taxa uses by frequency and percentages.

Number of Pteridophytes	None	1-5	6-10	11-15	16-20	More	Total
F/% in Male	12/9.1	70/53.0	22/16.7	14/10.6	7/5.3	7/5.3	132/100
F/% in Female	3/5.7	35/66	11/20.8	3/5.7	0/0	1/1.9	53/100
Number of taxa for medicinal use							
F/% in Male	31/23.5	71/53.8	20/15.2	6/4.5	3/2.3	1/0.8	132/100
F/% in Female	17/32.1	19/35.8	9/17.0	2/3.8	3/5.7	3/5.7	53/100
Use for Vegetable							
F/% in Male	38/28.8	77/58.3	8/6.1	7/5.3	2/1.5	0/0	132/100
F/% in Female	18/34	20/37.7	8/15.1	3/5.7	3/5.7	1/1.9	53/100
Number of taxa for ornamental purpose							
F/% in Male	24/18.2	81/61.4	14/10.6	5/3.8	4/3.0	4/3	132/100
F/% in Female	12/22.6	27/50.9	4/7.5	9/17.0	1/1.9	0/0	53/100
Common names of pteridophytes known to indigenous people							
F/% in Male	45/34.1	72/54.5	8/6.1	5/3.8	2/1.5	0/0	132/100
F/% in Female	22/41.5	19/35.8	3/5.7	2/3.8	2/3.8	5/9.4	53/100
For other use							
F/% in Male	59/44.7	58/43.9	10/7.6	4/3.0	1/0.8	0/0.0	132/100
F/% in Female	28/52.8	19/35.8	3/5.7	1/1.9	0/0	2/3.8	53/100

Widely used fernsfor various remedies

Fig.2. Shows that locals using 6 species as tonic and 6 against cough and chest congestion, 5 species for wound and skin healing 4 species as antipyretic and against leucorrhea, 3 for stomach disorders and 3 as antidotes, 2 against hepatitis, 2 as purgatives,2 for joint pains and 2 for bones dislocation and pectoral affections. One or two species are used as, ant diabetic, for spermatorhea dysentery, leprosy, menstrual disorders, diarrhea, as diuretic, for body pains and as nerve relaxant. Some taxa are used to prevent bad evils and against majictoona, while others are used as roof thatching, Shade making, ground insulation, sheep forage, as a dishwashing sponge and baskets making. Some ferns are grown with the belief to get wealthy, while others are considered as mood relaxant and health promoting.

Table 3. Number of taxa and their uses in hilly, rural, suburban and urban areas.

Number of Pteridophytes	None	1-5	6-10	11-15	16-20	More than 20	Total
F/% in hilly area	5/12.8	17/43.6	3/7.7	3/7.7	6/15.4	5/12.8	39/100
F% in Rural	4/4.0	59/59.0	24/24.0	9/9.0	1/1.0	3/3.0	100/100
F% in sub urban	2/13.3	10/66.7	3/20	0/0	0/0	0/0	15/100
F/% in Urban	4/12.9	19/61.3	3/9.7	5/16.1	0/0.0	0/0.0	31/100
No. of taxa used as medicinal							
F/% in hilly	10/25.6	12/30.8	6/15.4	5/12.8	3/7.7	3/7.7	39/100
F/% in Rural	23/23	59/59	14/14	2/2	1/1	1/1	100/100
F/% in sub urban	6/40	5/33	3/20	0/0	1/6.7	0/0.0	15/100
F/% in Urban	9/29.0	14/45.2	6/19.4	1/3.2	1/3.2	0/0.0	31/100
No. of taxa used as vegetable							
F%/ in hilly	13/33	16/41	6/15.4	1/2.6	2/5.1	1/2.6	39/100
F% in Rural	21/21	64/64	7/7	6/6	2/2	0/0	100/100
F/% in sub urban	7/46.7	4/26	2/13.3	1/6.7	1/6.7	0/0.0	15/100
F/% in Urban	15/48.4	13/41.9	1/3.2	2/6.5	0/0.0	0/0.0	31/100
No. of taxa used as ornamental							
F/% in hilly	7/17.9	18/46.2	5/12.8	5/12.8	3/7.7	1/2.6	39/100
F/% in Rural	17/17	64/64	9/9	5/5	2/2	3/3	100/100
% in sub urban	2/13.3	10/66.7	0/0.0	3/20	0/0.	0/0	15/100
F/% in Urban	10/32	16/51.6	4/12.9	1/3.2	0/0.0	0/0.0	31/100
Local common names							
F% in hilly	14/35.9	16/41.0	2/5.1	3/7.7	1/2.6	3/7.7	39/100
F/% in rural	29/29	61/61	3/3	3/3	3/3	1/1	100/100
F% in sub urban	7/46.7	4/26.7	3/20	0/0	0/0	1/6.7	15/100
F/% in urban	17/54.8	10/32.3	3/9.7	1/3.2	0/0.0	0/0.0	31/100
Other uses of the taxa							
F/% in hilly	15/38.5	17/43.6	3/7.7	3/7.7	0/0.0	1/2.6	39/100
F/% in Rural	40/40.0	50/50	6/6	2/2	1/1	1/1.0	100/100
F/% in sub urban	10/66.7	3/20.0	2/13.3	0/0.0	0/0.	0/0.0	15/100
F/% in Urban	22/71.0	7/22.6	2/6.5	0/0.0	0/0.0	0/0.0	31/100

Fidelity level (FL) value

The fidelity level (FL), the percentage of informants claiming the use of certain Pteridophytes for the medicinal purpose was calculated according to the following formula (Alexiades, 1996): FL (%) $= \frac{Ip}{Iu100}$

Where: Ipis the number of informants who in dependently suggested the use of the species for a particular disease and Iu is the total number of informants who mentioned the species for medicinal purpose.

Highly used pteridophytes fidelity level

The area is rich for edible species and active ingredients containing taxa particularlye practised against various ailments.Table.5. Shows the use of various Ferns and Allies by 30-180 respondents against 1-6 remedies. The highly used taxa are *Diplazium esculentum*and *Asplenium dalhousiae* (180), followed by *Equisetum arvense* L. (178), *Equisetum ramosissimum* and *Adiantum incism* (175), *Hypodematium crenatum* and *Christella dentate*(170). *Nephrolepis cordifolia*and, *Adiantum venustum* (160), *Adiantum caudatum* (150), *Marsilia minuta* (140). The rest of the species were used by 31 - 100 respondents only. The locals utilize these plants due to its potential active constituents and due to easy availability in the study area.

Table 4. Medicinally important taxa of District Mansehra and adjacent areas.

S.No	Species with family name	Common Names	Part used	Remedy against	Method of application
1*	*Asplenium dalhousiae* Hook. Aspleniaceae	Naroky	Rhizome	Gonorrhea, hepatitis	Orally decoction for one week is practiced and antiviral effect is observed.
2	*Asplenium ceterach x punjabense* Nakaike Aspleniaceae	Chahala	Root , leaf	Leucorrhoea. skin diseases	Orally decoction for one month& leaf paste used as Poultice. Antiviral.
3*	*Wood wardiaradicans* Smith. Blechnaceae	Zip Fern	Fronds	Worms	A leaf extract is given to children's to remove worms. The women use fronds and petioles for baskets making.
4*	*Equisetum ramosissimum* Desf. Eqvisitaceae	Naram, Pahari Bandaky. .	Whole plant	Scabies, itches, skin infections. bone fracture, female infertility, Wounds healing	Healing wound.
5	*Hippochaete debilis* (Roxb.exVaucher) Ching Eqvisitaceae	Bandaky Jenabil	Whole plant	Fracture, dislocation of bones.	Plant paste applied in bone fracture. Powdered stem dissolved in water is used for enema during stomach disorder in children. Women drink rhizome decoction to increase fertility. Plant is known to have ant rheumatic, antifungal diuretic, hemostatic, & antiviral properties. Paste of branches with leaves is used as local.
6	*Equisetum arvense* L. Eqvisitaceae	Bandaky	Cones	kidney troubles, acidity and for hair problems	Decoction of whole plant is useful for to increase bones strength. Paste of plant is used in hair to remove skin problem and maintain hair shine.
7	*Equisetum palustre* L. Eqvisitaceae	Bandaky	Cones	Stomach disorders	Decoction, also Plant powder mixed with mustard oil is used in the treatment of bone fracture, backache and in muscular pain. Decoction, remove kidney stones, also body cooling.
8*	*Dryopteris nigropaleacea* Fraser-Jenk. Dryopteridaceae	Kandadhenu ; Mangeti, Manjhibotii.	Rhizome	Snakebite, rheumatism and leprosy	Decoction of cones is orally practiced for stomach disorders.
9	*Dryopteris cochleata* (Buch. Ham.ex Don) C.Chr. Dryopteridaceae	Manjhi botii.	Young frond Dried rhizome	Croziers cooked as vegetable, sag, epilipsy, leprosy	Plant powder, mixed with water given to patients as well as paste relieves pain.
10**	*Hypodematium crenatum* (Forssk.) Kuhn,v. Deck. Dryopteridaceae		Rhizome, Frond	Infertility, UTII wounds snake, scorpion, dog bites	Rhizome extract, decoction is useful orally. Paste of whole plant useful on wounds snake, scorpion, dog bites, also antifungal.
11***	*Polystichum squarrusum* (D.Don.) Fee. Dryopteridaceae		Sporophyll-s, Fertile fronds	Wounds ,	Rhizome powder mixed in coconut with raw brown sugar called gur increases fertility in females. antibacterial, Sporophylls extracts is used as antibacterial
12*	*Pteridium-revolutum* (Bl.) Nakaike Dennstaediaceae	Barheipani	rhizome	Belly worms.	Decoction is taken orally at bedtime to remove belly worms.
13	*Pteridium aquilinum* (L.) Kuhn Dennstaediaceae	Barheipani	Rhizome, Frond ,	Stomach cramps, Against worms. Bad effects on sheeps milk.	Decoction of rhizome and fronds is taken orally at bed time in the treatment of worms. The infusion of plant is used to relieve stomach cramps and increases urine flow.

				Abortifacient.	Decoction of rhizome drunk as herbal health tea. Locals try to remove this species from cow, sheep feed causes as abortion.
14*	*Nephrolepis cordifolia* (L.) Presl. Lomariopsidaceae	Ghwar booty,	Fronds	Bleeding	Fronds paste applied on wounds to prevent bleeding.
15	*Nephrolepis exaltata* (L.) Schott Lomariopsidaceae	Ghwar booty,	Fronds	Air saturation	Potted ornamental remove ghosts and unseen evils
16	*Nephrolepis auriculata* (L.) Triamen Lomariopsidaceae	Ghwar booty,	Fronds	Air saturation	Potted ornamental, remove ghosts and unseen evils.
17*	*Lygodium japonicum* (Thunb.) Sw. Lygodiaceae		Leaves	Burns as cooling agent. Chest congestion	Fronds infusion reduce high blood pressure
18	*Lygodium scandense* (L.) Sw. Lygodiaceae	Bhanjabasa	leaves	Female infertility	Fresh leaves are used as salad.
91*	*Marsilea quadrifolia* L. Marsiliaceae	Devasthal	Whole leaves & petioles	Migraine nerve relaxant infantile diarrhea	Fresh leaves and tubers are crushed to form the paste then applied on boils twice a day for 5 days. Used as pot herb or sushnisaag.
20	*Marsilea minuta* L. Marsiliaceae	Deva sthali; watery shatala, Cool shaftal.	Leaves, leaves with petioles.	Cough insomia.	Used as an expectorant
21*	*Botrychiumlunaria* (L.) Sw. Osmundaceae	*Chahala*	Whole plant	Fever	Infusion with coconut oil increases fertility
22	*Osmunda regalis* L. Osmundaceae		Whole Plant	rickets, rheumatism	Root decoction ,tea administered orally, paste is poultice
23**	*Botrychium virginianum* (L.) Sw. Ophioglossaceae	Jenabil	Root	Hypertension, Cuts and wounds	Fresh young leaves extract 2 drops of dropped in the nostrils of nose twice a day effective in migraine. Crushed plant is used with sugar candy or honey. Also used as a pot herb.
24*	*Ophioglossum capense* Sw. Schrad. Ophioglossaeceae)	Tarinivilla	Leaf	Menstrual disorders.	About 10 g whole fresh plant paste is mixed with
25	*Ophiglossum petiolatum* Hook. Ophioglossaceae	Nawana	Leaf	Dysentery	100 g of curd prepared from black cow's milk. The dosage is given orally once a day in empty stomach for one month against epilepsy. Decoction with ginger control coughs.
26	*Ophiglossum vulgatum* L. *Ophioglossaceae*	Barakamda	Leaves	Joint pain.	Decoction is given to lower body temperature.
27 *	*Adiantum cappilus- veneris* L. Pteridaceae	Ratanjot	Whole plant	Female sterility ,Snake dog bites	5 g fresh leaf along with 100 g rice is made into a cake and the boiled cake is taken orally in empty stomach for 15-20 days. To use against bites fresh juice of fronds is used orally.
28	*Adiantum incism* Foressk. Pteridaceae	*Ratanjot,* Barheipani	Leaves	Falling hairs, malaria and bronchial diseases. cough, diabetes and fever	Frond juice is used for hair massage. Fresh juice of leaf is used to lower blood sugar.
29	*Adiantum venustum* D. Don Pteridaceae	Hansraj , Sunbal	Fronds	Cold & cough	Dried leaf powder and fresh juice is taken orally.
30	*Adiantum myrosorum* Baker. Pteridaceae		Whole plant	Chronic catarrhs and other pectoral affections	Leaf decoction is given in dysentery.
31	*Adiantum aethiopicum* Sess Pteridaceae		Whole plant	Congestion	Leaf poultices are applied for skin diseases and swelling.
32	*Adiantum caudatum* L. Pteridaceae	Kairakacha	Fronds	wound healing	Fronds extract is used to relieve intestinal gripping, as tonic& styptic.
33**	*Actiniopteris australis* (L.f) Link. Pteridaceae	Chahala	Rhizome	Snakebite.	Powder of rhizomes is given as an antidote against dog bite and snakebite. The extract of leaves is taken orally and paste of leaves is applied on the lower portion of stomach for

					clear and early release of urine. Died rhizome mixed with water is given to women orally once during menstrual period for 30sterility.
34**	*Cheilanthes pteridioides* (Reich.) C. Chr. Pteridaceae	Meghasani	Leaf	Dysentery, leprosy, skin diseases	Leaf powder mixed with butter prevents internal burning of the body, leaves juice useful for skin.
35	*Cheilanthes farinosa* (Forssk.) Kaulf. Pteridaceae	Jenabil	Rhizome and root	general tonic, gout and rheumatism	About fifty leaves are boiled with coconut oil and applied to cure various skin diseases. Paste of root is used to cure eczema.
36	*Cheilanthes albomarginata* C.B. Clarke Pteridaceae		Leaf	Body Pain	Leaf powder is taken along hot milk twice a day.
37	*Chelianthes leptopidium* Baker Pteridaceae	Jenabil	Rhizome and root	General tonic.	tonic, expectorant, astringent, emetic, diuretic
38	*Chelianthes acrostica* (Bulbis) Todaro Pteridaceae	Bhanjabasa	Leaf	Bleeding, skin diseases.	Decoction is given with gum acacia powder.
39	*Chelianthes bicolor* Fraser-Jenk.Pteridaceae		Whole plant	Weakness,	Tonic, all parts are washed and used orally for body strength.
40***	*Pellaea calomelanos* (Sw.) LinkPteridaceae		Frond	Cough, cold	Emollient in cough and diseases of chest
41****	*Pteris vittata L.* Pteridaceae	Zbarg bhottii	Leaves	Wounds, burns, infections viral bacterial.	Leaves extract, powder, decoction, as well as fresh paste is used for curing burns.
42	*Pteris cretica* L. Pteridaceae	Thandi bhootii	Frond	Wounds	Powder, Decoction, as well as fresh paste.
43	*Pteris quadriaurita* Retz. Pteridaceae	Kandadhenu	Frond, rhizome	Wounds, pus cells,	Leaf extract one teaspoon is useful in
44*	*Microsorium membranaceum* (D.Don.) Ching. Polypodiaceae	Patbil	Leaf	purgative, diuretic, healing wound	Dysentery, leaf paste is applied on skin for one hour.
45* F.12	*Psilotum nudum* (L.) P. Beauv. Psilotaceae		Spores	Diarrhea	Spores along synangium mixed in green tea control diarrhea.
4*F. 13	*Schizaea dichotoma* (L.) Shizaceae		Rhizome	Chest congestion	Extracts twice a day Cure eczema and stomachache
48*F14	*Salvinia auriculata* Aublet Salviniaceae	Marsh ferns	Plant colonies	Malaria	Leaf one teaspoon extract is useful against malaria.
49	*Salvininia molesta* D. Mitch. Salviniaceae	Marsh ferns	Whole plant	Antifungal	Decoction
50*F15	*Christella dentate* (Foressk).C. Chr. Thelypteridaceae	Jenabil,pemaar in hidko	Root, rhizome leaves	Spermatorrhea, gout and rheumatism, antidiabetic	Leaf extract
51**	*Phegopteris connectalis* (Michhx) Watt.	Bhanjabasa	Rhizome	White discharges.	Plant powder, mixed with cow's ghee is given to females. Brown stipe's, used as an incense to keep off fear in children.
52	*Psuedophegopteris levingie* (Clarke) Ching Thelypteridaceae	Jenabil	Root	Spermatorhea	Nose, ear jewelries. Root decoction is used Spermatorhea
53*F1416	*Diplazium esculentum* (Retz.) Sw. Woodsiaceae	Konji,kuanji, Lingra	Rhizomes and young fronds.	Vegetables Asthma, Tonic, Cold, cough.	Taken for asthma and cold in the head and chest. Also used as vegetable and young fronds are highly palatable.
54	*Diplazium japonicum* (Thunb.) Bedd. Woodsiaceae		Rhizome, young fronds.	Weakness Vegetables	Fronds are largely used as cushion for cattle sheds.
55	*Diplazium polypodioides* Bl. Woodsiaceae	Konji, lingra	Young frond	Vegetables	Plant extracts is used as demulcent, hypotensive, tonic, antiviral and antibacterial.
56	*Diplazium squamigerum* (Mett.) Christ Woodsiaceae	Naqlikonjie	Rhizome, leaf	Tonic	The paste made from the leaf is tied with cloth and

(*Indicate the start of new family and **indicate 2nd & ***3rd genus of the same family).

Rare taxa fidelity level

Most of the taxa having a significant potential to be used as medicinal but having narrow ecological amplitude ,habitat specificity and scarce distribution in the study area that's why rarely practiced to cure diseases.

Table.6. highlighting the least used taxa in the study area due to its rarity. Range of the respondents was from 4-30 and used these taxa against 1-3 diseases only. These species *Psilotumnudum* and *Schizaea dichotoma* are the rarest taxa having least area of occupancy due to over exploitation and no of present respondants were comparatively very less.

Potential parts of pteridophytes.

Various parts store various secondary metabolites and their mode of medicinal applications was determined by the locals for different remedies. Pteridophytes sporophyte or plant body prominent parts are fronds in case of ferns and rhizome (underground stem), one of the important parts for storage of photosyn thate in all ferns and allies. These are used as a part of various locally formulated recipes.

Figure 3. shows various part uses of the species utilized in various 59 remedies. The highest potential of part use was recorded for leaf or Frond (50%), followed by rhizome 33.4%, Whole plant 16.7%, and the root 8.3%.

The rest of the parts cones, sporophylls and spores are used comparatively very less 3.33% each. Similarly for various remedies Leaf and fronds are more useful 58.33%, followed by whole plant 26.67%, rhizome 21.67%and root 10 %. Cones, spores and sporophylls are used in a few remedies like, 5, 3.33 and 1.6% only.

Pteridophytes ornamental importance

Pteridophytes are not only the source of various medicines and food but also having a great ornamental potential and can fulfill the asthetic requirement of any garden, home and public recreational centre. Indoor keeping quality of ferns pots in even offices, banks and all working points is very easy as they are shade lovers.

Table 5. Fidelity level of medicinal taxa used for various remedies by no. of respondents.

Taxa Used for Medicinal Purpose	No. of respondants	No. of remedies	Fidelity level $FL(\%) = \frac{Ip}{Iu100}$
Asplenium dalhousiae Hook.	180	3	0.97
Asplenium ceterach x punjabense Nakaike	60	3	0.324
Woodwardia radicans Smith.	60	2	0.324
Equisetum ramosissimum Desf.	175	6	0.94
Hippochaete debilis (Roxb. Ex *Vaucher)* Ching	40	1	0.216
Equisetum arvense L.	178	4	0.96
Dryopteris nigropaleacea Fraser-Jenk.	30	4	0.16
Dryopteris cochleata (Buch. Ham. ex Don) C. Chr.	100	3	0.54
Hypodematium crenatum (Forssk.) Kuhn, V. Deck.	170	2	0.91
Polystichum squarrusum (D. Don.) Fee.	40	1	0.216
Pteridium-revolutum (Bl.) Nakai	90	1	0.486
Pteridium aquilinum Kuhn	40	4	0.216
Nephrolepis cordifolia (L.) Presl.	160	1	0.861
Nephrolepis exaltata (L.) Schott	50	1	0.270
Nephrolepis auriculata (L.) Triame	50	1	0.270
Lygodium japonicum (Thunb.) Sw.	35	3	0.19
Lygodium scandense (L.) Sw.	35	3	0.19
Marsilea quadrifolia L.	50	4	0.270
Marsilea minuta L.	140	2	0.76
Botrychium lunaria (L.) Sw.	30	1	0.16
Botrychium virginianum (L.) Sw.	30	1	0.16
Ophioglossum capense Sw. Schrad.	30	2	0.16
Ophiglossum petiolatum Hook.	30	2	0.16
Ophiglossum vulgatum L.	30	2	0.16
Osmund aregalis L.	40	1	0.216
Adiantum cappilus- veneris L.	178	4	0.96
Adiantum incism Foressk.	175	6	0.94
Adiantum venustum D. Don	160	6	0.86

Adiantum caudatum L.	150	2	0.81
Pteris vittata L.	50	3	0.270
Pteris cretica L.	100	1	0.54
Salvinia molesta D. Mitch.	160	2	0.86
Christella dentate (Forssk). Brownsey & Jermy	170	3	0.91
Phegopteris connectalis (Michhx) Watt.	50	2	0.270
Psuedophegopteris levingie (Clarke) Ching	30	1	0.16
Diplazium esculentum (Retz.) Sw.	180	5	0.97
Diplazium japonicum (Thunb.) Bedd.	60	2	0.32
Diplazium polypodioides Bl.	90	1	0.48
Diplazium squamigerum (Mett.) Christ	80	1	0.43

Ornamental potentiality of 55 pteridophyte taxa has been shown in Table 7 and Fig.4. These taxa distributed in 26 genera and 15 families. Dryopteridaceae was the largest family with 4 genera (16.66%) and 14 species (25%) of ornamental potential, followed by Pteridaceae with 4 genera (16.66%) and12 species (21.4%).

Table 6. Fidelity level of the least used taxa for no. of remedies.

Least Used taxa name	No. of least used taxa	No. of remedies	Fidelity level
Equisetum palustre L.	20	1	0.10
Dryopteris nigropaleacea Fraser-Jenk.	30	3	0.16
Salvinia auriculata Aublet	10	2	0.05
Botrychiumlunaria (L.) Sw.	30	1	0.16
Botrychium virginianum (L.) Sw.	30	2	0.16
Ophioglossum capense Sw. Schrad.	30	1	0.16
Ophiglossum petiolatum Hook.	30	1	0.16
Ophiglossum vulgatum L.	30	1	0.16
Adiantum myrosorum Baker.	10	2	0.05
*Adiantum aethiopicum*Sess	5	1	0.02
Actiniopteris australis (L.f) Link.	5	3	0.02
Cheilanthe spteridioides (Reich.) C. Chr.	10	1	0.05
Cheilanthes farinosa (Foressk.) Kaulf.	10	1	0.05
Cheilanthes albomarginata C.B.Clarke	15	2	0.08
Chelianthes leptopidium Baker	10	1	0.05
Chelianthesacrostica (Bulbis) Todaro	10	2	0.05
Chelianthes bicolor Fraser-Jenk.	10	1	0.05
Pellae hastate (Thunb.) Prantl	05	2	0.02
Pteris quadriaurita Retz.	5	1	0.02
Psilotum nudum (L.) Beauvois	4	1	0.02
Schizaea dichotoma (L.) J. S. Smith	05	1	0.02
Salvinia auriculata Aublet	10	1	0.05
Psuedophegopteris levingie (Clarke) Ching	30	1	0.16

Thelypteridaceae with 4 genera and 9 species of ornamental potential. Lomariopsidaceae and Aspleniaceae having 1 genus (4.16%) and 7 (12.5%) and 4 species (7.14%) respectively. Ophioglossaceae having 2 genera (8.32%) and 2 species (7.14%), Athyriaceae with 3genera (12.5%) and three species (5.35%).

The rest of the families having one genus (4.1%) with one (1.67%) or more than one species each.

Equisitaceae was least significant ornamental family if potted and needs special geometrical shapes for cultivation. These valued ornamental features were considered to identify potential for commercialization like better morphology , shine, texture, modified unique pinnae, ornamental sori, variable evergreen leaves, good propagation potential, short stature or easy to transport, indoor survival capacity, more spores and fronds production, more adopted to shade etc.

Table 7. List of ornamentally potential taxa in the study area.

Taxa	Family	Ornamental Potentiality and cultivars
Asplenium dalhousiae Hook.	Aspleniaceae	Very conspicuous shiny fronds.
Asplenium ceterach L.	Aspleniaceae	These are highly decorative small fern with shiny leathery fronds.
Asplenium septentrionale (L).Hoffim	Aspleniaceae	Bifurcated, unique fronds than any other Fern.
Asplenium teunifolium D. Don.	Aspleniaceae	Decent looking appearance of the plant.
Azolla pinnata R.Br.	Azollaceae	Striking appearance in aquatic habitats.
Athyriumfilix-foemina (L.) Roth.	Athyriaceae	2½' high and 2' wide soft green, delicate textured fronds attractive
Diplazium esculentum (Retz.) Sw.	Athyriaceae	Grown as pot plant under moist, well-drained soil. The fiddle heads very attractive as well as mature fronds.
Depariapetersenii (Kunze) M. Kato	Athyriaceae	A medium sized fern, grown in shady places and well-suited as potted plant.
Woodwardia radicans (L.) J. Sm.	Blechnaceae	A spectacular evergreen plant, the chain fern, has long, dark green, arching fronds which can grow up to two meters in length.
Dryopterisfilix–mas (L.) Shott.	Dryopteridaceae	Male plant very attractive
Dryopterisn odontoloma (Moore) C. Chr.	Dryopteridaceae	Pretty fronds.
Polystichum prescotianum (Wall. ex Mett.) T. Moore	Dryopteridaceae	Handsome hairs and scales with attractive fronds.
Dryopterisfilix–mas (L.) Shott	Dryopteridaceae	Male plant very attractive
Cyrtomium muticum (Christ) Ching	Dryopteridaceae	Shiny beautiful fronds.
Cyrtomium caryotideum (Wall. ex Hook. & Grev.) C. Presl.	Dryopteridaceae	Leathery, dark green fronds, ever green shiny
Cyrtomium macrophyllum (Makino) Tagawa	Dryopteridaceae	Tender, dark green, glossy large fronds.
Cyrtomium falcatum (L. f.) C. Presl.	Dryopteridaceae	Stringy, dark green fronds are very glossy and toothed making it more decorative.
Polystichum lonchitis (L.) Roth	Dryopteridaceae	Grows undertones partial shade to shade with moist, fairly rich soil. Polished, dark green, leathery, evergreen beautiful fronds.
Polystichum luctuosum (Kunze) T. Moore	Dryopteridaceae	Attractive auriculate shiny fronds.
Polystichum auriculatum (L.) C. Presl.	Dryopteridaceae	Good looking, beautiful fronds.
Polystichumpiceo-paleaceum Tagawa	Dryopteridaceae	Beautiful whorls of fronds.
Rumohra aristata (G. Forst.) Ching	Dryopteridaceae	Fronds can make a bunch of cut flowers more valuable.
Hypodematium crenatum (Foressk.) Kuhn	Dryopteridaceae	Atrractive tripinnate broad fronds.
Adiantum venustum D. Don	Pteridaceae	Smart fronds and indusium
Adiantum myrosorum Baker.	Pteridaceae	Attractive, delicate good looks, Maidenhair Fern 1½-2' high and wide, distinctive shiny, purple-black stems support dainty foliage held in fan shaped fronds.
Pelleae hastate (Thunb.) Prantl, Engl.	Pteridaceae	Succulent pinnae, black shining stipe's marginal sori giving unique look. Unique.
Pteridium-revolutum (Bl.) Nakai	Dennstaediaceae	Tripinnate beautiful showy fronds easily spreading and flourishing.
Chelianthes albomarginata C.B. Clarke	Pteridaceae	White undersurface e of fronds with dark sori making a graceful combination.
Pteris vittata L.	Pteridaceae	Beautiful fronds & pinnas abundantly growing in the wild.
Pteris cretica L.	Pteridaceae	Cultivars are Albo-lineata, a dwarf growing type with anointment stripe in the center of each leaflet. Childsii has light green frilled leaflets. Fronds tips are divided in Wilsonii' with bright greencolor.
Pteris ensiformis Burm.	Pteridaceae	Beautiful habit and fronds, cultivar 'Victoria' has silvery

		white fronds edged of dark green color.
Pterisquadriaurita Retz.	Pteridaceae	Showy, good looking fronds.
Pteris excels Gaud.	Pteridaceae	No match for its beautiful fronds.
Adiantumcapillus – veneris L.	Pteridaceae	Fine-looking, fetching fronds. Commonly called Maiden hair fern has exceedingly delicate fronds.
Adiantum caudatum L.	Pteridaceae	Maidenhair Fern, Walking Fern", charmingly trails with generously long, super-finely textured fronds.
Nephrolepis exaltata (L.) Schott	Lomariopsidaceae	Commonly known sword Bostan is a terrestrial, perennial, short, ever green, herbaceous fern. Leaflets arecurled. Rhizome is glabrous, brect with long creeping stolons; stipe is polished shinning black without ramenta and indusim. Fronds are sterile, short, erect and profuse with bipinnate leaves (Oloyede, 2012). Cultivar 'Bostoniensis' has arching fronds up to 3 feet long that cascade on all sides. Cultivar, Compacta has 15- to 18-inch fronds, Childsii' grows to 10 to 12 inches with overlapping curling leaflets. In cultivar Fluffy Ruffles have stiff upright fronds, cultivar, Verona has lacy drooping fronds while Fluffy Duffy' is very fringed and compressed.
Nephrolepis auriculata Trimen	Lomariopsidaceae	Good potted plant with noticeable auriculate pinnae and fronds.
Nephrolepis cordifolia (L.) C. Presl.	Lomariopsidaceae	Having all good characters as a trade plant, very popular potted plant.
Nephrodium molle (Sw.) R. Br.	Lomariopsidaceae	Fulfilling the aesthetic requirement of gardens.
Nephrolepis biserrata (Sw.) Schott	Lomariopsidaceae	It is called lemon button fern because its leaflets are lemon color it grows well on the soil in re-growth forest and inside the pots at homes and offices (Oloyede, 2012).
Osmunda japonica Thunb.	Ophioglossaceae	Conspicuous habit
Osmunda claytoniana L.	Ophioglossaceae	Appealing habit with showy fronds
Osmunda regalis L.	Ophioglossaceae	Lovely habit, unique reproductive features.
Ophioglossum reticulatum L.	Ophioglossaceae	Adder s tongue plant. This pretty fern is well suited for potted plants.
Lycopodium Japonicum Thunb.	Lycopodiaceae	Smart fronds and strobilus. The unusual climbing habit is the reason most people grow this fern. It can be grown in a hanging basket or trained on a trellis. The delicate fronds have attractive scalloped edges.
Lygodium japonicum (Thunb .) Sw.	Lygodiaceae	Climbing fern with attractive foliage
Nephrolepis auriculata (L.) Trimen	Lomariopsidaceae	Good-looking fronds.
Marsilia minuta L.	Marsiliaceae	Water fern These ferns grow well in moist part of the garden, around or in water features or floating attractively in shallow ponds or streams. They can be also grown in aquarium or shallow water containers.
Marsilea quadrifolia L.	Marsiliaceae	Water fern, good looking floating habit.
Psilotum nudum (L.) P. Beauv.	Psilotaceae	Striking habit and synangia. Beautiful bifurcated branches.
Polypodium argutum Wall. ex. Hook.	Polypodiaceae	Utilized for its beauty
Thelypteris erubescence (Wall. ex Hook.) Ching	Thelyptridaceae	Gorgeous habit
Glyphyropteridopsis erubescens Wall. ex Hook.	Thelyptridaceae	Nice-looking habit long fronds.
Selaginella sanguinolenta (L.) Spring	Selaginellaceae	Eye-catching small plant, best for potted plants.
Gymnocarpium robertianum (Hoffm.) Newman	Woodisiaceae	Smart habit long fronds. Creeping rhizome easy to propagate.

Discussions and conclusion

District Mansehra and its adjacent areas falls in the Sino Japanese region of Pakistan, having a diverse pteridophyte flora and a diverse pattern of traditional uses.

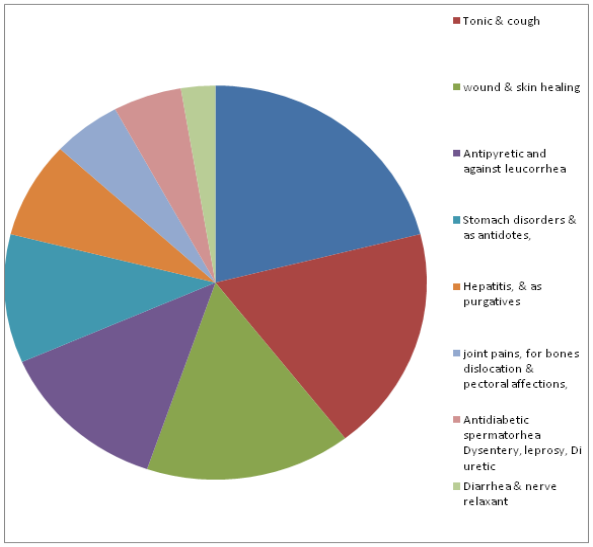

Fig. 2. No. of Species used for various remedies.

People of the area used to cure diabetes and hepatitis like life taking diseases with these plants. Women use them in various beauty remedies like hair care, glowing skin and fair complexion and to treat skin problems. As pteridophtes taxa having a strong potential for skin improvement so cosmetics industry must exploit them for beauty care and good earning. Most of the taxa are highly palatable used as potherbs and locals sell them in the local market collecting from the wild. Our results match with the previous workers (Nair, 1959; Dixit, 1974).

Residents of hilly and rural areas frequently used these taxa. Knowledge-wise older people have more awareness regarding these taxa. Keeping in view their sustainability, these taxa may be utilized for new drugs and commercial purpose. These are potential indoor plants due to shade loving nature, can be easily propagate, having excellent attractive foliage and can satisfy the aesthetic thirst of the customers.

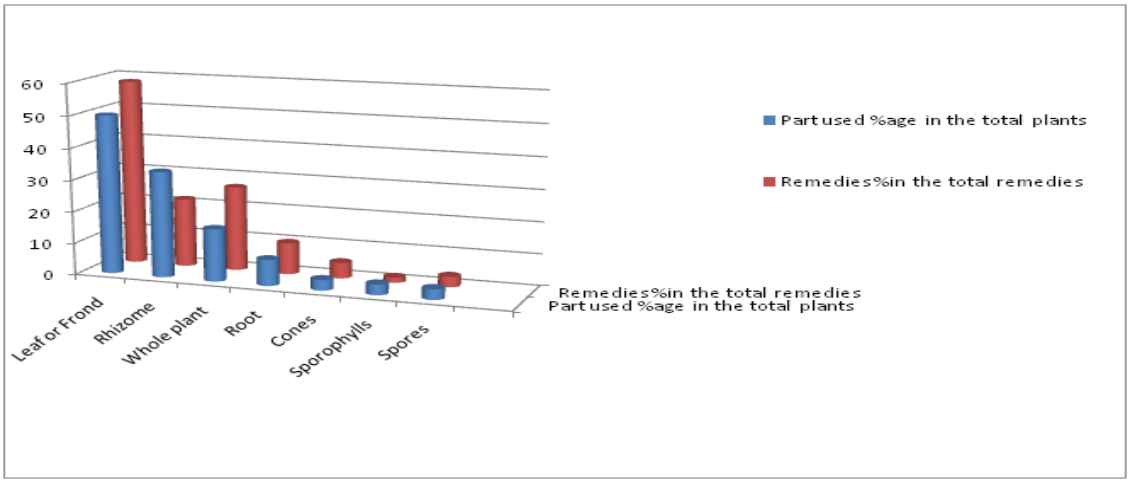

Fig. 3. Showing part used of 60 pteridophytes species in 59 remedies.

Our findings regarding ornamental potentiality to contribute environmental beauty and man pleasure and health care are is in full agreement with the previous workers. (Oloyede *et al.*, 2010, 2012; Kochhar, 2009; Biplab and Subir, 2007; Jim, 1999). Some of the taxa are used by the locals to improve air quality like (Croft, 1985; Benjamin and Manickam, 2007). Cultivation of these taxa for food, medicine and ornamental purpose is highly needed and appreciated by a no of early pteridologists (Kalsoom *et al.*, 2010). Ferns are mostly sited in the wild and their benefits are many, immense collection and cultivation of ferns for their ornamental aesthetics, landscaping, environmental protection, food and medicinal values is strongly recommended. Collection from the wild and their direct utilization without modern means of identification by the locals is highly risky.

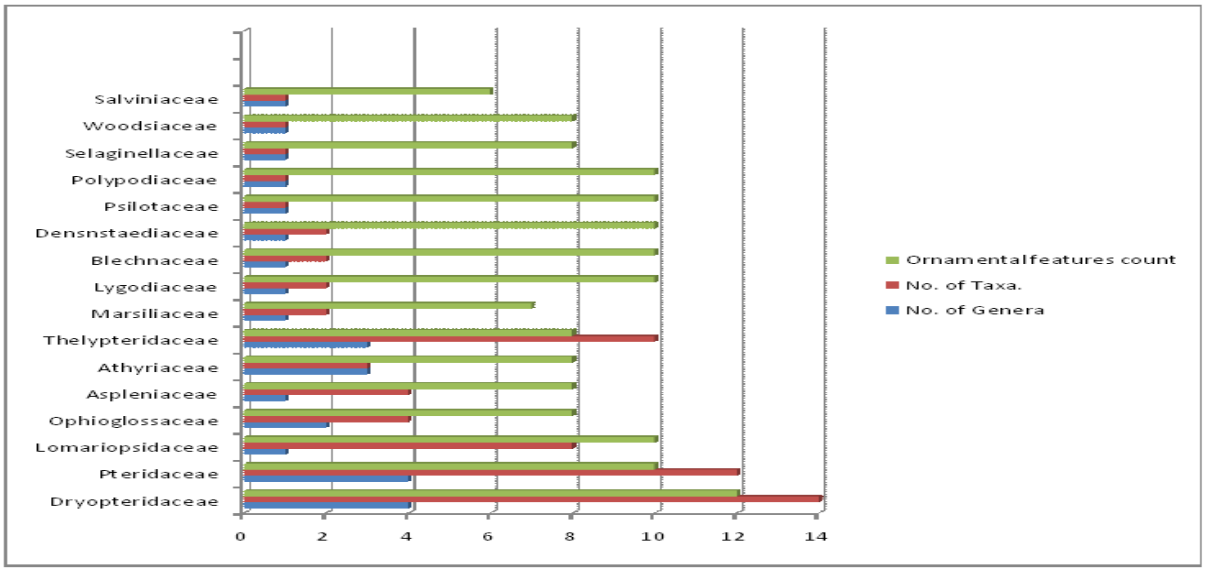

Fig. 4. Family-wise representation of the taxa showing ornamental potential.

Genera like Pteridium and Marsilia having poisonous taxa and care should be taken while utilizing these plants as a food source.

Pteridium aquilinum var. *latiusculum*and other toxic species need removal from Narran, and Shogran particularly to prevent their harmful effects on the livestock.

Fig. 1. *Adiantum cappilus- veneris* .: showing sporangia, submarginal, indusium:

Fig. 2. Commercial croziers (Diplazium esculentum) available in the local market as a pot herb.

Fig. 3. a.*Pellaea calomelonos*: showing habit.

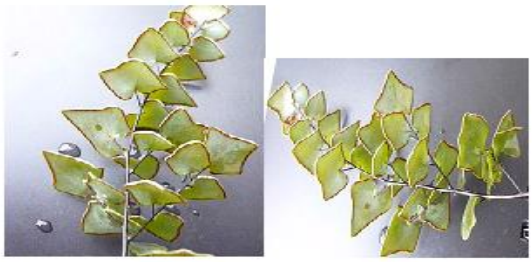

Fig. 3. b.*Pellaea calomelonos*: showing marginal sori.

Fig. 4. *Asplenium trichomane.*: habit.

Fig. 5. *Woodwardia unigemmata* : showing habit.

Fig. 6. a.*Ceterach dalhousiae*: showing habit.

Fig. 6. b.*Ceterach dalhousiae*: showing mature linear sori.

Fig. 7. *Eqvisitum ramosissimum.sub spp. ramosissimum*: habit

Fig. 8. *Chelianthes albomarginata*.Frond: showing white undersurface with matures marginal sori.

Fig. 9. *Pteris longifolia* . : habit.

Fig. 10. *Polystichum lonchitus*: habit and sori.

Due to severe threats i.e. deforestation, habitat loss and overgrazing, this ecologically and economically valued group of plants needs *in situ* and *ex situ* conservation for future generation.

Annexure 1.

Vouchers Nos. Alia Gul, 01, 05, 06, 8, 9, 30, 1028, 168, 260, 382, 387, 401, 402, 453, 472, 483, 486 539, 540, 561, 577, 608, 610, 625, 627, 616, 639, 646, 650 940, 1052, 1678, 912, 825, 645, 563, 600, 1678, 611, 844, 4, 593, 952, 29, 1225, 950, 613, 1614, 444, 443, 584, 501, 451.

References

Ahmad JA, Khaliq S, Iqbal ZS. 2004. Geological appraisal of radiactive minerals occurrence at Ahl in Mansehra granite North West Pakistan. Geological Bulletin, University of Peshawar **37(77),** 8-1.

Ahmad H. 1999. Issues regarding medicinal plants of Pakistan. Udyana Today **6(3),** 6-7.

Alexiades M. 1996. Collecting ethnobotanical data. An introduction to basic concepts and techniques (Ed.). In: Alexiades, M. (Ed.), Selected Guideline for Ethnobotanical Research: A field Manual. The New York Botanical Garden, USA Sheldon, J.W, 53–94 P.

Anonymous. 1998. District census report of Mansehra. Population Census Organization Statistics Division Islamabad, 1-32.

Benjamin A, Manickkam VS. 2007. Medicinal Pteridophytes from Western Ghats. Indian Journal of Traditional Knowledge **6(4),** 611-618.

Benniamin A. 2011. Medicinal ferns of North Eastern India with special reference to Arunachal Pradesh. Indian Journal of Traditional Knowledge **10 (3),** 516-522.

Biplab P, Subir B. 2007. Herbivore Damageto Ferns caused by a Chrysomelid Beetle from lower Gangetic plains of West Bengal, India. American Fern Journal **97(1),** 19-29. http://dx.doi.org/10.1640/00028444(2007)97[19:HDTFCB]2.0.CO;2

Champion HG, Seth SK, Khattak GM. 1965. Forest types of Pakistan. Pakistan Forest Institute, Peshawar.

Croft JR, Leach GJ, Osborne PL. 1985.Ferns and Fern Allies, in freshwater plants of Papua New Guinea, 33 –74.

Dixit RD. 1975. Ferns much neglected group of medicinal plants. International Journal of Research. Indian Med**10,** 74- 90.

Ghulam M. 2003. Mansehra- an Introduction. In: Science-Religion Dialogue (Mansehra, Paksitan: Hazara Society for Science-Religion Dialogue). Spring 50-161.

Ghulam M. 2003. Mansehra- an Introduction. In: Science-Religion Dialogue (Mansehra, Paksitan: Hazara Society for Science-Religion Dialogue). Spring 50-161.

Ghulam M. 2003. Mansehra- an Introduction. In: Science-Religion Dialogue (Mansehra, Paksitan: Hazara Society for Science-Religion Dialogue). Spring 50-161.

Ghulam M. 2003. Mansehra- an Introduction. In: Science-Religion Dialogue (Mansehra, Paksitan: Hazara Society for Science-Religion Dialogue). **20,** 50-161.

Gul A, Alam J, Ahmad H, IrfanM. 2016.An updated checklist of Pteridophytes of district Mansehra, Khyber Pukhtunkhwa-Pakistan. PlantScience Today **3(2),** 237- 247. http://dx.doi.org/10.14719/pst.2016.3.2.220

Hassler M, SwaleB. 2001. Checklist of Ferns and Fern Allies. Downloadable from http://homepages.caverock.net.nz/~bj/fern/

Jaman R, Umi-Kalsom Y. 2010. Matoniaceae. In: Flora of Peninsular Malaysia. (Eds: Parris BS,KiewR, Chung R.CK, SawLG, Soepadmo E.), FRIM Press, Kepong. 103-107.

Jim C. 1999. Ferns and man in New Guinea. Based on a paper presented to Papua New Guinea Botany Society.

Kamaruddin Salleh, Latif A. 2002. Tumbuhan Ubatan Malaysia.Percetakan Watan Sdn. Bhd. Kuala Lumpur. 37-61.

Kaushik P, Dhiman K. 1995. Common medicinal Pteridophytes, Indian Fern Journal.**12**, 139- 145.

Khullar SP. 1994. An Illustrated Fern Flora of West Himalaya, **1,** International Book Distributors, Dehra Dun.

Khullar SP. 2000. An Illustrated Fern Flora of West Himalaya, Vol. II. International Book Distributors, Dehra Dun.

Khullar SP, Pangtey Y.PS, Samant SS, Rawal RS,Singh P. 1991. Ferns of Nainital, Bisen Singh Mahendra Pal Singh, Dehradun.

Kumar M, Remesh M, Sequiera S. 2003. Medicinal pteridophytes of Kerala, South India. Indian Fern Journal **20,** 1-28.

Lord TR. 2006. *Ferns and fern allies of Pennsylvania*. PA: Pinelands Press, Indiana. Lu SG. Pteridology. Beijing: Higher Education Press; 2007.

Manickam VS, Irudayaraj V. 2003. Pteridophyte Flora of Nilgiris, South India, Bishen Singh Mahendra & Pal Singh, Publications, Dehra Dun.

May LW. 1978. The economic uses and associated folklore of fems and femallies. Bot. Rev. **44**, 491-528.

Mittal TC, Bir SS. 2006.The Indian substitutes of Male Fem *[Dryopteris filix-mas* (L.)Schott)]-I. Taxonomy and drug macroscopy. Indian Fern Journal **23,** 133-187.

Nair BK. 1957. Medicinal Ferns of India, Bull. Nat. Bot. Gard. Lucknow **29,** 1-36.

Nair BK. 1959. Medicinal Ferns of India. Bull. Nat. Bot. Gard. Lucknow. **29,** 1-36.

Oloyede FA, Alafe BO, Oloyede FM. 2008. Nutrient evaluation of *Nephrolepis bisserata* (Nephrolepidiaceae, Pteridophyta). Botanical Lithuanica **14(4),** 207- 210.

Oloyede FA, Oloyede FM, Salau TL, Ogunwole AA. 2010. Chemical composition of a Tropical fern, *Ceratopteris cornuta* (Parkeriaceae) in Nigeria. Acta Botanica Hungarica **52(1-2),** 145-150.

Oloyede FA, Makinde AM, Ajayi OS. 2012. Proximate analysis, nutritional and anti-nutritional compositions of a tropical fern, *Nephrolepis furcans* in Nigeria. Acta Botan. Hungarica **54(3-4),** 345355.

Pande PC. 1991. An Illustrated Fern Flora of Kumaun Himalaya Vol. I & II, Bisen Singh Mahendra Pal Singh, Dehradun.

Pei SJ. 1992. Mountain culture and forest resource management of Himalayas. In: D. W. Tiwari, Himalayan Ecosystem, Intel. Book Distr., Dehra Dun, India.

Perry LM, Metzger J. 1980. *Medicinal plants of East and South East Asia: Attributed properties and uses*. Cambridge, the MIT Press, Massachusetts and London.

Razdan B. 1986. Cytomorphological studies in Homosporous Ferns of Kashmir. Ph.D. thesis submitted to the Faculty of Science, Centre of Plant Taxonomy, University of Kashmir, Srinagar, India.

Singh HB, Viswanathan MV. 1996. *Useful Pteridophytes of India*. A gift of nature to Human beings, J. Econ.Tax.Bot., Add. Ser**12**, 24-36.

Singh JS. 2002. The biodiversity crisis. A multifaceted review, Curr. Sci. **82(6),** 638.

Sing HB. 2003. Economically viable pteridophytes of India.419-444. In S. Chandra & M. Srivastava (Eds.). Pteridology in the new millennium. Kluwer Academic, Dordrecht.

Schneider H, Schuettpelz E, Pryer KM, Cranfill R, Magallón S, Lupia R. 2004. Ferns diversified in the shadow of angiosperms. Nature, **428(6982),** 553–557. http://dx.doi.org/10.1038/nature02361

Smith AR, Pryer KM, Schuettpelz E, Korall P, Schneider H, Wolf PG. 2006. A classification of extant ferns. Taxon **55,** 705–731

Sullivan K, Shealy CN. 1997. *Complete natural home remedies*. Element books Simited, Shaftsbury, UK. Provide. 250-257.

Tryon RM. 1983. Ferns and alliedplants, with special reference to tropical America. New York NY: Springer; 1983.

Vasudev SM. 1999. Economic importance of Pteridophytes. Indian fern journal **16(1,2),** 130-152.

Zhigila DA, Fatima B,Sawa J, Ayodele F, Muhammad S. 2015. Aesthetic Values and Significance of Ferns to Landscaping Industries. A taxonomic review international journal of current research in bioscience plant biology **2(3),** 7-13.