STUDY ON SOME WILDLY GROWING ETHNOBOTANICAL PLANTS OF SOLAN DISTRICT (HIMACHAL PRADESH)

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Abstract: - Plants have been used in all cultures as a source of food, medicine, fodder, fuel, dye, oil, etc. Food security is the primary concern in recent scenario therefore; use of wild edible resources can be a great alternative step in maintaining equilibrium of human demands and utilization of resources. Human have been eating wild edible plants ever since they appeared on earth. Edible wild plants are the part of agricultural systems. They provide essential micronutrients to diet and considered as part of the total food system. The wild edible plans are not only the part of human diet, but their nutritional content is superior in vitamin and mineral content of widely raised domesticated field crops.

Key Words: — ***Food, agriculture, wild, Micronutrients, Vitamins, Nutrition.***

I. INTRODUCTION

The human population has developed closed association with plant life since time immemorial[1]. At global level in many developing countries, large number of population do not have sufficient food for their daily needs and many people are lacking one or more micronutrients [2]. Edible parts of wild plants (fruit, flower, leaves, tubers and rhizomes) are the nature's gift to mankind and these not only satisfy our taste buds but also serve as the chief source of vitamins, minerals and proteins[3],[4]. These wild edibles have served as nutritional supplements particularly for the tribal and rural areas of the Himalayas, for thousands of years. Although they are not consumed in large quantities, their role at regional level cannot be ignored[5].

It is estimated that in India about 800 species are consumed as food plants chiefly by the tribal inhabitants. Himalaya is known as the abode of wild edible plants. In India, the Himalayan region covers approximately 5,91,000 cm^2 which in only 11% of country's geographical area and is one of the 12 mega-biodiversity countries of the world. It accounts for more than 50% of country's forest cover with 40% of endemic species. The diverse natural habitants all over the Indian Himalayan Region (IHR) represent rich repositories of plant diversity. Himachal Pradesh (HP) is the largest state that lies in the IHR with magnificent biodiversity and climate varying from tropic to semi arctic conditions prevailing in Spiti and Pangi valley. The total geographical area of Himachal Pradesh is 55,673 km^2 which is 1.7% of country's area and 10.54% of Himalayan landmass, 66.52% is under forests (hpbiodiversity.gov.in). It supports 32 Wildlife Sanctuaries, 05 National Parks and 03 conservation reserves. The 12 district comprises the lush green vegetation at varying altitude.

Solan district, at an average elevation of 1600 metres (5,200ft) is located at 30.92^0N 77.12^0E. The highest point is atop Mount Karol (2,280 metres). The total geographical area of district is 1936km^2 which constitutes 3.49% of total area of the state. The district is bounded by Shimla district in the north and by Ropar district of Punjab and Ambala district of Haryana in the south, by Sirmour district in the east and Bilaspur in the west. Mandi district touches the boundary of Solan district in north east.

The study was conducted in Solan city and surrounding areas(Nauni, Chambaghat, Arki, Oochghat, Mamligh, Kunihar) of Solan district in Himachal Pradesh to congregate the data related to traditional knowledge, diversity and documentation

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of wild edible plants of the area. The present research was performed to gain the knowledge of local plants and their traditional use by locals as well as to know their ethonobotanical utilization.

II. METHODOLOGY

2.1 Field survey method

Extensive field surveys were conducted for the collection of data. The knowledgeable person was engaged with us to locate the sites where these plants were present. During the investigation, the villagers and the people of different communities of the area were interviewed.

The present study on wild edible plants was carried out mainly in few areas of Solan district viz. Jaunaji, Shilli, Chambaghat, Arki, Oochghat, Mamligh, Kunihar.

The information was collected about particular season for collecting plants and plant parts used for wild edible purpose. Plant specimens were photographed and sample of some plants were collected from the field.The information regarding the utility of different plants in wild edibles is collected through field surveys as carried out in various localities and people were met in their residential areas. (Table 1).

2.2 Discussion method

Discussions were held with different people of the localities in the groups in their local language. All aspects of the plants that are used in dye yielding process were discussed. Data was collected by questionnaire, interviews and discussions. The present study on wild edible plants was carried out in the Solan district of HP. The information regarding the utility, part used and other uses of the plants in different activities was collected through the field survey those were conducted in these localities and people were met in their residential areas. In order to collect the primary data following approaches have been followed. The secondary data was collected from libraries or research organizations, institutions, journals, magazines and internet.

Table.1. Profile of the informants of some of the villages of Solan district

S.No.	**Name**	**Sex**	**Age**	**Profession**	**Village**	**Tehsil**
1.	Janki Devi	F	43	Housewife	Damrog	Solan
2.	Krishan Lal	M	47	Farmer	Kaisu	Kandaghat
3	Kamal Kumar	M	62	Restaurant	Mamligh	Kandaghat
4	Arun Parihar	M	40	Shopkeeper	Mamligh	Kandaghat
5	Nand Lal	M	42	Farmer	Bushol	Kandaghat
6	Amar Lal	M	46	Farmer	Kanyara	Solan
7	Budhi Singh	M	68	Farmer	Banalag	Solan
8	Roshan Lal	M	58	Farmer	Kaisu	Kandaghat
9	Krishna Devi	F	53	Housewife	Kaisu	Kandaghat
10	Bishni Devi	F	75	Housewife	Bushol	Kandaghat
11	Ram Rattan	M	61	Shopkeeper	Haripur	Solan
12	Anita Parihar	F	38	Housewife	Banalag	Solan
13	Nek Ram	M	67	Farmer	Banalag	Solan

The study conducted in the present area throws light on 24 plants of various genera. The wild edible uses of the plant species were studied through different methodologies. The plant species which are used as a source of food by locals and tribals are listed below:

Table.2. List of Some Common Wild Edible Plants

S.no	Botanical name	Common name	Family	Part used
1.	*Aegle marmelos*(L)	Bael	Rutaceae	Fruit
2.	*Amaranthus viridis* L.	Chaulai	Amaranthaceae	Leaf
3.	*Bauhinia variegate* Linn.	Kachnar	Fabaceae	Flower
4.	*Berberis aristata* DC	Kashmal	Berberidaceae	Fruit
5.	*Cannabis sativa* L.	Bhang	Cannabaceae	Leaf
6.	*Chenopodium album*	Bathu	Amaranthaceae	Leaf
7.	*Ficus palmata* Ferrk	Fegda	Moraceae	Fruit
8.	*Ficus roxburghii*	Triyabal	Moraceae	Fruit
9.	*Geranium sp*.	Bhanda	Gerinaceae	Leaf
10.	*Grewia optiva*	Biyul	Tiliaceae	Fruit
11.	*Juglans regia* L.	Akhrot	Juglandaceae	Fruit
12.	*Morus alba* L.	Shahtoot	Moraceae	Fruit
13.	*Murraya koenigii*	Kadi-patta	Rutaceae	Fruit, Leaf
14.	*Pinus roxburghii*	Chir	Pinaceae	Seeds
15.	*Psidium guajava* .	Amrud	Myrtaceae	Fruit
16.	*Punica granatum* L.	Daru	Lythraceae	Fruit
17.	*Pyrus pashia* L.	kainth	Rosaceae	Fruit
18.	*Rumex hastatus* L.	Maroli	Polygonaceae	Flower
19.	*Rumex nepalensis* L.	Jungli palak	Polygonaceae	Leaf
20.	*Rubus ellipticus*	Akhe	Rosaceae	Fruit
21.	*Stellaria media* (L.) Vill	Phulke	Caryophyllaceae	Whole plant
22.	*Syzygium cumini* (L.)	Jamun	Myrtaceae	Fruit
23.	*Vicia faba* L.	Bean	Fabaceae	Pods
24.	*Urtica dioica* L.	Bichu-booti	Urticaceae	Leaf

III. RESULTS

3.1 Detailed Account of Some Wild Edible Plants

Aegle marmelos (L) Correa.ex Roxb.

Common name: Bael Family: Rutaceae

It is the only member of monotypic genus *Aegle.* It is deciduous shrub or small to medium sized tree with slender drooping branches. The bark is pale brown or grayish, smooth or flaking. The leaf is trifoliate, alternate each leaflet, ovate with tapering tip and rounded base. The flowers are pale green or yellowish, sweetly scented, bisexual, in drooping unbranched clusters. Fruit is globose or slightly pear shaped with a thick rind. **(Fig.1).** The fruit can be eaten either fresh from trees or after being dried. Fruit juice is made and sweetened to make sharbat or *belpana.*

Amaranthus viridis L.

Common name: Chaulai Family: Amaranthaceae

It is an annual herb with and upright, light green stem that grows to about 60-80 cm long, 2-4 cm wide, with long petioles of about 5 cm. The plant has terminal panicles with few branches, and small green flowers with 3 stamens. Flowers are generally radiating around the stem. **(Fig.2).**Green Leaves are cooked and eaten as vegetable which is highly nutritious. Green amaranth has a cluster of nutty seeds with are eaten as snacks.

Bauhinia variegata Linn.

Common name: Kachnar Family: Fabaceae

It is small to medium sized tree growing to 10 – 12 metres tall, deciduous in dry season. The leaves are long and broad, rounded, bilobed at base an apex. The flowers are conspicuous bright pink or white and have five petals. The fruit is a pod 15 – 30 com long, containing several seeds. **(Fig.3)** Kachnar is widely used as an ingredient in many Himachali recipes. Traditional kachnar curry is prepared using kachnar buds, yoghurt and other spices.

Berberis aristata

Common name: Kashmal Family: Berberidaceae

It is also known as Indian barberry, a deciduous evergreen shrub. It is characterized by an erect spiny shrub ranging between 2 to 3 m. It is a woody plant and the bark is covered with three branched thorns, which are modified leaves. Leaves are simple with pinnate venation. Leaves are leathery in texture and toothed. **(Fig.4).** The fruits of the species are eaten by people living in areas where plant is found. They are juicy and contain plenty of sugars.

***Cannabis sativa* L.**

Common name: Bhang Family : Cannabaceae

It is an annual herbaceous flowering plant indigenous to eastern Asia but now of cosmopolitan distribution due to widespread cultivation. The flowers are unisexual. It is a short day flowering plant, male plants usually taller and less robust than female plants. **(Fig.5).** Seeds of cannabis are used to make hempseed oil which is used for cooking, lamps and paints. Seeds are used to make chutney. Leaves are used in some food preparations during cultural gatherings.

Chenopodium album L.

Common name: Bathu Family: Amaranthaceae

It is fast growing weedy annual plant called white goosefoot. It tends to grow upright at first, but typically becomes recumbent after flowering unless supported by other plants. Leaves are alternate and varied in appearance. The small flower is radially symmetrical and grow in small cymes on a densely branched inflorescence. **(Fig.6).** The leaves and young shoots are eaten as vegetable either steamed in its entirety or cooked like spinach. The seeds or grains are used in mildly alcoholic fermented beverages.

Ficus palmata Ferrk

Common name: Fegda Family: Moraceae

It is a deciduous shrub or much branched small tree growing up to 5, metres tall. Young branches are velvety, often becoming hairless. Wood is moderately hard. Leaves are dark green and rough on upper surface and tomentose on the lower surface. **(Fig.7).**The fruits are eaten in the hills as it is succulent, sweet and pleasant.

Ficus roxburghii Sargent.

Common name: Triyambal Family: Moraceae

The roxburgh fig tree is a perennial evergreen shrub or small tree that grows up to 12 m high. Leaves are ovate and very large.They start of being red then turn to green. Fruits are pear shaped and reddish brown, hanging on peduncles. **(Fig.8).** The tree is harvested from the wild for its edible fruit.

Geranium *sp*.

Common name: Bhanda Family: Gerinaceae

The long palmately cleft leaves are broadly circular in form. The flowers have five petals and are coloured white, pink, purple or blue, often with distinctive veining. Geraniums grow in any soil as long as it is not waterlogged. Both flowers and leaves are edible but are sour or bitter in taste.

Grewia optiva Drummond ex Burret.

Common name: Biyul Family: Tiliaceae

Biyul is a small to medium sized deciduous tree. Branches are smooth and pale silvery brown. Bark is dark brown, thick and roughish, peeling in small woody scales. Leaves are opposite, ovate, long, pointed, small and blunt. Flowers are borne on a solitary stalk. Petals are white or pale yellow, shorter than the sepals. **(Fig.10).** Fruit is eaten raw from the wild species of plant.

Juglans regia L.

Common name: Akhrot Family: Juglandaceae

It is a large, deciduous tree commonly with a short trunk and broad crown. The bark is smooth, olive- brown when young and silvery grey on older branches. The leaves are alternately arranged. The largest leaflets are three at the apex.Female flowers are terminal, in clusters of two to five ripening in autumn into a fruit. **(Fig.11).**

The fruit is eaten raw or cooked or as an ingredient in dishes. The unripe fruit is pickled. The fruit can be dried and then eaten as a dry fruit increasing its shelf life.

Morus alba L.

Common name: Shahtoot Family; Moraceae

It is fast growing, small to medium sized mulberry tree which grows 10 -20 m tall. It has a rounded crown, short trunk and dense canopy with spreading branches. Its leaves are alternate, simple and broadly ovate and have three main veins running from the rounded or notched base at edges. The plant is dioecious. Its fruit are cylindrical aggregate which are white purple or pinkish. **(Fig.12).** Ripe fruit is eaten raw or made into jellies and other foods.

Murraya koenigii Spreng.

Common name: Kadi-patta Family: Rutaceae

It is a small tree with a trunk up to 40 cm in diameter. The aromatic leaves are pinnate with leaflets.The plant produces small white flowers which can self-pollinate to produce small shiny black berries containing single large, viable seed. **(Fig.13)**. Its leaves are used in many dishes. Often used in curries, leaves are generally called by the name „curry leaves".

Pinus roxburghii Sargent.

Common name: Chir Family: Pinaceae

Chir pine is native to Himalayas.The bark is red brown, thick and deeply fissured at the base of the trunk, thinner and flaky in the upper crown. The leaves are needle like in fascicles of three, very slender and long. The cones are broad at the base when closed, green at first, ripening glossy when old. The seeds are winged and are wind dispersed**. (Fig.14).** Seeds are edible, eaten either raw or cooked.

Psidium guajava Linn

Common name: Amrud Family: Myrtaceae

It is a shrub or small tree.The older stems are covered in smooth, light reddish – brown, bark that peels off in flakes. The simple leaves are oppositely arranged along the stems and are borne on short stalks.The flowers are borne singly in axils. The fruit is globose, ovoid and turns from green to yellowish in colour as it matures. **(Fig.15).** Guava edible fruits can be eaten raw or cooked.

Punica granatum L.

Common name: Daru Family: Lythraceae

A shrub or a small tree growing, having numerous spiny branches and is extremely long-lived. The leaves are opposite or sub opposite, narrow and entire. The flowers are bright red with 3-7 petals. The red purple in colour fruit (berry) has two parts: an outer, hard pericarp and an inner spongy mesocarp. **(Fig. 6).**The edible part is a fruit containing hundreds of seed (aril) which is eaten raw or made into a juice.

Pyrus pashia L.

Common name: Kainth Family: Rosaceae

It is small to medium-sized deciduous tree of the small and oval shaped crown,attractive white flowers and small pear like fruits. Flowers are white colored which are slightly tinged with pink.The early fruit is mostly of light green color but at maturity, its color turns blackish brown with numerous yellow and white dots on its skin surface**. (Fig.17).**The fruits (pome) of *Pyrus pashia* are edible and used by locals. Fruit can be eaten raw or even cooked.

***Rumex hastatus* L.**

Common name: Maroli Family: Polygonaceae

It is a busy, perennial small shrub growing to 1 m. Stem is erect and branched usually with long tap roots. The flowering period is from April to May and seeds ripen from May to June. Leaves are simple, pale green and hastate. The species are wind-pollinated**. (Fig.18).** Leaves are eaten raw or cooked which are generally high in oxalic acid.

Rumex nepalensis

Common name: Jungli palak Family: Polygonaceae

It is herbaceous, perennial plant producing erect, branched stems from a large rootstock. It flowers from May to June and seeds ripen from July to August. The plant is hermapdrodite. Leaves are simple, alternate and large. **(Fig.19).**

The leaves and young shoots are locally eaten as a cooked vegetable. Often mixed and cooked with other vegetables.

Rubus ellipticus Smith

Common name: Akhe Family: Rosaceae

The plant is commonly known as *golden Himalayan raspberry*. It is a large thorny shrub with stout stems. It leaves are trifoliate and toothed with long bristles. Flowers are short, white and have five petals.It grows in clusters and blooms in Himalayas in the month of February and April. **(Fig.20).** Fruits which are detachable and sweet to taste are commonly consumed raw.

Stellaria media (L.) Vill

Common name: Phulke Family: Caryophyllaceae

The plants are annual and weak slender stems. The plant germinates in autumn or late winter, forms large mats of foliage. It is sparsely hairy, with hairs in a line along the stem. The leaves are oval and opposite. Flowers are white and small with 5 very deeply lobed petals. The plant flowers and sets seed at the same time**. (Fig.21).** Young leaves are edible and nutritious, and is used as a leaf vegetable.

Syzygium cumini (L.) Skeels.

Common name: Jamun Family: Myrtaceae

It is an evergreen tropical tree commonly found in Indian subcontinent. At the base of the tree, the bark is rough and dark grey, becoming lighter grey and smoother higher up. The wood is water resistant. The leaves are pinkish when young, changing to leathery, glossy and dark green with a yellow midrib as they mature. The flowers are fragrant and small (around 5 mm). The fruits are oval, green to black when ripe, with dark purple flesh. **(Fig.22).** The purple colored fruits are eaten or raw or made into other preparations.

Vicia faba L.

Common name: Bean Family: Fabaceae

It is an upright annual forage legume that can grow to a height of 1.5- 2 m. The stems are coarse hollow and branched. Leaves are long pinnate and of distinct grey green color. The flowers are 1- 2.5 cm long with five petals. The flowers have a strong and sweet scent, which is attractive to pollinators. The fruit is a broad, leathery pod, green maturing to blackish brown. Each pod contains 3-8 seeds, round to oval, usually flattened.

(Fig.23) Beans are generally eaten while they are young and tender. The immature pods and young leaves are also cooked and eaten.

Urtica dioica L.

Common name: Bichu-boot Family: Urticaceae

It is herbaceous, perennial plant, 1 to 2 m tall in summer and dying down to the ground in winter. It has widely spreading rhizomes and stolons, which are bright yellow, as are the roots. The soft green leaves are long and born oppositely on an erect green stem. The leaves have a strongly serrated margin. The leaves and stems are very hairy with non-stinging hairs. **(Fig.24)** Young plants were harvested and used as cooked plant when other food plants were scarce. *Saag*, similar to preparation of spinach leaves is cooked during winters.

IV. THREATS AND CONSERVATION

The present study revealed that the plant is used not only for food, fuel but also also as source of natural dyes for dying cloths, and also for painting. Natural dyes are ecofriendly but now days synthetic dyes are used more frequently. Ancient times in India holi was played with natural colours obtained from different plant parts but recent times a few cheaper chemical dyes are used, which create problems like skin allergies, respiratory, kidney problems etc. Natural dye is a main source of tribes for coloring of various products they use now a days threat to these natural dye plants are increasing day by day because of many construction activities, deforestations, natural calamities and fire etc. The plant species need conservation strategies in order to maintain their availability to the future generations. Both in situ as well as ex situ conservation strategies have to be implemented to conserve the plant resources.


Fig.1 Aegle marmelos | Fig. 2 Amaranthus viridis | Fig.3: Bauhinia variegata


Fig.4: Berberis aristata | Fig. Cannabis sativa | Fig.6: Chenopodium album


Fig.7: Ficus palmata | Fig.8: Ficus roxburghii | Fig.9: Geranium sp.


Fig.10: Grewia optiva | Fig.11: Juglans regia | Fig.12: Morus alba

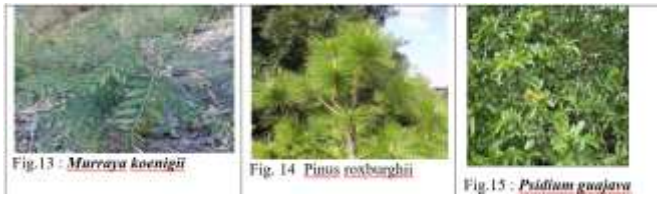
Fig.13 : Murraya koenigii | Fig. 14 Pinus roxburghii | Fig.15 : Psidium guajava


Fig.16 : Punica granatum | Fig.17: Pyrus pashia | Fig.18: Rumex hastatus


Fig.19: Rumex nepalensis | Fig.20: Rubus ellipticus | Fig.21: Stellaria media


Fig.22: Syzygium cumini | Fig.23: Vicia faba | Fig. 24 Urtica dioica

V. CONCLUSION

No doubt, these plants are the rich source of Vitamin, minerals and other essential micro as well as macro nutrients but one can only consume these plants after getting thorough information regarding plants constituents as some plants are highly poisonous also. The present study revealed the information of some plants and provides comprehensive information on diversity and indigenous used of wild edible plants. These plants are arranged with their family name, common name and plant part used. The plant parts used were leaves, flowers, fruits, seeds and pods. The study includes 24 plants belonging to 16 different families. Out of 24 plants 14 plants are used for edible purposes for their fruit.

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