

ETHNO-BOTANICAL STUDIES FROM NORTHERN PAKISTAN

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Background: In this research paper efforts have been made to document the ethno-botanical knowledge of important plant species found in Northern Pakistan. It includes Thandiani, Galiat, Kaghan, Swat, Buner, Dir, Chitral and Northern Areas of Pakistan. The area has many climatic and vegetation zones or biomes. Locals residing in mountainous areas belonging to various ethnic groups are traditionally utilizing plants over many generations; these ethnic groups have their distinct life style, belief, traditions and cultural heritage. **Methods:** Plant collection and data regarding traditional uses in various areas of Northern Pakistan has been done periodically in different flowering /fruiting seasons. Locals of old age belonging to various ethnic groups were personally interviewed for establishing uses of plants. Photography is done for easy identification and habitat recognition. Collected plant specimens and seeds were preserved. Plant species were dried, mounted, identified and authenticated. **Result:** 135 genera belonging from 66 families of angiosperms and gymnosperms were studied and described. 76 species were known to have traditional and ethno botanical uses. Plants have been utilized for many generations. Ethnic groups have distinct life style and have different economic uses for these plants. Due to unsustainable exploitation of natural habitats scarcity of drug plants has occurred. As consequence some species are depleting and may become extinct in near future, e. g. *Morchella esculenta*, *Colchicum luteum* and *Viola serpens* are just a few of these. **Conclusion:** Although some sporadic information is available about the flora of this region but very little documented record of the ethno-botanically important plants has been established. It is expected that this research paper will be beneficial for students, researchers, farmers, foresters and general public. On the basis of data obtained it is concluded that ethno-botanical Flora of Northern Pakistan is quite rich and is diverse, due to the difference in altitude, climate and other topographic conditions.

Keywords: Ethno botanical study, Northern Pakistan, Drug Plants

INTRODUCTION

Northern Areas of Pakistan has some very high and cold areas and many intermediate zones.¹ Consequently, it has many climatic and vegetation zones or biomes. All these varied ecological zones have distinct ethno-botanically important plants. These plants are not only important for the economy of a country, but they also act as useful tools in its defense.

Mountains provide goods and services such as forests, water and agriculture products, biodiversity resources, and tourism recreational opportunities, not only to the mountain people but also to a large segment of the population living downstream in plain areas.² Realizing the problems of vanishing flora of high mountains of Northern Areas of Pakistan due to various reasons including deforestation, overgrazing, soil erosion, Afghan migrants, poverty, extraction of medicinal plants at large scale etc this paper has been prepared.³

MATERIALS AND METHODS

Plant collection and data regarding their traditional uses in Northern Areas of Pakistan have been done periodically in various flowering/fruiting seasons.

A number of locals of old age belonging to various ethnic groups have been personally interviewed during field trips and asked questions regarding traditional uses of plants. Photography of individual plant has also been done for easy identification of individual plant and to know the actual habitat of the plant. Collected plant material has been preserved in the Laboratory by using 3 % Mercuric chloride in Ethyl alcohol. Dried plant specimens were soaked in a solution of Ethyl alcohol and 2 % Mercuric chloride. Collected plant specimens were dried in blotting/ newspapers. These dried and poisoned specimens were mounted on "Herbarium Sheets". Data was transferred from field notebook to herbarium sheets.

Identification of collected plant material from Chitral District had been done by using flora of Pakistan (series-1 2006)⁴ and studying more specimens of Northern areas of Pakistan, lying at various existing herbaria of Pakistan. Necessary literature has been collected from different existing libraries like Quid -e- Azam University, Peshawar University, Pakistan Forest Institute, Peshawar (PFI), National Agricultural Research Centre, and Islamabad (NARC) etc. National Herbarium has also consulted.



Figure-1: Karakorum Range, seen from Karimabad, Hunza

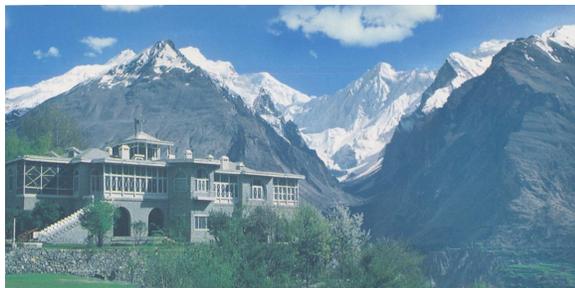


Figure-2: A view of Rakaposhi (7,788 meters ASL)



Figure-3: Snow clad peaks Hunza Valley



Figure-4: View of Passu Peak from KKH near Gulmit



Figure-5: Shunder lake area in Northern Pakistan



Figure-6: Foeniculum vulgare Mill



Figure-7: Colchicum luteum Baker

RESULTS

A total of 135 genera belonging to 66 families of Angiosperms and Gymnosperms were studied and described one by one whereas 76 plant species have been recorded having well defined ethno-botanical / traditional uses. These plants have been utilized over many generations. It was also noticed that these ethnic groups have their distinct ways of life, beliefs, traditions and cultural heritage. Based on this information, the economic importance of plants has been determined.

Besides, these plants are potential source of new medicines. Infact, a sizeable amount of medicines even today in use, are wholly or partially manufactured from plants collected from their natural habitats.²

Furthermore, the unsustainable exploitation, deforestation, overgrazing and conversion of natural habitats and settlement in the hill areas, resulted in the scarcity of drug plants some of which are of considered of immense benefits to mankind. Some species are rapidly depleting and may become locally extinct in near future e.g., *Morchella esculenta*, *Colchicum luteum*, *Bergenia ciliata*, *Pimpinella stewartii*, *Valleriana jatamonsii*, *Voila serpens*, *Dioscorea deltoids* etc.⁵

Socio economic and other benefits results are presented in tabulated form (Tables-1 and 2):

Table.-1: Important indigenous medicinal plants of Karakoram regions of Northern Areas of Pakistan, their part used and medicinal value

Plant species	Part used	Medicinal value
Artemisia absinthium Linn.	Flowers	Mixed with almond oil useful in ear diseases. Santonine is extracted from this plant, which is used as vermifuge.
Artemisia indica Willd.	Leaves	For ear diseases.
Artemisia vulgaris Linn.	Leaves/ Flowers	Leaves and flowering tops are useful in nervous disorders.
Berberis lycium Royle	Roots	Its roots are said to be used for skin diseases, in chronic diarrhoea and for piles.
Cannabis sativa Linn.	Plant	Used as narcotic, sedative; analgesic and intoxicant.
Capparis spinosa Linn.	Root bark	Useful in mental disorder, enlarged spleen and tubercular glands, analgesic, tonic etc.
Carum carvi Linn.	Fruits	Seeds of this plant are used as anti-spasmodic, carminative, stomach diseases, expectorant and diuretic.
Cedrus deodara (Roxb. ex D. Don.) G. Don	Root	Oil extract from the root is used for skin diseases of goats.
Centaurea behen Linn.	Roots	Used in Jaundice, heart tonic etc.
Chenopodium album Linn.	Plant	It is used as anthelmintic.
Cichorium intybus Linn.	Plant	Used in fevers and diarrhoea and enlargement of spleen.
Citrullus colocynthis Sch.	Fruit & Seeds	Purgative, antidote to snake poison. Roots used in jaundice and urinary diseases.
Colchicum luteum Baker	Bulbs	It is famous remedy for rheumatism and diseases of liver and spleen. It is also used for bronchial diseases.
Coriandrum sativum Linn.	Seeds	The fruits are also used in digestive ailments.
Cyperus scariosus R.Br.	Plant	It is diuretic, large dose as anathematic, externally for ulcers; used to make the hair grow thin, heart tonic.
Daphne mucronata Royle	Bark	The bark is used in diseases of bones and for washing hair.
Daucus carota Linn.	Seeds	Aromatic, carminative; useful in kidney diseases, nerve tonic given in uterine pain.
Dioscorea deltoidea Wall.	Tubers	It is said to be used for the expulsion of intestinal worms. Used to kill lice, fish poison.
Echinops echinatus Roxb.	Roots	Carminative, diuretic, used in cough. Powdered roots mixed with Acacia applied to the hair to kill lice.
Ephedra regeliana Florin in Svensk	Plant	It is used for asthma.
Ephedra Gerardiana Wall. ex Stapf.	Plant	It is also used for asthma.
Elaeagnus angustifolia Linn.	Fruit	Its fruit is used for cough and cold as a ingredient of 'Joshanda'.
Ferula assa-foetida Regel	Latex	It is chiefly used in veterinary work. It is also used for flavouring and rheumatic pain. Pouches for wound cure; carminative in hysteria and epilepsy.
Ficus carica Linn.	Fruit	Expectorant; used to remove kidney stone; to remove obstructions of the liver and spleen.
Foeniculum vulgare Mill.	Fruit	Carminative; aromatic, stomach diseases, its decoction is good for eyesight.
Hippophae rhamnoides Linn.	Plant/fruit	Useful as blood purifier; skin diseases, diarrhoea and anathematic. Fruit is a rich source of vitamins and oil. Oil is used for a variety of products in various industries such as cosmetics and pharmaceutical. The fruit flesh is an important raw material for pharmaceutical and cosmetic industries. Syrup is prepared from sour fruit, which is relished by the local people in many parts of Karakoram range to be a valuable remedy for lung and stomach complaints.
Hyoscyamus niger Linn.	Leaves	Sedative; narcotic; antiseptic, employed in irritable conditions and nervous affections; used in asthma and whooping cough.

Table-2: Ethno-botanical/traditional uses of economically important plants of Northern Areas of Pakistan

Plant species	Part used	Ethno-botanical Uses
Abies pindrow Royle	Stem	Wood is used for construction of doors, windows etc furniture and for fuel purposes.
Acer pentapomicum J.L. Stewart ex Brandis	Stem	Wood is used for making agricultural implements, construction of houses and for fuel purposes.
Artemisia absinthium Linn.	Flowers	Mixed with almond oil is useful in ear diseases. When it mixes with <i>Niswar</i> it gives better taste. Santonine is extracted from this plant, which is used as vermicide.
Artemisia indica Willd.	Leaves	For ear diseases; as an insecticide for clothes.
	Leaves/ Fl.	Leaves and flowering tops are useful in nervous disorders and also used as Vermicide.
Berberis lycium Royle	Roots	Its roots are said to be used for skin diseases, in chronic diarrhoea and for piles.
Betula utilis D.Don	Bark	Bark is used for roofing of huts, or umbrella covers and as a substitute for writing paper. Locals also use it as a basket for storage of cheese etc.
	Leaves	Leaves are used as fodder for cattle.
Capparis spinosa Linn.	Root bark	Useful in mental disorder, enlarged spleen and tubercular glands. Flowers analgesic, tonic. Flowers are used as vegetable.
Cannabis sativa Linn.	Plant	<i>Bhung</i> is widely cultivated in area studied for its valuable fibres for making ropes, strings etc. A strong narcotic is derived from resin of stem, leaves, flowers and even the fruits. <i>Chars</i> is obtained by rubbing of the leaves, young twigs, flowers and young fruits. <i>Bung</i> is used in preparation of green intoxicating beverage known as <i>Hashish</i> . Seeds are occasionally eaten and much valued for feeding birds. Seed oil is used in making of paints, varnishes and soap. Since this area is being very cold the straw of the <i>Bung</i> is used as a Mat, i.e., carpet by locals, during the winter season. Used as narcotic, sedative, analgesic and intoxicant.

Carum carvi Linn	Fruits	Seeds of this plant are used as anti-spasmodic, carminative, condiment, and stomach diseases, expectorant and diuretic.
Cedrus deodara (Roxb.) G. Don	Wood	The wood of this tree is of an excellent quality and used for construction and furniture purposes. Oil extract from the root is used for skin diseases of goats.
Celtis australis	Leaves	Leaves are used as fodder for livestock. It is a best plant for shade. It is used as a support for Grapes therefore; Grapes are grown on this tree.
Centaurea behen Linn	Roots	Used in Jaundice, heart tonic.
Chenopodium album Linn.	Plant	Anthelminthics, used as a vegetable.
Cichorium intybus Linn.	Plant	May be used in fevers and diarrhoea and enlargement of spleen.
Citrullus colocynthis Sch.	Fruits & Seeds Roots	Fruits & seeds may be used as purgative. Fruits & Roots are antidote to snake poison. Roots are used in jaundice and urinary diseases.
Colchicum luteum Baker	Bulbs and Flowers	It is famous remedy for rheumatism and diseases of liver and spleen. It is also used for bronchial diseases.
Coriandrum sativum Linn.	Seeds	The leaves and fruits are used as a spice. The fruits are also used in digestive ailments. Condiment, tonic, aromatic and may be used for stomach diseases.
Cyperus scariosus R.Br	Whole plant	It is diuretic, large dose as for killing stomach insects of children, externally for Ulcers; used to make the hair grow thin, heart tonic.
Daphne mucronata Royle	Leaves	The leaves are poisonous but are tolerated by goats; can be applied for abscesses. Its bark is used in diseases of bones and for washing hair. Gunpowder charcoal is said to be made from the wood. The fruit can be eaten and is used as a dye for leather. Seeds can be used for skin diseases.
Daucus carota Linn.	Seeds Roots	Aromatic, carminative; useful in kidney diseases, nerve tonic given in uterine pain. Roots are useful for eyesight, cough, cold, asthma & best tonic.
Dioscorea deltoidea Wall.	Tubers	Its tubers are used for washing shawls, woollen clothes and blankets. It is said to be used for the expulsion of intestinal worms. Used to kill lice, fish poison.
Diospyrus lotus Linn.	Fruit	Fruit is edible by locals and wood is used for fuel purposes.
Echinops echinatus Roxb.	Roots	Carminative, diuretic, used in cough. Powdered roots mixed with Acacia applied to the hair to destroy lice.
Ephedra regeliana Florin in Svensk	Plant	It is a source of fuel wood, soil binder and ephedrine extracted from it, may be used as a nasal drops. It is mixed with tobacco for preparation of good quality of <i>Niswar</i> . It is also used for treatment of asthma.
Ephedra gerardiana Wall. Ex Stapf.	Plant	It is a source of fuel wood, soil binder and ephedrine extracted from it is used as a nasal drops. It is mixed with tobacco for preparation of quality of <i>Niswar</i> . It is also used for treatment of asthma.
Elaeagnus angustifolia Linn.	Flower	The yellow flowers have a strong but pleasant odour. Its fruit is used for cough and cold as an ingredient of ' <i>Joshanda</i> '.
Ferula assa-foetida Regel.	Latex	' <i>Heeng</i> ' of commerce is extracted from the cut end of the root below the stem region of this plant. It is used in medicine, chiefly in Veterinary work. It is also used for flavoured and rheumatic pain. Used in condiments; its poultice for wound cure; carminative in hysteria and epilepsy.
Ficus carica Linn.	Fruits	Expectorant; used to remove Kidney stone; to remove Obstructions of the liver and Spleen.
Foeniculum vulgare Mill.	Fruits	Carminative; aromatic, stomach diseases, its decoction is good for eyesight.
Fraxinus xanthoxyloides (G.Don) DC	Whole plant	Its wood is hard, white and close-grained; used for tool handles and walking sticks and best for furniture. The foliage is used as fodder. It is suggested that it should be conserved on top priority.
Fumaria parviflora Lam.		Useful as blood purifier; skin diseases, diarrhoea, etc.
Hippophae rhamnoides Linn.	Plant	Sea buckthorn is a multi-purpose shrub, grows abundantly in Gulmit, Sost, Passu, Immit, Yasin, Gaguch, Phundar, Shatubar etc. Fruit is a rich source of vitamins and oil. Oil is used for a variety of products in various industries such as cosmetics. The wood is used for fuel purposes. The fruit though acidic, when boiled with sugar can be eaten. Berries are utilized in the preparation of preserves, jams and soft drinks. The fruit flesh is also an Important raw material for Pharmaceutical and cosmetic industries. Syrup is prepared from sour fruit, which is relished by the local people to be a valuable remedy for lung and stomach complaints. The branches are lopped by the Farmers in the month of April/Oct. and later stacked along the edge of cultivated Fields to protect them grazing of livestock. It is a good fodder and also used as Fuel-wood.
Hyoscyamus niger Linn.	Leaves	Sedative; narcotic; antiseptic, employed in irritable conditions and nervous affections; used in asthma and whooping cough.
Indigofera heterantha	Branches	Branches are used for preparation of sweeping material and are used in making roof of huts and houses. Livestock also uses it as a fodder.
Melia azadirachta	Whole plant	Antiseptic, poultice used to cure boils and skin diseases for hair growth. Bark is bitter tonic, astringent
Juglans regia Linn	Stem	The wood is excellent for furniture, especially for carving of furniture, gun stocks, and sometime body of truck. The bark is good for the gums and available in the local market ' <i>Dandasa</i> ', which is good for cleaning the teeth. Bark is also used as a dye. The seeds yield oil used for cooking and in rheumatic pain. The ' <i>Kaghzi</i> ' variety is valued for its thin shell and edible fruit.

Juniperus excelsaa L.	Plant	The ash is mixed with tobacco for better taste and best <i>Niswar</i> for locals may prepared. It is also source of Fuel-wood for locals.
Mentha sylvestris Linn.	Plant	Carminative, a cooling medicine. It is used for flavouring dishes. It is also used for preparation of local <i>chami</i> .
Morus nigra	Fruit	Fruit is edible and best source of income for local peoples. Dry fruit is also exported. Useful for sore throat.
Morus alba Linn.	Fruits	It is edible and best source of income for local peoples. Dry fruit is also exported. Useful for sore throat.
Nepeta hindostana Roth.	Plant	Used in fever and cardiac tonic, blood purifier, decoction used as gargle in sore throat, in chest and back pain.
Nerium odorum Soland.	Leaves	Its leaves are used in piles diseases. Root Paste with water applied to ulcers on penis. Oil preparation used in skin diseases and leprosy.
Peganum harmala Linn	Seeds	Seed powder is used in asthma, colic, and jaundice and as an anthelmintic against tapeworms and reducing temperature in chronic malaria. Seeds are used as narcotic. It increases the flow of milk in livestock and is stimulant. The smoke is considered to be antiseptic and wounds are fumigated by burning of seeds and leaves. Blood purifier with olive oil for ear diseases, as a remedy for tapeworm. Leaves are used for rheumatic pain. Roots are applied to kill lice.
Pimpinella stewartii (Dunn) E. Nasir	Roots	The roots are scented and fruits are used as carminative and other stomach diseases.
Plantago lanceolata Linn.	Seeds	Seeds are used as purgative and in any stomach diseases while leaves are applied to wounds. Used in stomach diseases.
Plantago major Linn.	Leaves	Leaves are said to be diuretic; used in inflammatory conditions of the mucous membrane of gastrointestinal and urinary tracts; in chronic dysentery; diarrhoea and constipation; powdered seed in vinegar with castor oil is useful for headache.
Platanus orientalis Linn.	Stem	Wood is used in some places for making gun carriages, small painted boxes, cabinetwork, and panelling and also for construction purposes.
Polygonum viviparum Linn.	Roots	Used for chest and lung diseases; good gargle for sore throat and spongy gums; good lotion for ulcers; astringent.
Populus spp.	Leaves	Leaves are used as a fodder by livestock where as stem and branches are used as a fodder.
Prunus domestica Linn.	Fruits	In combination with other drugs useful for irregular menstruation and debility following miscarriage.
Punica granatum Linn.	Seeds	The fruit is delicious to eat. Juice used as tonic in fever Dried seed of source variety ' <i>Anaar daana</i> ' are used for adding taste to certain foods. Bark of the root and wood is used for killing tapeworms. Also used in diarrhoea and dysentery a no of dyes can be obtained from it. Black writing ink is also made from it. Carminative stomach diseases. Condiments combined with aromatics like cloves etc. It is also used in tooth powder and Local <i>Chami</i> .
Rosa spp.	Plant	It is planted as a hedge and may be used as a fuel.
Ribes himalense Decne	Fruit	Berries are edible and are sold as currants for making jams, cakes etc.
Ricinus communis L.	Seed	The oil from the seed has many uses such as purgative, a leather- preservative and a lubricant, may be used in delicate machinery; the oil-cake is used as fertilizer and fuel.
Robinia pseudo-acacia Linn.	Tree	Cultivated as a roadside tree and to prevent soil erosion. May be used as a fuel purposes.
Rumex dentatus	Plant	May be used in the preparation of <i>chami</i> by locals, when dry may be used as fuel.
Salix caprea Linn.	Flowers	Heart tonic, water distillate of stems and flowers are cordial, leaves externally applied in headache. Stem is used as fuel-wood.
Saussurea lappa C.B.	Roots	Tonic, carminative, used in asthma, cough and cholera, in chronic skin diseases and rheumatism, useful in epilepsy, paralysis, vermicide, diuretic.

DISCUSSION

It is important to mention here that *Artemisia maritima* steppe of great importance was gregariously found between Kamari Pass and Rupal Nala. *Scabiosa speciosa* is also commonly collected from Rattu. *Saussurea lappa* (*Kuth*) is very common forest plant in Rattu with roots bearing a pleasant scent, which had a great reputation in China.^{6,7} *Salix karelinii* a Russian species is gregarious at high altitudes. Common plants of great traditional uses are *Capparis spinosa*, *Tamarix gallica*, *Chenopodium album*, *Rumex hastatus*, *Fraxinus xanthoxyloides*, *Peganum hermala* (*Harmal*), *Mentha longifolia* (*Mentha*), *Perovskia*

abrotanoides, *Hippophae rhamnoides* (Sea Buck Thorn) etc.⁸

Various factors like altitude topography, climate, soil moisture, exposures, altitudinal variation etc. determine the particular vegetation types and specific habitats.⁹ These habitats have been altered over the years by biotic and other factors like overpopulation, urbanization, deforestation, terracing of land for agriculture, overgrazing, forest fires etc.

In the lower hills Chirpine (*Pinus roxburghii*) forms practically the whole of the top canopy but associated with other broad leaved species like Oaks (*Quercus incana* and *Q. baloot*) in depressions coupled with shrubby undergrowths. *Cheerh* pine is completely dominant with oak species

like *Quercus incana* with the undergrowth's like *Rhamnus* and *Berberis* species, *Maytenus royleanus* and *Daphne mucronata*.¹⁰ At lower elevations shrubs like *Punica granatum*, *Nerium oleander*, *Vitex negundo*, *Dodonea viscosa*, *Justicia adhatoda*, *Jasminum*, *Sageretia theezans*, *Rumex hastatus*, *Mallotus philippensis* etc are fairly common. The herbaceous flora is represented by *Verbascum thapsus*, *Fumaria indica*, etc are common.¹¹

Throughout the moist temperate zone the greater part of the precipitation is derived from monsoon during summer.¹² The conifers generally form a fairly complete forest cover of good height (80–150 ft). Populations of *Taxus wallichiana* and *Picea smithiana* are declining considerably. Among the broad-leaved associates Oaks and maples are not uncommon specially *Quercus incana* and *Acer caesium*. Considerable damage has already been done to these forests. The shrubby dominant undergrowths are *Viburnum nervosum*, *Lonicera*, *Sarcococa saligna*, *Skimmia laureola*, *Plectranthus rugosus*, *Stachys*, *Rhododendron* sp., *Origanum* sp., *Rosa webbiana* etc. It appears that *Taxus wallichiana* and *Quercus* species especially *Q. incana* are heavily lopped. Among the herbaceous flora *Viola serpens*, *Gentiana kurro*, are common.³ In the shady places especially cliffs, several species of ferns are found. Common parasites are *Arceuthobium minutissimum* (Mistletoe) on pines, *Viscum album*, on walnuts, horse chestnuts, willows, apricots and poplars, *Loranthus cordifolius* and *Korthasella opuntia* on oaks. A variety of microhabitats are met at the sub alpine pastures including open sunny sites rock slopes steppes and marshy/aquatic places. The species differ in their ecological preferences even when occurring in the same general area. The representative species are *Abies pindrow*, *Picea smithiana*, *Pinus wallichiana*, *Taxus wallichiana* etc.

Most of the ferns love shady places whether under the forests or under the cliffs. Several

members of Asteraceae are found in open sunny sites. Members of Ranunculaceae and Scrophulariaceae are mostly found along the streams or on wet grassy grounds. Among the trees *Cedrus deodara* loves steep slopes, and *Taxus wallichiana* is found where there are fewer disturbances. Conservationists often talk about the problems of disappearing ethnobotanically important plant species but the knowledge of how to use these species is disappearing more rapidly than the species themselves.² It is advisable that Phytopharmacological aspects of these plant species should be exploited before they become a distant memory.

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