

Medicinal And Other Potential Use Of Wild Flora Found In Kumaun Area

Meenakshi Jalal¹ and Deeksha Nautiyal²

¹Department of forestry and environmental science DSB campus Nainital, Uttarakhand 263002, India – M.Sc student.

²Department of forestry and environmental science DSB campus Nainital, Uttarakhand 263002, India – Research scholar

Email: Minaxi.tou@gmail.com

Abstract: The use of the plant species of the Himalaya as medicine is known since the long time. These species play an important role in combating many diseases for time immemorial. They are turned as magic stick for people who can't go through proper medicinal treatment in terms of need, due to lack of money and scarcity of things. The species used are mostly wild flora present in Kumaun region. Wild flora mostly termed useless for people visiting Kumaun but these have tremendous ethanol medicinal and ethanol- veterinary property. If awareness is created for these worldwide and proper research is conducted then Kumaun might get groom in overall economy of people and they do not have to move out in search of their bread and butter. In this context, the current study was conducted in Khurpatal area situated at a distance of 8-10 km from Nainital located at 29.22° N and 72.25° E at an elevation of 1750m. All these data were collected during field survey participatory rural appraisal method. Detail study of 9 most common found species of the area was studied in terms of medicinal and other uses along with documentation of few other species. The species documented are widely used as a traditional medicine in hilly region all over Kumaun.

[Jalal M, Nautiyal D. **Medicinal and other potential use of wild flora found in Kumaun area.** *Researcher* 2015;7(4):14-22]. (ISSN: 1553-9865). <http://www.sciencepub.net/researcher>. 3

Key word: Wild flora, ethano medicinal, ethano veterinary and traditional medicinal.

Introduction-

India has richest plant based traditional medicinal system because of its rich biodiversity. Like India in other developing countries herbal plants constitute very important national resources of health sector. These herbal medicines are mainly used for health care due to their cost value, effectiveness and lesser side effects on human body (Sekar et al., 2010). Plants have played a key role in day today life support system of human beings from times immemorial. With the present day urge to gather knowledge of natural resources for their scientific and economic exploitation for various uses, the urgency of assessing botanical information at micro level has received special attention and thus requires afresh surveys to be conducted to know not only the floristic richness of the area but also the ethno medicinal practices prevalent therein. The estimated 95% of medicinal plants collected in India are from the wild and process of collection is said to be destructive because of the use of parts, like roots, barks, wood and whole plants. An estimate of the parts used by *Ayurvedic* industries are: roots – 29.6%, leaves – 25.8%, bark – 13.5%, wood– 2.8%, whole plant – 16.3% and rhizome – 4% and rest: seeds, flowers etc (Mathoo, 2003).

Uttarakhand, the state of India is well known for its rich diversity of medicinally important plants and associated traditional knowledge. The State is characterized by young fragile ecosystem, diminishing

biodiversity, marginalized and resource poor inhabitants with inadequate infrastructure. The intricate relation of poverty, unemployment and environment poses the most difficult challenge of sustainable agriculture development in hills. A large number of people migrate to other states in search of jobs. Under these circumstances forest NTFP's can provide a good source to provide employment to the inhabitants. NTFPs have a tremendous potential to create large scale employment opportunity thereby helping in reducing poverty and increasing empowerment of particularly tribal and poor people of the poorest and backward districts of the country. The State is blessed with thousands of species, however; about 320 species have been identified in terms of their medicinal value. The state is declared as "**Herbal State**" in 2003 by state government. The Forest Department claims to have knowledge of about 175 species, which are being commercially extracted and traded. But the District-wise invention has yet to be completed (*Final Report on Research Study on: "Mechanism for Sustainable Development & Promotion of Herbal & Medicinal Plants in the State of Uttaranchal"* 2004). 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 Uttarakhand, people use magical-religious therapy as- bhubuti, tantra-mantra and Jagar for supernatural power or local god but in natural therapies, like Ayurveda they use herbal product. Despite significance development of rural health services, village people still use herbal folk medicine to good extent for treatment of common ailment like cough, cold, burn, cut, body ache, constipation and others (tewari et.al 2009). Modern medicine today is fast growing with its branches spread for and wide in air of latest discoveries. Thus we can say root of present medicine was embedded in deep of ancient part.

Medicines developed from species have emerged as an important branch of study which focuses on the utility of different plant species and their properties as food, medicine and other uses. If the uses of plants done sustainably without a blind greed, then they may be turn into a power weapon to increase the economy of countries.

Keeping in view this need, the authors have surveyed the village of Nainital district for the presence of plants of medicinal importance used locally besides recorded in the ancient and modern texts. The present study documented few wild flora used as medicine for human, animal and their other uses like fodder, fuel wood.

Material and methods

The study area Sariyatal is situated in 29.22°N and 72.25°E at an elevation of 1750 m, situated in hill top at distance of 17-18 km from

Nainital city in Uttarakhand. Area is easily accessible by road. The vegetation is dominated by Pine forest, with well distributed ground flora, as we move up to Nainital the vegetation is covered with oak and *Cupressus* forest. Vegetation present around nursery area is- *Pinus gergii*, *Pinus roxburghii*, *Putli*, *Surai*, oak and wide variety of shrubs and herbs.

Climate

Climate of studied areas varies from tropical to alpine. It has temperate summer varies from max. 27°C- 7°C with chilling winter 15°C- (-3°C) with snow covered peak at higher mountain. In monsoon season humidity exceed 70% than average and receive high rainfall from July to end of September at the range between 37cm-50 cm.

Methods

PRA tool was used for identification of medicinal plant species collected during the survey and to explore the more information about the traditional knowledge with the help of indigenous people of the concern areas who have knowledge about the use of these medicinal plant species. The work was conducted among local people, rural persons, farmers to know the local names and medicinal importance of the mentioned plants. The collected information was re-examined by consulting important works pertaining to medicinal plants, Ethno-botany and Ethano-vetinary. The collected plant specimens were identified with the help of herbarium that occurs at different institutes, taxonomic experts of the organization and through nursery of forest department which was working on medicinal species.

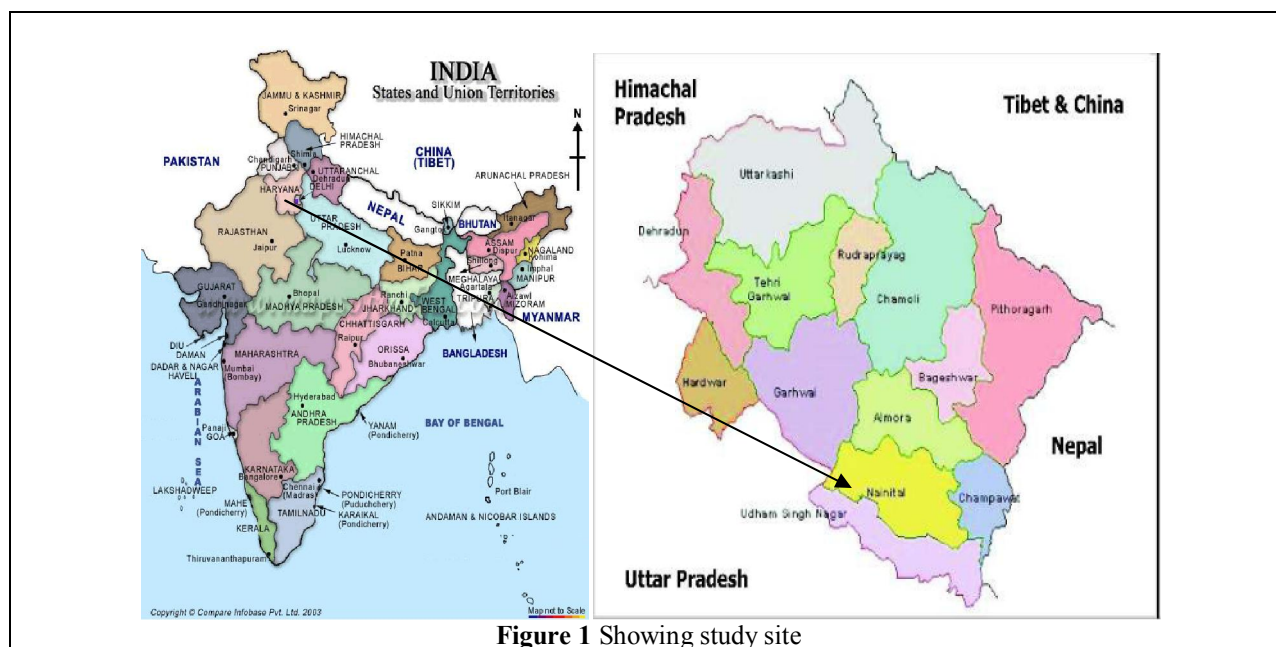


Figure 1 Showing study site

Results and discussion-

1. *Agave Americana* Linn./ Rambans ; Family-*agavaceae* ; Part used-Leaves Type shrub/herb



Agave americana is a large, rhizomatous succulent that grows in a wide range of conditions including cliffs, urban areas, woodlands, grasslands, riparian zones, beaches and sandy areas, and rocky slopes. *A. americana* is tolerant of wind, salt, high temperatures, and extreme drought. It can grow in shallow, very dry, low fertility soil and can colonies bare sand. It is grown for many reasons- ornamental, medicinal and agricultural. *Agave americana* has several uses: ornamental, medicinal, as a vertebrate poison, agricultural, fodder, erosion control.

Medicinal use-

- The sap of agaves is antiseptic, diaphoretic, diuretic and laxative and used internally for the treatment of diarrhea and dysentery (Chevallier, 1996).
- An infusion of the chopped leaf is purgative and the juice of the leaves is applied to bruises (Duke and Ayensu, 1985).
- Locally it is use to treat burn, bruises, minor cuts and external injury in animals.

Other uses-

- Agave is a good soil binder and is cultivated in sloppy and eroded area to stop soil erosion.
- In hilly areas agave work as a demarcation of boundaries or to protect crop from wild animals
- Agave when mature form wood use as a fuel wood or wood for making instruments.
- Fibers derived from *A. americana* have been shown to be more extensible than other natural fibers, and also exhibit high tensile strength and are low density and have a high moisture content (Msahli 2000, in El Oudiani *et al.*, 2009). Ropes and twines made from *A. americana* fiber were important

agriculturally (otherwise) in North Africa up until the 1960's (El Oudiani *et al.* 2009; Jaouadi *et al.*, 2009).

2. *Aspergus racemosum* Wild. Linn/Satavar Family-Aspergaceae; Part used-root/upper part Type – herb/climber



It is a species of asparagus common throughout India. It grows one to two meters tall and prefers to take root in gravelly, rocky soils high up in piedmont plains, at 1,300–1,400 meters elevation.

Medicinal use

- *Asparagus racemosus* is an important plant in traditional medicine in tropical and subtropical India. Its medicinal usage has been reported in the Indian.
- The roots are used in Ayurvedic medicine, following a regimen of processing and drying.
- The herb helps in digestion and alleviates ulcers and other inflammatory stomach ailments.
- Asparagus can restore hormonal balance in women who have fluctuating hormonal levels due to menstruation and menopause. It enhances fertility and regulates the menstrual cycle. It is a natural diuretic that reduces water retention.
- It helps with nervousness, pain, restless sleep, disturbing dreams and people with weak emotional and physical heart. The herb is useful for treating anorexia, insomnia, hyperactive children and people who are under-weight

3. *Berberis ariscata* DC. Linn/kilmora Family- Berberidaceae Part used- roots, stem, bark and fruits. Type- shrub.



Berberis aristata is characterized by an erect spiny shrub, ranging between 2 and 3 meters in height. It is a woody plant, with bark that appears yellow to brown from the outside and deep yellow from the inside. Prefers a warm moist loamy soil and light shade but it is by no means fastidious, succeeding in thin, dry and shallow soils, can be well managed in heavy clay soil.

Medicinal uses-

- The fruits of *Berberis aristata* DC. are given as a cooling laxative to children. Parmar, C. and M.K. Kaushal.(1982).
- The stem is said to be diaphoretic and laxative and useful in rheumatism. Parmar, C. and M.K. Kaushal.(1982).
- The bark of its root is a valuable medicine in intermittent and remittent fevers. Parmar, C. and M.K. Kaushal. (1982).
- Locally its root are used as a preparation of alcoholic drink and as a medicine for sugar patient.

Other potential use-

- Fruit of the species are eaten by local inhabitants.
- Plant is a good source of dye and tannin.
- Use as a soil binders and boundary protectors in hilly areas.
- Tree yield turmeric which is helpful in healing wound and work as antiseptic for animals in villages.

4. **Prinsepia utilis Royle.** /Linn Jhitalu, bakhel Family- Rosaceae Part used—seed and fruits. Type- shrub/small tree

Usually found in sunny open places on dry hillsides near any spring or water-course. It grows

well in semi-shade and direct sun, and prefers high levels of water. The plant is happy in any situation, exposed or sheltered. it is also called Himalayan cherry. Found widespread in Kumaun hill.



Medicinal uses

- Oil from the seed is rubefacient. It is applied externally as a treatment for rheumatism and muscular pain caused by hard work.
- The oil is also applied to the forehead and temples in the treatment of coughs and colds.
- The heated oilcake is applied as a poultice to the abdomen in the treatment of stomachaches.
- A paste of this seedcake is used as a poultice to treat ringworm or eczema.

Other uses-

- Hedge row and woodland margin.
- Fruit - raw or cooked. The fruit is up to 17mm long and contains a single large seed. Edible oil is obtained from the seed. It was used in cooking in past.
- A deep purple color obtained from the fruits is used for painting windows and walls. Plants are grown as a hedge in the Himalayas.
- Plants have an extensive root system and are used for binding the soil.
- Wood - very hard, compact, very liable to split.
- Its bushes like appearance give shelter to birds.

5. **Pyracantha cernulata** (D. Don) M. Roem. Linn Hisalu Family- Rosaceae Part used— seed and fruits. Type- shrub/small tree

Shrubberies, open slopes, cultivated areas. Prefers a good well-drained, moisture retentive loamy soil (Huxley. A). Succeeds in any soil that is warm and not very heavy. Another report says that it grows well in heavy clay soils. Succeeds in sun or part shade, though it does not fruit so well in a shady position. Susceptible to scab and fire blight(Thomas. G. S) , especially when grown on acid sandy soils. It is also called Himalayan Fire thorn due to its Yellow fruits.



Medicinal uses-

- Powdered or dried fruit combine with yoghurt use in blood dystenry.
- Leaves used to make herbal tree
- Thorns are used by some villagers in some kind of treatment of animal's diseases.

Other Uses-

- The fruits are rich in sugar.
- The ripe fruit is eaten fresh. The fruit is 6 - 8mm in diameter
- The plant makes an excellent hedge.
- Wood - hard, very close and even grained. Used for walking sticks.

6. ***Bohemeria rugulosa* wedd./** linn-Gethi
Family- *Urticaceae* Part used—bark and fruits. Type- tree

A small tree of open waste land and degraded places. It is found naturally on dry slopes. The bark is dark brown in color, very rough and deep fissures render it into small, more or less rectangular scales. Wood is dark red, moderately hard and heavy, smooth and even-grained

Medicinal uses-

- Juice of the bark is applied to treat fresh cuts and also helps in blood coagulation.
- The paste is applied in the sprain.

- Paste is also applied in boils of animals widely.

Other uses-

- It is a good fodder, of considerable importance locally.
 - Fruit of tree is consumed locally somewhere.
 - Wood when died used as a fuel wood
- *****



7. ***Callicarpa macrophylla* vahl** linn-daiya
Family- *Verbenaceae* Part used— leaves, roots and bark. Type- shrub/ small tree.



Callicarpa macrophylla is a species of beautyberry native to the Indian subcontinent. Its fruits are small white berries that actually are drupes. It is a deciduous found in Waste places and roadsides to 1800 meters [Gamble. J. S]. Normally mixed in forests at elevations of 100- 2000 metres in China. Requires a sunny position or light shade. Prefers a highly fertile well-drained loamy soil. This species is only requiring a warm sunny corner.

Medicinal use-

- The leaves are heated and applied as a poultice to ease the pain of rheumatic joints.
 - A decoction of the leaves is used in the treatment of diarrhoea and dysentery.
 - A juice made from the leaves mixed with equal portions of *Drymaria diandra* and *Oxalis corniculata* is used in the treatment of gastric troubles.
 - The root is chewed to relieve rashes on the tongue. A paste made from the roots is used to treat fevers.
 - The juice of the root is used to treat indigestion.
 - Oil obtained from the roots is aromatic and stomachic. It is assumed that this is an essential oil.
 - The inner bark is pounded and used as a poultice on cuts and wounds.
- The fruits are chewed to treat boils on the tongue. The juice of ripe fruits is used in the treatment of indigestion and fevers.

Other uses-

- Wood generally use as fuel wood.
- It is nowadays used as a fodder.

8. *Zanthoxylum alatum* Roxb. linn-Timur Family- Rutaceae Part used— leaves, branches and bark. Type- shrub/ small tree

It is known as winged prickly ash, tejbal, tejphal, timroo or Nepali dhaniya. The fruit of several species is used to make the spice . It is widely distributed throughout the warmer region of the world, Prefers a good deep well-drained moisture retentive soil in full sun or semi-shade.



Medicinal uses-

- The fruits, branches and thorns are considered to be carminative and stomachic. They are used as a remedy for toothache.
- The seeds and the bark are used as an aromatic tonic in the treatment of fevers, dyspepsia and cholera.
- The seeds and the bark are used as an aromatic tonic in the treatment of fevers, dyspepsia and cholera.
- The fruits, branches and thorns are considered to be carminative and stomachic. They are used as a remedy for toothache.
- The fruits, branches and thorns are considered to be carminative and stomachic they are used as a remedy for toothache.

Other uses-

- Edible uses - Seeds /Spice : A pepper substitute, it is widely used in the Orient. The Dried fruits can be used directly in a pepper mill. A light roasting brings out more of the flavor.
- Leaves- Young leaves are used as a condiment. They are used for flavoring and in pickles; they have the same aroma as the fruits.
- Wood -The wood is heavy, hard and close grained. It has been traditionally used for walking sticks. Toothbrushes are made from the branches.

9. *Pinus roxburghii* Sarg.linn-Pine; Family- Pinaceae ; Part used-cone, seed, and tree; Type- tree.



Pine commonly known as chirpine, is a tall tree with a spreading crown found in the Himalayan from Kashmir to Bhutan, Afghanistan and in southern Indian hills. It comes up tolerably well in the plains also and is sometimes planted in gardens for ornamental purposes. The chir pine occurs in the Himalayas almost exclusively in the outer hills and valleys, which receive the bulk of the rainfall during the monsoon (Anonymous, 2003).

Table 1: Various species of trees

Botanical name	Verneclular name	Family	Habitat	Part used	Uses
<i>Betula utilis</i> D.Don	Bhojpatra	betulaceae	Tree		Stomach ache
<i>Bauhinia variegata</i> L.	Koiralo	Fabaceae	Tree		Diarrhea, skin disease and diabetes
<i>Cassia fistula</i> Linn.	Amaltas	Fabaceae	Tree		Antiviral, toxic, ringworm
<i>Emblica officinalis</i> Garten.	Amla	Euphorbiaceae	Tree	Bark	Used in dysentery, constipation and body ache
<i>Syzygium cumini</i> (L.) S Keels	Jamun	Myrtaceae	Tree	Bark leaves	Bark juice used in diahorrehea, dystenary good for indigestion
<i>Citrus limon</i> (L.) Burm. f.	nimboo	Rutaceae	Tree	fruit	Decoction of root eases stomach disease.
<i>Ficus palmata</i>	Bedu	Moraceae	Tree	Fruit, Twigs	Used in treatment of lung with various things.
<i>Ficus roxburghii</i>	Timil	moraceae	Tree	fruit	Used as laxative

Table 2- various species of shrub/herb

<i>Berberis asiatica</i> Roxb.ex DC.	Kilmoda	Berberidaceae	Shrub	Bark	Used in diabetic, Paste used in externall injury.
<i>Lawsorvia vinermis</i> linn	Mehandi	lytheraceae	Shrub	Leaves	Skin disease hair tonic burning
<i>Murraya koenigii</i> Linn.	Curry patta	Rutaceae	Shrubs	all	Paste apply in skin disease
<i>Rubus ellipticus</i> Smith	Hishalu	Rosaceae	Shrubs	Whole plant	In various medicines
<i>Debregessia longifolia</i> (Burm.f.)wild	Tushar	Urticaeae	Shrubs	bark	Used in bone fracture
<i>Paracantha cernulata</i>	ghingaroo	Rosaceae	Shrubs	Fruit	Used as a heart tonic
<i>Urtica diota</i>	Bichu	Apiaceae	Shrubs	Leaves	Used with various substitute to treat Leprosy, power to healing wound.
<i>Flemingia strobilifera</i> R. Br	Veer-brat	Fabaceae	Herb	Root	Root decoction is used in cough, fever and bronchial disorder
<i>Eupatorium</i>	Kalbansh	Asteraceae	Herb	Leaves	Leaf juice is used in blood clotting

<i>adenophorum</i> Spreng					
<i>Asparagus racemose</i> Willd.	Satavari	Lilaceae	Herb	Root	To increase lactation in women and cattle

Medicinal use-

- The plant resin is sweet, bitter, pungent; and intestinal antiseptic.
- Internally, the colophony is used as a stomachic and externally as a plaster and is applied to buboes and abscesses for suppuration.
- The wood is considered stimulant, diaphoretic and useful in burning of the body, cough, fainting and ulceration.
- It is also useful in inflammations, asthma, chronic bronchitis, piles, diseases of the liver and spleen, urinary discharges, earache, toothache, lumbago, tuberculosis, scabies and epilepsy.

Other uses

- Wood is a good fuel wood and also used in building construction
- Seeds called chilgoza eaten by wild animals and local peoples
- Resin obtain from tree is a good source of income for villagers
- Dry pine leaves use for bedding for animals.
- Pine cone and wood used as a construction of decorative items and a source of small scale income.

10. **Grewia optiva drum.** Linn-bhimal; Family Malvaceae; Part used- bark. Type-tree

Grewia optiva is a small to medium-sized deciduous tree. This is a tree of the subtropical climate. It tolerates frost which is common during autumn and winter. The upper reaches receive light snowfall during January-February. Most of the rain is received during monsoon.

Medicinal uses-

- It is use to cure upset stomach, which reveal it has some antibiotic property but how is used clearly not described by locals.
- Bark paste applied externally in animal's stomach problem.

Other uses-

- It is used as a fodder for localities and mostly cultivated in bunds of fields.
- Wood is used as fuel wood.
- Baskets are also made from wood.
- Fiber used to make rope.

Documentation of some locally available trees, shrubs and herbs for the medicinal use.

Table 3 - Species and their indigenous uses in studied area.

Species	Indigenous Uses
<i>Emblica officinalis</i> Garten. (Amla)	Fruit eaten as raw to intake vitamin c, pickles and powdered form is also uptake.
<i>Berberis asiatica</i> Roxb.ex DC., (kilmora)	Root use as a sugar controller by dipping it overnight in water and drinking next morning.
<i>Ocimum sanctum</i> Linn (tulsi)	Leaves have good antibiotic property used to eat raw or in mixture of tea, water. Paste of leaves applied in wounds
<i>Lawsorvia vinermis</i> linn (mehandi)	Leaves paste are used as a good hair tonic to control dandruff and various diseases of hairs and paste is also applied in various skin diseases.
<i>Aegle marmelos</i> (Linn.) Corr. (bel)	Fruit juice is used in summer as it has a good cooling property.
<i>Bauhinia variegata</i> Linn. (kachnar)	Juice of root is given in snakebite
<i>Citrus limon</i> (L.) Burm. f.	Decoction of root eases stomach disease.
<i>Asparagus racemose</i> Willd. (satavr)	Root is used to increase lactation in women.

Conclusion:

The documented medicinal plants are found abundantly in hilly areas at barren and waste land. These species besides having medicinal property are a source of good soil binding. Traditionally using medicines by locals are use since many centuries but these are getting popularity with time in the name of Ayurveda. Increasing pressure on Ayurvedic medicine due to fewer side effects indirectly put pressure on medicinal plants. There is a need of conservation, cultivation and creating awareness on medicinal plants. The findings above throw light on abundantly found plants of Khurpatal area and their indigenous use. Uttarakhand in itself is a mine of many small scales work like medicinal use of plant, apiculture, dairy culture but there is a need to groom up the people technically so that these works which they inherited from their ancestors can compete with this modern world.

Acknowledgement:

I am thankful to Dr L.S Lodhiyal, assistance professor Kumaun University Nainital for attaching me with Forest research training academy which is working in medicinal plant as a M sc. Course work. I am obliged and grateful to Mr. Kuber Singh Bisht, DFO (Silviculturist Department Nainital). At the juncture I deeply feel thankful to villagers proving traditional knowledge, Range officer of Ganja Nursery, Mr. Kheem

Singh (Forester, Sariyatal Nursery) and the staff members of Sariyatal Nursery- Mr. Harish Singh Bisht, Mr. Govind Singh Bisht for giving me various important suggestions and providing me the necessary facilities. I found inexplicable the kind help and support given by my seniors- Mr. Bijender Lal. Miss Jyoti Pandey, Miss Deeksha nautiyal and Miss Anjali arya. I wish to express my gratitude to my Parents for supporting me throughout the time of survey work and various authors of research paper who help me to read a good literature.

Corresponding author

Meenakshi Jalal

Currently working as Intern

WWF, Harinagr kusumkhera, (Haldwani-26313)

Email: Minaxi.tou@gmail.com

References

1. *Anonymous (2003)*. The Wealth of India. A Dictionary of Indian Raw Materials and

Industrial Products, Raw Materials, CSIR, Publications and Information Directorate (PID), New Delhi, 8, 2003. p. 64-82.

2. Gaur, R.D. (1999). Flora of district Garhwal, north-west Himalaya: with ethno-botanical notes. Transmedia Publishing, Srinagar Garhwal, Uttarakhand, India.
3. Gamble, J. S. A Manual of Indian Timbers. Written last century, but still a classic, giving a lot of information on the uses and habitats of Indian trees.
4. Huxley, A. (1992) *The New RHS Dictionary of Gardening*. MacMillan Press ISBN 0-333-47494-5 (1992-00-00).
5. Kala, C.P. (2005a). Indigenous uses, population density and conservation of threatened medicinal plants in protected areas of the Indian Himalayas. *Conservation Biology*, 19:368-378
6. Maikhuri, R.K., Nautiyal, S., Rao, K.S., Saxena, K.G. (1998). Role of medicinal plants in the traditional health care system: a case study from Nanda Devi Biosphere Reserve. *Curr. Sci.* 75:152-157.
8. Negi, K.S., Tiwari, J.K., Gaur, R.D. (1985). Economic importance of some common trees in Garhwal Himalaya—an ethno-botanical study. *Ind. J. Forest* Pp. 276-289.
9. Parmar, C. and M.K. Kaushal. 1982. *Berberis aristata*. p. 10–14. In: Wild Fruits. Kalyani Publishers, New Delhi, India.
10. Samant, S.S., Dhar, U., Palni, L.M.S. (1998). Medicinal Plants of Indian Himalaya: Diversity Distribution and Potential Value. Gyanodaya Prakashan, Nainital.
11. Samant, S.S. (1993). Diversity and status of plants in Nanda Devi Biosphere Reserve. In: scientific and ecological expedition to Nanda Devi. Report of Army Head Quarters, New Delhi Pp. 54-85.
12. Sekar T, Ayyanar M, Gopalakrishnan M (2010). Medicinal plants and herbal drugs. *Curr. Sci.* 98(12):1558-1559.
13. Tewari, L.M., Kumari., Priti., Singh., Bibhesh., Joshi, Girish. K., 2009. Veterinary ethnomedicinal plant in uttrakhand himalya region, india: ethanobotanical leaflet 13:1312.
14. Thomas, G. S. (1992) *Ornamental Shrubs, Climbers and Bamboos*. ISBN 0-7195-5043-2 (1992-00-00).
15. Uniyal, M.R. (1977). Uttarakhand vanaushadhi Darashika CCRIMH, New Delhi.

3/21/2015