

Full Length Research Paper

Traditional use of medicinal plants in district Chamoli, Uttarakhand, India

VK Bisht^{1*}, LS Kandari², JS Negi¹, AK Bhandari¹ and RC Sundriyal³

¹Herbal Research and Development Institute, Mandal, Gopeshwar (Chamoli) - 246 401, Uttarakhand, India.

²School of Natural Resource Management and Environmental Sciences, College of Agriculture and Environmental Sciences, Haramaya University, P. Box # 337, Dire Dawa, Ethiopia.

³GB Pant Institute of Himalayan Environment and Development, Kosi, Katarmal (Almora) - 263643, Uttarakhand, India.

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Uttarakhand has a rich wisdom of traditional system of medicine since time immemorial. There is urgent need to document the medicinal and aromatic plants associated traditional knowledge which is vulnerable to shrink. Present study is an attempt to document the traditional system of medicine; used by the native communities of district Chamoli, Uttarakhand, India. On the basis of semi-structural questionnaire and in consultation with the local herbal practitioner (*Vaidyas*), 124 species belonging to 59 families and 108 genera, used for the treatment of 39 diseases were documented. About 38% of the species were used for their roots/rhizomes, followed by leaves (28%), fruits/seeds (10%) and whole plant (6%). Seeds, barks, flowers, twigs/branch and gum of less than 5% species were used for curing diverse form of diseases. About 16% of the recorded species were used for treating fever (20 spp.), 14% for skin diseases, 12% for Joint pains, 8% for cough and cold and stomach related disorders and 7% for blood pressure. 58 plants were used to cure more than one ailment, while 66 plants were used for single therapeutic application. Most of the species used in traditional healthcare in the region were harvested from wild. As a result of destructive harvesting, 13 species out of 124 recorded species are enlisted as threatened in Uttarakhand. Among these, 5 are critically rare, 5 are endangered and 3 are in vulnerable category. This study thus underlines the importance of traditional knowledge associated with medicinal and aromatic plants used for the treatment of different diseases.

Key words: Ethnobotany, Himalaya, primary healthcare, traditional knowledge, conservation, Asteraceae.

INTRODUCTION

Traditional knowledge on primary healthcare has been widely acknowledged across the world especially in the last few decades. According to World Health Organization (WHO), around 75% of the population in the developing countries relies still on traditional system for their primary healthcare needs. In India, about 65% of the population depends on this system (Uniyal and Shiva, 2005). Uttarakhand, the state of India is well known for its rich diversity of medicinally important plants and associated traditional knowledge (TK). The rural communities in

Chamoli; the remote district of Uttarakhand, have their own way of living with in social and cultural moorings. Irrespective of their simplicity and complexity, these communities holds rich traditional knowledge on medicinal plants. Poor development of western system of medicine in this region enforces them to rely on their traditional healthcare practices for maintenance of health as well as diagnosis and improvement of physiological disorders.

The traditional system of medicine has led to the

*Corresponding author. E-mail: vksbisht@gmail.com.

discovery of many important plant based drugs (Uniyal et al., 2002; Semwal et al., 2010). Thus, documentation and further research on traditional use of medicinal and aromatic plants (MAPs) has been considered as a high priority because such resources may play a pivotal role in discoveries of new plant based drugs in addition to healthcare. Information on the utilization of plants for primary healthcare in Uttarakhand has been documented by several workers (Negi et al., 1985, Samant, 1993; Uniyal, 1997; Samant et al., 1998; Maikhuri et al., 1998; Gaur, 1999; Kala, 2005a, b; Uniyal and Shiva, 2005; Phondani et al., 2010; Bisht et al., 2011a, b; Kandari et al., 2012). In addition, Bisht et al. (2012) enumerated the use of plant species belonging to family Lamiaceae in Uttarakhand, India. This knowledge is of paramount importance for survival and sustainable development of rural communities. However, this knowledge orally passes on from one generation to the next; thus, have vulnerability to wiped out (Kala, 2005a). Therefore, present study is aimed to document and underlines the importance of traditional knowledge used for the treatment of different diseases in the district Chamoli, Uttarakhand.

MATERIALS AND METHODS

Chamoli district (29°0' to 31°06' N latitude and 71°10' to 80°15' E Longitude) lies in north-western part of the Uttarakhand state, India. It covers an area of 7520 km² that varies from 500 to 7817 m above sea level (m asl). This wide altitudinal range has unique physiognomic, climatic and topographic conditions which supports a rich biodiversity, culture, tradition and mythology. Native communities of the area depend on their immediate natural resources for their livelihood besides from primary sectors such as agriculture, horticulture and livestock. The inhabitant of the study area was most familiar with the medicinal and aromatic plants of the surrounding area with their traditional uses.

A reconnaissance house hold survey was carried out to collect information on the medicinal uses of plants found in the region during 2005 to 2009. During the field surveys, attempts were made to collect all possible information regarding the traditional use of medicinal plants, mode of usage and part(s) used. A semi-structured questionnaire survey, consultation and focused group discussion (FGD) with local herbal practitioner (*Vaidyas*) were conducted. The specimens were collected and identified with the help of herbarium in botany department at HNB Garhwal (Central) University and through previous works (Duthie, 1906; Gaur, 1999; Naithani, 1985; Kirtakar and Basu, 1994).

RESULTS AND DISCUSSION

A total of 28 herbal practitioners (*Vaidyas*) were interviewed in different regions of the study area. Most of the *Vaidyas* were in the age group between 21 to 76 years and were very familiar with majority of medicinal plants growing in their surroundings. A total 124 plant species were identified which belongs to 59 families and 108 genera being used in traditional healthcare (Table 1). The native communities of the study area thus rely on traditional knowledge for their primary healthcare. Most of

the plant species used by native communities were commonly found around their surroundings, wastelands and the nearby forest area. Some of the species not found or rare in the study area were procured from outside of the district. However, *Aconitum balfourii*, *Aconitum heterophyllum*, *Angelica glauca*, *Arnebia benthamii*, *Dactylorhiza hatagirea*, *Fritillaria roylei*, *Habenaria pectinata*, *Nardostachys jatamansi*, *Picrorhiza kurrooa*, *Podophyllum hexandrum*, *Swertia chirata* and *Saussurea obvallata* are some highly potential species harvested from sub-alpine and alpine regions of the study area. In terms of number of species used, Asteraceae appeared as the largest family with 9 species followed by Liliaceae (7 species), Lamiaceae and Apiaceae (6 each species), Rosaceae (5 species) and Rutaceae, Polygonaceae, Euphorbiaceae, Orchidaceae and Solanaceae with 4 species each. The other families are represented by less than 3 species. Bisht and Purohit (2010) also reported Asteraceae as the largest family being used in traditional healthcare practices in Uttarakhand. Several part(s) of the individual plant are being used as medicine. Among all, 38% of species were used for their roots/rhizomes (47 species), 28% for leaves (35 species), 10% for fruits/seeds (13 species) and 6% of the species were used as whole (7 species). Other parts such as seeds, barks, flowers, twigs etc. of less than 5% species were used for the treatment of different diseases. About 20 species were noted to be used for treating fever, followed by skin diseases (17 species), Joint pains (15 species), cough and cold and disorder related to stomach (10 species) and blood pressure (9 species). Fifty nine plants were found to be used for curing more than one ailment and 66 for only one ailment (Table 1). The study highlights that in the absence of or poor modern healthcare facilities, peoples in far flung of the study area are more dependent on plants in exigency. Further, the positive relationship between rural communities and resources indicate their relevance to livelihood (Misra et al., 2008).

Most of the species used for their underground parts were usually uprooted. Moreover, large scale collection of plants from wild can have a negative influence on their growth, reproduction and survival (Bhattarai et al. 2010). It is noted that, government of Uttarakhand had banned the collection of 34 species of medicinal plants from wild. *Aconitum balfourii*, *Aconitum heterophyllum*, *Acorus calamus*, *Angelica glauca*, *Arnebia benthamii*, *Fritillaria roylei*, *Gloriosa superba*, *Habenaria pectinata*, *Malaxis muscifera*, *Nardostachys jatamansi*, *Picrorhiza kurrooa*, *Polygonatum verticillatum*, *Rheum emodi*, *Swertia chirata*, *Taxus baccata*, *Tinospora cordifolia*, *Valeriana jatamansi*, *Zanthoxylum armatum* were the species recorded in present study, collected from wild by local communities for their healthcare need. Among these *Aconitum heterophyllum*, *Arnebia benthamii*, *Dactylorhiza hatagirea*, *Nardostachys jatamansi* and *Picrorhiza kurrooa* are in critically rare category, *Angelica glauca*,

Table 1. Traditional healthcare practices of plants used in household remedies in District Chamoli, Uttarakhand.

Name of the Plant	Common/ Vernacular Name	Harvesting season	Ailment	Mode of Uses
<i>Abies pindrow</i> Royle	Raga	October-November	Wounds	Leaf paste is applied externally on wounds.
<i>Abrus precatorius</i> L.	Rattidana	March-April	Rheumatic ulcer	Root used to cure ulcer and rheumatic pain.
<i>Acacia catechu</i> Will.	Kher	September-February	Ulcer	Root paste is used to cure ulcer.
<i>Aconitum balfourii</i> Stapf.	Bauva	September- November	Arthritis	Tuber powder boiled with butter is applied externally in arthritis.
<i>Aconitum heterophyllum</i> Wall. ex Royle	Ateesh	September- November	Diarrhea, body pain	Paste of tuber with sugar taken to treat diarrhea, body ache.
<i>Acorus calamus</i> L.	Bach	September-October	Dysentery, fever, asthma, throat infection	Rhizome is used for the treatment of fever, asthma, throat infection, epilepsy, dysentery and as a nervine tonic.
<i>Adhatoda zeylanica</i> Medik.	Basinga	April-June	Cough and cold	Leaves and flowers paste mixed with honey taken in cough and cold fever.
<i>Aegle marmelos</i> (L.) Corr.	Bel	June-August	Fever and cold	Dried fruit with sugar taken to treat fever and cold.
<i>Ajuga bracteosa</i> Wall. ex Benth.	Neelkanth	May-September	Acidity, indigestion	Leaf extract is useful in acidity and indigestion.
<i>Ajuga parviflora</i> Benth.	Neelbadi	September-October	Gastric problem	Extract of leaves useful in carminative.
<i>Allium cepa</i> L.	Piaz	June-July	Ear pain, headache, high blood pressure,	Extract of bulb and Mentha leaves is useful in ear pain, headache, high blood and pressure epilepsy.
<i>Allium sativum</i> L.	Lahsun	June-July	Joint pain	Extract of bulb taken with mustard oil applied on joint pain.
<i>Amaranthus spinosus</i> L.	Kadya sagoti	October-December	Burns	Paste of leaves applied on burns.
<i>Angelica glauca</i> Edgew.	Choru	September-October	Cough and cold, stomachache	Root powder useful in cough, cold and stomachache.
<i>Arisaema intermedium</i> Bl.	Meen	July-August	Fever, skin infections, body pain	Root powder with water orally taken in fever, vomiting, body pain while stem extract applied on skin infections.

Table 1. Contd.

<i>Arnebia benthamii</i> (Wall. ex G. Don) Jhon	Balchadi	July-August	Piles	Root mixed with mustard oil used as hair tonic, antiseptic and in throat problems. Root powder with butter given in piles.
<i>Artemisia roxburghiana</i> Wall ex Besser	Kunju	September-November	Diabetes	Leaf powder with <i>Paeonia emodi</i> leaf powder given in diabetes.
<i>Asparagus adscendens</i> Roxb.	Ghirunn	September-November	Fever	Plant paste is used in fever.
<i>Asparagus curillus</i> Buch.-Ham. ex Roxb.	Jhirna	May-October	Urinary infection	Root extract with milk given as tonic and in urinary infection.
<i>Barleria cristata</i> L. <i>Bauhinia vahlii</i> W. & A.	Kularkattya Malu	October-December June-September	Skin disease Pyorrhea	Leaves paste are used in skin disease. Root paste used in pyorrhea
<i>Bauhinia variegata</i> L.	Kachnar	May-August	Blood pressure	Leaf paste used in skin diseases and bark powder is used in blood pressure.
<i>Berberis lycium</i> Royle	Kingod	August-September	Blood purification, skin diseases	Root is used as blood purifier and in skin diseases.
<i>Berberis osmastonii</i> Dunn.	Kingore	September-October	Eye infection	Root decoction mixed with rose water is useful in eye infection.
<i>Bergenia ciliata</i> (Haw.) Sternb.	Silphodi	May-June	Kidney stone, diabetes	Root extract used in the treatment of kidney stone and diabetes.
<i>Betula utilis</i> D. Don	Bhojpatra	October-November	Fever, body pain	Gum or bark extract applied externally to relieve from fever and body ache.
<i>Bistorta affinis</i> (D. Don) Greene	Kukdi	August-September	Stomachache, fever	Roots are used for the treatment of stomachache and also applied on forehead to control fever.
<i>Boerhavia diffusa</i> L.	Pundari	October-December	Cut and wound	Roots are used on wound and swelling.
<i>Brassica campestris</i> L.	Sarshaon	March	Fever, joint pain, jaundice	Oil is used as ear drop to prevent cold, applied externally to relieve from fever, joint pain and jaundice.

Table 1. Contd.

<i>Callicarpa macrophylla</i> Vahl.	Daiya	August-October	Rheumatic pain	Fruit extract used in rheumatic pain and mouth ulcer.
<i>Cannabis sativa</i> L.	Bhang	August-October	Curing fever, bronchitis	Seed and leaves extract with pepper, cumin seed and cardamom is useful in curing fever and bronchitis.
<i>Carum carvi</i> L.	Kalajeera	May-June	Fever, headache	Seed boiled with salt taken orally is useful in fever, head ache.
<i>Cassia tora</i> L.	Chakunda	July-December	Stomachache, cough and cold	Seed powder is given in tea for the treatment of stomachache, cough and cold.
<i>Cedrus deodara</i> Roxb. ex D. Don	Dewdar	Septembre-December	Piles	Wood oil (1 drop/day) given in piles.
<i>Celastrus paniculata</i> Will.	Malkangi	October-December	Arthritis	Oil is used in arthritis.
<i>Centella asiatica</i> (L.) Urban	Brahmi	June-November	Headache	Leaf juice enhances memory and relieves headache.
<i>Centipeda minima</i> Benth.	Nakh-chiki	August-September	Gastric	Plant paste is useful in gastric when taken with butter.
<i>Cicerbita macrorhiza</i> (Royle) Beauv.	Karatu	August-October	Headache	Leaf juice taken orally during headache.
<i>Cinnamomum tamala</i> (Ham.) Nees ex Eberm	Kikhadu, Tejpat	June-July	Blood pressure, digestion	Leaf is used as spice, to reduce blood pressure and digestion.
<i>Citrus limon</i> (L.) Burm. f.	Nimbu	February-March	Gastric disorders, vomiting, acidity	Fruit extract with <i>Mentha</i> leaf is taken in vomiting, acidity and gastric disorders.
<i>Cleome viscosa</i> L.	Jakhiya	July-August	Blood pressure	Seeds used in high blood pressure.
<i>Cobretia duthie</i> Cl.	Murya	All time	Stomachache, intestinal disorder	Root powder with milk taken orally to relieve stomach and intestinal disorder.
<i>Colebrookia oppositifolia</i> Sm.	Bindu	February-March	Eye problems	Leaf juice is useful in eye problems.
<i>Coriandrum sativum</i> L.	Dhaniya	May-June	Diarrhea, constipation	Seed are used for diarrhea and constipation.
<i>Cuscuta europaea</i> L.	Alasjbail	August-September	Skin diseases	Plant extract used in skin diseases.

Table 1. Contd.

<i>Cynodon dactylon</i> (L.) Pers.	Doob	April-October	Nose bleeding and anemia	Plant extract is useful dysentery, nose bleeding and anemia.
<i>Cynoglossum zeylanicum</i> Thub. ex Lehm.	Rajpatti	August-October	Wound and ulcer	Leaf paste used in wound and ulcer.
<i>Dactylorhiza hatagirea</i> (D. Don) Soo, Nom.	Hattazari	September-October	Diarrhea	Tuber paste with water taken as tonic, to cure diarrhea.
<i>Datura stramonium</i> L.	Dhatura	April-July	Bronchitis, asthma, cough	Flowers and seeds are used for the treatment of bronchitis, asthma and cough.
<i>Delphinium denudatum</i> Wall. ex Hook.	Nirbisi	April-July	Intestinal problem	Leaf powder with milk taken orally in intestinal problem.
<i>Dioscorea bulbifera</i> L.	Genthi	August-September	Diabetes, skin diseases, burns	Tubers used in diabetes, skin diseases and burns.
<i>Diplocyclos palmatus</i> L.	Shivlingi	September-October	Fever	Fruits are used to control fever.
<i>Eupatorium adenophorum</i> Sprengel	Kala binda	July-August	Wounds	Leaf paste applied externally on wounds.
<i>Euphorbia royleana</i> Boiss.	Sullu	April-July	Ear problem	Bark extract useful as ear drop.
<i>Ficus religiosa</i> L.	Pepal	October-November	Swelling and joint pains	Bark ash is applied on swelling and joint pains.
<i>Fritillaria roylei</i> Hook.	Kakoli	August-October	Body weakness	Bulb powder with milk is given as tonic.
<i>Fumaria indica</i> (Hausssk.)	Pitphapara	February-April	Headache, fever	Leaf paste is useful in headache and fever.
<i>Gloriosa superba</i> L.	Langali, Kalihari	August-September	Chronic ulcer, skin diseases	Rhizome and seeds are used for the treatment of chronic ulcer. skin diseases.
<i>Glycine max</i> (L.) Merr	Kala bhatt	September-December	Eye tonic	Seed paste useful in eyesores.
<i>Habenaria pectinata</i> Smith	Ridhi	September-October	Body weakness	Root powder useful as tonic.
<i>Hedychium spicatum</i> Buch.-Ham. ex Sm.	Banhalidi	August-September	Asthma, bronchitis	Rhizome extract useful in asthma and bronchitis.

Table 1. Contd.

<i>Hordeum vulgare</i> L.	Jau	May-June	Cataract, diseases	eye	Leaf juice useful in cataract and eye diseases.
<i>Impatiens balsamina</i> L. Ed.	Balsam, majethi	August-October	Burns		Leaf paste useful in skin burns.
<i>Juglans regia</i> L.	Akhor, Akhrot	August-October	Pyorrhoea		Twigs useful as cleaning of tooth and curing pyorrhoea.
<i>Jurinea dolomiaea</i> Boiss.	Dhoop	August-October	Cuts		Leaf paste applied as antiseptic.
<i>Macrotyloma uniflorum</i> (Lam.) Verdcourt	Gahath	August-October	Kidney stone		Seed extract useful in kidney stone.
<i>Malaxis muscifera</i> (Lind.) Kuntz.	Jeevak	September-October	Body weakness		Bulb powder used as tonic.
<i>Megacarpaea polyandra</i> Benth.	Barmauo	May-June	Asthma, stomach pain	fever,	Root extract with butter useful in asthma, fever and stomach pain.
<i>Melia azedarach</i> L.	Dainkan	April-May	Skin diseases		Leaf, bark and seed decoction used in skin diseases.
<i>Mentha longifolia</i> (L.) Huds.	Pudina	September-October	Liver vomiting	disorder,	Leaf extract with ginger taken orally during vomiting and liver disorder.
<i>Micromeria biflora</i> (Don) Benth.	Gorkapaan	March-October	Ulcer		Leaf powder useful in ulcer.
<i>Murraya koenigii</i> Spreng.	Curry patta	February-April	Blood diabetes	pressure,	Leaves used as spices and condiment, reduce blood pressure and control diabetes.
<i>Myrica esculenta</i> Buch.-Ham. ex D. Don	Kaphal	April-June	Fever, body pain	headache,	Fruit juice with salt useful in fever, headache and body pain.
<i>Nardostachys jatamansi</i> DC.	Jatamansi	September-October	Heart disease, blood pressure	high	Root powder with oil taken orally in heart disease and high blood pressure.
<i>Nicotiana rustica</i> L.	Hamaku	May-June	Skin sores		Root powder applied externally in skin sores.
<i>Ocimum sanctum</i> L.	Tulsi	April-November	Cough and cold		Leaf powder taken orally to relieve from cough and cold.
<i>Orchis chusua</i> D. Don	Hatha	July-August	Fever and cough		Tuber powder with sugar taken orally is useful in fever and cough.

Table 1. Contd.

<i>Origanum vulgare</i> L.	Van tulsī	August-October	Skin diseases, insect bites.		Leaf paste is useful in skin diseases and insect bites.
<i>Oxalis corniculata</i> L.	Khatti buti	August-November	Pimples, disease	skin	Leaf extract taken orally in pimples and skin disease.
<i>Paeonia emodi</i> Wall. ex Royle	Chandra	April-June	Intestinal dysentery, piles	pain,	Root decoction taken orally is useful during intestinal pain, dysentery and piles.
<i>Perilla frutescens</i> L.	Bhangjeera	September-October	Ear problem		Leaf juice is used in earache. Seeds are used as condiments and spice.
<i>Phaseolus vulgaris</i> L.	Sem	September-October	Skin irritation		Leaf paste applied externally to relieve in skin irritation.
<i>Phyllanthus emblica</i> L.	Aonla	September-November	Diabetes, problems, weakness	eye body	Fruits with the fruits of <i>Terminalia chebula</i> and <i>T. bellirica</i> as <i>Triphala</i> used as tonic to recover body weakness, diabetes etc.
<i>Picrorhiza kurrooa</i> Royle	Kutki	July-August	Fever, stomachache, jaundice		Root powder taken orally in fever, stomachache and jaundice.
<i>Pimpinella diversifolia</i> DC.	Bazeer	September-October	Gastric disorder		Plant powder useful in gastric disorder.
<i>Plantago ovata</i> L.	Esabgol	September-October	Digestion		Seeds are used with milk and water for digestion.
<i>Podophyllum hexandrum</i> Royle	Ban-kakri	September-October	Blood wounds and diseases	purifier, skin	Tuber paste taken as blood purifier, wounds and skin diseases.
<i>Polygonatum verticillatum</i> (L.) All.	Salam Mishri, Meda	August-September	Body pain		Tuber paste with milk taken as tonic.
<i>Potentilla fulgens</i> Wall. ex Hk. F.	Bajradanti	September-October	Tooth pyorrhea	ache,	Plant decoction useful as tooth cleaning and pyorrhea.
<i>Prunus cerasoides</i> Don.	Painya	February-March	Swelling and pains	Joint	Boiled bark in water is useful for swelling.
<i>Pyracantha crenulata</i> (Don) Roem	Ghangara	June-October	Burns		Leaf paste applied on burns.

Table 1. Contd.

<i>Pyrus pashia</i> Buch.-Ham ex Don	Molu	May-December	Eye injury	Fruit juice used in eye injury.
<i>Raphanus sativus</i> L.	Muli	April-May	Piles, jaundice, diabetes	Rhizome extract taken during piles, pimples, jaundice and diabetes.
<i>Rheum emodi</i> Wall.	Archu, Dolu	August-September	Rheumatism	Roots paste with turmeric powder mixed with mustard oil is applied externally to relieve muscular pain.
<i>Rheum moorcroftianum</i> Royle	Tantric, Archa	August-September	Cough and cold	Rhizome powder with water taken orally to relieve cough, cold.
<i>Rhododendron arboretum</i> Sm.	Burans	April-October	Blood pressure	Flower juice is useful in reducing blood pressure.
<i>Rhus parviflora</i> Roxb.	Tungla	July-November	Wounds	Bark extract is applied externally. Twigs used for cleaning of teeth.
<i>Ricinus communis</i> L.	Arand	August-December	Bronchitis, skin diseases, jaundice	Roots and bark are used to cure asthma, bronchitis and skin diseases. Fruits are useful in jaundice.
<i>Rubus ellipticus</i> Sm.	Hisool	May-June	Skin diseases	Root paste applied on skin diseases.
<i>Rumex hastatus</i> Don.	Almoda	June-October	Skin diseases	Root paste applied on skin diseases.
<i>Sapium insigne</i> (Royle) Benth.	Khennu	May-June	Burns	Leaves paste used on burns.
<i>Saussurea costus</i>	koot	September-October		
<i>Saussurea obvallata</i> (DC) Edgew.	Brahmkamal	August-October	Headache and body pain	Whole plant paste used for the treatment of headache and other body pain.
<i>Selinum vaginatum</i> (Edgew.) Cl.	Bhutkeshi	August-October	Skin disease	Root extract useful in skin disease.
<i>Sida rhombifolia</i> L.	Bhuanlya	August-November	Stomachache	Root juice given to children in stomachache.
<i>Solanum nigrum</i> L.	Geahwai, Makoi	Almost throughout the year	Jaundice and fever	Leaf and branch paste are useful in jaundice and fever.
<i>Solanum surattense</i> Burm.	Kantkari	June-July	Jaundice	Fruits are useful in jaundice.

Table 1. Contd.

<i>Stephania glabra</i> (Roxb.) miers	Gindaru	July-October	Fever	Root powder is useful in fever.
<i>Swertia chirata</i> Grisebach	Chirayita	September-October	Fever, blood purifier	Root powder or extract is given in fever and as blood purifier
<i>Syzygium cumini</i> L.	Jamun	April-July	Diabetes, kidney stone	Seed powder useful in diabetes. Ripe fruits are used in kidney stones.
<i>Tagetes minuta</i> L.	Genda	September-November	Earache	Leaf juice useful in earache.
<i>Taraxacum officinalis</i> Weber.	Kadvae	August-October	Fever	Roots are used in fever.
<i>Taxus baccata</i> L.	Thuner	September-October	Cold and cough	Bark powder given in cold and cough.
<i>Terminalia bellirica</i> (Gaertn.) Roxb.	Bahera	June-July	Stomach disorder, fever	Fruits used in cough fever and stomach disorder.
<i>Tinospora cordifolia</i> (Willd.) Hook. f. & Th.	Giloya	March-May	High blood pressure, weakness	Root powder is useful in high blood pressure and weakness.
<i>Trigonella foenum-graecum</i>	Methi	April-May	Rheumatism	Leaf extract applied on joint pain.
<i>Valeriana jatamansi</i> Jones	Sumaya	May-June	Stomach pain, nervous disorder	Root extract given in nervous disorder and fits. Leaf juice used in stomach pain.
<i>Verbascum thapsus</i> L.	Akalveer	August-November	Intestinal pain	Root powder with milk is useful in intestinal pain.
<i>Viola biflora</i> L.	Saini	June-August	Diaphoretic, intestinal pain.	Fruit paste is useful during diaphoretic and intestinal pain.
<i>Viola pilosa</i> Blume	Banfsha	August-September	Kidney diseases, cough, liver disorder	Flowers are used to treat cough, liver disorder and in kidney diseases.
<i>Vitex negundo</i> L.	Siwali	July-August	Wounds	Leaves extract applied on wounds.
<i>Woodfordia fruticosa</i> (L.) Kurz	Dhuala	February-April	Dysentery	Dried flowers used in dysentery.
<i>Zanthoxylum armatum</i> DC.	Timru	July-October	Toothache, pyorrhea	Twigs used for teeth cleaning. Seeds useful in pyorrhea.

Table 1. Contd.

<i>Zingiber officinale</i> Rosc.	Adrak	October-January	Cough and cold	Rhizome extract with honey is useful in cough and cold.
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Fritillaria roylei, *Rheum emodi*, *Swertia chirata* and *Taxus baccata* are in endangered category and *Gloriosa superba*, *Polygonatum verticillatum* and *Valeriana jatamansi* are in vulnerable category. Thus, due to destructive harvesting and other biotic and abiotic reasons, these species are subjected to vulnerability towards possible extinct from the region. Dependency on the traditional primary healthcare practices in indigenous communities of the study area evolved over a long period of time based on necessities and experiences. Older people or herbal practitioner (*Vaidyas*) are more familiar and have more knowledge than the younger ones about traditional use of MAPs. The present study revealed that the local community had rich ethno-botanical knowledge however, the method of using a particular plant for the treatment of particular ailment may differ from one place to another. These findings can be utilized for future studies regarding the status of the traditional knowledge in the region. Indigenous system of medicine is eroding very quickly, particularly during the recent years. The rapid change in socio-economic and cultural values among local people and depopulation of the rural areas could be attributed to this change (Maikhuri et al., 2004). If this is not halted, a significant portion of this valuable medicine practice will be vanished in near future. Therefore, there is urgent need to develop policy towards conservation, documentation and promotion of traditional knowledge on medicinal plants.

Conclusion

Chamoli district of Uttarakhand is the repository of

important MAPs, which are being used for traditional healthcare system by local people since time immemorial. Many research institutes are working on different cultivation aspects of these medicinal plants viz. organic and conventional approach. Keeping in mind, improper use of the medicine, fear of over exploitation of plant species and fear of losing their status in the local community the local healers are usually unwilling to disclose their knowledge. This study is a proactive documentation of traditional knowledge of Chamoli district, India.

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