



RESEARCH ARTICLE

A CONTRIBUTION TO THE MEDICINAL PLANTS OF DOON VALLEY, UTTARAKHAND

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ABSTRACT

Present study deals with the medicinal plants and their utilization by the villagers of Doon Valley. Attempts were made for collection of medicinal plants in different seasons. 115 herbaceous plant species belonging to 95 genera and 40 families were collected from the Barkot forest in Doon Valley. Villagers were consulted to find the utilization pattern of medicinal plants. Documentation of traditional knowledge from the elder villagers of Doon Valley is of utmost necessity. Conservation protocol needs to be developed for the medicinal plants of Doon Valley as they are under various anthropogenic pressures.

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INTRODUCTION

Plants are provided the means of curing disease perhaps since the evolution of mankind on the planet earth. The methods of herbal treatments have achieved eminence especially in the Central and South Asia, Northern Africa, China and countries surrounding the Mediterranean Sea. In India, the oldest record of the use of plants as medicine is mentioned in the Rigveda (4500-1600 B.C.) which contains many *Shlokas* and hymns written in the praise of plants. The *Charaka Samhita* by Agnivesa and *Charaka* (1000-800 B.C.) and *Susruta* (800-700 B.C.) describes Himalaya as the best habitat of medicinal plants. Since, then the science of medicinal plants has progressively evolved to the present state (Samant *et al.* 1998). Curative properties of medicinal plants have been well exploited in the indigenous system of medication. Today, India is sitting on the gold mine of well recorded and traditionally well practiced knowledge of herbal medicine. India recognizes over 3000 plants for their medicinal value and India being the largest producer of medicinal plants is rightly called the Botanical Garden of the World. Medicinal plants are used by every community with the help of traditional medicine system as well as by means of modern medicine system. Himalayan region is blessed with large number of the medicinal plant species. The forests in the region are dominated by the plants

species of medicinal properties. The local knowledge related to the significant use of the plant species available in the nearby forest is comparatively very high in Himalayan region. Local knowledge of plant biodiversity and its use in our medicine system is a most important component in terms of natural resource management of a particular area. An attempt has been done to document the medicinal plant species of Barkot forest in Doon Valley as no study was conducted to document the medicinal plant in the region.

MATERIALS AND METHODS

Study Site

The study was conducted in Barkot forest of Doon Valley which represents the bouldery valley that runs parallel to and between the lesser Himalayan range and the Shivalik range (Fig 1). Doon Valley is located between the rivers Yamuna and Ganga, at the north-western limit of the State of Uttarakhand and adjoining the state of Himachal Pradesh in India. The Climate of the Doon Valley varies from tropical to temperate. The mean annual rainfall of Dehradun is about 2000 mm, most of it being received during the monsoon season (June to September). Altitudinal range of Doon Valley is between 400 m to 1200 m above mean sea level. Forest vegetation is dominated by *Shorea robusta*. Common associates of *Shorea robusta* are *Mallotus philippensis*, *Terminalia alata*, *Syzgium cumini*, and *Flacourtia indica*. Understorey vegetation is formed by *Clerodendrum viscosum*, *Ardisia solanacea* and *Justicia Adhatoda* (Raut *et al.*, 2013).

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Table 1. Medicinal Uses of herbs present in the study site

Species	Common name	Family	Medicinal Uses
<i>Barleria cristata</i> L.	Saundi	Acanthaceae	Roots and leaves are used to reduce swellings, and their infusion is given in cough, bronchitis and pneumonia.
<i>Dicliptera roxburghiana</i> Nees	Kuthhi	Acanthaceae	General tonic and cures dysentery
<i>Hemigraphis rupestris</i> Heyne ex T. Anders.	-	Acanthaceae	Roots are use in Urinary tract infection
<i>Hygrophila polysperma</i> (Roxb.) T. Anders.	-	Acanthaceae	Headache, Wounds and Swelling of boils
<i>Justicia diffusa</i> Willch.	-	Acanthaceae	Headache, Fever, Jaundice and plant paste used to cure cuts and wounds
<i>Justicia simplex</i> D.Don.	-	Acanthaceae	Antityphoid and Antifungal Activities.
<i>Lepidagathis incurva</i> D. Don	-	Acanthaceae	Promote Digestion and treat cough
<i>Nelsonia canescens</i> (Lam.) Spreng.	-	Acanthaceae	Reduce fever, colds, flu, and viral infections, analgesic and anti-inflammatory
<i>Rungia parviflora</i> (Retz.) Nees	-	Acanthaceae	Juice of leaves is cooling refrigerant and is given to children suffering from small pox.
<i>Achyranthes aspera</i> L.	Apamarga	Amaranthaceae	Roots are anti-inflammatory, used in rheumatism. Juice of leaves is taken in dysentery.
<i>Aerva sanguinolenta</i> (L.) Blume	Sufedphulia	Amaranthaceae	Leaves are diuretic and demulcent. Roots are used in medicines for dysentery.
<i>Alternanthera sessilis</i> (L.) DC.	Gudre-Saag	Amaranthaceae	Used in burning sensation, diarrhoea, leprosy, skin diseases, dyspepsia and fever.
<i>Amaranthus viridis</i> L.	Jangli Chaulai	Amaranthaceae	Roots are used in urinary disorder and snakebite.
<i>Pupalia lappacea</i> (L.) Juss	Nagdaminee	Amaranthaceae	Antitussive, diuretic and febrifuge, treatment of coughs, dysenteriform diarrhoea and oedema, constipation, boils, treat cuts, infected sores and phagogenic ulcers, sore-throat, treatment of flatulence and leprosy sores.
<i>Centella asiatica</i> (L.) Urban	Brahmi-Buti	Apiaceae	Brain tonic, cardio tonic, diuretic and expectorant and galactogogic activity
<i>Ichnocarpus frutescens</i> R.Br.	Bel-Kami	Apocynaceae	Rheumatism, Asthma, Cholera And Fever.
<i>Rauwolfia serpentina</i> (L.) Benth. ex Kurz	Sarpgandha	Apocynaceae	Root decoction is given during labour pains and its extract is valued for intestinal troubles.
<i>Adenostemma lavenia</i> (L.) Kuntze	-	Asteraceae	Leaves are used as antiseptic, and the fresh juice is used as stimulant. Also used in insect bite, cuts and wounds.
<i>Ageratum conyzoides</i> L.	Gundrya	Asteraceae	The juice from the fresh plant and the extract from dried plants are used to cure allergic rhinitis and sinusitis. Leaves are applied to wounds.
<i>Bidens biternata</i> (Lour.) Merr. & Sherff	Mangrinya	Asteraceae	Used in cuts and wounds.
<i>Blumea fistulosa</i> (Roxb.) Kurz	-	Asteraceae	Antiseptic
<i>Blumea lacera</i> (Burm. f.) DC.	Kakranda	Asteraceae	Fresh leaf juice is used to expel threadworms
<i>Blumea sinnautia</i> (Lour.) Merr.	-	Asteraceae	Root kepts in mouth cures mouth diseases; when mixed with black pepper, is used in Cholera. Diuretic and stimulant.
<i>Blumea mollis</i> (D. Don) Merr.	-	Asteraceae	Leaves are used as medicines in cuts and wounds and skin diseases.
<i>Conyza japonica</i> (Thunb.) Less. ex DC.	-	Asteraceae	Eczema, Amygdalitis, Laryngitis, Alveolysis
<i>Conyza leucantha</i> (D.Don) Ludlow & P.H. Raven.	-	Asteraceae	Antibacterial
<i>Eclipta prostrata</i> (L.) L.	Bhringraj	Asteraceae	Hair Fall Treatment, Liver Disorders, Skin Diseases, Jaundice
<i>Emilia sonchifolia</i> (L.) DC.	Hirankuri	Asteraceae	Whole plant is used as medicines and is astringent, sweet, thermogenic and antipyretic.
<i>Siegesbeckia orientalis</i> L.	Liskura	Asteraceae	Tincture from plant mixed in equal parts with glycerine is used externally in ring worms and similar other parasitic eruptions.
<i>Spilanthes paniculata</i> Wall. ex DC.	Akarkara	Asteraceae	Leaves and flowers are rubbed to soothe the itching and rashes caused by water during rainy season. Also used to cure toothache.
<i>Syndrella vialis</i> (Less.) A. Gray	-	Asteraceae	Pain-Killers, Arthritis And Rheumatism
<i>Tridax procumbens</i> L.	Kumra	Asteraceae	Leaf juice is insecticidal and piscicidal and is also used to check haemorrhages of wounds,
<i>Vernonia cinerea</i> (L.) Less.	Kalgira	Asteraceae	Skin problems
<i>Xanthium strumarium</i> L.	Gokhru	Asteraceae	Antipyretic, Sedative, improves appetite, cures leucoderma. Fruits are rich in Vitamin C and are used as tonic, diuretic, diaphoretic.
<i>Youngia japonica</i> (L.) DC.	-	Asteraceae	Whole plant is used in dysentery.
<i>Cynoglossum lanceolatum</i> Forssk.	Lichkura	Boraginaceae	Whole plant is aphrodisiac and used as medicines in cough, cold, itching sores and wounds
<i>Capsella bursa-pastoris</i> (L.) Medik.	Tuntkya	Brassicaceae	Diarrhoea, dropsy, Gonorrhoea, Skin Diseases
<i>Rorippa indica</i> (L.) Hiern	Piria	Brassicaceae	Dysentery, Diarrhoea, Fever, Sprains, Seeds are laxative
<i>Rorippa nasturtium-aquaticum</i> (L.) Hayek	Kholia saag	Brassicaceae	Hair Tonic, Chest and Kidney complaints, Chronic Irritations and Inflammations of the skin, Lymphatic swellings.
<i>Chamaecrista pumila</i> Lam. V. Singh	-	Caesalpinaceae	Antimicrobial, Antimalarial, Antidiabetic, Anticancer, Hypotensive, Diuretic, Antioxidant, Laxative, Anti-Inflammatory, Analgesic, Antipyretic, Anxiolytic, Antidepressant, and Sedative Activities

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<i>Stellaria media</i> (L.) Vill.	Badyalu	Caryophyllaceae	Employed in plaster for broken bones and swellings. It is stringent and used in snakebite, burns, ulcer, eczema, digestive and respiratory problems.
<i>Chenopodium album</i> L.	Bathua	Chenopodiaceae	Leaves and seeds are used as veterinary medicines in cuts and wounds, sores, smooth delivery.
<i>Commelina benghalensis</i> L.	Kanjula	Commelinaceae	Whole plant is used as medicines and is bitter, emollient and demulcent, refrigerant, laxative and is used in leprosy, fever, diarrhea, liver troubles, dysentery, swellings and body ache.
<i>Cyanotis cristata</i> (L.) D. Don	-	Commelinaceae	Fresh leaves are bruised and mixed with buttermilk and is used as wash for itch in children.
<i>Floscopa scandens</i> Lour.	-	Commelinaceae	Stem is used as medicines and its juice is used for eyesores and the plant is used in bone fracture.
<i>Murdannia nudiflora</i> (L.) Brenan	Kansura	Commelinaceae	Bruised plant is applied to burn, itches and boils. Leaves are made into poultice and applied to scores.
<i>Evolvulus nummularius</i> (L.) L.	-	Convolvulaceae	Reduce tonsillitis pain
<i>Dioscorea deltoidea</i> Wallich ex Griseb	Harvish	Dioscoreaceae	Rhizomes are used as medicines in rheumatism, spermatorrhoea, piles, and dysentery.
<i>Euphorbia hirta</i> L.	Dudhi	Euphorbiaceae	Bowel Complaints, Cough and Gonorrhoea. Juice of plant is tonic, narcotic. Aerial part is used for bronchitis, relaxes bronchial tube and ease breathing, also is a mild sedative and expectorant.
<i>Phyllanthus urinaria</i> L.	Lalbhuin	Euphorbiaceae	Plant is bitter, sour, diuretic, cooling, sweetish, anti bacterial and demulcent properties and is used in soar throat, boils, infantile cheek eczema, tongue thrush. Roots are given to sleepless children
<i>Phyllanthus simplex</i> Retz.	Bhiuavate	Euphorbiaceae	Fresh leaves are bruised and mixed with buttermilk and is used as wash for itch in children.
<i>Desmodium heterocarpon</i> (L.) DC.	-	Fabaceae	Fever, Contusions And Strains
<i>Desmodium laxiflorum</i> DC.	-	Fabaceae	Leaves Can Be Used During Diarrhoea, Dysentery. Roots are considered carminative, tonic, diuretic and used in cough and asthma.
<i>Desmodium triflorum</i> (L.) DC.	Kudaliya	Fabaceae	Used in vitiated conditions of pitta, cough bronchitis, wounds, and burning sensations.
<i>Medicago lupulina</i> L.	-	Fabaceae	Antibacterial and Lenitive.
<i>Curculigo orchitoides</i> Gaertn.	Kali- Musli	Hypoxidaceae	Rootstock or rhizome is used as medicines, and is sweat, cooling, emollient, diuretic, aphrodisiac, depurative, skin diseases.
<i>Acrocephalus hispidus</i> (L.) Nicolson & Sivadasan	Utkund	Lamiaceae	Cold and High Fever
<i>Ajuga macrosperma</i> Wall. ex Benth.	Bugle	Lamiaceae	Nephritis, Body ache, Sore Gum and Tooth Decay.
<i>Anisomeles indica</i> (L.) Kuntze	Gopali	Lamiaceae	Oil form plant is used for uterine infections.
<i>Leucas mollissima</i> Wall. ex Benth.	-	Lamiaceae	Fever and Cough
<i>Mentha piperita</i> L.	Piperment	Lamiaceae	Stimulant, carminative, antiseptic, diuretic, toothache and swollen gums.
<i>Mosla dianthera</i> (Buch.- Ham.) Maxim.	-	Lamiaceae	Carminative Property and beneficial during heartburn.
<i>Nepeta hindostana</i> (Roth) Haines	Billilotan	Lamiaceae	Fever, Stimulant for toothache, dysentery, diarrhea, gonorrhoea and mouth ulcers
<i>Perilla frutescens</i> (L.) Britton	Bhangjeera	Lamiaceae	Whole plant is sedative, antispasmodic, antiseptic, and antidote and used in cephalic and uterine troubles.
<i>Rabdosia lophanthoides</i> (Buch.-Ham. Ex D.Don) H. Hara	-	Lamiaceae	Hepatitis, Cholecystitis, Gynecopathia and Esophagitis
<i>Wolffia arrhiza</i> (L.) Horkel ex Wimm.	-	Lemnaceae	Treatment of waste water and municipal waste water.
<i>Reinwardtia indica</i> Dumort.	Phiunli	Linaceae	Bark and leaves are used in diarrhoea and dysentery. Flowers are used in leprosy.
<i>Ammannia baccifera</i> L.	Dadmari	Lythraceae	Irritant, Rubefacient And Vesicant, Skin Diseases, Wounds, Swelling, external remedy for Ringworms and Parasitic Skin Infections and Herpetic Eruptions
<i>Rotala rotundifolia</i> (Roxb.) Koehne	-	Lythraceae	Aid Digestion, Toothache, Stomach Ache.
<i>Malvastrum coromandelianum</i> (L.) Garcke	Suchi	Malvaceae	Emollient and solvent and its decoction is used in dysentery and wounds. Leaves are applied to inflamed sores and wounds as a cooling and healing salve.
<i>Sida acuta</i> Burm. f.	Karenti	Malvaceae	Fever, Headache and Infectious diseases.
<i>Sida cordata</i> (Burm. f.) Borss.	Bhiyli	Malvaceae	Fever, Headache, Skin Diseases, Indigestion, Healing of boils and wounds, Gonorrhoea and other venereal diseases.
<i>Sida cordifolia</i> L.	Balu	Malvaceae	Stimulant, Tonic, Numbness, Nerve Pain, Muscle Cramps, Skin Disorders, Tumors, Joint Diseases, Wounds, Ulcers, Scorpion Sting, Snakebite and as a Massage Oil.
<i>Sida rhombifolia</i> L.	Bhiunli	Malvaceae	Fever, Indigestion, Headaches, Boils, Cramps, Rheumatism, Toothache, Chapped Lips And Pimples
<i>Mimosa pudica</i> L.	Lajwanti	Mimosaceae	Leaves are used to treat urinary infections. Leaves juice is used in dressing for sinus and for sores and piles.
<i>Ludwigia prostrata</i> Roxb.	-	Onagraceae	Abscess, Leucorrhoea And Whooping Cough
<i>Dendrobium gamblei</i> King & Pantl.	-	Orchidaceae	Headache and Dizziness
<i>Nervillia prainiana</i> (King & Pantl.) Seidenl. & Smitinand	-	Orchidaceae	Fever
<i>Oberonia falconeri</i> Hook. f.	-	Orchidaceae	Sleeping Disorder
<i>Vanda parviflora</i> Lindl.	-	Orchidaceae	Skin Cancer, Anti ageing and age related disorders
<i>Zeuxine strateumatica</i> (L.) Schlecht	-	Orchidaceae	Dry powder of Roots and tubers is used as tonic
<i>Oxalis corniculata</i> L.	Bhilmori	Oxalidaceae	Appetizer, Astringent. Grounded leaves are eaten to purify blood and for treating dizziness. Juice of leaves is applied to open wounds.

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<i>Argemone mexicana</i> L.	Pili Kateli	Papaveraceae	Cures Itching, leprosy, cramps, neuro-muscular pains, antihelmintic, constipation
<i>Peperomia pellucida</i> (L.) Kunth	-	Piperaceae	Renal disorders, Abdominal pain, Joint Pain, abscesses, boils, acne, colic, gout, fatigue, headache.
<i>Polygonum barbatum</i> L.	-	Polygonaceae	Roots are astringent and cooling. Decoction of leaves and stalks is used as stimulating wash for ulcers. Roots are astringent and are used in stomachache and wounds.
<i>Polygonum hydropiper</i> L.	Ameta	Polygonaceae	Leaves are diuretic. Styptic. Roots are anthelmintic and bitter tonic and its juice is used for itch and other skin infections
<i>Polygonum plebeium</i> R. Br.	Dondya	Polygonaceae	Roots are given in bowel complaints. Plant is dried and taken internally in pneumonia.
<i>Rumex hastatus</i> D. Don	Kilmori	Polygonaceae	Whole plant is astringent and is used as medicines in cuts and wounds, gastralgia, insect bite, boils, cough and to check bleeding.
<i>Portulaca pilosa</i> L.	-	Portulacaceae	Diuresis, Antipyresis and Analgesia
<i>Androsace umbellata</i> (Lour.) Merr.	-	Primulaceae	Eye disorder, Uterine disorder, Cough and Antidote to snakebite
<i>Ranunculus arvensis</i> L.	Chambul	Ranunculaceae	Fever, Gout, Asthma, Skin diseases
<i>Ranunculus muricatus</i> L.	-	Ranunculaceae	Intermittent fevers, Gout and Asthma.
<i>Ranunculus sceleratus</i> L.	Jaldhaniya	Ranunculaceae	Common Cold, Fungicide, Skin Treatment
<i>Borreria articularis</i> (L.f.) F. N. Williams	Guthari	Rubiaceae	Extract of leaves is used in hemorrhoids and gall stones. Decoction of roots is alterative. Seeds are stimulant and are used in diarrhoea and dysentery. Vapour is inhaled to kill tooth worms.
<i>Oldenlandia corymbosa</i> L.	Daman-papar	Rubiaceae	Viral Infections, Cancer, Acne, Boils, Appendicitis, Hepatitis, Eye Problems and Bleeding
<i>Thecagonum ovatifolium</i> (Cav.) Babu	-	Rubiaceae	Snake Bite, Insects Stings, Sprains, Bone Dislocation and Wounds
<i>Bacopa monnieri</i> (L.) Pennell	Pan-Brahmi	Scrophulariaceae	Skin diseases, epilepsy, fever.
<i>Bacopa procumbens</i> (Mill.) Greenman	-	Scrophulariaceae	Wounds and Cuts
<i>Limnophila rugosa</i> (Roth) Merr.	Karpurya	Scrophulariaceae	Leaves infusion is diuretic, tonic, digestive and stomachic.
<i>Lindernia anagallis</i> (Burm. f.) Pennell	-	Scrophulariaceae	Diuretic, Asthma and Gonorrhoea
<i>Lindernia ciliata</i> (Colsm.) Pennell	-	Scrophulariaceae	The sap from the crushed leaves is given after childbirth and cures menorrhagia.
<i>Lindernia crustacea</i> (L.) F. V. Muell.	-	Scrophulariaceae	Whole plant has medicinal properties and is used in bilious affections and dysentery and is used as poultice for boils, sores, and also for ringworm and itching.
<i>Lindernia viscosa</i> (Hornem.) Boldingh	-	Scrophulariaceae	Used to treat ringworm
<i>Mazus pumilus</i> (Burm.f.) Steenis	Mastyar	Scrophulariaceae	Aperient, Emmenagogue, Febrifuge and Tonic.
<i>Scoparia dulcis</i> L.	-	Scrophulariaceae	Infusion of leaves used in fever, cough, bronchitis and its gargle is used for toothache.
<i>Veronica anagallis-aquatica</i> L.	Sada,	Scrophulariaceae	Applied externally for healing burns, cuts and wounds, ulcers and swollen piles.
<i>Picarsma quassioides</i> (D. Don) Bennett.	Karui	Simaroubaceae	Insecticide, Parasiticide to get rid of lice, fleas etc
<i>Solanum nigrum</i> L.	Makoi	Solanaceae	Ringworms, Ulcers, Diuretic, Testicular swellings, Gout and Ear pain
<i>Corchorus aestuans</i> L.	Titpatti	Tiliaceae	Seeds are stomachic and are used in pneumonia and dyspepsia.
<i>Triumfetta rhomboidea</i> Jacq.	Leswa- kura	Tiliaceae	Demulcent, Astringent, Diarrhea, Dysentery, Gonorrhoea, Promote Parturition, Dysentery; Facilitate Childbirth.
<i>Fleurya interrupta</i> (L.) Gaudich.	-	Urticaceae	Leaf-paste used for boils, root extract, as diuretic and fruits used for headache.
<i>Pouzolzia pentandra</i> (Roxb.) Bennett & Brown	-	Urticaceae	Fever and Tooth ache
<i>Premna herbacea</i> Roxb.	Bharangi	Verbenaceae	Dropsy, Cough, Asthma, Fever, Rheumatism and Cholera
<i>Viola biflora</i> L.	Vanafsa	Violaceae	Flowers are emollient, pectoral, diaphoretic, antiseptic and antispasmodic. Whole plant is used in skin eruptions, cold, constipation and cough
<i>Zingiber roseum</i> (Roxb.) Rosc.	-	Zingiberaceae	Digestion, Fever and Joint Pain

Data Collection and Analysis

Extensive field studies were conducted during the year 2010-11. Usual methods of collection, preservation and maintenance of specimens in the Herbarium were followed (Jain & Rao, 1977). Several attempts were made for collection in different seasons. Plant specimens in flowering and fruiting stages were collected at regular intervals throughout the year. The plant specimens collected during field trips were identified with the help of regional floras and confirmed after matching specimens with authentically identified specimens preserved in the Herbaria of Forest Research Institute (DD) and Botanical Survey of India, Northern Circle, Dehra Dun (BSD). After identification, all the specimens were preserved and mounted on herbarium sheets and deposited in the Herbarium of Ecology Research Laboratory, Botany Department D.A.V. (P.G.) College Dehradun. The description

of plants has been examined with the help of available literature (Duthie, 1906; Babu, 1977 and Gaur, 1999). The medicinal plants discussed in the present paper, were selected on the basis of their established medicinal values as well as through interaction with the local villagers near Barkot forest in Doon Valley.

RESULTS

115 herbaceous plant species belonging to 95 genera and 40 families were collected from the Barkot forest in Doon Valley. The most represented families were Asteraceae (14 genera and 18 species), Lamiaceae (9 genera and 9 species), Acanthaceae (8 genera and 9 species), Scrophulariaceae (6 genera and 10 species), Amaranthaceae (5 genera and 5 species) and Orchidaceae (5 genera and 5 species) (Table 1). Medicinal uses of collected herbs are described (Table 2). A glimpse of medicinal plant of Doon Valley is given in Plate 1.



Spilanthes paniculata



Rauvolfia serpentina



Bacopa monnieri



Evolvulus nummularius



Polygonum barbatum



Sida acuta

DISCUSSION

Documentation and knowledge of medicinal plant repository in the area is of immense importance for developing the conservation plan of medicinal plants. Numerous studies have been conducted from time to time to document the medicinal wealth in Himalayan region. Raut *et al.* 2013 have conducted the study on population status of commercially important medicinal plants in Dehradun Forest Division. 86 commercially important medicinal plants were analyzed from the entire Dehradun Forest Division. During the present study, documentation of 115 medicinal plants from the Barkot Range of Dehradun Forest Division was conducted. 178 medicinal plants species belonging to 110 genera and 65 families of Angiosperms from Govind Wildlife Sanctuary were

documented by Agnihotri *et al.* (2013). Pande *et al* (2006) have compiled the documentation on 1338 medicinal plants of Uttarakhand. Medicinal plants can have significant role in the livelihood development of the local communities of Uttarakhand (Joshi and Joshi 2014). 58 medicinal plant species are documented from the Sahastradhara and elaborative significance of the medicinal plants of the region was also highlighted (Bisht and Bhatt, 2012). The present study represents the medicinal plant wealth in the recognized area. Anthropogenic pressure on the medicinal plants by over exploitation is caused by the villagers residing in the villages near the forest fringe. Change in the climate pattern, biotic disturbances cause the impact on the population status of the medicinal plants and rigorous studies are required to assess the distribution, population and threatened status of the medicinal plants in the Doon Valley.

Conclusion

The present investigation revealed that the Barkot forest is rich in medicinal plants. Plants are used for the various medicinal purposes like headache, fever, jaundice, hair fall treatment, liver disorders, skin diseases, leprosy, cramps, neuro-mascular pains etc. During the interaction with the villagers it was found that younger generation have less knowledge about the uses of medicinal plant. The elder people of villages have more knowledge about the use pattern of medicinal plants. The documentation of medicinal values of the plant is of utmost necessity as we can face the possibility of losing this knowledge. A detailed study is needed to find the habitat preferences of the medicinal plants and their population. Anthropogenic pressures like habitat fragmentation, fuel wood collection, invasive species, illegal collection of medicinal plants, grazing and fodder collection by the villagers is causing tremendous impact on the medicinal wealth of Doon Valley. In situ as well as ex situ conservation measures should be formulated to conserve the medicinal plants. Establishment of Medicinal Plant Conservation Areas (MPCA) in Barkot forest will lead to the conservation and development of medicinal wealth of the region.

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