



Ethnobotanical Uses of Some Plants of Bhattiyat Block in District Chamba, Himachal Pradesh (Western Himalaya)

Savita Rani and J.C. Rana

Research

Abstract

In this study an ethnobotanical survey of plant diversity was carried out at Bhattiyat block of District Chamba, Himachal Pradesh, India. The study was mainly focused on the medicinal plants used for treatment of various ailments/diseases by the nearby village inhabitants. The information was collected by questionnaire and consulting local elders. The present paper provides information on the indigenous therapeutic application and other traditional uses of 22 plant species that are commonly used by the natives of Bhattiyat block of District Chamba.

Introduction

District Chamba is situated in the northwestern end of the Himachal Pradesh between 32°11'30"–33°13'06"N and 75°03'49"–77°03'30"E and is surrounded by hill ranges. The geographical area of the district is 6528 km², comprising 25% of total area of the state. The territory is wholly mountainous with altitudes ranging from 600 to 6400 m. Chamba is a forested district with a total forest area of approximately 5030 km². Nearly 2000 flowering plant species have been documented across District Chamba with floristic affinities from tropical-subtropical to temperate alpine (Singh & Sharma 2006).

District Chamba is inhabited by two main tribal (rural) communities: Gaddis (migratory pastoralists) and Gujjar (nomadic tribe). These native people are the custodians of indigenous knowledge associated with their surrounding biological resources (Dutt *et al.* 2011). Aside from exploring floristic diversity and inventorying plant resources of the district (Sharma & Singh 1990, 1997), documentation of traditional knowledge on the utilization of plants has been initiated by few workers. Dutt *et al.* (2011) provides the information on 70 species of medicinal and aro-

matic plants from Bharmour block, and Singh and Banyal (2012) explored the Kalatop and Khajjiar area of District Chamba. The present study is an attempt to enhance such investigations.

Materials and Methods

In order to document the utilization of medicinal plants, a total of 10 field surveys were carried out in the area from July 2011 to July 2013. The surveys were spread across seasons to get maximum information and also to cross-check the information provided by the local informants during the earlier visits. Surveys were conducted among the Masas, Gaddi, Brahmin, Rajput, Gujjar, and Lohar communities residing in different localities of Bhattiyat block of District Chamba (Figure 1). During the initial surveys, friendly relations were developed with the village people. Information on medicinal plants was gathered in the local language (Chambali). Twenty **vaidyas** (local healers), 15 male and 5 female) were identified and interviewed during subsequent surveys. Structured questionnaires, interviews, and participatory observations were used to illicit information from the informants (Martin 1995, Reyes-Garcia *et al.* 2005). Information on local name, exact plant

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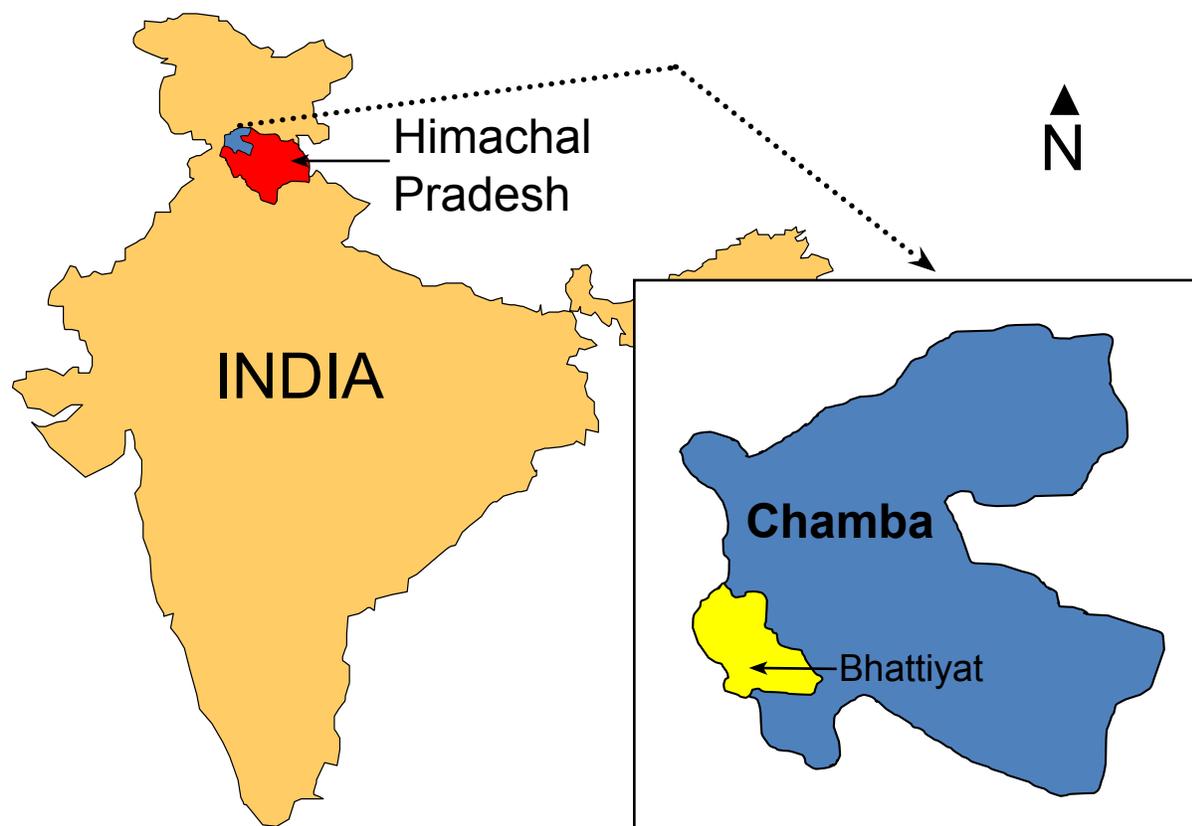


Figure 1. The study region of Bhattiyat block (yellow) of District Chamba (blue), Himachal Pradesh (red), India.

part used, and method of dosage of these plants was provided by informants. The identification of the plants was done with the help of various floras (Chowdhery & Wadhwa 1984, Dhaliwal & Sharma 1999, Hooker 1879, Kaur & Sharma 2004, Singh & Sharma 2006). The identifications were then confirmed by matching the plants with authenticated specimens available in the Herbaria of Forest Research Institute (DD), Dehradun, India, and Botanical Survey of India (Northern Regional Center) (BSD), Dehradun, India. Scientific names were verified and updated using The Plant List (2013) and Tropicos.org (2014). Voucher specimens have been deposited in the Herbarium, National Bureau of Plant Genetic Resources Regional Station, Phagli, Shimla, Himachal Pradesh, India.

Results

Twenty-two plant species were identified by residents of Bhattiyat block of District Chamba as having specific ethnomedicinal uses. These species are in 17 plant families with only Asteraceae and Lamiaceae having more than one reported species. Both native species and cultivated exotic species were reported. Results from the informant questionnaires are summarized in Table 1.

Discussion

Several species that were reported as useful for treating liver-related ailments have other documented ethnomedicinal or ethnobotanical uses. In addition to treating acute hepatitis, *Allium sativum* L. is a common spicy flavoring agent that can be used for its antimicrobial, anti-thrombotic, hypolipidemic, antiarthritic, hypoglycemic, and antitumor properties (Thomson & Ali 2003). **Brahmi** (*Bacopa monnieri* (L.) Wettst.) is commonly used in the treatment of anxiety, neurosis, mental fatigue, improving mental clarity, confidence, and memory recall and is a traditional ayurvedic treatment for epilepsy and asthma (Gohil & Patel 2010). *Cajanus cajan* (L.) Millsp. is indicated in the relief of pain in traditional Chinese medicine and as a sedative (Ahsan *et al.* 2009). In southern parts of India, the leaves of *Cajanus cajan* (L.) Millsp. are commonly used for rearing silkworms; its green pods are used as a vegetable, and the husk, green leaves, and tops are used as fodder and green manure (Ambasta 2004).

Arnebia benthamii (Wall. ex G.Don) I.M. Johnst. is a high-value Himalayan medicinal plant, ranking second in the

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Table 1. Plants reported as having ethnobotanical use by residents of Bhattiyat block of District Chamba, Himachal Pradesh, India. Parts used: bark (Ba), bud (Bu), flower (F), leaf (L), root (R), seed (Se), stem (St).

Scientific name [Family] Acc. no.	Local name	Distribution	Parts used	Ethnobotanical use(s)
<i>Allium sativum</i> L. [Amaryllidaceae] 24491	Lashun	Native to Asia	F	A paste of 5–6 buds with 20 g fresh leaves of <i>Leucas aspera</i> (Willd.) Link mixed in a glass of warm water is prescribed twice daily for 5 days with a small ripe banana for acute hepatitis associated with dyspepsia and loss of appetite.
<i>Alternanthera sessilis</i> (L.) R.Br. ex DC. [Amaranthaceae]	Garundi	Widespread in old and new world tropics and sub-tropics	L	Leaf decoction with a little salt is drunk to check vomiting of blood.
<i>Aplotaxis auriculata</i> DC. [Asteraceae]	Kut	Native to Himalayas	L	Leaf paste is externally applied for venereal diseases.
<i>Arnebia benthamii</i> (Wall. ex G.Don) I.M.Johnst. [Boraginaceae] 25501	Rattan jot	Mostly occurring in the alpine and sub-alpine Himalayas at 3000–3900 m	R	Dried roots are immersed in mustard oil and kept for 1–2 weeks. When the color changes to reddish pink, it is then applied to the scalp for prevention of hair loss and removal of dandruff.
<i>Bacopa monnieri</i> (L.) Wettst. [Plantaginaceae] 26409	Brami	Widespread in tropics and sub-tropics below 1100 m	L, St	About 5 g fresh juice of the leaves boiled with ghee and 2.5 g root of <i>Aplotaxis auriculata</i> DC. and honey is prescribed internally for bilious disorders. Paste of the shoot along with shoots of <i>Centella asiatica</i> (L.) Urb. and <i>Alternanthera sessilis</i> (L.) R.Br. ex DC. in equal parts (10–15 g each) is given twice daily on an empty stomach for both chronic and acute liver disorders associated with hepatomegaly.
<i>Bergenia pacumbis</i> (Buch.-Ham. ex D.Don) C.Y.Wu & J.T.Pan [Saxifragaceae] 25502	Shaprotri	From Kashmir to Bhutan at 2100–3000 m and Khasia hills at 4000 m (Kirtikar & Basu 1983, Pandey 1988)	L	Dried leaves are ground and inhaled to recover from heavy sneezing. Leaves are used as pattar (a type of gate) during marriage ceremonies.
<i>Cajanus cajan</i> (L.) Millsp. [Fabaceae] 26419	Arehar chana	Native of tropical Africa; widely cultivated	L, Se	Leaf juice or a young leaf decoction is given with sugar for jaundice (regularly in morning) for about 1 month. Seeds are useful for treating vitiated conditions of the pitta. Juice of 2–4 seeds is given twice daily for 4–5 days for acute viral hepatitis.
<i>Centella asiatica</i> (L.) Urb. [Apiaceae]	Brahma manduki	Tropical America, Africa, India, W. Pakistan, China, Japan, and Pacific Islands	L	Leaf extract is taken once daily to treat any type of weakness.

Table 1. Continued.

Scientific name [Family] Acc. no.	Local name	Distribution	Parts used	Ethnobotanical use(s)
<i>Cinnamomum verum</i> J.Presl. [Lauraceae]	Dalchini	Native to Sri Lanka; cultivated in many Asian countries	Ba	Cinnamon from dried bark is used to treat stomachache.
<i>Clematis barbellata</i> Edgew. [Ranunculaceae] 25503	Bhtaani	From Kashmir eastward to Nepal	L	Leaves are crushed either with water or cow urine, and the paste is applied on pimple and boil eruptions to treat the infected part.
<i>Foeniculum vulgare</i> Mill. [Apiaceae]	Mithisaunf	Native to the Mediterranean	Se	Powdered seeds are taken twice daily to cure indigestion and other digestive problems.
<i>Jurinea macrocephala</i> DC. [Asteraceae] 25504	Guggal	Kashmir to throughout Himalaya	R	Roots are used during religious ceremonies for incense. Root decoction is given once per day to treat cold and cough.
<i>Leucas aspera</i> (Willd.) Link [Lamiaceae]	Gophaa	Kashmir to Sikkim, Indo-China, Malaysia	F	The aroma of crushed flowers is inhaled through the nostril for relief of migraines.
<i>Mentha longifolia</i> (L.) L. [Lamiaceae] 25505	Marhendri	Indigenous to South Africa	L	Leaves are placed inside seed containers to deter insects and inside catteries to protect them from ticks, mites, and rat fleas. A paste is made from fresh leaves and applied to burst boils for pus removal.
<i>Origanum vulgare</i> L. [Lamiaceae] 26210	Tulsi	Macronesia, S Europe, Mediterranean, SW and C Asia, along the Himalayan area to China and Taiwan	L, St	Dried leaves and shoots are boiled in water, and the decoction is taken twice daily to relieve cold and fever. The plant is also used in many religious ceremonies as a symbol of Vishnu.
<i>Pinus roxburghii</i> Sarg. [Pinaceae] 26209	Chil	Afghanistan, the Himalaya from Chitral east to Bhutan, Sikkim	L	Green needles are ground with water. Extracted sap is taken once per day to increase urine flow and treat kidney stones.
<i>Rheum australe</i> D.Don [Polygonaceae] 25506	Chukari	Temperate and subtropical Himalayas from Kashmir to Sikkim, at 2000 to 4500 m (Chauhan 1999)	R	Roots are sun-dried and powdered, then mixed with water to form a thick paste which is applied to cuts and wounds.
<i>Rubia cordifolia</i> L. [Rubiaceae] 25507	Mishtu	Throughout the hilly districts of India from NW Himalayas eastward, ascending to 8000 ft, and southward to Ceylon	L, St	Leaves and stems are used to scrub the aching parts of skin so that the ointment absorbs easily, relieving bone aches.

Table 1. Continued.

Scientific name [Family] Acc. no.	Local name	Distribution	Parts used	Ethnobotanical use(s)
<i>Sarcococca saligna</i> Müll. Arg. [Buxaceae] 25508	Diyund	Throughout the Himalayas from Afghanistan to W Nepal	L, St	Leaves are ground and the paste applied on burns as a coolant for quick relief.
<i>Saussurea costus</i> (Falc.) Lipsch. [Asteraceae] 25509	Kuth	Native to Himalayas at 2500–3000 m (Samant <i>et al.</i> 1998) and higher elevations of Jammu, Kashmir, and Himachal Pradesh (Aswal & Mehrotra 1994)	R	Dried roots are ground to powder and taken orally to treat colds and joint pain.
<i>Syzygium aromaticum</i> (L.) Merr. & L.M.Perry [Myrtaceae]	Laung	Native to Himalayas	Bu	Powdered buds mixed with milk are applied to wounds and for toothaches.
<i>Viola canescens</i> Wall. [Violaceae] 25510	Vanksha	Himalayas at 1500–2400 m, from Kashmir to NE India	F	A decoction is prepared by boiling flowers along with dalchini , mithisaunf , and laung and taken orally to relieve cold and cough. Flowers are also added in tea preparation.

list of medicinal plants prioritized for Western Himalaya and figuring among the 59 medicinal plants prioritized for conservation due to high extinction threat (Sastry & Chatterjee 2000). The species is a major ingredient of the commercial drug available under the name **gaozaban**, which has antibacterial, antifungal, anti-inflammatory, and wound-healing properties (Kirtikar & Basu 1984). In Kashmir Himalaya, the rhizome is used against cold, cough, fever, and as a blood purifier (Malik *et al.* 2011). Local peoples of Uttarakhand use it as hair tonic and antiseptic (Semwal *et al.* 2010). In District Chamba, it is also used against hair problems, which is reported here for the first time.

Sarcococca saligna Müll. Arg. was reported here as a burn treatment. Its antibacterial activity against several human pathogenic bacteria has been reported by Rahman *et al.* (1998). *Rheum australe* D. Don. is also useful against skin wounds, and its ethnomedicinal uses have been recorded from China, India, Nepal, and Pakistan for 57 different types of ailments, including ailments related to the circulatory, digestive, endocrine, respiratory, and skeletal systems as well as for infectious diseases in other parts of the world (Rokaya *et al.* 2012).

Two Asteraceae species were reported by informants as ethnobotanically useful: *Jurinea macrocephala* DC. and *Saussurea costus* (Falc.) Lipsch. Commonly, *J. macro-*

cephala roots are used as a stimulant and given for colic or fever after child birth (Khare 2007). It is also used in Lahul & Spiti districts during religious rituals called **havan** (Srivastava *et al.* 1992), similar to its use in this study as ceremonial incense. *Saussurea costus* was used here for colds and joint pain but is a well-known and important medicinal plant used in several indigenous systems of medicine for the treatment of asthma, inflammatory diseases, ulcers, and stomach problems (Pandey *et al.* 2007).

Two species from the mint family (Lamiaceae) were mentioned by informants. *Mentha longifolia* (L.) L. is commonly used as an antioxidant (Nickavar *et al.* 2008), antimicrobial (Al-Bayati 2009), and a hepatoprotective (Mimica-Dukic *et al.* 1999). Local **vaidyas** of Uttarakhand use leaves of *M. longifolia* to treat dehydration, vomiting, and liver diseases (Semwal *et al.* 2010). Oregano (*Origanum vulgare* L.) is widely used in agriculture and cosmetic industries as a culinary herb, a flavoring substance of food products and alcoholic beverages, and a perfume for its spicy fragrance (Aligiannis *et al.* 2001). Its spasmodic, antimicrobial, expectorant, carminative, and aromatic properties make it a traditional pharmaceutical remedy to treat various ailments such as whooping and convulsive coughs, digestive disorders, and menstrual problems (Aligiannis *et al.* 2001).

Both *Clematis barbellata* Edgew. and *M. longifolia* (L.) L. were listed as useful against pimples and boils. In other parts of Himachal Pradesh, *C. barbellata* is used against itching and skin diseases (Rana & Samant 2011). *Clematis barbellata* is additionally commonly used against diabetes.

In many parts of Himachal Pradesh and Pakistan, *Viola canescens* Wall. is used against cold and cough (Abbasi *et al.* 2010, Haq *et al.* 2011), matching what was reported by informants within Bhattiyat block.

Rubia cordifolia L. is reported here as being used against bone aches and skin itches and as an antiseptic for wounds. It has also been used in folk medicine against cancers, ulcers, swellings, and eczema (Karodi *et al.* 2009).

While *Pinus roxburghii* Sarg. was reported by informants as useful for kidney ailments, the essential oil (pine oil) is commonly used as an antiseptic, expectorant, carminative, and stimulant (Uniyal *et al.* 2006). From eastern Himalayan region, the seeds of *P. roxburghii* are used to treat indigestion (Kala 2005).

Reported here as useful against heavy sneezing and for making ceremonial wedding gates, *Bergenia pacumbis* (Buch.-Ham. ex D. Don) C.Y. Wu & J.T. Pan is a well known Indian drug referred to as **pashanbheda** in Ayurveda. It is a key tonic for urinary complaints, kidney stones, colds, hemorrhagic disease, stomach distension, and epilepsy (Ruby *et al.* 2012). The root is used as a tonic, antidiabetic, antiscorbutic, cardiogenic, antidote to poison, and a treatment for conjunctivitis, fever, diarrhea, and cough (Kirtikar & Basu 1983). An ethnobotanical study of Upper Siran Valley in Pakistan showed that *B. ligulata* was used there as a diuretic (Harsoliya *et al.* 2011). It has also been shown to be hepatoprotective, and alcoholic extracts of *B. ligulata* showed anticancer, antiprotozoal, diuretic, cardiovascular, antiscorbutic, and antilithiatic properties (Garodia *et al.* 2007).

Conclusion

Only 22 plant species were identified as medicinal in this part of the Himalayas. In a global or regional sense this is a surprisingly small number but reflects the state of traditional knowledge among the people interviewed. We expect that further interviews would reveal more plants and details of use since much higher numbers are found in other districts of this region.

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Literature Cited

Abbasi, A.M., M.A. Khan, M. Ahmed & M. Zafar. 2010. Herbal medicines used to cure various ailments by the inhabitants of Abbottabad district, North West Frontier Province, Pakistan. *Indian Journal of Traditional Knowledge* 9(1):175–183.

Ahsan, R., M. Islam, E. Haque & A. Mossaddik. 2009. *In vitro* antibacterial screening and toxicological study of some different medicinal plants. *World Journal of Agricultural Sciences* 5:617–621.

Al-Bayati, F.A. 2009. Isolation and identification of antimicrobial compound from *Mentha longifolia* L. leaves grow wild in Iraq. *Annals of Clinical Microbiology and Antimicrobials* 8:20. dx.doi.org/10.1186/1476-0711-8-20

Aligiannis, N., E. Kalpoutzakis, S. Mitaku & I.B. Chinou. 2001. Composition and antimicrobial activity of the essential oils of two *Origanum* species. *Journal of Agricultural and Food Chemistry* 49:4168–4170. dx.doi.org/10.1021/jf001494m

Ambasta, S.P. 2004. *The Useful Plants of India*. 4th edition. National Institute of Science Communication, New Delhi, India.

Aswal, B.S. & B.N. Mehrotra. 1994. *Flora of Lahaul-Spiti: A cold desert in North Western Himalaya*. Bishen Singh Mahendra Pal Singh, Dehra Dun, Uttarakhand, India.

Chauhan, N.S. 1999. *Medicinal and Aromatic Plants of Himachal Pradesh*. Indus Publishing Company, New Delhi, Delhi, India.

Chowdhery, H.J. & B.M. Wadhwa. 1984. *Flora of Himachal Pradesh: Analysis. Volumes 1–2*. Botanical Survey of India, Calcutta, India.

Dhaliwal, D.S. & M. Sharma. 1999. *Flora of Kullu District (Himachal Pradesh)*. Bishen Singh Mahendra Pal Singh, Dehra Dun, India.

Dutt, B., S.S. Sharma, K.R. Sharma, A. Gupta & H. Singh. 2011. Ethnobotanical survey of plants used by Gaddi tribe of Bharmour area in Himachal Pradesh. *ENVIS Bulletin: Himalayan Ecology* 19:22–27. <http://gbpihedenviis.nic.in/HTML/Vol%2019/Vol%2019.pdf>

Garodia, P., H. Ichikawa, N. Malani, G. Sethi & B.B. Aggarwal. 2007. From ancient medicine to modern medi-

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- cine: Ayurvedic concepts of health and their role in inflammation and cancer. *Journal of the Society for Integrative Oncology* 5(1):25–37.
- Gohil, K.J. & J.A. Patel. 2010. A review on *Bacopa monniera*: Current research and future prospects. *International Journal of Green Pharmacy* 4(1):1–9. www.greenpharmacy.info/text.asp?2010/4/1/1/62156
- Haq, F., H. Ahmad & M. Alam. 2011. Traditional uses of medicinal plants of Nandiar Khuwarr catchment (District Battagram), Pakistan. *Journal of Medicinal Plants Research* 5(1):39–48. www.academicjournals.org/article/article1380532251_Haq%20et%20al.pdf
- Harsoliya, M.S., J.K. Pathan, N. Khan, D. Bhatt & U.M. Patel. 2011. Effect of ethanolic extracts of *Bergenia ligulata*, *Nigella sativa* and combination on calcium oxalate urolithiasis in rats. *International Journal of Drug Formulation & Research* 2(2):268–280. www.ordonearresearchlibrary.org/Data/pdfs/IJDFR93.pdf
- Kala, C.P. 2005. Ethnomedicinal botany of the Apatani in the Eastern Himalayan region of India. *Journal of Ethnobiology and Ethnomedicine* 1:11. dx.doi.org/10.1186/1746-4269-1-11
- Karodi, R., M. Jadhav, R. Rub & A. Bafna. 2009. Evaluation of the wound healing activity of a crude extract of *Rubia cordifolia* L. (Indian madder) in mice. *International Journal of Applied Research in Natural Products* 2(2):12–18. www.ijarnp.org/index.php/ijarnp/article/view/54/55
- Kaur, H. & M. Sharma. 2004. *Flora of Sirmaur*. Bishen Singh Mahendra Pal Singh, Dehra Dun, India.
- Khare, C.P. 2007. *Indian Medicinal Plants: An illustrated dictionary*. Springer-Verlag, Berlin/Heidelberg, Germany.
- Kirtikar, K.R. & B.D. Basu. 1983. *Indian Medicinal Plants. Volume 3*. Second edition. Lalit Mohan Basu Publication, Allahabad, India.
- Kirtikar, K.R. & B.D. Basu. 1984. *Indian Medicinal Plants. Volume 3*. Bishen Singh Mahendra Pal Singh, Dehradun, India.
- Malik, H.A., A.A. Khuroo, G.H. Dar & Z.S. Khan. 2011. Ethnomedicinal uses of some plants in the Kashmir Himalaya. *Indian Journal of Traditional Knowledge* 10(2):362–366.
- Martin, G.J. 1995. *Ethnobotany: A methods manual*. Chapman and Hall, London, U.K.
- Mimica-Dukic, N., M. Popovic, V. Jakovljevic, A. Szabo & O. Gašic. 1999. Pharmacological studies of *Mentha longifolia* phenolic extracts. II. Hepatoprotective activity. *Pharmaceutical Biology* 37(3):221–224. dx.doi.org/10.1076/phbi.37.3.221.6306
- Nickavar, B., A. Alinaghi & V. Kamalinejad. 2008. Evaluation of the antioxidant properties of five *Mentha* species. *Iranian Journal of Pharmaceutical Research* 7(3):203–209.
- Pandey, G. 1988. *Dravyaguna Vijnana*. Materia medica: Vegetable drugs. Volume III. Krishnadas Academy, Varanasi, Uttar Pradesh, India.
- Pandey, M.M., S. Rastogi & A.K.S. Rawat. 2007. *Saussurea costus*: Botanical, chemical and pharmacological review of an ayurvedic medicinal plant. *Journal of Ethnopharmacology* 110(3):379–390. dx.doi.org/10.1016/j.jep.2006.12.033
- Rahman, A., S. Anjum, A. Farooq, M.R. Khan & M.I. Choudhary. 1998. Phytochemical studies on steroidal alkaloids of *Sarcococca saligna*. *Natural Product Letters* 11(4):297–304. dx.doi.org/10.1080/10575639808044963
- Rana, M.S. & S.S. Samant. 2011. Diversity, indigenous uses and conservation status of medicinal plants in Manali wildlife sanctuary, North western Himalaya. *Indian Journal of Traditional Knowledge* 10(3):439–459.
- Reyes-Garcia, V., V. Vadez, E. Byron, L. Apaza, W.R. Leonard, E. Perez & D. Wilkie. 2005. Market economy and the loss of folk knowledge of plant uses: Estimates from the Tsimane' of the Bolivian Amazon. *Current Anthropology* 46(4):651–656. www.jstor.org/stable/10.1086/432777
- Rokaya, M.B., Z. Münzbergová, B. Timsina & K.R. Bhattarai. 2012. *Rheum australe* D. Don: A review of its botany, ethnobotany, phytochemistry and pharmacology. *Journal of Ethnopharmacology* 141(3):761–774. dx.doi.org/10.1016/j.jep.2012.03.048
- Ruby, K., R. Chauhan, S. Sharma & J. Dwivedi. 2012. Polypharmacological activities of *Bergenia* species. *International Journal of Pharmaceutical Sciences Review and Research* 13(1):100–110. <http://globalresearchonline.net/journalcontents/v13-1/018.pdf>
- Samant, S.S., U. Dhar & L.M.S. Palni. 1998. *Medicinal Plants of Indian Himalaya: Diversity, distribution, potential value*. HIMAVIKAS Publication No. 13. Gyananodaya Prakashan, Nainital, India.
- Sastry, A.R.K. & S. Chatterjee. 2000. Prioritization of medicinal plants of India. Pp. 467–473 in *Setting Biodiversity Conservation Priorities for India. Volume 2*. Edited by S. Singh, A.R.K. Sastry, R. Mehta & V. Uppal. World Wildlife Federation-India, New Delhi, Delhi, India.

- Semwal, D.P., P.P. Saradhi, C.P. Kala & B.S. Sajwan. 2010. Medicinal plants used by local vaidyas in Ukhimath block, Uttarakhand. *Indian Journal of Traditional Knowledge* 9(3):480–485.
- Sharma, M. & H. Singh. 1990. Observations on floristic composition of Chamba District, Himachal Pradesh. *New Botanist* 17:273–281.
- Sharma, M. & H. Singh. 1997. Observations on the herbaceous vegetation of Chamba District. Pp. 147–153 in *Current Researches in Plant Sciences*. Edited by T.A. Sarma, S.S. Saini, M.L. Trivedi & M. Sharma. Bishen Singh Mahendra Pal Singh, Dehradun, India.
- Singh, H. & M. Sharma. 2006. *Flora of Chamba District*. Bishen Singh Mahendra Pal Singh, Dehradun, India.
- Singh, V. & H.S. Banyal. 2012. Diversity and ecology of mammals in Kalatop-Khajjar wildlife sanctuary, District Chamba (Himachal Pradesh), India. *International Journal of Science and Nature* 3(1):125–128. www.scienceandnature.org/IJSN_Vol3%281%29M2012/IJSN-VOL3%281%29-23.pdf
- Srivastava, T.N., B.K. Kapahi & Y.K. Sarin. 1992. Ethnobotanical studies in Lahul and Spiti, Himachal Pradesh. *Ancient Science of Life* 11(3&4):126–130.
- The Plant List. 2013. Version 1.1. www.theplantlist.org. Accessed March 2014.
- Thomson, M. & M. Ali. 2003. Garlic [*Allium sativum*]: A review of its potential use as an anti-cancer agent. *Current Cancer Drug Targets* 3(1):67–81. [dx.doi.org/10.2174/1568009033333736](https://doi.org/10.2174/1568009033333736)
- Tropicos.org. 2014. Missouri Botanical Garden. www.tropicos.org. Accessed March 2014.
- Uniyal, S.K., K.N. Singh, P. Jamwal & L. Brij. 2006. Traditional use of medicinal plants among the tribal communities of Chhota Bhangal, Western Himalaya. *Journal of Ethnobiology and Ethnomedicine* 2:14. [dx.doi.org/10.1186/1746-4269-2-14](https://doi.org/10.1186/1746-4269-2-14)