

ETHNOBOTANICAL OBSERVATIONS IN TRANS-HIMALAYAN REGION OF LADAKH

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Abstract : An ethno botanical survey of Ladakh region in Jammu and Kashmir State, India was made to document the traditional knowledge and usage pattern of indigenous medicinal plants used by local communities. Based on the survey, information on 40 high altitude plants species, belonging to 35 genera and 21 families has been documented in the present paper. All the forty plants species are traditionally consumed by the local inhabitants of Ladakh either as traditional food, medicine, as fuel and fodder and possess ornamental and sacred value. Owing to rapid urbanization, over-exploitation and unplanned anthropogenic activities, many wild flora and their indigenous folk knowledge are under serious threat of disappearing, indicating an urgent need of their documentation with traditional practices and recommendation for their conservation and sustainable uses.

Keywords : Ethnobotany, Ladakh, Traditional knowledge, Local communities

INTRODUCTION

Owing to the hostile climatic conditions and negligible agriculture production, the local communities of Ladakh depend heavily on plant diversity, for decades, as one of their prime food resources. Ladakh has a rich traditional knowledge and cultural values associated with plants. They have their own traditional ways and methods of food preparation and consumption from the local wild plant products. However, due to rapid urbanization, population explosion, changing lifestyle, over-exploitation of resources and development of technologies, many useful plant species are disappearing in wild and also the vast folk indigenous knowledge and practices in rural Ladakh are eroding at fast pace. Hence, priority ought to be given to document the important wild plants with traditional knowledge and practices, and to suggest some intrinsic measures for their conservation. Several explorations have been made in different regions of Ladakh to document the traditional use of plants as food and medicine (Navchoo *et al.*, 1990; Bhattacharyya, 1991; Phani Kumar *et al.*, 2009; Pal Murugan *et al.*, 2010). Despite the vast and rich repository of traditional and cultural diversity of plants based foods and other products, ethnobotanical studies in Ladakh are still in infancy. Therefore, the present survey was designed to document the traditional use of some wild plants in different localities of Ladakh.

MATERIAL AND METHOD

Surveys were conducted in different areas of Ladakh, including Wanla, Domkhar, Skurbuchan, Temosgang, Gangless, Gyamtsa and others. The

ethnobotanical information was gathered by visiting different places and recording the indigenous knowledge and usage pattern of plants. Information regarding the local names, food and medicinal values of plants were collected by semi-structured interviews and crisscrossed queries with the local people. The plant specimens were collected and identified with the help of different monographs and literature available. The identified specimens were deposited in botanical herbarium of Department of Botany, University of Jammu, Jammu and Kashmir, India.

RESULT AND DISCUSSION

Based on the ethnobotanical information gathered from the different localities of Ladakh, 40 wild plants were collected and identified with varying degree of their potential uses during the present study. Their botanical names, vernaculars, family, part used and their traditional uses are presented in table 1.

Among the 40 plant species belonging to 21 families, four were gymnospermous taxa while the remaining were angiosperms. Among gymnosperms, one species was belonging to the family Ephedraceae while the family Cupressaceae was represented by three species. Majority of the angiosperms (seven species) were the members of Asteraceae while three species each were of Lamiaceae, Rosaceae and Solanaceae family. Families like Amarylidaceae, Elaeagnaceae, Fabaceae, Crassulaceae and Salicaceae were represented by two species each while Apiaceae, Boraginaceae, Plumbaginaceae, Capparidaceae, Iridaceae, Scrophulariaceae, Juglandaceae, Betulaceae, Ranunculaceae and Polygonaceae were represented by one plant species each, as shown in fig.1.

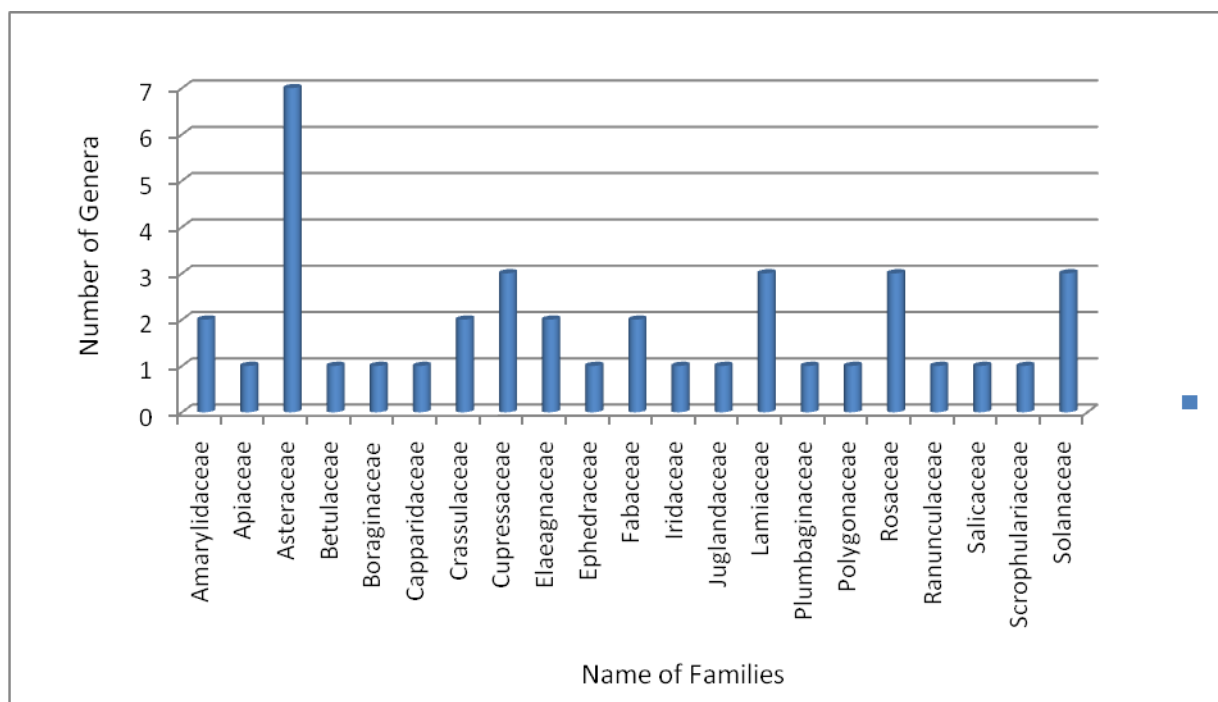


Fig. 1: Families with dominant genera

Usage pattern of various plant taxa showed considerable variation: *Allium przewalskinam*, *A. carolinianum* and *Carum carvi* were prominent aromatic species used as spice and condiments in different local dishes (Fig.2-4). Their seeds and leaves were used as flavouring agent in local recipes and pickles. The young leaves and tender shoots of *Capparis spinosa* (Fig.5) were used as a fried vegetable, known as *Kabra tsotma*, by local inhabitants of Ladakh. The leaves of *Mentha longifolia* were used in preparation of chutneys by locals and occasionally mixed in curd as flavouring component while the leaves of *Nepeta glutinosa* were mixed in curd to prepare *Tangthurr*, a special traditional recipe (Fig.6). The tender shoots of *Rhodiola tibetica* and *R. imbricate* were rinsed properly in running water and mixed in curd to prepare *Tangthoor*, a special local recipe while the roots of *Potentilla anserina* were edible and eaten raw. The roots of *Saussurea lappa* (Fig.7) were also employed in local Amchi medicine to treat the muscle and joint pains. Similarly, the seeds of *Lancea tibetica* and *Hyocyamus niger* are extensively used by Amchis, local medicine practitioner, in several medicines as mentioned (Table1). *Juniperus macropoda*, *J. communis* and *J. recurva*, locally referred to as *Shukpa*, were used for producing a mesmerizing incense in local houses and monasteries in Ladakh while the flower of *Waldheimia glabra*, *W. tomentosa* and *Rosa webbiana* are mixed with Juniper leaves for producing better quality of incense.. *Prunus armeniaca* (Fig.8) is extensively used by locals as one of the highly priced edible fruits. Their ripe fruits are sun dried to prepare one of the most delicious dry fruits called *Phating* in Ladakh, and its kernels were also used for extraction of oil

locally known as '*Tsegumar*'. The dried fruit and kernel as well as the apricot oil fetch a very high price in the local market. The fruit (berries) of *Hippophae rhamnoides* (Fig.9) were edible and extensively used in preparation of jam, juice, sauce etc. while its leaves formed a herbal tea substitute. The kernels of *Juglans regia* served an excellent dry fruit and were sold by the local farmers. The fruits of *Ephedra gerardiana* were edible and consumed in wild (Fig.11). Besides being edible, roots of *Arnebia euchroma* and *Rheum spiciforme* were used as dye by locals for colouring cloths (Fig.10,13).

Acantholimon lycopodoides is used as fuel during extreme winter as it is supposed to produce a good amount of heat (Fig.12) while *Cicer microphyllum*, *Echinops cornigerus*, *Tanacetum gracile* and *Artemisia brevifolia* were some of the potential fodder plants used by locals. *Salix alba* and *Populus nigra* constituted multipurpose plants for fodder, fuel and timber while *Betula utilis* were believed to be used by Aryans to write their manuscripts during ancient times. *Stachys tibetica* was used as fodder and also as a roofing material in building by locals.

Several plants like *Aster flacidus*, *Delphinium brunonianum*, and *Iris lacteal* were extensively grown by Ladakhis as ornamentals. *Elaeagnus angustifolia* and *Rosa webbiana* were praised for their fragrance and used as offering in local shrines and monasteries. The orange coloured flowers of *Physalis alkekegi* were exclusively used as decorating piece by the Ladakhis belonging to Aryan race residing in village of Dha and Hanu. A special kind of indigenous broom is prepared from the tender shoots of *Oryzopsis gracilis*.

During the ethnobotanical foray, it was revealed that the local populace is largely dependent on wild plants for their food, medicinal and aesthetic attributes. However, the extensive utilization of the above mentioned wild plants for food and other purposes, and their over exploitation by local Amchis for medicine has lead to their uprooting and habitat destruction. Moreover, hysterical developmental activities, population explosion and uncontrolled tourism in present Ladakh have threatened the

existence of these rare plants in wild. As a consequence, most of the wild plants have become rare, endangered and threatened in the fragile ecosystem of Ladakh. Therefore, conservation and sustainable use of these important rare wild flora entities through various conventional and non-conventional conservation methods is needed to ensure the continuity of their population and their availability for future generation.

Table: 1. Enumeration of some useful plants of Ladakh with traditional uses.

S.No.	Botanical name	Vernacular name	Family	Part used	Traditional uses	Medicinal uses
1	<i>Acantholimon lycopodioides</i> (Girard) Boiss.	Longzeh	Plumbaginaceae	Whole plant	The plant is used as special fuel as it is considered to give intense heat during winter.	Plant ash is used with milk in cardiac disorders.
2	<i>Allium przewalskianum</i> Regel.	Skotse, Luksgokpa	Amaryllidaceae	Leaves	Leaves are used as spices in local recipes.	Leaves are used against indigestion.
3	<i>Allium carolinianum</i> DC.	Skotse, Rasgokpa	Amaryllidaceae	Leaves	Leaves are used as spice in flavoring the local recipes.	Leaves are used against indigestion.
4	<i>Arnebia euchroma</i> (Royle) Jhon.	Demok	Boraginaceae	Roots	Mature root is used as dye in colouring cloths by locals.	In Amchi system of medicine roots are used in blood diseases, blood purification and pulmonary problems.
5	<i>Artemisia brevifolia</i> Wall. ex DC.	Burtse	Asteraceae	Shoots	The plant is used as fuel and fodder.	Leave extract is used in Amchi medicine against stomach problems and internal worms
6	<i>Aster flacidus</i> Bunge	Niamentok	Asteraceae	Flowers	The plant is used as ornamental.	Flowers are used in treating infections, common cold and poisoning.
7	<i>Betula utilis</i> HD Don.	Stakpa	Betulaceae	Bark	The bark of tree was believed to be used by Aryans to write their manuscripts.	Bark is known to possess antiseptic properties.
8	<i>Capparis spinosa</i> Linn.	Kabra	Capparidaceae	Buds & young leaves	Young buds and leaves are traditionally consumed as vegetable known as Kabra tsotma.	Plant extract is used in treatment of viral hepatitis, cirrhosis of liver and old age ailments.
9	<i>Carum carvi</i> Linn.	Kosnyot	Apiaceae	Seeds	Seeds are used as flavoring agent in cooking.	Seeds and fruits are useful for weak eye sight, indigestion and poisoning.
10	<i>Cicer microphyllum</i> Benth.	Sari	Fabaceae	Whole plant	The plant is used as fodder.	Seeds are considered as a good source of lecithin.
11	<i>Delphinium brunonianum</i> Royle.	Lunde-kaown	Ranunculaceae	Flower and whole plant	Plant is used as an ornamental.	Flower juice and infusion of whole plant is used for colic in Ladakh.
12	<i>Echinops cornigerus</i> DC.	Aczema	Asteraceae	Whole plant	The plant is considered as a special fodder for ass.	Seeds are used as tonic. The paste of leave is applied on septic on wounds.
13	<i>Elaeagnus angustifolia</i> Linn.	Sersing	Elaeagnaceae	Shoots, flowers and fruits.	The shoots of plant along with flower are aromatic and are used as offerings in shrines and temples.	Flower extract are used in treatment of malignant fevers. Fruits are known to contain vitamin- A, C and E.
14	<i>Ephedra gerardiana</i> Wall ex. Stapf.	Tsepat, Charay	Ephedraceae	Fruits and whole plant	Fruits are edible. The ash of whole plant is used in addictive narcotic by locals.	The plant is used as tonic, against fever, hepatic diseases and bronchial asthma.
15	<i>Hippophae rhamnoides</i> Linn.	Tsermang	Elaeagnaceae	Fruits, leaves	Fruits are edible and used in preparation of juices and sauce and its powder is mixed in barley flour. Leaves are used as fodder.	Fruits, seeds and leaves are considered as anti-aging, anti-cold and energetic. The plant is considered as storehouse of vitamins- C, K, E, B, and Carotenoids.

16	<i>Hyocymus niger</i> Linn	Gya-lantang	Solanaceae	Seeds	Leaves are used as fodder.	Fumigation of seed is useful in tooth infection. Leaves are used against asthma.
17	<i>Iris lacteal</i> Pallas.	Tesma	Iridaceae	Flowers	The plant is grown as an ornamental.	-
18	<i>Juglans regia</i> Linn.	Starga	Juglandaceae	Seeds,	Seeds are edible and consumed as dry fruits. Woods are used in door and window frames.	Seeds are used in treatment of frequent urination, asthma, chronic fever and constipation. Leaves are anti-inflammatory.
19-21	<i>Juniperus macropoda</i> Boiss. <i>Juniperus communis</i> Linn. <i>Juniperus recurva</i> Buch – Ham	Shukpa	Cupresaceae	Leaves, Fruits	Leaves are considered as aromatic and used for producing fragrant incense.	The Fruit are considered useful for constipation, gout, menstrual problems, and inflammation of lung, liver, kidney and gall bladder.
22	<i>Lancea tibetica</i> Hk. f. & T.	Spa-yang sta	Scrophulariaceae	Fruits	The extract of whole plant is used as tonic.	Fruits are used for cardio diseases and retention of menses.
23	<i>Mentha longifolia</i> (L.) Huds.	Phololing	Lamiaceae	Leaves	Leaves and tender shoots are mixed in curd and also used in chutneys.	Whole plant is considered as anti-dysenteric in Ladakh.
24	<i>Nepeta glutinosa</i> Benth.	Shakmazok	Lamiaceae	Leaves	Leaves are mixed in curd to prepare local recipe, <i>tangthur</i> .	The decoction of dried leaves is used against diarrhea.
25	<i>Oryzopsis gracilis</i> (Mez). Pilger	Chipskang	Fabaceae	Shoots	The tender shoots of plant are used for making broom by locals.	-
26	<i>Physalis alkekengi</i> Linn.	Shoklo	Solanaceae	Flowers	The flowers of plant are used as decorating item by the women.	The fruit is used in the treatment of urinary disorders, gouts and rheumatism.
27	<i>Physochlania praeala</i> (Decne) Hiers.	Lanhang	Solanaceae	Leaves	Plant is used as fodder.	Leaves are narcotic and used in ulcer and eye diseases.
28	<i>Populus nigra</i> Linn.	Youlat	Salicaceae	Shoots	The tender shoots of plants are used as fodder during summers.	-
29	<i>Potentilla anserina</i> Linn.	Toma	Rosaceae	Roots	The roots of plant are eaten raw especially by children.	Roots are used as tonic against diarrhea.
30	<i>Prunus armeniaca</i> Linn.	Chuli	Rosaceae	Fruits & Seeds	Fruits are sweet, juicy and delicious. Kernals are also consumed and used for oil extraction.	Fruits are nutritious, mild laxative. Flower extract are used as tonic. Decoction bark is used to neutralize effect of hydrogen cyanide.
31	<i>Rheum spiciforme</i> Royle.	Lachhu	Polygonaceae	Shoots & roots	Tender shoots are edible and consumed by locals. The roots are used a dye for colouring cloths	Purple roots are used in Amchi medicine against rheumatism.
32	<i>Rhodiola tibetica</i> Hk. f & T	Shrolo- marpo	Crassulaceae	Shoots	The tender shoots of plant are used for making some traditional recipes.	The roots are used in medicine as health tonic.
33	<i>Rhodiola imbricate</i> Edger.	Shrolo-serpo	Crassulaceae	Shoots	They are also used in traditional recipes.	Roots are used against cold, cough, fever and lung problems
34	<i>Rosa webbiana</i> Wall. ex. Royle	Siahh	Rosaceae	Flowers	Flowers of plant are used for ornamental purposes and also mixed with Juniper leaves for incensing.	The plant is used for treatment of hepatitis and is good source of vitamin- C.
35	<i>Salix alba</i> Linn.	Malchang	Salicaceae	Shoots	The tender shoots of the plant are used as fodder during summer.	Barks are considered anti-inflammatory, analgesic and used against fever.
36	<i>Saussurea lappa</i> Linn.	Rustha	Asteraceae	Roots	Roots are medicinally used for joint pains, chest pain and inflammation etc.	Roots are recommended for curing joint pains, chest pains, kidney and liver diseases.
37	<i>Stachys tibetica</i> Vatke.	Yahzas	Lamiaceae	Whole plant	The plant is used as fodder and as roofing material in buildings in Ladakh.	-
38	<i>Tanacetum gracile</i> Hk. f. & T.	Khamchu	Asteraceae	Tender shoots	Tender shoots are used as fodder.	The dried leaves and flowers are used against intestinal worms.
39	<i>Waldheimia glabra</i> (Docne) Regel.	Palu	Asteraceae	Whole plant	The plant is considered as holy and mixed with Juniper leaves for incensing.	The plant is used for septic wounds.

40	<i>Waldheimia tomentosa</i> (Docne) Regel.	Palu-karpo	Asteraceae	Whole plant	The whole plant is aromatic and used in incensing.	The plant is used for septic wounds.
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Fig.2. *Allium prezewalskinam*



Fig.3. *Carum curvi*



Fig.4. *Allium carolinianum*

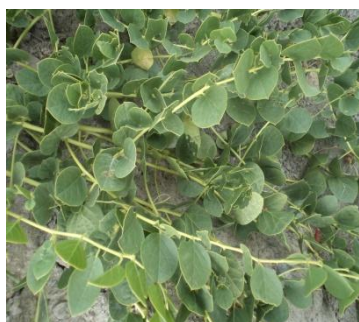


Fig.5. *Capparis spinosa*



Fig.6. *Nepeta glutinosa*



Fig.7. *Saussurea lappa*



Fig.8. *Prunus armeniaca*



Fig.9. *Hippophae rhamnoides*



Fig.10. *Rheum spiciforme*



Fig.11. *Ephedra gerardiana*



Fig.12. *Acantholimon lycopodoides*



Fig.13. *Arnebia euchroma*

Fig. 2 to 13 showing photograph of some selected plants.

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