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WILD EDIBLE LEAVES: A STUDY OF THEIR SUBSISTENCE DIETETIC SUPPORT TO THE INHABITANTS IN NANDA DEVI BIOSPHERE RESERVE, UTTARANCHAL.

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WILD EDIBLE LEAVES: A STUDY OF THEIR SUBSISTENCE DIETETIC SUPPORT TO THE INHABITANTS IN NANDA DEVI BIOSPHERE RESERVE, UTTARANCHAL.

Himalayas are known to be accretion of innumerable wildly growing plants having immense support towards dietary constitution of the local inhabitants. Wild edible leaves are frequently consumed throughout the various months and seasons of the year and gathered by the local inhabitants from high altitudinal zones of Nanda Devi Biosphere Reserve (NDBR). In addition to fresh consumption in season, many leaves are processed, fermented for storage and used off-seasonally. Although, adults are familiar with various ethnobiological uses and medicinal properties of the herbs, the younger generation is less aware regarding their uses as well as habitats. Wild edibles are of particular value for sustaining over long winters when resources from agriculture and others are scarce. Current study deals with the inventiveness towards these few plant species regarding their consumption and medicinal uses by indigenous Bhotiya tribal community of higher expanses of Garhwal in Nanda Devi Biosphere Reserve. Survey provides a database regarding the ethno-botanical facts of these lesser-known leafy wild green edible species based on its palatability, medicinal property, occurrence in natural habitats and the extent of anthropogenic pressure on its habitats based on people's perception. Studying these herbs had a special reason of creating awareness regarding their conservation as well as managing their habitat against degradation.

Introduction

Uttaranchal (200 26' and 310 38' N latitude and 770 49' and 800 6' E longitude) covering an area of 53,483 sq. km and with the population density of 159 persons/m² is paradise of wild edibles. The diversity of topographical and climatic conditions has favored the luxuriant growth of forests. Uttaranchal in general and Garhwal in particular are rich in its ethno-cultural, traditional and biological diversity. Nanda Devi Biosphere Reserve (NDBR), a world heritage site, occupies a special place in the biosphere reserve system of higher Himalayan region of India. The reserve is located in the northern part of western Himalaya with a core zone and two buffer zones. Tolchhas, Marchhas and Jadh sub tribal communities of Bhotiya tribes are the main inhabitants of higher Garhwal Himalayas. They traditionally differ from each other in their dialect, food habits and life style they presume. Livelihood income and lifestyle are more or less dependent on the natural resources around their surroundings. For daily use needs they are directly or indirectly dependent on forests or forest related resources that is for fuel wood, timber, fodder, NTFP's and wild edibles especially during the days of food scarcity in winters because of heavy snowfall in the area. The people inhabiting the villages of the biosphere reserve traditionally use various plant parts as medicines, food, fodder, fuel, agriculture tools, building fibers, religious and other purposes. A total of 97 species are being utilized by the local people. Out of these 17 species are used as medicine, 55 as food (edibles), 15 as fodder, 16 fuel, 5 cultivated tools, 8 house building, 2 fibers, 6 miscellaneous and 11 religious purpose (Anonymous, 1993).

Higher Himalayas are going through the phase of transition due to increasing population pressure, tourism related activities while; its rich herbal wealth is in huge market demand (Maikhuri *et.al* 1998). Besides, harvesting crops after tough hustle in their small and terraced fields and still being paid with low productivity local inhabitants are frequent enough to collect these wild edibles for food and other plants from their natural habitats to meet their subsistence requirements. Use of wild edibles as a supplement in the delicious indigenous cuisine of ethnic Bhotiya tribes is promising (Maikhuri and others, 2001). Wild leaves other than fruits et cetera are among the most widely consumed wild edibles by the tribal community. Most of these plant species sprout out after the snow melts in the valley. Localities consume these leaves by preparing several recipes from them. There are almost 10-15 green leaved plants in the forests of biosphere reserve of Niti valley near to Indo-China border which are used by the tribal community in their traditional cuisine in one way or other. Some commonly eaten green vegetables of the area are fine to consume during winter season as they help in maintaining the body temperature. While, few of plants consumed for their leaves may be high in their fat content, others are rich in proteins; most of them are good sources of multi vitamins and minerals (Sundriyal, 2003). Women and girl children usually collect these herb species along with fuel wood and other minor forest products. Bhotiya tribes dwelling in remote and inaccessible valleys of Nanda Devi Biosphere Reserve also explore their wilderness of forest localities for wild food

other than leaves. There are various processes devised in the kitchens of the Bhotiya community to make the wild edibles palatable. These wild green leafy vegetables necessitate a comprehensive field investigation with the prop up of laboratory data related to their nutritional and other essential dietary content, so that the habitat of economically important species can be conserved and if possible can be promoted for their domestication.

Materials and Methods

The methods employed in the study were designed with the purpose of providing baseline information on the use of plant species in local system through village surveys and field visits to various areas in the villages of Chamoli district falling under the boundaries of NDBR in Garhwal Himalayas, Uttaranchal.

A detailed questionnaire based survey was made in different buffer zone villages (Tolma, Bhallagaon, Sukhi, Phagti and Long) (table 2) of Niti valley in NDBR covering two local tribal sub communities (Tolchha and Marchha) to understand the utilization and consumption pattern of various wild edible plants herbs and shrubs in particular providing nutritious green vegetable following the methodology of Grandstaff et.al 1998. Based on the reconnaissance survey among the total population of 230 households and 1417 individuals and 14 migrated households 135 households were selected randomly for questioning (table 1). Sampling was stratified random basically with age group of 35 and above as they were found more aware with the indigenous practices and knowledge related to wild edible species. Overall sampling was 58.69%. Older aged inhabitants in general and women folk in particular were questioned as they were directly involved with forest and agriculture related daily activities and were more experienced about wild edibles and change in their consumption patterns because of shrinking habitats of such species. On the basis of questionnaire and meetings at village level 5 individuals each were selected for personal interviews to receive more appropriate indigenous traditional knowledge related to these wild edible species. In addition, field visits were made with locals to identify species of economic usage. Field identification of plant was made with the help of flora, research papers and reports (Anonymous, 1993; Hajra, 1983; Naithani, 1984; Polunin, 1984). Among various wild edible plant species selected species were inventorised as well as identified used for the preparation of vegetables. The prioritized survey was done on the basis of following criteria:

1. Palatability 2. Medicinal or healing property 3. Occurrence in the natural habitats and 4. The extent of anthropogenic pressure on the plant species. On the basis of these criteria, about 10 wild edible leafy species were selected for the study naming, ***Smilacina purpurea*, Wall., *Paeoniaemodi*, Wall.Ex, *MegacarpaPolyandrea*, *Phytolacaacinosa*, Roxb., *Girardinia diversifolia*, *Allium siminoi*, *Diplaziumesculentum*, *Rumex nepalensis*, Hook. *Chenopodium foliolosum*, Hook. and *Amaranthusspp*.**

Results

Wild plants are all those gathered in the form of edible plant parts eg. roots, tubers shoots, leaves, twigs, flowers, fruits, fronds, bark, piths, buds and other vegetative parts (Samant and Dhar, 1997). A very large section of the population in Garhwal Himalayas living close to the natural forest boundaries, particularly in remote and far flung valleys, depend upon a variety of wild plants for their subsistence (Sundriyal and Sharma, 1999). On the basis of the detailed questionnaire based and supporting field surveys following species were identified and studied, details are mentioned in Table 3.

1. *Smilacina purpurea*, Wall.

Family: Liliaceae

Vernacular Name- Puyanu

Leaves of the plant are consumed as nutritious vegetable. The plant grows under the canopy of *Betula utilis*, *Taxus baccata* and *Abies pindrow* but does not grow under the canopy of *Cedrusdeodara* forests. Average height of the plant ranges from 30-70 cm. it is an erect herb with creeping rhizome. Leaves elliptical to oblong, 6-12 cm long, flowers in spike like clusters appear during May-June. Leaves are gathered for vegetable and also sun dried as well as some times also dried in earthen pots by fermenting them and then stored near to hearth in these pots for the future consumption particularly, during the winter season by the local inhabitants of the valley. Leaves after collection are incised into small pieces, dried or eaten fresh. *S. purpurea* also has certain considerations for serving. It is not provided to lactating mothers or they can reduce the lactation and this can severely affect the health of the newly born (based on indigenous knowledge). Plant is incompetent to nurture in the kitchen gardens and terrace fields of the village surroundings. The plant requires lot of quantity of organic litter that the habit of the plant easily receives in the forest and is

hard to provide in the kitchen gardens and terraced crop fields owned by the inhabitants of the village.

2. *Paeonia emodi*, Wall. ex Royle.

Family- Paeoniaceae

Vernacular Name- Chandra

The plant is commonly called as "*Himalayan Peony*". It is a glabrous perennial herb with fleshy tuberous roots, up to 1 m high. Leaves 1-2 ternately compound with decurrent entire or incised leaflets. Flowers are showy, 2.5-10 cm across, white coloured. Seeds are black, smooth and shiny. Flowering starts from the month of March and remain up to the month of June. Collection time exists only in the month of March and leaves are collected for vegetable purposes before the shedding of flowers. Plant grows in the narrow valleys or glens with streams. Plant requires extensive moist and nutrient rich conditions to flourish. Plant grows particularly under the canopy of *Juglans regia* (Apricot) and *Populus deltoidea* (Van Peepal). Local inhabitants consume *Paeonia* as food. After collection from the forest; leaves are boiled and preserved for long in the form of leaf cakes. *Paeonia* is consumed raw as well as after fermenting or sun drying. Leaves are bitter in taste because of its extensive medicinally important unknown chemical constituents (as told by the local people). It is an ancient, indigenous remedy as well as traditional practice against stomach related ailments used by Bhotiya tribal community.

3. *Phytolaca acinosa*, Roxb.

Family- Phytolacaceae

Vernacular Name- Jagra

It is a tall, erect, stout herb with succulent stem; broadly lanceolate leaves with pale green flowers. Leaves from the plant are plucked before the plant starts flowering and fruiting during August to September. Fruit of the plant is berry like filled with some blue tinted fluid. Earlier in the past, local inhabitants of the villages used to prepare a local variety of ink or dye to write and dye clothes. Leaves of *Phytolaca* are eaten fresh just after collection. Small green leaves of *Phytolaca* are boiled, mashed and then cooked as other green leaved vegetables are cooked. Premature green leaves of the plant are consumed having rich medicinal properties against skin diseases. Presently localities have also started cultivation of this species for vegetable purpose.

4. *Gerardianadiversifolia* (Link) Friis.

Family- Urticaceae

Vernacular Name- Dhol Kanali

The plant is a weed for the entire Himalayan belt and can be located from very low altitude to the very high altitudes. This is the part of the cuisine of Garhwal inhabitants of higher Himalayan region, where the plant grows extensively as a weed. Tibetan migrants living mainly at high altitudes also prefer plant for eating. It is a robust, perennial herb with stinging bristles. The major difference is just in species with broadly ovate shape that are deeply lobbed and each species is having different margins of leaves. Flowers are small and greenish. Flowering and fruiting occurs during August to September. Fresh leaves of the plant are collected with the help of stick before stump of the plant becomes thick and woody as it is hard and tough to chew. Preparation of vegetable from the leaves of the plant is highly specific due to presence of spiny outgrowths on the plant habit. Leaves are boiled just after they are plucked and boiled leaves are mashed so that harmful stinking substances can be excluded from the leaves. For preparation all the leaves are cooked in their traditional mode with the local edible oil. Occasionally, leaf mash is mixed with gram flour and balls of this paste are prepared that are fried in local edible oil. The strong fibrous stem of the plant is used for manufacturing ropes in distant valleys.

5. *Allium siminoides*

Family- Liliaceae

Vernacular Name- Sedum

In the local dialect *Sedum* is referred as brother of garlic as it has somewhat bigger capsules than of garlic. It is found in boondocks as well as also cultivated in crop fields by inhabitants of the valley. Crop emerges out from the fields in the month of August. Seeds itself fall on the fields during onset of the season where they are cultivated and further regenerate into the plantlets. *Sedum* is eaten fresh and mostly not alone, but by mixing it with potato or other vegetables. The method of cooking is more or less same as for other green vegetables. It is very nutritious and is also used to flavor local *Daal* (pulses), *Payo* (curry prepared by local curd called *Chhanch*) and other vegetables cooked.

6. *Diplazium esculentum* (Retz.) Sw and *Diplazium frondosum* (C.B. Clarke) Christ.

Family- Dryopteridaceae

Vernacular Name- Lingra

It is a local variety of fern of about 1 m height, with bipinnate fronds, sori are present in two oblique rows in the segments, indusium of the frond is linear. Commonly grows in moist and shady places. Young fronds are used as vegetable (circinately coiled) while; mature fronds are used as fodder. Juvenile fronds of the plant are plucked by the women folk of the area. As they are experienced in separation and collection of the fronds as the edible fern species grows all along with poisonous ferns locally known as "*Jakh Lingra*". The fronds are boiled and fried in oil with jakhiya (*Cleome viscosa*) after removing the red petiolar hairs. The matured Fern leaf termed as "*Una*" grass is used as cattle bedding from the month of June to October/November. During these six months this fern along with few other ferns is the major cattle bedding for the livestock of the area.

7. *Megacarpa Polyandrea* Benth.

Family- Brassicaceae

Vernacular Name- Barmau

The plant grows under the canopy of *Betula utilis*, *Abies pindrow* of Himtoli near to core zone of NDBR. The habit of the plant is perennial large herb in its external appearance and has hollow stem, fleshy, deeply lobbed large number of leaves on its habit. Flowers of the plant are white in colour and arranged in corymbs. The seeds of the plant having whitish tint, resembles with the seeds of *Delbergia sissoo*. *M. polyandrea* is an important green leafy herbaceous plant consumed by the Bhotiya tribal community. Leaves of the plant are collected from March to June and are consumed fresh and processed for preservation. Flowering and fruiting is prevalent during April-September. This plant is **rare** in its habitat in NDBR because of restricted habitat (alpine slopes from 3500-4000 m asl), small population size, narrow range of distribution and may be exploitation because of commercial purposes (Anonymous, 1993).

8. *Rumex nepalensis*, Hook.

Family-Chenopodiaceae

Vernacular Name- Payoom

This green Spinach is somewhat different in both its external appearance (morphology) and taste from the locally cultivated. It is a tall, erect, robust, annual/perennial herb, up to 1 meter in height. Stems are glabrous; leaves are ovate/ elliptic-ovate, entire with cordate base. Flowers are bisexual, arranged in whorls in long terminal racemes, pink coloured. Habitat is particularly around moist places near to water sources. Fresh soft leaves of *Rumex* are collected before flowering and fruiting on the plant from June-Oct. Seeds are collected at the end of the life cycle of the plant. This green leafy vegetable *Rumex* is cooked fresh and not dried for its preservation for the months when there is shortage of green vegetables.

9. *Chenopodium foliolosum*, (Moench) Aschers.

Family- Chenopodiaceae

Vernacular Name- Bethu Saag/Bhetua

Leaves of *Chenopodium* as well as aerial parts are used as vegetable. Plant habit is erect, slightly foetid herb, leaves are triangular, hastate flowers are minute and greenish. Flowering and fruiting occurs from July-August. *Chenopodium* grows as a weed in the pasture, culturable wastelands as well as waysides. The wild edible leaves of the plant are different in taste and appearance that are cultivated and eaten in the plains of north India. Plants are not cultivated only collected from the fields and roadsides of higher altitudes of the valley surveyed. It is a lesser-used green vegetable by the sub tribes and rarely eaten. Before cooking this plant is boiled and mashed so that the poisonous elements can come out and then it is cooked in the same way as other green leaved vegetables are cooked by local people.

10. *Amaranthus spp.*

Family- Amaranthaceae

Vernacular Name- Chaulai

High altitude *Amaranthus* is mainly of three types these are Red *Amaranthus*, White *Amaranthus* (Plant and flower are yellow in color), Black *Amaranthus*. Average height of the plant is from 5-7ft. the collection is done from the forests in the month of June to July while, cultivable *Amaranthus* is sown in the fields in the month of March and April. The plant is different in taste and habit from the cultivable *Amaranthus* found and eaten at the plains of north India. Plucking of the leaves is done before the emergence of flowers on the shoots. Leaves of the plant are eaten fresh after collection no drying is done.

DISCUSSION

During recent years a greater shift in cultural aspects of the tribal sub communities of the

higher Himalayas has been discussed at large. However, use of wild edible leaves is still under continuation whenever and wherever they are available. People are interested to consume them because of their taste and healing properties. The local use value, demand and healing properties of these wild leafy vegetable plant species demonstrate that all of them have a rich potential of bio-prospecting for the region. These species are assumed to be highly nutritive and medicinal. Present study is just to provide baseline information regarding the rarely known leafy wild edible potential from this valley of the biosphere reserve. So, collecting and consuming these wild edible plant species can play major role in meeting the dietary requirements of the tribal community of the biosphere reserve and the adjoining areas. The value addition of the product can increase the cash return from the wild edible plants multifold by processing it into pickle, dry storing, spices et cetera. Collection of all these plant species is done during the time of grazing by their livestock or fuel wood and fodder collection. The frequency of occurrence of all these species in their natural habitats is very low and thus conserving and managing these species for sustainable harvest can appear to be a feasible option. In recent time, there has been considerable emphasis to undertake research for providing economic benefit to the local communities. It is argued that plants providing edible parts are often used beyond their carrying capacity and such species and their habitats need to be conserved through special protection and management measures. Out of discussed species only *Lingra (Diplazium esculentum)* is sold in few nearby local markets. Still this species also do not have a huge market because of its less and seasonal productivity from the nearby forest areas to meet the demands of the consumers (table 4). Selling of the leaves or its dried form brings minimum return to the vendor due to fairly low keeping quality and market costs. The whole survey showed that the wild edible leaves can be an important source of cash earning to the subsistence of cultivator families if managed and worked out without middleman's interference.

Information on chemical constituents of these food plants can add to the existing knowledge about the nutritional values of leafy wild edibles of Garhwal Himalayas. Comparing the mineral contents of various wild edible species with the commercial fruit species showed about 5-50 times higher calcium content in *Diplazium esculentum* and *Urtica diocea*. High iron content is also recorded in the same leaves and fronds of the above plants. Overall trend of nutrient is also reported higher from wild leafy part than other plant parts except the fruiting bodies of wild edible mushrooms (Sundriyal and Sundriyal, 2001).

The forest cover in the Indian Himalayan region has been depleting at a rapid rate due to various biotic and abiotic pressures. Past few decade changes have been observed in the traditional land use practices due to construction of roads and influence of market forces and other environmental factors (Anjali Awasthi, 2003). Unfortunately the biodiversity of the region is dwindling fast due to increasing population pressure and injudicious exploitation. Harvesting or collection and consumption of wild leafy edibles in a very huge quantity also provide the opportunity to decrease their population from their natural habitats. These leafy wild edible species need to be conserved in their natural habitats. Plant dwellers and leaf collector need to be educated about the associate species of these valuable wild edibles and adverse impact of their over collection from their habitats as well as destruction of their habitats through extensive grazing and browsing by their livestock bovines and equines in particular. So, these sections of the tribal community also need to be taught for taking precautions while taking their livestock for grazing.

CONCLUSION

There are more or less at least 3,000 edible plant species that are known to human being, with merely 30 crops contributing to more than 90 % of the world calorie intake. Use of wild edible part as supplement holds promise. Existence of wild edibles in general and leafy green vegetables in particular as they are present in very small areas of fragmented habitats and because of continuous extraction have created intimidation towards their survival in their habitats for near future. The rich diversity of lush green wild edible leaf species play a commendable role in the dietary, nutrient and economical security of the Bhotiya tribal community of the Nanda Devi Biosphere Reserve, as they are available in one or other seasons of the year. These plant species are also sufficient in providing ecological security because of their property of providing extensive resistance towards several diseases and thus they are declared to be excellent healers against several diseases by the localites. Although these herbs nurture in inaccessible geographical terrains and harsh climatic conditions yet they provide sufficient production to be consumed by local people and to be sold in the nearby small local markets in a definite quantity. There is an urgent need to make people aware about the status of these plants, their utilization in a sustainable manner and propagation of these species in fairly similar Protected Area Network (PAN) (Anonymous, 1993). It can be accomplished that wild edible leaves

are a very rich source of essential nutrients and can be support for hill economy as a small extra amount for each also as they are locally available at very low cost. Using the sustainable harvest measure can help in uplifting the local economy of the people. Some value addition and bio-prospecting of wild edible leaves in the form of pickle, spices and dried products may generate some employment in the rural sectors. Therefore, some training and extension programmes are needed for creating awareness towards the potential of these wild edible leaves. To develop cost effective agronomic practices if can be suggested will also add value for their survival in their natural habitats by cultivating them in their terraced crop fields. The most important aspect should be to plan monitoring based on scientific inputs in different seasons after a time gap of every three years to review the status to conserve them.

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- Table 1: General profile of high altitude villages (buffer zone villages of NDBR)

Village	Total no.of House-holds	Total population	Average family size	No. of literate person	Average livestock holding/family	Total Agricultural area (Ha)	Average land holding/family (Ha)
Tolma	26	135	5.2	101	5.7	46.18	1.77
Bhallagaon	40	302	7.5	246	5.3	31.23	0.78
Suki	42	322	7.7	259	5.8	41.20	0.98
Phagti	28	141	5.0	81	6.1	42.78	1.52
Lata	75	412	5.1	302	4.4	51.23	0.68
Long	19	107	5.6	72	6.2	16.31	0.85
Total	230	1419	6.0	1061	5.5	39.15	1.09

Table 2. Characteristic features of the buffer zone villages situated along an elevational gradient in NDBR
(Niti valley), Uttaranchal

Parameters	Lower Altitude	Middle Altitude	Higher Altitude
Altitude	1900-2400 m asl	2400-2800 m asl	2800-3600 m asl
Transhumance	Not practiced	Practiced (short migration)	Practiced
Cropping patterns	3 crops per 2 year	3 crops per 2 year	1 crop per year
Distance from NDBR core zone	5-8 km	3-4 km	>12 km
Distance from NDBR core zone	5-8 km	3-4 km	>12 km
Main occupation	Agriculture	Agriculture	Agriculture
Subsidiary occupation	Animal Husbandry	Animal Husbandry	Animal Husbandry
Horticultural trees	Present	Present	Present
Number of cultivated agricultural crops	14	12	10
Number of cultivated Medicinal plant species	3	4	4
Land under traditional crops (ha)	105	61	107
Land under medicinal Crops (ha)	2.12	3.49	5.79
Total arable land	107.12	64.49	112.79
Name of villages	Lata, Reni, Peng	Tolma, Suki Bhallagaon, Phagti and Laung	Malari, Dronagiri Garpak and Niti

Table 3. General features, Traditional use & Medicinal value of some Wild edible leaves consumed by the tribal of NDBR, Uttaraanchal.

Species	Local Name	Collection Period	Habitat	Properties
<i>Smilacina purpurea</i> ,	Puyanu	March -May	Dense dry temperate, sub alpine forests from an altitude of 3000-3500 masl.	<i>Smilacina</i> is a green leaved plant with rich medicinal properties. Leaves of the plant have extensive cooling property.

<i>Paeonia emodi</i> , Wall.Ex	Chandra	March.	Dense dry temperate forests situated at an altitude from 2000-2500masl	<i>Chandra</i> is excellent medicine for dysentery and colic ache. Vegetable of dried leaves is blood purifier and fried dry leaves with ghee are used to cure dysentery and diarrhea.
<i>Phytolac acinosa</i> , Roxb.	Jagra	March-June	Jagra is found at an altitude of 2000-2600 m asl Jagra flourishes on the sides of the terrace croplands and also from the shade areas of the big stones on the way.	Paste of the leaves is used to cure skin diseases in the animals like sheep and cow while, the decoction of the root is used to cure indigestion
<i>Gerardiana diversifolia</i>	Dhol Kanali	Feb.-May	Flourishes from an altitude of 1800-2200 m asl. But it has been noticed that plant is also collected from the fields and waysides.	Fresh leaves of the plant are cooked and are eaten to cure fever due to cold.
<i>Allium siminoi</i>	Sedum	March- June	Sedum is grows from 1100-4000m asl.	Aromatic. Capsules are consumed against gastritis problems and capsules are mixed with mustard oil to cure the pain of arthritis.
<i>Diplazium esculentum</i> (Retz.) Sw	Lingra	April - May	1900-2900 masl.	A perfect medicine against constipation.
<i>Megacarpa Polyandrea</i> (Rare plant)	Barmau	March - April	Collection area stretches beyond the Timberline zone at an altitude ranging from 3000-3500 m asl.	Juvenile green leaves of the plant are used as vegetable; leaves are effective and efficient healers against stomach disorder. Root decoction is also advantageous against common cold and fever.

<i>Rumex nepalensis</i> , Hook.	Payoom	March-May	Payoom grows at an altitude of 1700-3000 m asl.	<i>Rumex</i> has high iron content same as the local spinach of plains. This vegetable is provided to anemic, weak and pregnant women, as they need more iron content in their diet.
<i>Chenopodium foliolosum</i> , Hook	Bethu	March- June	Bethu grows at an altitude of 2800-3100 m asl.	It is warm and Iron rich. This vegetable is provided to anemic.
<i>Amaranthus</i> spp.	Jangli Chaulai	June-July	<i>Amaranthus</i> found at the altitude of 900-3000 masl.	Leaves of the plant are mainly provided to the weak patients and pregnant women mainly those are prone to or are anemic.

Table 4: Important wild plants collected for the purpose of vegetable (along with value and use) collected by the inhabitants of buffer zone villages of NDBR

Scientific name	Vernacular name	Part used	Cure	Rs/Kg
<i>Smilacinapurpurea</i> , Wall.	Puyanu	Aerial parts	Dysentery, fever	25.00
<i>Paeonia emodi</i> , Wall.Ex	Chandra	Leaves	Dysentery, blood purifier	22.00
<i>Megacarpa polyandrea</i>	Barmau	Roots & Leaves	Stomach pain	18.00
<i>Phytolaca acinosa</i> , Roxb.	Jagra	Leaves	Skin infections	25.00
<i>Girardinia diversifolia</i>	Dhol Kanali	Leaves	Fever	-
<i>Allium siminoi</i>	Sedum	Leaves	Dysentery	45.00
<i>Diplazium esculentum</i>	Lingra	Fronds	Constipation	22.00
<i>Rumex nepalensis</i> Hook.	Jangali Palak (Payoom)	Leaves	Anaemia	20.00
<i>Chenopodium foliolosum</i> , Hook	Bethu Saag/Bhetua	Leaves	Anaemia	-

Fig.1. The total number of surveyed villages at high altitudinal region of NDBR [IMAGE]