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Original Article

USE OF SOME ETHNOMEDICINAL HERBS BY THE NATIVES OF SOLANG VALLEY, KULLU DISTRICT, HIMACHAL PRADESH

MANINDER KAUR, VIJAY KUMAR SINGHAL, JASWANT SINGH

Punjabi University, Public University in Patiala, India
Email: maninderdhot84@gmail.com

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ABSTRACT

Objective: The objective of the study was to enlist the ethnobotanical uses of wild plants of Solang Valley, Kullu District, Himachal Pardesh. Due to the specific geographical location of the valley, it possesses a high amount of endemic plant diversity. The plants are being used medically by local people against many ailments such as rheumatism, gastric disorders, muscular pain, asthma, dysentery, diabetes, constipation, cold, cough, fever, etc.

Methods: For documentation of ethnomedicinal information, a questionnaire containing vernacular name, plant part/s used, medicinal uses, method of preparation and amount of dose taken was prepared. To gather such information, personal interviews/interactions were conducted with medicine men (vaids and hakims), local healers, village elders, tribals and shepherds.

Results: Presently, 42 plant species belonging to 41 genera and 24 families are included for ethnobotanical study with respect to their scientific names, vernacular names, plant parts used, ethnomedicinal purposes, mode of preparation, and dose/amount taken. As many as 23 species are used for treating more than one ailment. By consulting the previous literature, it was found that there are 19 species which have not been reported earlier and are used by the natives for different medicinal purposes.

Conclusion: The unsustainable harvesting such as uprooting of whole plant of medicinal use from the wild is resulting into a serious decline in plant populations. Therefore various cultivation techniques should be designed, and implemented especially for the highly medicinally important and endangered plant species. Grazing should be restricted in high altitudinal zones possessing high endemic plant diversity. Further, information gathered on ethnobotanical aspects of plants of medicinal use will be helpful in the selection of elite genotypes/chemotypes which could provide a base for future plantation programmes which will be helpful for sustainable development of the valley.

Keywords: Solang Valley, Ethnobotany, Medicinal Plants, Unsustainability, Grazing

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INTRODUCTION

In India, native people exploit a variety of herbs for the effective treatments of various ailments. The plant parts used, preparation, and administration of drugs vary from place to place [1]. Indigenous knowledge is as old as human civilization, but the term *ethnobotany* was coined by an American botanist, John Harshburger who defined it as a mean to study the plants used by primitive and aboriginal people. Since time immemorial, plants have been employed in traditional system of medicines in different parts of the world. According to the World Health Organization (WHO), as many as 80% of the world's people depend on traditional systems of medicines to meet their primary health care needs. There are considerable economic benefits stemming from the development of indigenous medicine and use of medicinal plants for the treatment of various diseases [2].

Himachal Pradesh, a Northern Indian State is a rich storehouse of medicinal herbs and people living in the vicinity of higher hills and isolated valleys especially of cold deserts of Lahaul-Spiti, Kalpa Valley, Pangi Valley, and Parvati Valley are well conversant with the medicinal use of many herbs for their daily medicinal needs. As such, the locals are quite rich in traditional knowledge about the use of several of indigenous herbs of local medicinal use. So much so, several species of medicinal herbs have been collected in mass by the traders through employing locals.

Solang Valley which has derived its name from Solang Village and the nearby Solang Nullah, is a side valley at the top of the Kullu Valley in Himachal Pradesh. It lies between latitude 32 ° 16" 0' N and longitude 77 ° 10" 0' E with an altitudinal range of 2400-3540m. Solang Nullah originates from Beas Kund glacier and finally merges into river Beas near village Palchan. The Valley is situated towards the North-West of the resort town Manali and is well known for its summer and winter sports. Popularly known as 'Snow-point', it offers various challenging activities of horse-riding, paragliding, skiing and zorbing. There is a beautiful view of Patalsu Peak (3963m) from Solang Valley. The trek in the valley starts along the right bank of the river Beas through villages like Palchan (2400m), BRO office (2400m), Bahang (2450m), Schnag (2450m), Burua (2450m), Vashisht Village (2475m), Goshal (2575m), Solang Nullah (2700m), Solang Village (2750m), Dhundhi (3050m), and Rohtang Tunnel (3100m) (Map 1c). Along the treks, are present glaciers and snow-capped peaks including the peaks of Deo-tibba (6001m) and Indrasan (6221m).

The changing situation in the ecological zones like Solang Valley, especially the loss of habitats and habitat fragmentation is the major threat to plant diversity of the region. In highly populated areas especially around Palchan (2400m) and Dhundhi (3050m), original habitats are already destroyed resulting into a huge loss of endemic plant species particularly of medicinal value. Looking at the importance of traditional knowledge on locally used medicinal herbs, several workers have gathered ethnobotanical information in Himachal Pradesh [3-12] and within Himachal Pradesh, district based information has been gathered by various workers viz., Districts of Dharamshala [13], Kullu [14, 15], Parvati Valley [16-18], Lahaul-Spiti [19-27], Kangra [28-31], Mandi [32-38], Sirmaur [39]; Solan [40], Chamba [41], Hamirpur [42-45], and district Kinnaur [46-48].

Also the antimicrobial activity of some important medicinal herbs have also been gathered from some other parts of India [49, 50]. On similar lines, authors have gathered ethnobotanical information on the plant wealth of Solang Valley, a typically isolated and unexplored valley in Kullu district.

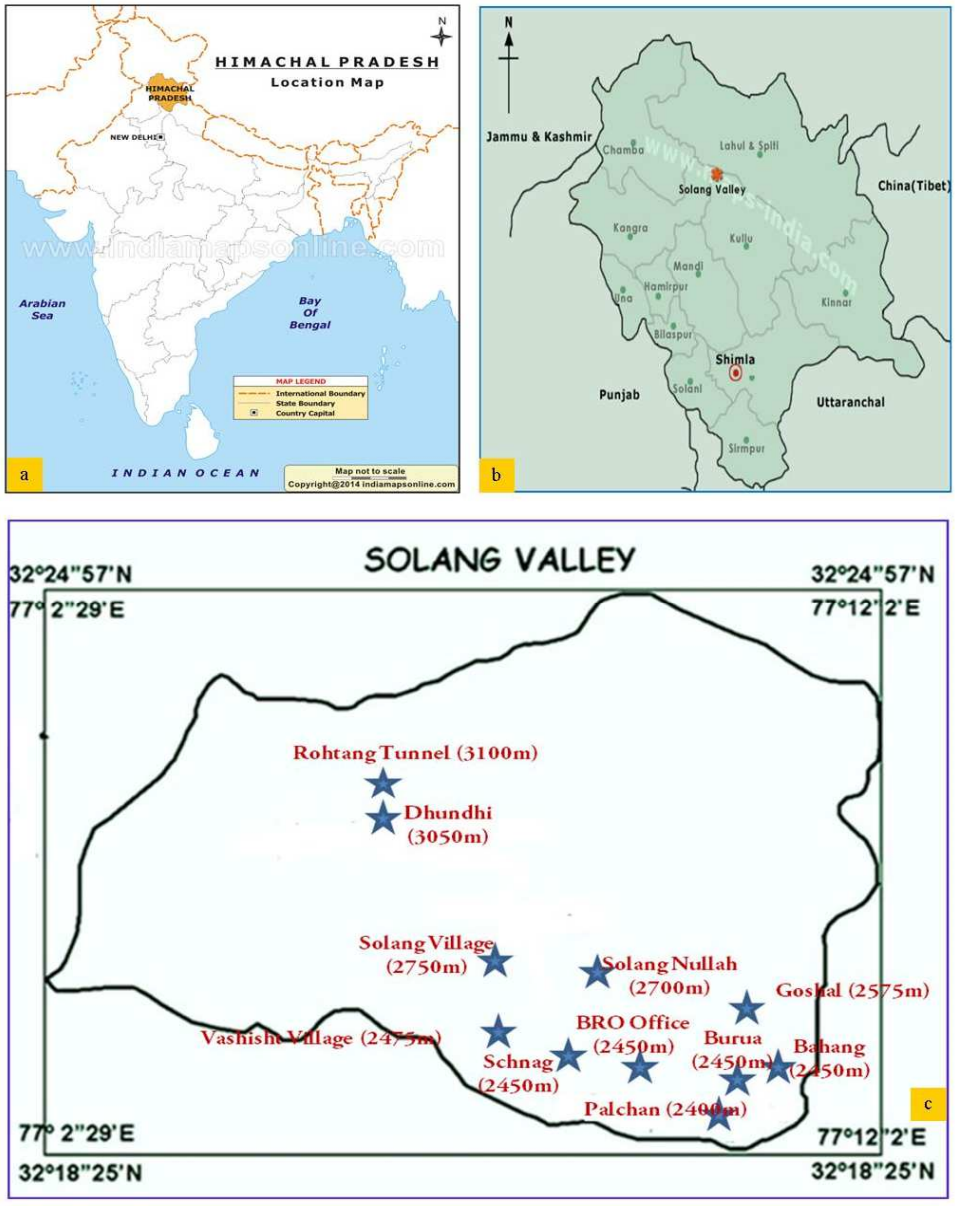
The age old Indian system of traditional medicine is among the one of most ancient system of medicine. Out of a sum total of 400 plant species used in the Ayurvedic or other systems of traditional medicines, 30% of the preparations are derived from roots, 14% from bark, 16% from whole plants, 5% from flowers, 10% from fruits, 6% from leaves, 7% from seeds, 3% from wood, 4% from rhizomes, and 6% from stems [51].

The occurrence of diverse ecosystems along altitudinal gradients from tropical to temperate and alpine zones with its associated array of species and genetic diversity make India one of the 12 mega-biodiversity countries of the world. The wide range of plant species helps to provide for people's needs, including the need for medicines.

MATERIALS AND METHODS

Methods

For documentation of ethnomedicinal information, a questionnaire containing vernacular name, habit and habitat, flowering and fruiting period, plant part/s used, medicinal uses, method of preparation and amount of dose taken was prepared by visiting the various localities at different altitudes of Solang Valley (see: Map 1).



Map 1,(a-c), a) The map showing tha geographical location of Himachal Predesh in India. (b) Map showing geographical location of solang valley in kullu district, Himachal Predesh. (c) The map depicting the various localities visited during tha present study in solang valley, kullu district Himachal Predesh

To gather such information, personal interviews/interactions were conducted with medicine men (vaids and hakims), local healers, village elders, tribals and shepherds. Information about plants of herbal value was recorded as per the vernacular name/s and was further confirmed by their field photographs. The informations in each case were cross validated to ascertain the facts about the local use of each plant species.

The ethnobotanical information gathered about each plant species included vernacular/local names, ethnobotanical purposes, plant part/s used, mode of preparation, and dose/amount taken.

RESULTS

Presently, 42 plant species belonging to 41 genera and 24 families are included for ethnobotanical study with respect to their scientific

names, vernacular names, plant parts used, ethnomedicinal uses, mode of preparation, and dose/amount taken. The plants are being used medically by local people against many ailments such as rheumatism, gastric disorders, muscular pain, asthma, dysentery, diabetes, constipation, cold, cough, fever, pneumonia, jaundice, cuts and wounds, swellings, joint pains, liver and nervous disorders, cardiac and skin problems and also in abdominal pain, headache, toothache and bodyache. Various plants are used as antiseptic, anti-inflammatory, appetizer, astringent, carminative, laxative, diuretic, stimulant, tonic, antipyretic, anti-poison, calmative, aromatic, and blood purifiers. It was found that local people use various plant parts which include leaves, stem, flowers, fruits, seeds and other plant parts such as wood, bark and underground parts like rhizome. (table 1).

Table 1: Ethnobotanical information collected on some selected plant species from Solang Valley, Kullu District (Himachal Pradesh)

S. No.	Taxon	Family	Vernacular name	Plant parts used	Uses
1.	*Achillea millefolium* L.	Asteraceae	Gandana	Leaves and flowers	Leaves are crushed to cure tooth-ache, dysentery, and urinary tract infections. Flowers are aromatic, carminative, laxative, stimulant and diuretic and are used to cure mumps, measles, fever, dysentery, and diabetes.
2.	*Achyranthes bidentata* Blume	Amaranthaceae	Puthkanda	Seeds	Seeds are boiled in 250 ml of water and are taken orally to cure cold, cough, mouth ulcers, whooping cough and veterinary diseases.
3.	*Aconitum heterophyllum* Wall. ex. DC.	Ranunculaceae	Atish	Roots	The dry roots are powdered and taken orally with lukewarm water twice a day for 3-4 d in fever.
4.	*Ageratum conyzoides* L.	Asteraceae	Okalbuti	Leaves	Leaves are sun dried to make a powder. 2-3 tablespoons of powder are to be taken with cow's milk 2-3 times a day to cure headache, diarheoea, leprosy, snake bite and uterine infections.
5.	*Ainsliaea aptera* DC.	Asteraceae	Kadvi-Booti	Roots	Roots are dried and crushed in a pastle mortor in a small quantity of water, 2-3 g of paste are then taken orally 3-4 times with lukewarm water to relieve stomachache, constipation and acute fever.
6.	*Anemone rivularis* Buch.-Ham. ex DC.	Ranunculaceae	Talpal	Roots	A small piece of fresh root is put between aching teeth. The root piece is chewed for 4-5 min for toothache.
7.	*Angelica glauca* Edgew.	Apiaceae	Choru	Fruits	Fresh fruits are pruned along with leaves and chewed for 10-15 min to get relief from constipation, gastric ulcers, diarrhoea and vomiting.
8.	*Artemisia nilagirica* (C. B. Clarke) Pamp.	Asteraceae	Jhaoo	Seeds	Seeds are soaked in mustard oil for 8-10 d. Seed oil is extracted and massaged on swollen joints in case of arthritis, back pain, and bone fractures.
9.	*A. scoparia* Waldst. and Kit.	Asteraceae	Jandrodhi	Roots	Fresh root part is crushed to make a thick paste which is then taken with lukewarm water to cure vomiting, bowels, cold, headache and earache.
10.	*Berberis glaucocarpa* Stapf	Berberidaceae	Kashamal	Mature fruits	Mature black dried fruits are collected and then grounded in a pastle mortor to make it into a smooth paste. The 1 g paste is then taken orally along with warm milk to get relief from menorrhazia.
11.	*Bidens biternata* (Lour.) Merr. and Sherff (=*Coreopsis biternata* Lour.)	Asteraceae	Lumb	Flowers and fruits	Dried flowers and fruits are used medicinally to cure cuts, burns, wounds, and mouth ulcers. The plant parts are also used as an appetizer.
12.	*Cannabis sativa* L.	Cannabaceae	Bhang	Seeds	Seed oil is extracted and is warmed by heating. The warm oil is massaged on the affected parts for arthritis.
13.	*Capsella bursa-pastoris* (L.) Medik. (=*Thlaspi bursa-pastoris* L.)	Brassicaceae	Jangli Sarson	Stem	Stem is used medicinally to cure jaundice, liver diseases, eye diseases, bodyache, headache and constipation.
14.	*Cardamine impatiens* L.	Brassicaceae	Mrigu	Roots	Dried roots are used as diuretic, stimulant and also to cure asthma, cough, and fever.
15.	*Chenopodium album* L.	Chenopodiaceae	Bathua	Fresh leaves and stems	Plant is considered as a stimulant, blood purifier and is used to cure hypothermia by making soup of its leaves in hot water.
16.	*Conyza japonica* (Thunb.) Less.	Asteraceae	Gaadi	Leaves	Leaf paste is used to cure eczema, skin diseases, itching, jaundice and leucoderma.
17.	*Corydalis cornuta* Royle	Fumariaceae	Lassari	Fresh leaves	Fresh leaves are grounded to prepare a juice along with equal quantities of water. The juice is taken orally in case of bone fractures, torn ligaments to heal them faster and better.
18.	*Cynoglossum lanceolatum* Forssk. (=*C. micranthum* Desf.)	Boraginaceae	Balraj	Whole plant	Whole plant is used to cure asthma, anaemia, antifertility, and urine complaints.

19.	*Datura stramonium* L.	Solanaceae	Dhatura	Dried seeds	Dried seeds are roasted on iron pan and powdered after cooling. The powder is mixed with hot mustard oil to make a paste. A thick paste is applied on the affected parts at bed time in case of arthritis.
20.	*Delphinium denudatum* Wall. ex Hook. f. and Thoms. (=*D. pauciflorum* Royle)	Ranunculaceae	Salyan	Rhizome	Dried rhizome is powdered and 1 tablespoon is taken orally with hot cow's milk at night for 5-6 d to relieve constipation and hypothermia.
21.	*Dicliptera bupleuroides* Nees	Acanthaceae	Banbuti	Fresh leaves	Fresh leaves are plucked and rubbed against the cut wound to stop bleeding.
22.	*Gentiana kurroo* Royle	Gentianaceae	Neelkanthi	Fresh leaves	The leaves are boiled in water and filtered. The extract is taken orally for fever.
23.	*Geranium nepalense* Sweet	Geraniaceae	Ratanjot	Roots	Roots are used locally to cure diarrohea, dysentery, fever, snake bite, and vomiting.
24.	*Gomphogyne cissiformis* Griff.	Cucurbitaceae	Bel phal	Fruits	Fresh fruits are eaten by the locals to cope with anaemia especially during blood loss.
25.	*Hypericum elodeoides* Choisy	Hypericaceae	Vasanti	Whole plant	Whole plant is used as a laxative and is used to cure constipation, anthelmintic, parasiticide, antifungal, ascariasis, and diuretic.
26.	*Lactuca dissecta* D. Don.	Asteraceae	Mogri	Roots	Dried roots are powdered, stored and rubbed against snake bite by making a paste in water. Powder is also taken orally to cure bodyache, cuts, burns, inflammations, vomiting, and mental disorders.
27.	*Mentha longifolia* (L.) L.	Lamiaceae	Jangli podina	Leaves	Leaves are crushed to make a smooth paste and are eaten to cure diaorrhea, dysentery and vomiting.
28.	*Ocimum sanctum* L.	Lamiaceae	Tulsi	Root and leaves	Decoction of the roots and leaves is given in case of malarial fever.
29.	*Origanum vulgare* L.	Lamiaceae	Ban-tulsi	Leaves	Fresh leaves are chewed to fix cough, cold and breathing problems.
30.	*Oxalis corniculata* L.	Oxalidaceae	Khatti-Meethi	Fresh leaves	Fresh juice of leaves is useful in gum problems and dysentry. Children pluck the leaves and chew them for its sweet and sour taste.
31.	*Picrorhiza kurooa* Royle ex Benth.	Scrophulariaceae	Karu	Leaves	Dry leaves are boiled in water and decoction is prepared. The decoction is taken orally once a day for cold and cough.
32.	*Plantago major* L.	Plantaginaceae	Carrata, Therma	Leaves	Slightly warmed leaves applied with mustard oil are kept on boils overnight to burst it out. It is believed that it reduces both swelling and pain.
33.	*Plectranthus rugosus* Wall. ex Benth.	Lamiaceae	Pasak	Leaves	Leaves are sun dried, powdered and taken orally for the purification of blood, stomachache and acidity.
34.	*Podophyllum hexandrum* Royle	Podophyllaceae	Ban-kakdi	Roots	Roots are washed, sun dried and then roasted in a little mustard oil. Roasted roots are then grounded to make it a smooth paste. The paste is consumed alongwith food 2-3 times to relieve from stomach bowels, flatulence and other gastric problems.
35.	*Persicaria amplexicaulis* (D. Don) R. Decr. (=Bistorta amplexicaulis (D. Don) Greene)	Polygonaceae	Rambha	Roots	Dried roots are grounded to make a paste and then applied on boils.
36.	*Ranunculus laetus* Wall. ex Hook. f. and Thoms.	Ranunculaceae	Mingo	Roots	Fresh roots are grounded and the paste is applied on wounds overnight.
37.	*Rumex dentatus* L.	Polygonaceae	Jangli-Palak	Roots	Dried roots are used to cure against any type of poison.
38.	*Senecio nudicaulis* Buch.-Ham. ex D. Don	Asteraceae	Ratpati	Flowers	Fresh flowers are boiled in milk up to 10-15 min and then taken orally to cure cough and cold.
39.	*Sigesbeckia orientalis* L.	Asteraceae	Dachroo	Roots	Dried roots are powdered, make a paste with water. The paste is then mixed with cooked vegetables to cure mouth, throat, eczema and other skin diseases.
40.	*Silene vulgaris* (Moench) Garcke	Caryophyllaceae	Gandoli	Whole plant	Whole plant is cooked as vegetable and is considered to be good in cold treatment and digestive in nature.
41.	*Taraxacum officinale* Wigg.	Asteraceae	Dhudhee	Leaves	Fresh leaves are crushed to make a paste which is supposed to be diuretic and blood purifier.
42.	*Thalictrum foliolosum* DC. (=*Thalictrum dalingo* Buch.-Ham. ex DC.)	Ranunculaceae	Pilijari	Leaves	Fresh leaves are kept in storage of grains in drums to avoid grain infestation.

Among various plant parts, leaves (33.33%) are the mostly frequently used, followed by roots (31.11%), fruits (8.89%), seeds (8.89%), flowers (6.67%), and stem (4.44%) while in 6.67% cases whole plant is used for different medicinal purposes (fig. 1).

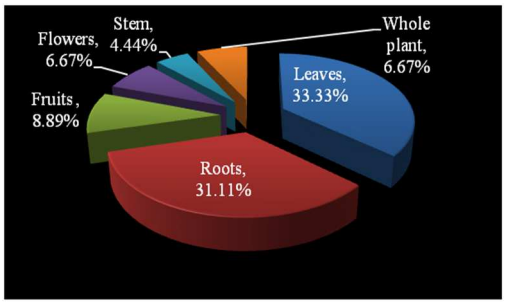


Fig. 1: % age of various plant parts used for ethnobotanical purposes

DISCUSSION

As many as 23 species such as, *Achillea millefolium, Achyranthes bidentata, Ageratum conyzoides, Ainsliaea aptera, Angelica glauca*, *Artemisia nilagirica*, *A. scoparia, Bidens biteranata, Capsella bursa-pastoris, Cardamine impatiens, Chenopodium album, Conyza japonica, Cynoglossum lanceolatum, Delphinium denudatum, Geranium nepalense, Hypericum elodeoides, Lactuca dissecta, Mentha longifolia, Oxalis corniculata, Plectranthus rugosus, Podophyllum hexandrum, Siegesbeckia orientalis,* and *Taraxacum officinale* are used for treating more than one ailment. By consulting the previous literature, it was found that there are 19 species viz., *Achyranthes bidentata, Ageratum conyzoides, Anemone rivularis, Artemisia nilagirica, Berberis glaucocarpa, Bidens biteranata, Cannabis sativa, Cardamine impatiens, Chenopodium album, Conyza japonica, Cynoglossum lanceolatum, Delphinium denudatum, Dicliptera bupleuroides, Gomphogyne cissiformis, Hypericum elodeoides, Origanum vulgare, Plantago major,* and *Silene vulgaris* which have not been reported earlier and are used by the natives for different medicinal purposes.

As the Solang Valley is situated at the border of Great Himalayas and Trans-Himalaya and due to its strategic geographical location, it harbours endemic plant diversity of both the ecological conditions. The study also reveals that the natives are still dependent upon their surrounding plant resources to fulfil their day-to-day needs and for traditional healing system. Present study explores information for the first time from the Solang Valley for various ethnomedicinal purposes such as gastric disorders, joint pains, skin disorders, cuts, wounds, burns, snake bites, fever, anaemia, hypothermia, cold, cough, and many other diseases. By comparing the previous literature regarding ethnobotanical information gathered by other workers from different parts of Himachal Pradesh, it was found that a number of species with unreported uses or new uses with different plant parts used and also with new mode of use have been recorded from the study area.

Despite imposing the ban by the government in the study area, there is a heavy exploitation of roots of highly medicinally important plant species such as, *Aconitum heterophyllum*, *Ainsliaea aptera*, *Angelica glauca*, *Artemisia nilagirica*, *Berberis glaucocarpa*, *Cardamine impatiens*, *Mentha longifolia*, *Picrorhiza kurroa*, *Podophyllum hexandrum*, and *Senecio nudicaulis* which are sold to the traders by the tribals to fulfill their household needs resulted into severe decrease in their population size. As a consequence some herbs are now restricted to small pockets in the study area. Another matter of great concern in the study area is the serious threats posed by grazing especially in the sub-alpine and alpine regions to species which fall under the IUCN-World Conseravtion Union's Red list of threatened species such as *Aconitum heterophyllum*, *Podophyllum hexandrum*, *Ainsliaea aptera*, and *Picrorhiza kurroa*.

Keeping in view the importance of endemic plant diversity and also to conserve the highly important but rare medicnal herbs present in the valley, immediate steps must be taken up to formulate an action plan to preserve the ethnic knowledge and about the distribution of medicinal herbs in the region. Further, it is suggested that we should follow this year's UNEP theme of World Conservation Day that is *'Go Wild for Life'* that visualizes us to ascertain all those species which are under threat and to take an action to conserve them for future generations. It is rightly said that local level extinctions are followed by global level extinctions. Another important aspect in this arena is to educate and create employment opportunities for the younger generation regarding the ethnic knowledge in the region.

The unsustainable harvesting such as uprooting of whole plant of medicinal use from the wild is resulting into a serious decline in plant populations. It is thus recommended that cultivation techniques should be designed, and implemented especially for the highly medicinally important and endangered plant species. Grazing should be restricted in areas which are much prone to natural calamities and in some high altitudinal regions with high endemic plant diversity. Further, information gathered on ethnobotanical aspects of plants of medicinal use will be helpful in the selection of elite genotypes/chemotypes which could provide a base for future plantation programmes for sustainable development. Interestingly, inspite of extensive and intensive surveys, the author could not locate even a single individual of some important medicinal herbs viz., *Dactylorhiza hatagirea, Meconopsis aculeata, Rheum emodii, Saussurea costus, S. obvallata,* and *Valeriana jatamansi*. All the mentioned species falls under IUCN-World Conservation Union's list of threatened species.

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CONFLICT OF INTERESTS

Declared none

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