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# Phytofoods of Nubra valley, Ladakh –The cold desert

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The paper presents the findings of an investigation on traditional wild edible plants available in the Nubra valley, Ladakh used for the preparation of traditional food items by the local tribal people. The Nubra, one of the valleys of Ladakh is known for its floral diversity in the cold arid zone. Twenty seven high altitude plant species belonging to 18 families in Nubra valley were identified as edible plants and used for the preparation of *Ladakhi* dishes. *Shangso chonma, Ldum chonma, Thanthour chonma, Kabra chonma* and *Phololing chamyk* were some of the famous traditional *Ladakhi* food item prepared from the wild edible plants.

**Keywords:** Ethnobotany, Phytofoods, Nubra Valley, Wild edible plants, *Ladakhi* dishes, Ladakh

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India, the sub-continent, is not only known for its diversity in culture, flora, fauna and also the agro-climatic character.The climate versatility is considered of tropical, sub-temperate, temperate, semi-arid, hot arid and cold arid, which has resulted in the vast biodiversity. Himalaya, the youngest fold mountains which is the northern barrier of India has the richest biodiversity among the mountain ranges of India. The mighty Himalaya is divided into the Shivalik, the Pirpanjal, the Greater Himalaya, the Ladakh, the Zanskar and the Karakoram ranges depending upon the altitutde. The cold arid region in Jammu and Kashmir is confined to Ladakh region located between the Greater Himalaya and the Karakoram Range has several peculiar climatic conditions. It lies between $31^{o}$ 44'57'-$32^{o}$ 59'57' N latitude and $76^{o}$ 46'29''-$78^{o}$ 41' E longitude and covers approximately 82, 665 sq km area.The cold deserts are characterized by prolonged sub zero temperatures, low annual precipitation (80-300 mm mostly in the form of snow), least fertile sandy soils with very less water holding capacity, sparse plant density , dry humidity (<30%), intense solar radiation, low oxygen content, low atmospheric pressure , high wind velocity and rugged terrain[1-5].

The Ladakh known as the little Tibet comprises of 5 valleys such as Leh, Nubra, Changthang, Suru, and Zanskar. The people of Ladakh settled in these valleys and depend on agiculture for their sustenance. Owing to prolonged subzero temperature cultivation is only possible during the summer season between March–September. The valley is devoid of cultivation rest of the year, which necessitated them to go for alternatives such as storing the excess produce from the cultivated field and traditionally available plants which are capable of growing even in sub-zero temperatures. From the time immemorial man has been using the plant and animal for food. The knowledge on those phytoplants passed from generation to generation for the sustainability of human being. These plants are localized to the particular region depending upon the climatic condition. The flora of cold desert areas and their ethnobotanical importance were studied earlier which focused on plant diversity, its documentation and scattered ethnobotanical uses by the tribal communities[6-8]. Tribals mostly eat vegetables of leafy varieties, which grow as wild weeds and depend on such natural products for their food. With this view, the study has been carried out during 2006-2007 aimed at exploring the possibilities of using the locally available plants for consumption.The purpose of the study is to survey and document the plants traditionally consumed in the Nubra valley, Ladakh and to document the food preparation methods using the traditionally available plants along with the tastes,

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preferences among the local folk and their medicinal uses. The survey on the phytofoods and sample collection from the Nubra valley were conducted in 2006-2007 during the winter (October – March) and summer (April – September). The Nubra, the valley of green lies between the 2 great mountain ranges the Ladakh (on the South) and the Karakoram (on the North) (approximately 34° 15'45'-35° 30' N and 76° 55'-78° 05' E) and is located in the cold desert of North Himalaya in the district of Leh, Jammu and Kashmir (Fig.1)[9]. The altitude ranges from 2,700-6,000 masl. The climate of the area is of cold arid and alpine.

## Methodology

For collection of data semi-structured interviews, questionare and direct observations were used. The respondents were chosed using stratified sampling and consisted of 70 male informants ranging from 45-70 yrs and 30 females ranging from 25–50 yrs. The plant specimens were collected, and carefully identified with the help of various monograms and herbarium (Figs.2-13).The information was gathered and confirmed by repeated queries raised time to time among the village head and others. Taste and preferences of the *Ladakhi* dishes prepared among the local folk are presented by using percentage analysis.

## Results and discussion

The Nubra, one of the valleys of Ladakh, the cold desert, is a treasure of cold arid plants known for its alpine floral diversity. Owing to harsh climatic condition, non availability and lack of irrigation facilities during Octobr–April necessitated the cultivation of crops during one season only (May-September). It was observed that the *Ladkhi* tribes harvest the wild edible plants during the month of May to September and store it for the onsetting winter. So the knowledge and documentation of such plants will be useful for the future generation. Based on the ethnobotanical survey conducted in the Nubra valley, wild edible plants used for the preparation of local dishes have been arranged along with botanical names, local name, family, parts used, recipe and medicinal uses (Table 1). A total of 27 high altitude plant species belonging to 18 families of Nubra valley were identified as edible plants and used for the preparation of famous *Ladakhi* dishes. The dominant families are Asteraceae (3sp), Brassicaceae (3sp), Amarlidaceae (2sp), Lamiaceae (2sp) and Poligonaceae (2sp). Various plant parts such as leaves of 15 sp, shoot of 1 sp, leaves and shoots of 4 sp, fruits and seeds of 4 sp, fruit and leaf of 1 sp, root of 1 sp and fruiting body of mushroom *Agaricus campestris* were used for the preparation of local *Ladakhi* dishes (Fig.14).

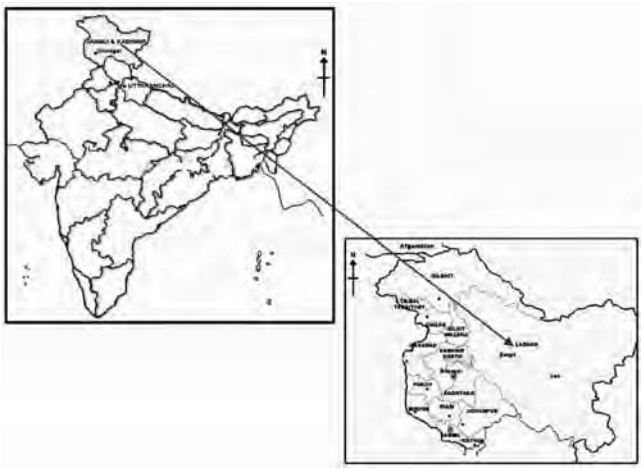

Fig. 1 — Location map of study area

Among these 27 plant species, *Allium prezewalskianum and Allium humile* known as *Skotche* and *Kue* in *Bodhi* language and *Bunium persicum* and *Carum carvi* are used as aromatic and flavouring agents. Leaves of *Anaphalis triplinervis* and *Oxyria digyna* are used as salad by the locals. *Shangso chonma*, a local dish is prepared using the leaves of *Lepidium latifolium* Linn., *Ldum chonma* or *Thooba*, *Thanthour chonma* from *Chenopodium album*, *Chenopodium foliosum* and *Elsholtzia densa*, *Kabra chonma* prepared from *Capparis spinosa* Linn. and Phololing chamyk from *Mentha longifolia* Linn. were the famous *Ladakhi* dishes prepared from these wild edible plants. The tastes and preferences of the *Ladakhi* folk was also studied during the study for the dishes prepared using these edible plants. It is observed (Fig.15) that the *Shangso chonma* was the most preferred and tastiest one (80%) followed by *Ldum chonma/Thooba* (76%), *Thangthour chonma* (72%), *Phololing Chamyk* (65%), *Kabra Chonma* (60%) and *Shong chonma* (50%). It was also observed that the availability of mushroom was rare and depends upon the availability of the rain.

Except *Lepidium latifolium* and *Capparis spinosa*, all other plant species were available during June-September in the cultivated fields. *Lepidium latifolium* and *Capparis spinosa* were cold tolerant and available to the *Ladakhi* tribal people during the month of May-December also. It was also observed

Fig.2 *Allium prezewalskianum*

Fig.3 *Allium humile*

Fig.4 *Agaricus* campestris

Fig.5 *Bunium persicum*

Fig.6 *Saussurea gossypiphora*

Fig.7 *Hippophae rhamnoides*

Fig.8 *Avena fatua*

Fig.9 *Elsholtzia densa*

Fig.10 *Oxyria digyna*

Fig.11 *Lepidium latifolium*

Fig.12 *Mentha longifolia*

Fig.13 *Fagopyrum tataricum*

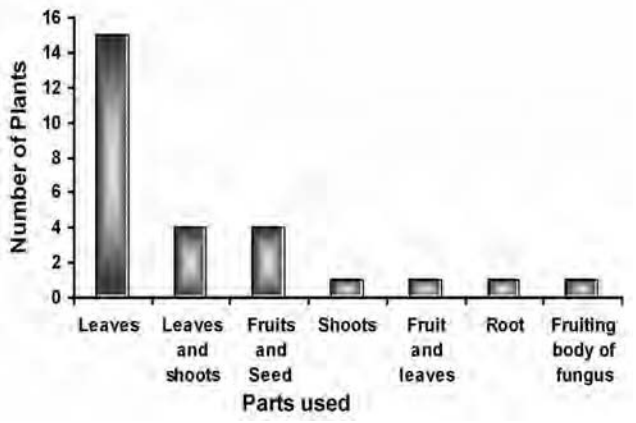


Fig. 14 — Plant parts used for the preparation of Ladakhi dishes

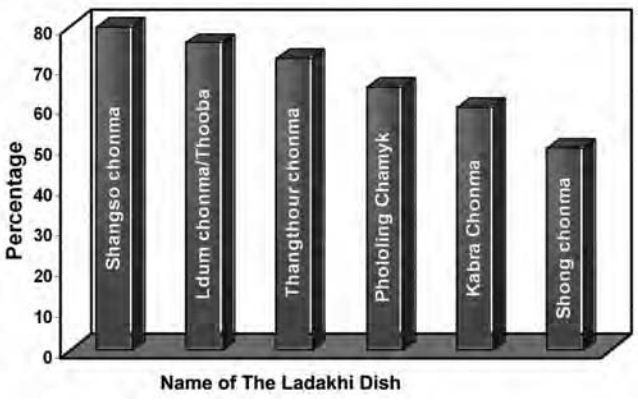


Fig. 15 — Tastes and performances of Ladakhi folic on the Traditional Ladokhi dishes propared from wild edible plants.

Table 1— Phytofoods of Nubra valley, Ladakh

| Plant name/Family/Local name | Edible Parts and Recipe | Medicinal use |
|---|---|---|
| *Allium prezewalskianum* Regel Amarylidaceae *Skotche,* Wild onion | Leaves of the plant are used instead of onion in the preparation of *thangthour* (vegetable curry). | Leaf decoction is used against stomach complaints. |
| *Allium humile* Kunth Amarylidaceae *Kue* | Leaves of the plant are used instead of garlic in the preparation of *thangthour* (vegetable curry). | Leaf decoction is used against stomach complaints |
| *Amaranthus spinosus* Wild Amaranthaceae *Chulai* | *Chulai chonma*: Leaves are washed with water and cut into small pieces. Oil is heated in a pan for 3 minutes. Onion and garlic is fried till it become golden brown colour. Then the leaves of *Amaranthus* is added and cooked for 10 minutes and taken with rice. | Root is antispasmodic, carminative and promotes onset of menstruation. |
| *Agaricus campestris* Agaricaceae *Shong/*Mushroom | *Shong chonma:* Fruiting bodies of mushrooms are washed with water to remove the soil particles. Oil is heated in pan for 3 minutes. Onion, garlic and green chillies are fried together till they become golden brown in colour; mushroom is added mixed with salt and chilli powder. The mix is cooked for 10 minutes and served hot. | Used against constipation. |
| *Bunium persicum* (Boiss) Fedtsch. Apiaceae *Korneet* | Seeds of *Bunium persicum* are used *traditionally* instead of *zera* in cooking. | Fruit is used against abdominal and colic pains. |
| *Carum carvi* Linn. Apiaceae *Karvi* | Seeds of *Carum carvi* are used traditionally instead of *zeera* in cooking | Fruit is used against stomach disorders. |
| *Lactuca dolicophylla* Kitam Asteraceae *Khala* | Leaves and shoots are used as vegetable. | |
| *Saussurea gossypiphora* D.Don Asteraceae *Ldum* | *Ldum chonma (thooba)*: Leaves of *Saussurea* are cut into small pieces after washing with water. Buttermilk/*lassi* is boiled for half an hour. After cooling it is sun dried for three days till it becomes like cheese or *panner*. This is known is *churpey* in *Ladakhi* language. *Atta* is mixed with water and *rotti/ chapatti* is prepared. Then it cut into small pieces like finger chips. Leaves of *Saussurea*, churpey, and rotti finger chips are mixed in the boiling water and cooked for 15 minutes. Oil is heated in pan for 3 minutes. Onion and garlic are fried till it becomes golden brown in colour. Then mutter is added to it and cooked for 5 minutes. Finally, *ldum*, *churpey* and rotti finger chips mix is added in the pan and fried and taken along with *zank*. | Root paste is applied on cuts and bruises. |
| *Arnebia euchroma* (Royle) John Boraginaceae *Troma* | Roots are eaten by children after washing in water during winter. Roots are fried in oil after washing and taken with *Ladakhi rotti*. | Leaf is used against cough and improves hair growth. |

*Contd—*

Table 1— Phytofoods of Nubra valley, Ladakh —*Contd*

| Plant name/Family/Local name | Edible Parts and Recipe | Medicinal use |
|---|---|---|
| *Capsella bursa-pastoris* (L) Medik Brassicaceae *Shamsho* | Leaves are used as vegetables. | |
| *Capsella elliptica* (L) Medik Brassicaceae *Shamsho* | Leaves are used as vegetables. | |
| *Lepidium latifolium* Linn. Brassicaceae *Shangso* | *Shangso chonma*: Tender leaves are boiled in hot water for 15 minutes to remove the bitterness. After boiling, the leaves are immersed in cold water and dried. Then they are cut into small pieces and fried with onion, garlic, salt and *masala*; taken along with *zank*. | Leaf extract is used against joints pain and also possess the anti bacterial activity. |
| *Capparis spinosa* Linn. Capparidaceae *Kabra* | *Kabra chonma*: Leaves are washed, boiled with hot water to remove the bitterness; cut into small pieces and fried with onion, garlic, salt and *masala*; taken along with rice and *rotti*. | Used for curing hyper acidity. |
| *Arenaria holosteoides* Edgew Caryophyllaceae *Chiki* | Tender shoot is used as vegetable. | |
| *Chenopodium album* Linn. Chenopodiaceae *Em.* | *Tangthour chonma*: Leaves are cleaned and boiled with water for 15 minutes; washed with cold water and cut into small pieces. Then leaves are added to the buttermilk/*lassi*; mixed vigorously. It is then fried with onion, garlic, salt and chillies and cooked for 10 minutes and taken along with *zank*. | |
| *Chenopodium foliosum* (Moench) Chenopodiaceae *Sneou/Sangsti* | *Tangthour chonma*: Leaves are cleaned and boiled with water; washed with cold water and cut into small pieces. Then leaves are added to the buttermilk/*lassi* mixed vigorously; fried with onion, garlic, salt and chillies and cooked for 10 minutes and taken along with *zank*. | |
| *Convolvulus arvensis* Linn. Convolvulaceae *Ratcho* | Seeds are eaten as such by children. Seeds are also boiled along with onion and tomato and fried in oil and taken. | |
| *Rhodiola heterodonta* Crassulaceae *Shrolo* | Tender leaves and shoots are boiled and then washed thoroughly with water. Then it is mixed with curd and stirred thoroughly and used for the preparation of local dish *tangthour*. | |
| *Hippophae rhamnoides var. turkestanica* Rousi Elaegnaceae *Sermang* | Fruits are used in the preparation of juices and squashes. | Fruit juice is used as multivitamin tonic, especially for vitamin 'C'. |
| *Avena fatua* Linn. Graminae Wild oat | Grains are ground and the flour is used for the preparation of *rotti*. | |
| *Mentha longifolia* (L.) Huds. Lamiaceae *Phololing/Pudhina* | *Phololing chamyk* Leaves are washed and grounded. Salt and chilli powder or green chillies are added to the paste and mixed thoroughly. Then added to buttermilk/*lassi* and taken with *rotti*. | Dried leaves are used to treat abdominal pain, as stimulant, diuretic, headache and rheumatism. |
| *Elsholtzia densa* Benth Lamiaceae *Sanik* | *Tangthour chonma*: Leaves are cleaned and boiled with water for 15 minutes; washed with cold water and cut into small pieces; added to the buttermilk/*lassi* mixed vigorously; fried with onion, garlic, salt and chillies and cooked for 10 minutes and taken with *zank*. | |
| *Oxyria digyna* (Linn.) Hill. Polygonaceae *Suchli* | Tender leaves and shoots plugged and eaten raw by children and used as vegetable. | Leaves are used as appetizer |
| *Fagopyrum tataricum* (Linn.) Gaertn. Polygonaceae *Dyat* | *Dyat chonma*: Leaves are washed with water and cut into small pieces. Oil is heated in pan for 3 minutes .Onion and garlic is fried till it become golden brown in colour. Then the leaves of *dyat* added and cooked and taken along with rice. | |
| *Potentilla atrosanguinea* Lodd Rosaceae *Skialdaepo* | Leaves are used as vegetable. | Leaf paste is used in stomachache, cough cold, sore throat and ulcer. |
| *Solanum nigrum* Linn. Solanaceae *Tsigma.* | Leaves are washed with water and cut into small pieces. Oil is heated in pan for 3 minutes. Onion and garlic is fried till it become golden brown in colour; leaves of *Solanum* are added and cooked for 10 minutes and taken along with rice. | Seed paste is applied on face as UV protectant. |

that among these 27 plant species, about 15 plant species has specific medicinal properties and used against various ailments such as stomach disorders, skin diseases, joints pain, fever and cold, etc. (Table 1)[10]. Due to the developmental activities, population explosion and anthropogenic reason, majority of the above listed plants has become rare, endangered and threatened category (RET) due to the fragile ecosystems of the Ladakh Himalaya[11]. So, there is an urgent need to conserve such plants through *in situ* and *ex situ* conservation methods and preserve them for the future generation. The analysis of the nutrient content of above said foods will be useful for developing balanced diet for local people.These edible plants, which are the integral part of tribal diet could be exploited to meet the food and nutrition security of this region. It is also suggested that majority of the plant species has medicinal value besides human food. So, phyotochemical analysis and development of novel drugs from these plants will be an immense help to the mankind fighting against cold and frost in the Ladakh region.

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