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ETHNO-BOTANICAL STUDIES OF ECONOMICALLY IMPORTANT PLANTS FROM MOUNTAINOUS REGION OF GILGIT-BALTISTAN, PAKISTAN

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Abstract

Ethno botanical studies of economically important plants from Gilgit-Baltistan were conducted during 2003-2006. Extensive field trips were conducted for collection of plants according to their flowering and fruiting period and ethno-botanical data obtained during field trips. This area has many ecological zones, lies between 3000ft to 29000ft above sea level. Due to difference in soil, climate, moisture contents, latitude, longitude, altitude and topography, great diversity of plants of economic importance were found in these areas. Locals belonging to different ethnic groups, like, Sayyed, Gujjar, Mughal, Sheen, Yaskuin, Wakhi, Tajik, Khowar, etc., are settled there. They have distinct life styles, beliefs, traditions, life style and culture. There is a great shortage medical treatment therefore locals use indigenous plants for treatment of various diseases at local level.

Folklore treatment is considered the cheapest source of curing diseases at local level. Information regarding ethno-medicinal importance was obtained from local inhabitants of old age. These plants have been utilised over many generations by various ethnic groups. It was found that indigenous medicinal flora of the area is quite rich and is diverse, due to the difference in altitude, climate and other topographic conditions. It is expected that this paper will be beneficial for locals, students, researchers, farmers, foresters and general public alike.

Keywords: Ethno-botanical study, Gilgit-Baltistan, Economically important plants.

Introduction

Gilgit-Baltistan, previously known as Northern Areas of Pakistan, has unique climate, latitude, longitude and altitude. It has dry and rigid mountains. It includes Deosai Plains (altitudinal range 13000-14500 ft. above sea level), Khunjrab Pass (altitudinal range 16000-17000 ft.), Kilik, Nanga Parbat Area, Rakaposhi peak (altitudinal range 2300-23364 ft). Three main ranges, i.e. Karakoram, Hindu Kush and Himalayas, meet near Jaglot village of Gilgit-Baltistan. Due to difference in climate, it has rare and unique system of bio-diversity and have distinct ethno-botanically important flora. Stewart (1982) in history and exploration of plants in Pakistan and adjoining areas (Edited by E. Nasir Flora Pakistan). These mountains provide goods and services, such as, forests, water and agricultural products, biodiversity resources and tourism and recreational opportunities, not only to the local inhabitants of the area but also to a large segment of the population living downstream in plain areas. Due to the difference in climate and other topographic conditions, a large number of plants with medicinal, commercial and spiritual values have been found in this region (Awan et al., 2011)

The local population of the region primarily depends upon plant resources for their domestic needs. Majority of local inhabitants is poor and illiterate. The people have distinct life styles, beliefs, traditions and cultural heritages and they are utilising local plants for food, shelter, furniture, medicine, timber, etc., and have continued to do so over many generations. They have established reliable indigenous knowledge, systems for the protection, production, utilisation and management of natural resources and their environment (Awan et al., 1992). Although, indigenous knowledge in this region is becoming

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increasingly important, even today, the danger of loosing this traditional knowledge concerning diverse bio-species, cultigens and land-use practices is increasing. General topography of the studied area is presented in Fig. 1.

Fig. 1. General topography of Gilgit-Baltistan

Alpine meadows of Deosai plain area are located at an altitude of 14000ft above sea level. Major plants are *Polygonum affine*, *Saxifragasiberica* and *Euphorbia kanaorica*. Many grasses, like, *Poaannua*, *Cynodandactylon*, *Drabatrinervia*, etc., are also a part of the biodiversity of the region (Fig. 2).

Fig. 2. Alpine zone in Deosai plains (altitude: 14000ft)

Permanent snow covered peaks and cold deserts/arctic zone: In the northern-most region and the highest altitude as typified by the Karakoram Mountains, Hunza, the vegetation is

often more xeric in those alpine zones. Permanent snow covered peak of Rakaposhi is 23364ft above from sea level (Fig. 3). Over grazing by sheep is common in the highest plateau 162000ft of Khunjerab Pass (Awan et al., 2011) (Fig. 4).

Fig. 3. A scenic view of permanent snow covered peak of Rakaposhi (23364ft asl).

Fig. 4. Over-grazing has disturbed natural habitants of alpine pasture in Khunjerab pass, which is at an altitude of 16200ft. (Awan, 2011)

Due to above mentioned varied ecological zones, difference in altitude, latitude, longitude, climate and other topographic conditions, the ethno-medicinal flora of the area was found to be

quite rich and diverse. Typical animal of the area, known as Yak, is very common in Deosai Plains and also in various areas of Khunjerab Pass (Fig.5).

Fig. 5. Yak commonly found at high altitude in Deosai Plains. (Awan, 2011)

Plants are a major source of medicines. It has been estimated that two-third of all medicines used in the world have plant origin. For example *Cannabis sativa* (Bhang) is a fiber plant, used in textile industry, has narcotic effect. This plant has recently been discovered as a source medication effective in many eye diseases, such as, glaucoma. Similarly, many other plants have enormous ethno medicinal importance.

Prior to the development of science and technology, man learned the use of many plants as food and curing certain ailments. Knowledge thus collected through experience of centuries resulted in the development of rational system of medicines. Beside these, the plants are potential source of new medicine. In fact, a sizeable amount of medicine in use today is wholly or partially manufactured from plants collected from their natural habitat. It is surprising that though numerous floristic surveys of our local flora have been conducted, very little attention has been paid to the ethno-botanical aspect of the study. The Hakeems, on the other hand, are mainly concerned with the supply of the floral and vegetative parts of the medicinal plants and they are least bothered about the botanical characteristics, their occurrence and distribution in the various regions and their conservation (*in situ*) and cultivation (*ex situ*). The present effort will go a long way in unraveling the habits and cultural practices of the local people of the country.

Local Languages

Different languages are spoken in various areas of Northern Pakistan, like, Hindko, Pashto, Sheena, Brushaski, Wakhi, Khowar, Pahari, Kashmiri, etc. Area wise detail of which is in tabulated form below (Table 1).

Table 1. Area wise detail of languages

Language	Area
Balti	Baltistan.
Shina	Gilgit, Diamer, Parts of Skardu and Ghizer districts and Palas in Kohistan.
Brushski	Hunza, Nagar, Yasin and some areas of Gilgit.
Wakhi	Upper Ishkoman and Upper Hunza.
Khowar	Koh Ghizer, Chitral and some areas of Ishkoman and Yasin.
Hindko	Hazara division and Kashmir.
Pashto	Some parts of Hazara Division, Malakand Division, etc.
Kohistani	Indus Kohistan districts, like, Elai, Dasu, etc.

Materials and Methods

Plant collection for strengthening of PMNH Herbarium has been done periodically in various flowering/fruiting seasons during 2003 to 2006.

Localities botanised are Gilgit, Karga Nalla, Khunjerab, Sost, Passu, Gulmit, Hunza, Aliabad, Karimabad, Nagar, Nilt, Chalt, Nomal, Naltar, Chatore Khand, Immit, Deosai, Chilum Choki, Sat para lake area, Kachura lake area, Sochar lake area, Skardu area, Nanga Parbat, Astore, Guppies, Gaguch, Yasin, Teru, Phandar, etc.

Surveys and filling of questionnaires were used during research work. About 150 questionnaires were sent to local inhabitants of old age belonging to various ethnic groups. 100 samples were received back. Apart from this, 110 locals were personally interviewed during field trips and were asked questions regarding ethno-botanical uses of economically important plants (Annex. 1).

Photography of individual plant has also been done for easy individual identification and actual habitat of the plant. Collected plants were pressed and dried in the field and preserved/disinfested in the laboratory of Botanical Sciences Division of Pakistan Museum of Natural History, Islamabad, for strengthening of PMNH, Herbarium. The dried and poisoned specimens were mounted on herbarium sheets (standard size 11.5 inches x 16.5 inches).

Identification of collected plant material has been done by using Flora of Pakistan, edited by Nasir, E. and S.I. Ali (Series 1-213) (1971-2012) and plant specimens were studied at various existing herbaria of Pakistan. Stewart (1972), in an annotated catalogue of the vascular plants of Pakistan and Kashmir. Edited by E. Nasir and S.I Ali flora Pakistan

Results and Discussions

Dry fruits and medicinal plants are good source of income for local community of Gilgit-Baltistan, Pakistan. Human life has always been dependent upon plant life in one form or another. Over the last few decades, relationship between people and their planet, including its plants, has been transformed. Previously, a vast majority of people lived in rural areas and used local plants for their livelihood. In recent years, vast body of indigenous knowledge is being rapidly lost as natural ecosystems and cultures are being destroyed by the encroachment of development. Dry fruit is the source of income of locals and Almond (Badam). *Prunusamagdalus* is a common dry nut which has great medicinal value (Fig. 6).

Fig. 6. *Prunusamagdalus* is a common dry nut which has great medicinal value. (Awan, 2011).

This area was once considered as an ideal region for variety of wild medicinal plants. Due to modernisation and rapid development the traditional use of herbal medicines has decreased

in favour of allopathic medicines. Furthermore, the unsustainable exploitation, deforestation, overgrazing and conversion of natural habitats and settlement in the hilly areas, have resulted in the scarcity of ethno-medicinally important plants, some of which are of immense benefits to mankind. Some species, viz., *Carumcarvi*, *Colchicum lueteum*, *Hyosymusniger*, are rapidly depleting and may become locally extinct in near future. *Ephedra gerardiana* is a common medicinal shrub (Awan et al., 2011) (Fig.7).

Fig. 7. *Ephedra gerardiana* a common medicinal plant in Gilgit-Baltistan Area. (Awan, 2011)

Gilgit-Baltistan is known for its rich biodiversity of flora and fauna, especially medicinal and aromatic plants. Besides, these plants are potential source of new medicines. In fact, a sizeable amount of medicines even today in use are wholly or partially manufactured from plants collected from their natural habitats. Sea buck thorn (*Hippo phaerhamnoides* Linn.) is a common shrubby plant of great economic value (Fig. 8).

Fig. 8. Sea buck thorn (*Hippo phaerhamnoides* Linn) is a common shrubby plant of great economic value (Awan, 2011).

Russian olive *(Elaeagnus angustifolia* Linn) is commonly found bush and sometimes, small trees in Hunza, Karimabad, Nilt, Chalt, Yaseen, Guppis, Punder and Teru (Awan et al., 2001;

Naeema et al., 2009). It has yellow flowers that have a strong and pleasant fragrance. Its fruit is edible used for treatment cough and cold and as an ingredient of *joshanda* (Fig. 9).

Fig. 9. *Elaeagnus angustifolia* Linn. *var. angustifolia*. Russian olive is a common plant. (Awan, 2011)

Research on ethno botany from Gilgit-Baltistan and dissemination of the gained knowledge is necessary for better use of these plants for socio economic and other benefit of local community, where very little health care is available (Awan et al., 2012). Results are summarised in tabulated form (Table 2).

Table 2: List of Ethno botanically important plants collected from Gilgit-Baltistan

Plant species	Common Name	Family Name	Ethno-Botanical Uses
Abiespindrow Royle	Paludar, Rewar	Pinaceae	Used as a timber tree for construction of building and preparation of furniture. Tinctures or decoction of the dried terebintinous leaves is useful in case of cough, asthma, chronic bronchitis and catarrh of the bladder and other pulmonary affections. Juice of the fresh leaves infants is administered in fever.
Artemisia absinthium Linn.	Drun	Asteraceae	Powder of this plant when mixed with almond oil is used for the treatment of ear diseases.
Artemisia indica Willd.	Drun	Asteraceae	It is used by local community for treatment of ear diseases and as an insecticide for clothes.
Berberislycium Royle	Sumblu	Berberadaceae	Root powder may be used as blood purifier and skin diseases.
Betulautilis D. Don	Birch	Betulaceae	The bark is astringent and used in deodorants.
Capparisspinosa Linn.	Kawir	Capparidaceae	It is very useful in mental disorders and tubercular glands. Flowers are used as vegetable.
Cannabis sativa Linn.	*Bhang*	Cannbaceae	A strong narcotic is derived from the resin of stem, leaves, flowers and even the fruits. Used

Plant species	Common Name	Family Name	Ethno-Botanical Uses
			as narcotic, sedative, analgesic and intoxicant. Its fiber is used by locals.
Carumcarvi Linn	Zeera Siaah	Umbelliferae	Seeds of this plant are used as condiment.
Cedrusdeodara (Roxb.) G. Don	Deyar/Cedar	Pinaceae	Wood is excellent furniture.
Celtisaustralis	Batkalar, Nettle tree.	Ulmacae	Leaves and fruit are used to reduce menstrual uterine bleeding and stem for sticks.
Chenopodium album Linn.	Bathu	Chenopodiaceae	It is used as vegetable.
Cichoriumintybus Linn.	Kasni	Asteraceae	Used in fevers, diarrhea and enlargement of spleen.
Colchicum luteum Baker	Suranjan-e-Talakh, Soorganda	Colchicaceae	It is famous remedy for rheumatism and diseases of liver and spleen. It is also used for bronchial diseases.
Coriandrumsativum Linn.	Dhania	Umbellifereae	The leaves and fruits are used as a spice and stomach diseases.
Cyperusscariosus R.Br	Ghayakochin	Cyperaceae	It is used for killing stomach worms of children.
Daphne mucronata Royle	Kutilal	Thymeliaceae	Its bark is used in diseases of bones and for washing hair. The fruit is eaten and seeds are used for skin diseases.
Daucuscarota Linn.	Carrot/Gaajjar	Umbelliferea	It is edible as vegetable and considered as useful for improving eyesight.
Dioscoreadeltoidea Wall.	*Ratalu*	*Dioscoreaceae.*	It is said to be used for the expulsion of intestinal worms. It is also used to kill lice.
Diospyrus lotus Linn.	Amlok	Ebenaceae	The fruit is edible by local inhabitants.
Echinopsechinatus Rox b.	Kandiari	Asteraceae	Powdered roots mixed with *Acacia* are applied on hair to kill lice by locals.
Ephedra regeliana Florin in Svensk	Bata	Ephedraceae	Extract ephedrine nasal drops are used for nose treatment. Locals mixed it with tobacco to prepare good quality snuff.
Ephedra gerardiana Wall.	Bata	Ephedraceae	Extract ephedrine nasal drops are used for nose treatment. Also used for treatment of cough and cold.
Elaeagnusangustifolia Linn.	Shanjur	Elaeagnaceae	The yellow flowers have a strong and pleasant smell; Fruit is used for treatment of cough and cold and as an ingredient of *joshanda*.
Ferula assa-foetida Regel.	Hing	Umbelliferea	Hing of commerce is extracted from the cut end of the root below the stem region of this plant. It is used in medicines. It is also used as a flavouring agent and in rheumatic pain.
Ficuscarica Linn.	Injeer	Fabiaceae	It is used to remove kidney stones and obstructions of the liver and spleen.
Foeniculumvulgare Mill.	Sonf	Umbelliferae	It used ingredient of carminative also used in stomach diseases; decoction is said to be good for eyesight.
Fraxinusxanthoxyloides (G.Don) DC	Sum/Ashtree	Oleaceae	Due grains stem is used for best quality furniture.
Fumariaindica Lam.	Paapra	Fumariaceae	It is used to treat skin diseases as blood purifier.
Hippophaerhamnoides Linn.	Mirghiz, Seabuck thorn	Eleagnacea	Sea buckthorn is a multi-purpose shrub; grows abundantly in many areas of Gilgit-Baltistan. Its fruit is a rich source of vitamin C and oil. Oil is

Plant species	Common Name	Family Name	Ethno-Botanical Uses
			used for a variety of products in various industries such as cosmetics. Berries are utilised in the preparation of conserves, jams and soft drinks. Its syrup is prepared from sour fruit, which is relished by the local people to be a valuable remedy for lungs and stomach complaints.
Hyoscyamusniger Linn.	Ajwain-e-Khurasaani	Solanaceae	It is used as narcotic and antiseptic; also used in asthma and whooping cough.
Indigoferaheterantha	Kainthi	Papilionaceae	Baskets are prepared with its branches and an extract of plant is considered good for epilepsy and neuropathy.
Meliaazadirachta	Dhraek	Meliaceae	Its fruit and leaves are used to cure boils and skin diseases; also used for hair growth; bark is bitter tonic, astringent.
Juglansregia Linn.	Akhrott/Birmo	Juglandacea	Fruit is edible, sweet, emollient, aphrodisiac, tonic and carminative.
Juniperusexcelsaa Linn.	*Chuch, Petthar*	*Pinacea*	The ripe berries are used for catarrhal inflammation and drops / suppression of urine. The oil obtained from the fruit is carminative, stimulant and diuretic it has also been employed in mucus discharges such gonorrhoea, leucorrhoea. Dried stem and leaves are used as fuel. Wood obtained from the plant is used for various purposes.
Menthasylvestris Linn.	Podeena	Labitaea	Carminative; a cooling medicine; used for flavouring dishes; also used for preparation of local chatni.
Morusnigra	*Kala toot, Shahtoot, Toot-e-siah*	Moraceae	Fruit is edible and best source of income for local people; dry fruit is also exported; useful for sore throat.
Morus alba Linn.	Chitta toot, lailan	Moraceae	Used for cough and facial dropsy.
Neriumodorum Soland.	*Kaner*	*Apocynaceae*	Leaves used to treat piles; oil preparation is used in skin diseases and leprosy.
Peganumharmala Linn	*Harmal*	*Zygophyllaceae*	Seed powder is used in asthma, colic, jaundice, against tapeworms and reducing temperature in chronic malaria. Seeds are used as narcotic; smoke is considered antiseptic and wounds are fumigated by burning seeds and leaves; blood purifier with olive oil; leaves are used for rheumatic pain.
Pimpinella stewartii (Dunn) E. Nasir	*Tarpakhi*	Umbellifereae	Roots are scented and fruits are used as carminative and other stomach diseases.
Plantagolanceolata Linn.	Ispagol	Plantaginaceae	Leaves are cooling, alternative and diuretic. The seeds are used to cure the stomach disorder. A decoction is made by simmering ½ cup of the fresh or dried leaves in 2 or 3 cups of water for 30 to 40 minutes. 1 or 2 cups of tea are used several times daily. This tea is used for relieving coughs, ulcers, irritable bowl, cystitis and painful urination
Plantago major Linn.	Ispagol	Plantaginaceae	Leaves are said to be diuretic, used in

Plant species	Common Name	Family Name	Ethno-Botanical Uses
			inflammatory conditions of the mucous membrane of gastrointestinal and urinary tracts, in chronic dysentery, diarrhea and constipation; powdered seed in vinegar with castor oil is useful for headache.
Prunusdomestica Linn.	Lucha	Rosaceae	In combination with other drugs, useful for irregular menstruation and debility following miscarriage; laxative and refrigerant.
Punicagranatum Linn.	Druna, Anar	Punicaceae	Fruit is edible; juice is used as tonic in fever; dried seeds are used for flavouring; bark of the root and wood used for killing tape worms; also used in diarrhea and dysentery; carminative, useful in stomach diseases; also used as condiment.
Prunusarmeniaca Linn	Hari	Rosaceae	The flesh of the fruit is dried. The seeds are eaten as almonds & fruit is eaten as dried& fresh and it is the source of income of the locals of Northern areas of Pakistan. It is also exported to plains & the oil is extracted for burning.
Ribeshimalense Decne	Kaala Meva	Crassulaceae	Berries are edible and are sold for making jams, cakes, etc.; laxative.
Ricinuscommunis Linn.	Arund	Euphorbiaceae	The oil from the seeds is used as purgative.
Rumexdentatus	Khatimal	Polygonaceae	Mild laxative; considered best for the treatment of chronic diseases, particularly that of gastrointestinal tract.
Salix caprea Linn.	Baid	Salicaceae	Cardiac tonic, water distillate of stems and flowers are cordial, leaves externally applied in headache.

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Annexure 1

Ethno-Botanical Survey Performa

- Name of the project / title of the thesis: _____
- Botanical Name: _____
- Date: _____
- Sheet No.: _____
- Participants: _____
- Habit: _____
- Habitat: _____
- Altitude : _____
- Latitude : _____
- Longitude: _____
- Soil type: _____
- Plant identified by: _____
- Remarks if any: _____
- Name of the person contacted for the data :_____
- Gender: ---------- Male / Female
- Ethnic group/cast: _____
- Local name of plant: _____
- Name of the local language:_____
- Locality : _____
- District:_____
- Is it familiar by this name: _____ Yes/No
- In other places where it is found:_____
- Flowering and Fruiting period:-_____
- Traditional uses of plant:
  - a) Locally:_____
  - b) Regionally:_____
- Traditional uses of plant by: _____Hakim, Pansar, etc.
- Side effects if any:_____
- Part used: _____ Leaves, Branches, Flowers, Seeds, Roots
- Is it sold in the market: _____ Yes/No
- If sold rate per Kg: _____
- Is it favorite food of livestock: _____ Yes/ No
- Then name of livestock, whom it is popular: Sheep, Goat, Cow, Yak, etc.
- Which part of plant is favourite: Branches, Leaves, Flowers, Seeds
- Is it used for cure of human diseases: _____ Yes/No
- If yes then for which disease :_____
- How it is used by local community:_____
- In which season it is available: Spring, Autumn, Summer, Winter
- Status of the plant: Common, rare, endangered, vulnerable
- Name of the researcher :_____