



Ethnobotanical survey of medicinal plants from Ilam District, East Nepal

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Abstract

An ethnobotanical survey was carried out on the utilization of medicinal plants by Brahman and Chhetri of Nayabazar VDC of Ilam District, East Nepal by interviewing traditional herbalists and various elderly men and women in April and May 2014. All together 102 plant species were recorded for their uses to cure at least 56 human ailments. These species, belonging to 64 families, are listed in alphabetical order, each with local name, parts used, methods of preparation and dose, route of administration, and local status of the plant.

Key words: *Brahman* and *Chhetri*, Ethnobotany, Medicinal properties, Terai and Chure

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Introduction

The use of plants and plant products for different purposes such as food, fodder, medicine, fiber, etc could be traced as far back as to the beginning of human civilization. Over the centuries people have depended on the plant resources around them and through trial and error have learned several properties and uses of plants including medicinal values. Around the world,

more than 20,000 plant species are being used for medicinal purposes in various human cultures (Lewington, 1993). Across the whole Himalayan Region, folk healers have a remarkable knowledge of herbs, accumulated through generations (Gupta *et al.*, 2014). In Nepal, it is reported that traditional healers use 1792 plant species for medicinal purpose (Baral and Kurmi, 2006). Therefore, medicines derived from

the plants have played a key role in health sector in maintenance of health and introduction of new treatment (Khanal, 2006).

The documentation of indigenous knowledge on the utilization of local plant resources by ethnic groups or different communities is one of the main objectives of ethnobotanical research (Rao, 1996). In Nepal, the study of ethnobotany started with the publication of a paper on medicinal and food plants by Banerji in 1955. Since then, many scientists have covered different ethnic groups in different geographical area. Number of studies such as Kunwar *et al.* (2010), Rokaya *et al.* (2010), Pandey (2013), Singh and Hamal (2013), Thapa *et al.* (2013), and Bhattarai and Acharya (2015) have documented valuable information on traditional use of medicinal plants from western Nepal. Similarly, Bhattarai *et al.* (2010), Uprety *et al.* (2010), and Thapa (2012) have documented ethno-botanical information from central Nepal. Rai (2004), Acharya and Pokhrel (2006), Gachhadar (2006), Maden *et al.* (2008), Parajuli (2012), Limbu and Rai (2013), and Bhattarai (2015) have documented ethnobotanical information based mainly on Meche, Bantar, Tharu, Rai and Limbu, Lepcha communities in eastern Nepal.

Documentation of indigenous knowledge is important for the conservation, utilization and assessment of the status of biological resources (Singh and Hamal, 2013). It is a fact that a large number of medicinal plants along with their indigenous knowledge are waiting for proper documentation (Chaudhary, 1998). Further, documentation of such knowledge is very important for sustainable utilization of natural resource and to face the challenges of biopiracy and patenting indigenous and traditional knowledge by others. There is also a need for

field survey among the natives about the available plants and their conservation status. Therefore, present study was aimed to document information on diversity of ethno-medicinal plants, parts used, methods of preparation, use and their local conservation status in Nayabazar VDC of Ilam, focusing to Brahman and Chhetri communities.

Materials and methods

Study area

Ilam is a hilly district situated in the eastern region of Nepal in Mechi Zone. Spatially it is located between latitudes 26°40' N - 27°08' N and longitudes 87°40' E - 88°10' E with area of 1,703 sq. km. The district stretches from lower belt of terai and chure to the upper hilly belt of the Himalayan region with altitude ranging from 140 m to 3636 m above sea level. The average annual temperature is 20.5°C and the average annual rainfall is 2500 mm. The tropical to alpine vegetation is found in the district with forest coverage of about 47 percent (DDC, 2015). The 2011 census counted 64,502 households with 290,254 people living in Ilam (CBS, 2013).

The study was conducted in Nayabazar VDC of Ilam district in east Nepal (Fig. 1). It is located in the north-east part of Ilam at an altitude ranging from 600 m to 2500 m asl. Geographically, the VDC extends between latitudes 26°54'46" N - 26°59'56" N and longitudes 88°02'7" E - 88°03'42" E. The total population of the VDC is 4743 (M= 2355, F=23880) living in 1090 households. The education level of this VDC is good with 79 % literacy rate. According to cast/ethnicity, Chhetris' population is highest (27%) with 1294 individuals, followed by Brahman (18%), Rai (16%), Sherpa (7.6%), Tamang (5%), Gu-

rung (5%), and remaining others (CBS, 2014). The main occupation in this VDC is agriculture. They cultivate potato, tea, medicinal plants (mainly *Swertia chirayita*), produce soft wood (mainly *Alnus nepalensis* and *Macaranga pustulata*) and milk production by cow rearing. Many people are also in foreign employment.



FIG. 1 MAP OF STUDY AREA

Data collection

This study was conducted between April and May 2014. The ethnobotanical data were collected through Participatory Rural Appraisal, which is based on interaction with local people and direct observation in the field (Martin, 1995). During the field visits, information about a number of plant specimens were collected through semi-structured interviews, focus group discussions and informal conversations with herbal practitioners. The unidentified plant specimens were collected and preserved as herbarium and were identified with the help of various literatures (Polunin and Stainton, 1984; Stainton, 1988; Shrestha, 1998; Press *et al.*, 2000) and deposited at the herbarium of District Plant Resources Office, Ilam. The nomenclature of Press *et al.* (2000) was followed. Based on information collected from the informants, all the human ailments were grouped into 11 categories *viz.* gastrointestinal disorders, ear, nose and throat (ENT) problems, dermatological disorders,

genito-urinary problems, skeleto-muscular problems, circulatory disorders, cut and wounds, fever and malaria, dental problems and other ailments.

Results and discussion

Plant diversity, their local status and uses

From the study 102 plants belonging to 94 genera and 64 families were documented to cure 56 human ailments (Tab. 1). Out of these plants, 95 were angiosperms (79 dicots and 16 monocots), 1 gymnosperm and 6 pteridophytes. Among the documented plants, herbs were the primary source of medicine (49%), followed by trees (25%), climbers (14%), shrubs (9%) and creepers (3%) (Fig. 2). This proportion was close with the study carried out in east (Limbu and Rai, 2013), central (Uprety *et al.*, 2010) and west Nepal (Rokaya *et al.*, 2010) but quite different from the study in NE India where trees were the main source of medicine followed by shrubs, climbers and herbs (Sharma *et al.*, 2014). About the local conservation status of the enumerated plant species, 42% were not so common, 30% were common, 12% dominant and 16% rare (Fig. 3). This information indicates that most of the plants were not commonly available on their natural habitat and their population is decreasing. Among the plants, 88% were wild and 12% were cultivated.

The study revealed that 82% plant species were reported to be used to cure more than one ailment, such as *Achyranthes aspera* (for cough, relieve pain, urine problem and tooth problem) and *Centella asiatica* (for cut and wounds, swelling testicles, throat pain and stomach diseases). Similarly, different plants used to cure single ailment such as *Cissus quadrangularis* and *Clematis connata* used in fracture. It was also found that most of the collected plants

Table 1. Ethnomedicinal plants documented at Nayabazar VDC, Ilam.

SN	Scientific name	Family	Local name	Parts used	Preparation and dose	Route of administration	Uses	Plant category; Habit	Local status of plant
1	<i>Acacia pennata</i> (L.) Willd.	Fabaceae	Arari	Root	Paste; as per required	Applied externally	Sprain	Dicot; S.	C.
2	<i>Achyranthes aspera</i> L.	Amaranthaceae	Apamarga	Root, stem	Powder or juice; 1-4 gram	Taken orally	Relieve pain, cough, urine problems, tooth problems	Dicot; H.	D.
3	<i>Acmella calva</i> (D.C.) Jansen	Asteraceae	Pire Jhar	Flower	2/3 flower heads taken raw	Taken orally	Fever, sore throat	Dicot; H.	C. (in rainy season)
4	<i>Acorus calamus</i> L.	Araceae	Bojho	Rhizome	Dried or fresh raw pieces; 1-2 gm	Taken orally	Sore throat, worms in stomach	Monocot; H.	C. (in wetlands)
5	<i>Aegle marmelos</i> (L.) Correa	Rutaceae	Bel	Fruit	Powder or paste; 3-6 gm	Taken orally	Ripe fruit against constipation, pneumonia, unripe fruit against diarrhoea	Dicot; T.	Nc.
6	<i>Allium sativum</i> L.	Alliaceae	Lasun	Leaf, bulb	Decoction or fried in ghee or oil; taken as per required	Taken orally	Gastritis, heart diseases, poisoning etc.	Monocot; H.	C. (Cultivated)
7	<i>Aloe vera</i> (L.) Burm f.	Asphodelaceae	Ghyukumari	Leaf	Pulp or juice, as per required	Eaten, applied	Pulp is eaten in liver problem or applied in bum	Monocot; H.	Nc. (Domesticated)
8	<i>Amaranthus</i> sp.	Amaranthaceae	Latte jhar	Stem, leaf	Juice; 4-5 gm	Taken orally	Diarrhoea	Dicot; H.	C. (in rainy season)
9	<i>Amomum subulatum</i> Roxb.	Zingiberaceae	Alainchi	Fruit	Powder; 1-2 gm	Taken orally	Nausea, gastritis	Monocot; H.	C. (Cultivated)
10	<i>Angiopteris evecta</i> (G. Frost.) Hoffm.	Marattiaceae	Gaikhure	Root	Powder; 3-4 gm	Taken orally	Fracture	Pteridophytes; T.	R.
11	<i>Artemisia indica</i> Willd.	Asteraceae	Titepati	Stem, leaf	Juice; as per required	Applied externally	Skin diseases, allergy	Dicot; H.	D.
12	<i>Asparagus racemosus</i> Willd.	Asparagaceae	Kurilo	Tuberous root, young shoot	Powder or curry; as per required	Taken orally	Increase lactation in women and animals	Monocot; H.	R.
13	<i>Asparagus curillus</i> Buch.-Ham. ex D. Don	Asparagaceae	Kurilo	Young stem	Cooked to make curry; as per required	Taken orally	Urine problems, high blood pressure	Monocot; H.	R.

14	<i>Astilbe rivularis</i> Buch.-Ham. ex D. Don,	Saxifragaceae	Budo okhati/thulo okhati	Root	Powder or decoction 10-15 gm; as per required	Decoction or powder is taken orally	Fracture, body ache, and given to postpartum recovery	Dicot; H.	Nc.
15	<i>Begonia picta</i> Smith.	Begoniaceae	Makar kanche	Rhizome	Powder; 2-4 gm	Taken orally	Diarrhoea, high blood pressure	Dicot; H.	D.
16	<i>Berberis aristata</i> DC	Berberidaceae	Chutro	Root, bark	Powder; 1-4 gm	Taken orally	Diarrhoea, high blood pressure, malaria, jaundice	Dicot; S.	D.
17	<i>Bergenia ciliata</i> (Haw.) Sternb.	Saxifragaceae	Pakhenbed	Root, leaf	Paste, powder or juice as per required	Applied externally or taken orally	Root paste is applied in wound, root or leaf powder is taken orally in diabetes and calculi	Dicot; H.	Nc.
18	<i>Cassia fistula</i> L.	Fabaceae	Rajbrikchha	Seed	1 piece taken raw.	Taken orally	Diarrhoea, vomiting	Dicot; T.	R.
19	<i>Centella asiatica</i> (L.) Urb.	Umbelliferae	Ghodtapre	Leaf	3-4 fresh raw leaves or paste	Taken orally or applied	Swelling testicles, sore throat, stomach diseases, cut and wound	Dicot; H.	C.
20	<i>Cissus adnata</i> Roxb	Vitaceae	Jadelo	Stem	Juice; 1-2 drops	Applied externally	Eye problem	Dicot; Cl.	Nc.
21	<i>Cissus quadrangularis</i> L.	Vitaceae	Hadjora	Stem, root	Paste; 2-3 gm	Applied externally	Sprain and fracture, cut and wound	Dicot; Cl.	R.
22	<i>Citrus junos</i> Tanaka	Rutaceae	Kali jyamir	Fruit	Raw; 40-50 gm	Taken orally	Dysentery	Dicot; T.	Nc. (Cultivated)
23	<i>Clematis buchana-niana</i> DC.	Ranunculaceae	Pinesa lahara	Leaf	Juice; 2-4 drops	Put inside nostril	Sinusitis, epistaxis (nasal bleeding)	Dicot; Cl.	Nc.
24	<i>Clematis connata</i> DC.	Ranunculaceae	Bhainselahara	Bark	Powder; 3-4 gm	Taken orally	Sprain and fracture	Dicot; Cl.	R.
25	<i>Myrsine seguinii</i> H.Lev..	Myrsinaceae	Bakalpate	Leaf	Juice or paste is used as per required	Taken orally or applied externally	Sprain and calculi (stone disease)	Dicot; T.	Nc.
26	<i>Chilocostus speciosus</i> (J. Konig)C. Specht	Costaceae	Betlauri	Stem	Juice is used as per required	Taken orally	Dysuria (Burning urination)	Monocot; H.	Nc.
27	<i>Curcuma caesia</i> Roxb.	Zingiberaceae	Kalo haledo	Root	Paste is applied as per required	Applied externally	Sprain	Monocot; H.	R.
28	<i>Curcuma longa</i> L.	Zingiberaceae	Besar	Rhizome	Powder; 5 gm	Taken orally	Cough and cold	Monocot; H.	C. (Cultivated)

29	<i>Cuscuta reflexa</i> Roxb.	Convolvulaceae	Binajari	Stem	Juice or powder; 10-15 gm	Taken orally	Jaundice	Dicot; Cl.(parasitic)	R.
30	<i>Cyathea spinulosa</i> Wall.ex Hook.	Cyatheaceae	Thulo unu	Young leaf	Cooked to make curry; as per required	Taken orally	Menorrhagia (excessive bleeding in menstruation)	Pteridophytes; T.	R.
31	<i>Cynodon dactylon</i> (L.) Pers	Poaceae	Dubo	Whole plant	Crushed and juice is used as per required	Taken orally or applied externally	Tonic, skin disease, eye disease	Monocot; H.	D.
32	<i>Datura stramonium</i> L.	Solanaceae	Dhaturu	Fruit	Powder; 1-2 gm	Taken orally	Against poisoning	Dicot; H.	Nc.
33	<i>Dichroa febrifuga</i> Lour.	Hydrangeaceae	Bashak	Young shoot	Young shoots eaten raw; 2-3 tips	Taken orally	Fever and malaria	Dicot; S.	Nc.
34	<i>Dioscorea</i> sp.	Dioscoreaceae	Rato tarul	Root	Powder; 50-60 gm	Taken orally	Pro-lapse (<i>Ang Khasne</i> problem), menorrhagia	Dicot; Cl.	Nc.
35	<i>Diplazium esculentum</i> (Retz.)SW., Schrad.	Woodsiaceae	Jire unu	Stem, leaf	Paste is applied as per required	Applied externally	Cut and wound	Pteridophytes; H.	D.
36	<i>Dolichos tenuicaulis</i> (Baker) Craib	Fabaceae	Gahat	Seed	Juice; 20-30 ml	Taken orally	Measles	Dicot; H.	Nc. (Cultivated)
37	<i>Drymaria cordata</i> (L.) Wild.ex Roemer and Schultes	Caryophyllaceae	Avijalo, pinesajhar	Stem	Juice; 1-2 gm	Enhaled by nostrils.	Sinusitis	Dicot; H.	C.
38	<i>Eclipta prostrata</i> (L.) L.	Asteraceae	Bhringaraj	Stem, leaves	Paste of 5-6 leaves	Applied externally	Control bleeding from cut and wound	Dicot; H.	C.
39	<i>Entada phaseoloides</i> (L.) Merr.	Fabaceae	Pangro	Seed	Paste is applied as per required	Applied externally	Wound by burning	Dicot; Cl.	Nc.
40	<i>Eriobotrya elliptica</i> Lindl.	Rosaceae	Maya	Bark	Powder; 15-20 gm	Taken orally	Joint ache, back ache	Dicot; T.	Nc.
41	<i>Euodia fraxinifolia</i> (D. Don) Hook. f.	Rutaceae	Khanakpa	Fruit	Powder; 3-4 gm	Taken orally or applied as per required	Vomiting, dizziness, applied in allergy	Dicot; T.	Nc.
42	<i>Eupatorium adenophorum</i> Spreng.	Asteraceae	Kalijhar	Leaf	Juice, as per required	Applied externally	Control bleeding from cut and wound	Dicot; H.	D.
43	<i>Euphorbia heterophylla</i> L.	Euphorbiaceae	Dudhe jhar	root, leaf	Latex or paste or juice is used as per required	Applied externally	Ring worm, skin warts etc.	Dicot; H.	D.

44	<i>Fragaria daltoniana</i> J. Gay	Rosaceae	Bhuin ainselu	Stem	Paste is used as per required	Applied externally	In cut and wound	Dicot; Cr.	D.
45	<i>Fraxinus floribunda</i> Wall.	Oleaceae	Lankuri	bark	Powder; 15-20 gm	Taken orally	Sprain, gastritis	Dicot; T.	Nc.
46	<i>Gleichenia gigantea</i> Wall. ex Hook.	Gleicheniaceae	Hade unu	Leaf	Paste is used as per required	Applied externally	In cut and wound	Pteridophytes; S.	C.
47	<i>Gonatanthus pumilus</i> (D. Don) Engler & Krause	Araceae	Mane	corm	Paste is used as per required	Applied externally	Used in boils	Monocot; H.	C.
48	<i>Gonostegia hirta</i> (Blume) Miq.	Urticaceae	Chiple ghans	Whole plant	Paste or juice is used as per required	Applied externally as well as taken orally	To facilitate child birth taken orally. Paste also applied in sprain and fracture along with <i>Viscum album</i>	Dicot; Cr.	D.
49	<i>Heracleum nepalense</i> D. Don	Apiaceae	Chingphing	Fruit	Raw pieces; 3-4 gm	Taken orally	Headache, vomiting	Dicot; H.	Nc.
50	<i>Jasminum</i> sp.	Oleaceae	Jai	Leaf	Raw leaves; 3-4 in number	Taken orally	Sore throat, stomach problem	Dicot; Cl.	R. (domesticated)
51	<i>Justicia adhatoda</i> L.	Acanthaceae	Asuro	Leaf, flower	Powder or juice 3-5 gm ; paste as per required.	Taken orally or massage externally.	Cough and asthma, in sprain leaf paste is applied.	Dicot; S.	Nc.
52	<i>Kaempferia rotunda</i> L.	Zingiberaceae	Bhuin champa	Root	Paste is used as per required	Applied externally	In cut and wound, in sprain leaf paste is applied	Monocot; H.	C.
53	<i>Lindera neesiana</i> (Wall. ex Nees) Kurz,	Lauraceae	Siltimur	Fruit	Decoction is used as per required	Taken orally	Cough, cold and sore throat	Dicot; T	C.
54	<i>Lobelia pyramidalis</i> Wall.	Campanulaceae	Eklebir	Root, srtem	Paste is applied as per required	Applied externally	In leucoderma	Dicot; H.	Nc.
55	<i>Macropanax undulatus</i> (Wall. ex G. Don) Seem.	Araliaceae	Chinde	Young shoot, root	Shoot is eaten by making curry or pickle; root ash is applied as per required	Taken orally or applied	Eaten in calculi, stomach problems and cancer, root ash applied in caterpillar hair infection	Dicot; T.	Nc.

56	<i>Mentha arvensis</i> L.	Lamiaceae	Mentha	Stem, leaf	Juice of 4-5 fresh leaves	Applied externally	In cough, cold and fever	Dicot; H.	Nc.
57	<i>Mentha piperita</i> L.	Lamiaceae	Pudina	Stem, leaf	Juice of 4-5 fresh leaves	Taken orally	Stomach problems	Dicot; H.	Nc.
58	<i>Michelia champaca</i> L.	Magnoliaceae	Payanlo champ	Bark	Powder; 3-4 gram at a time	Taken orally	Respiratory problems	Dicot; T.	Nc.
59	<i>Mirabilis jalapa</i> L.	Nyctaginaceae	Lankasani	Root	Powder; 40-50 gm	Taken orally	In uterine diseases of women	Dicot; H.	C.
60	<i>Mussaenda macrophylla</i> Wall.	Rubiaceae	Dhobini	Root	Decoction or paste of 5-7 gm pieces.	Taken orally	Fever, pneumonia etc.	Dicot; S.	Nc.
61	<i>Neopicrorhiza scrophulariiflora</i> (Pennell) D.Y. Hong	Scrophulariaceae	Kutki	Root	Powder; 1-3 gm	Taken orally	In jaundice, liver problems, skin diseases	Dicot; H.	R.
62	<i>Nephrolepis auriculata</i> (L.) Trimen	Nephrolepidaceae	Pani amala	Root-bulb	Taken raw, 1-2 balls.	Taken orally	In stomach problems and worms infestation	Pteridophytes; H.	C.
63	<i>Nyctanthes arbor-tristis</i> L.	Oleaceae	Parijat	Root-bark, leaf, seed	Juice or paste applied as per required	Applied	Root paste applied in snake bite; seed paste used to prevent baldness	Dicot; T.	Nc.
64	<i>Ocimum tenuiflorum</i> L.	Lamiaceae	Tulsi	Whole plant	Juice or powder 1-2 gram	Taken orally	Vomiting, joint pain, urinary diseases	Dicot; H.	C. (domesticated)
65	<i>Oroxylum indicum</i> (L.) Kurz	Bignoniaceae	Totala	Seed, flower, bark	Ash or curry or bark juice is used	Taken orally	Increase appetite, reduce high blood pressure, jaundice	Dicot; T.	Nc.
66	<i>Paris polyphylla</i> Sm.	Trilliaceae	Satuwa	Root	Dried pieces; 1-2 gm at a time.	Taken orally	Aphrodisiac; indigestion and in stomach problems	Monocot; H.	R.
67	<i>Persea odoratissima</i> (Nees) Kosterm.	Lauraceae	Kaulo	Root, bark	Powder; 10-12 gm	Taken orally	Used in constipation, and in piles	Dicot; T.	Nc.
68	<i>Phyllanthus emblica</i> L.	Euphorbiaceae	Amala	Bark, seed	Powder; 15-20 gm	Taken orally	Used as blood purifier, stomach problems	Dicot; T.	Nc.
69	<i>Phytolacca acinosa</i> Roxb.	Phytolaccaceae	Jaringo	Root, stem, leaf	Decoction or powder as per required	Taken orally	In stomach problems	Dicot; H.	Nc.

70	<i>Piper longum</i> L.	Piperaceae	Pipla	Fruit	Powder; 2-3 gm	Taken orally	Indigestion, throat problem.	Dicot; Cr.	Nc.
71	<i>Piper nigrum</i> L.	Piperaceae	Marich	Fruit	Scent; single fruit	Applied externally	remove corneal opacities, fruit is chewed then warm scent passed to eye with breathing out	Dicot; Cl.	Nc.
72	<i>Plumbago zeylanica</i> L.	Plumbaginaceae	Chitu	Root	Paste as per required	Applied externally	In fracture	Dicot; H.	Nc.
73	<i>Potentilla fulgens</i> Wall. ex Hook.	Rosaceae	Banmulla/bajradanti	Root	Decoction or dried piece is chewed	Taken orally	Headache, sore throat	Dicot; H.	Nc.
74	<i>Pyrus pashia</i> Buch-Ham. ex Don.	Rosaceae	Mel	Fruit	Decoction as per required	Taken orally	Dysentery	Dicot; T.	C.
75	<i>Quercus lamellosa</i> Sm.	Fagaceae	Bajranth	Bark	Powder; 3-5 gm	Taken orally	In gastritis, used as tonic.	Dicot; T.	Nc.
76	<i>Rheum acuminatum</i> Hook. f. & Thomson ex Hook	Polygonaceae	Khokim/padamchal	Root	Juice; 5-7 ml	Taken orally	In cough and respiratory problems	Dicot; H.	Nc.
77	<i>Rhus wallichii</i> Hook. f.	Anacardiaceae	Bhalayo	Bark	Ash; 2-3 gm	Applied on infected parts	Skin diseases, scabis, ring worm etc .	Dicot; T.	C.
78	<i>Rubia manjith</i> Roxb. ex Fleming	Rubiaceae	Majitho	Root	Powder; 2-3 gm	Taken orally	Dysentery, calculi, urinary or sex organ diseases	Dicot; Cl.	D.
79	<i>Rubus ellipticus</i> Sm.	Rosaceae	Kande ainselu	Root	Paste as per required	Taken orally	In dysentery	Dicot; S.	C.
80	<i>Rumex nepalensis</i> Spreng.	Polygonaceae	Halhale	Root	Paste as per required	Applied externally	In ring worm	Dicot; H.	C.
81	<i>Sambucus canadensis</i> L.	Sambucaceae	Jaliphool	Leaf	Juice; 10 ml	Taken orally	Sore throat	Dicot; T.	C.
82	<i>Santalum album</i> L.	Santalaceae	Srikhanda	Stem	Paste as per required	Applied or taken orally	Skin lesion, pneumonia, burning sensation in stomach	Dicot; T.	R.
83	<i>Selinum wallichianum</i> (DC.) Raizada & Saxena	Apiaceae	Bhutkesh	Root, stem	Powder; 5 gm	Taken orally along with milk	Circulatory diseases, high blood pressure	Dicot; H.	Nc.
84	<i>Smilax aspera</i> L.	Smilacaceae	Kukurdiano	Stem	Powder; 3-4 gm	Applied on infected parts.	Skin lesion, especially in rainy season.	Monocot; S.	Nc.
85	<i>Stephania glandulifera</i> Miers	Menispermaceae	Gudargano	Root-tuber	Powder; 3-4 gm	Taken orally	Sprain, fatigue, gastritis	Dicot; Cl.	R.

86	<i>Swertia chirayita</i> (Roxb. ex Fleming) Karsten	Gentianaceae	Chiraito	Whole plant	Decoction or infusion	Taken orally	Fever, gastritis, high blood pressure	Dicot; H.	C. (Cultivated)
87	<i>Tagetes minuta</i> L.	Asteraceae	Sayapatri	Flower	Fresh floret; 3-4 gm	Taken orally	Cough, cold, respiratory and urinary problems	Dicot; H.	C.
88	<i>Taxus wallichiana</i> Zucc.	Taxaceae	Lauth sallo	Leaf	Powder; 3-4 gm	Taken orally	Appetizer, in cancer	Gymnosperm; T.	R. (Cultivated)
89	<i>Tectaria coadunata</i> (Wall. ex J.Sm) C.Chr.	Dryopteridaceae	Kali unu	Root	Decoction as per required	Taken orally	Dysentery	Pteridophytes; H.	C.
90	<i>Terminalia bellirica</i> (Gaertn.) Roxb.	Combretaceae	Barro	Fruit	Powder as per required	Taken orally	Gastritis, increase digestive power	Dicot; T.	C.
91	<i>Terminalia chebula</i> Retz.	Combretaceae	Harro	Fruit	Powder; 4-5 gm	Taken orally	Cough and cold, high blood pressure	Dicot; T.	C.
92	<i>Tinospora sinensis</i> (Lour.) Merr.	Menispermaceae	Gurjo	Stem, leaf	Powder; 3-4 gm	Taken orally	Burning sensation of stomach, in cancer (along with <i>Taxus wallichiana</i>)	Dicot; Cl.	Nc.
93	<i>Trichosanthes tricuspidata</i> Lour.	Cucurbitaceae	Indrani	Root, fruit	Powder as per required	Taken orally	Stomach problems, to prevent from cold	Dicot; Cl.	C.
94	<i>Trigonella foenum-graecum</i> L.	Fabaceae	Methi	Fruit, seed	Powder; 1-2 gm	Taken orally; applied as per required	prevent from cold; applied in boils to open it faster	Dicot; H.	Nc. (Cultivated)
95	<i>Urtica dioica</i> L.	Urticaceae	Sisno	Root, stem	Root paste or decoction of stem	Taken orally	Stomach problems, in high blood pressure, diabetes	Dicot; H.	D.
96	<i>Valeriana jatamansi</i> Jones.	Valerianaceae	Sugandhwal	Whole plant	Powder; 2-4 gm	Taken orally	In nerves problems	Dicot; H.	C.
97	<i>Viscum album</i> L.	Loranthaceae	Hadchur	Whole plant	Powder; 5-7 gm	Taken orally	Metrorrhagia (irregular menstruation), body ache, sprain fracture	Dicot; Cl. (semi-parasitic)	R.
98	<i>Woodfordia fruticosa</i> (L.) Kurz.	Lythraceae	Dhayero	Flower	Taken raw; 2-3 fresh or dried flower	Taken orally	Dysentery	Dicot; T.	C.
99	<i>Zanthoxylum acanthopodium</i> DC.	Rutaceae	Boke timur	Fruit	Decoction or 1-2 pieces eaten raw	Taken orally	Fever, tooth ache, gastritis	Dicot; T.	Nc.

100	<i>Zingiber cassumunar</i> Roxb.	Zingiberaceae	Phachhyang	Root	Taken raw; 5-10 gram dried or fresh pieces	Taken orally	In dry cough	Monocot; H.	R.
101	<i>Zingiber officinale</i> Rosc.	Zingiberaceae	Aduwa	Rhizome	Juice or decoction or baked in fire	Taken orally	In cough and cold	Monocot; H.	C. (Cultivated)
102	<i>Zizyphus mauritiana</i> Lam.	Rhamnaceae	Bayer	Fruit	Taken raw; 3-4 gm	Taken orally	Fever and pneumonia	Dicot; S.	Nc.

were used for the treatment of gastro-intestinal problems (36 sp.), followed by ENT and Ophthalmological problems (23 sp.), dermatological problems (17 sp.), genito-urinary problems (16 sp.), skeletal-muscular problems (15 sp.), circulatory disorders (14 sp.), cut and wounds (10 sp.), respiratory disorders (6 sp.), fever, malaria (5 sp.), dental problems (2 sp.) and other ailments (9 sp.) (Fig. 4).

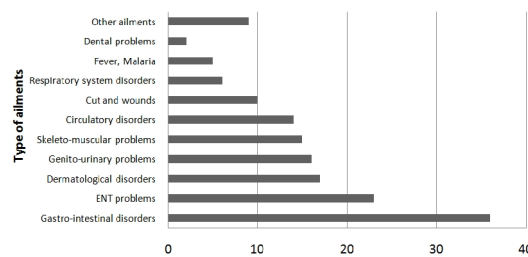


Figure 4. Type of ailments and number of plant species used.

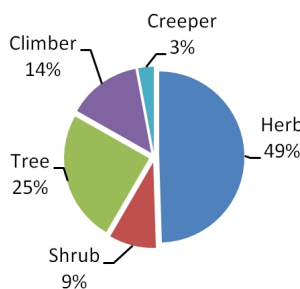


Figure 2. Form of enumerated plants.

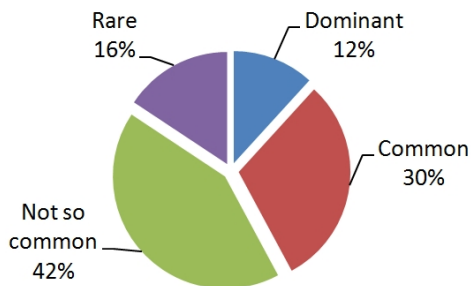


Figure 3. Local status of plants

Plant parts used, medical preparation and admission

The different parts of plants such as root, rhizome, tuber/bulb, bark, young shoot, leaves, flowers, fruits, seeds, whole plant etc. were used as medicines. The most commonly used parts of ethnomedicinal plants were leaves (32%), roots (24%), whole plant (13%) followed by fruits (9%), seeds (6%) and flowers (6%) (Bhat *et al.*, 2013). In this study area, the maximum number of species were harvested for underground parts (30%), leaf (20%), stem (19%) and fruit (11%), followed by bark, seed, whole plant and flower (Fig. 5), which is similar with the study in North Sikkim (Pradhan and Badola, 2008) and Darjiling (Chettri *et al.*, 2014). The removal of underground parts or whole plant or excessive removal of fruits or seeds lead to decline plant population, compared to this the removal of leaves or aerial parts is

much more sustainable (Rokaya *et al.*, 2010). Usually the different parts of plants were used in different forms such as juice, decoction, infusion, paste, powder, ash etc. Sometimes, fresh or dried plants parts were used in their raw forms (Thapa, 2012). In this study, powder (31%), paste (20%) and juice (19%) were found to be used more often in comparison to raw form (13%), decoction (11%), cooked (6%), ash (2%), and others (2%) (Fig. 6).

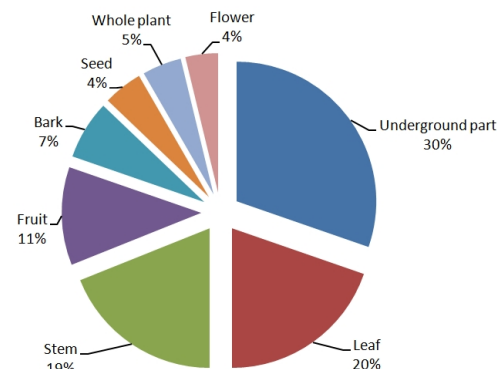


Figure 5. Frequency of plant parts used

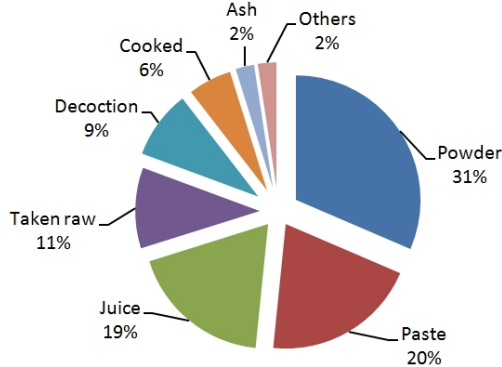


Figure 6. Mode of preparation of medicine

External applications as well as internal consumption are involved in the treatment of diseases. It was found that oral (69%), external application (28%), scent/inhaled (3%) were the major route of administration on medicine (Fig. 7). Similar preparation and administration were also

documented from inside Nepal (Upriety *et al.*, 2010; Rokaya *et al.*, 2010; Thapa, 2012; Bhattarai and Acharya, 2015) and from outside Nepal (Pradhan and Badola, 2008; Sri-thi *et al.*, 2009). Most of the preparations include single plant species and in rare case the combinations of two or more species. In this study, combinations of two or more species were preferred in the treatment of fracture.

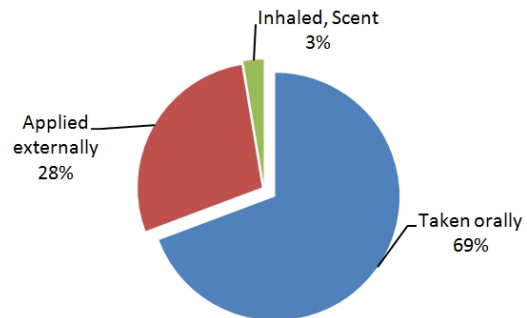


Figure 7. Route of administration of medicine

Management of plants

Although some of the elderly people and women of Nayabazar VDC have enormous knowledge about the medicinal use of the plants, they hardly share their knowledge to the outsiders with the belief that the medicines would lose their effectiveness if revealed to other people (Bhat and Jacobs, 1995). This non-sharing attitude must have been one of the strongest reasons for the decline of this archaic system of medicine (Pradhan and Badola, 2008). The medicinal plants used were collected nearby forest but their population gradually decreasing due to habitat destruction, deforestation and unsustainable harvesting. In order to reverse this trend cultivation of these plants should be taken up (Chhetri *et al.*, 2005). The traditional knowledge about medicinal plant is rapidly eroding (Khanal, 2006), as young generation found to have less interest and knowledge about medicinal use of plant

(Bhattarai and Acharya, 2015). It is utmost important to share and document the knowledge and experiences of plants which can help for economic development and genetic resources conservation (Parajuli, 2011). Introducing techniques of ex-situ cultivation of commercially beneficial species, development of *home herbal garden* (Bhattarai, 2015), sustainable harvesting, effective domestication methods, participatory management, education and awareness programmes to the community are key strategies that can help optimize the benefits of the medicinal plants sector in Nepal (Uprety *et al.*, 2010). Therefore, the benefits obtained from this knowledge should equitably be shared within the community of the study area (Rokaya *et al.*, 2010) that help for the revival of traditional knowledge and conservation of valuable medicinal plants of this area.

Conclusion

Nayabazar VDC of Ilam is rich in ethno-medicinal plants which still need more exploration. It is a fact that many modern medicines have been formulated from the herbal plants through an ethnobotanical approach (Cox and Balick, 1994). So, Department of Plant Resources (DPR) should investigate and verify the phytochemical content from the information's obtained from this study and should involve in the development of medicine, benefit sharing and sustainable utilization.

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References

- Acharya, E. and B. Pokhrel 2006. Ethno-medicinal plants used by Bantar of Bhaudaha, Morang, Nepal. *Our nature* 4: 96-103.
- Banerji, M.L. 1955. Some edible and medicinal plants from East Nepal. *J. Bombay Nat. Hist. Soc.* 53: 153-155.
- Baral, S.R. and P.P. Kurmi 2006. *A compendium of medicinal plants in Nepal*. Mrs. Rachana Sharma, Maiju Bahal, Chabahil, Kathmandu, Nepal.
- Bhat, J.A., M. Kumar and R.W. Bussmann 2013. Ecological status and traditional knowledge of medicinal plants in Kedarnath Wildlife Sanctuary of Garhwal Himalaya, India. *Journal of Ethnobiology and Ethnomedicine* 9: 1.
- Bhat, R.B. and T.V. Jacobs 1995. Traditional herbal medicine in Transkei. *Journal of Ethnopharmacology* 48: 7-12.
- Bhattarai, K.R. 2015. *Ethnobotanical plants use by Lepcha tribe of Ilam District, East Nepal*. A report, Department of Plant Resources, District Plant Resources Office, Ilam.
- Bhattarai, K.R. and S.K. Acharya 2015. Documentation of ethnobotanical knowledge of Tharu people on the utilization of plant resources in Gadariya and Phulwari VDCs of Kailali District, West Nepal. *Bull. Dept. Pl. Res.* 37: 41-50.
- Bhattarai, S., R.P. Chaudhary and R.S.L. Taylor 2010. Ethnomedicinal plants used by the people of Nawalparasi district, Central Nepal. *Our nature* 7: 82-99.
- CBS 2013. *Statistical year book of Nepal 2013*. Government of Nepal, National Planning Commission Secretariat, Central Bureau of Statistics, Kathmandu, Nepal.
- CBS 2014. *National Population and Housing Census 2011- Ilam (Vol. 06)*. Government of Nepal, National Planning Commission Secretariat, Central Bureau of Statistics, Kathmandu, Nepal.
- Chaudhary, R.P. 1998. *Biodiversity in Nepal: Status and Conservation*. S. Devi, Saharapur, India and Tecpress Books, Bangkok, Thailand.
- Chettri, D., S. Moktan and A.P. Das 2014. Ethnobotanical studies on the tea garden workers of Darjiling Hills. *Pleione* 8(1): 124-132.
- Chhetri, D.R., D. Basnet, P.F. Chiu, S. Kalikotay, G. Chhetri and S. Parajuli 2005. Current status of

- ethnomedicinal plants in the Darjeeling Himalaya. *Current Science* **89(2)**: 664-668.
- Cox, P.A. and M.J. Balick 1994. The ethnobotanical approach to drug discovery. *Scientific American*. **270(6)**: 82-87.
- DDC 2015. *District Development Plan, Ilam*. Government of Nepal, Ministry of Federal Affairs and Local Development, District Development Committee Office, Ilam, Nepal.
- Gachhadar, P. 2006. *Indigenous knowledge and practices on medicinal plants among Tharu community in Eastern Nepal*. (http://himalaya.socanth.cam.ac.uk/collections/rarebooks/downloads/Gachhadar_Indigenous_Knowledge.pdf (20/01/2015))
- Gupta, P., V.K. Sharma and S. Sharma 2014. *Healing traditions of North-western Himalayas*. <http://www.springer.com/978-81-322-1924-8>.
- Khanal, M. 2006. *Non-timber forest products use in two villages of Lumbini Zone, Nepal*. University of Natural Resources and Applied Life Sciences, Vienna, Austria. (M.Sc. dissertation)
- Kunwar, R.M., C. Burlakoti, C.L. Chowdhary and R.W. Bussmann 2010. Medicinal plants in Farwest Nepal: Indigenous use and pharmacological validity. *Medicinal and Aromatic Plant Science and Biotechnology* **4(1)**: 28-42.
- Lewington, A. 1993. *Medicinal plants extract. A review of their importation into Europe*. Traffic International, Cambridge, U.K.
- Limbu, D.K. and B.K. Rai 2013. Ethno-medicinal practices among the Limbu community in Limbuwan-Eastern Nepal. *Global Journal of Human Social Science* **13(2)**: 1-29.
- Maden, K., R. Kongren and T.M. Limbu 2008. *Documentation of indigenous knowledge, skill and practices of Kirata Nationalities with special focus on Biological resources*. A report, Social Inclusion Research Fund (SIRF), SNV Nepal, Bakhundole, Lalitpur.
- Martin, G.J. 1995. *Ethnobotany: A people and plants conservation manual*. Chapman and Hall.
- Pandey, J. 2013. Documentation of ethnomedicinal knowledge on plant resources used by Magar community of Dhanbang VDC, Salyan District. *Bull. Dept. Pl. Res.* **35**: 62-66.
- Parajuli, R.R. 2011. Study on ethnomedicinal plants of Maipokhari wetland area in Ilam, Eastern Nepal. *Bull. Dept. Pl. Res.* **33**: 33-42.
- Parajuli, R.R. 2012. Ethnomedicinal use of plants in Rai community of Maimajuwa and Puwamajuwa VDCs of Ilam District, Eastern Nepal. *Bull. Dept. Pl. Res.* **34**: 65-73.
- Polunin, O. and A. Stainton 1984. *Flowers of the Himalaya*. Oxford University Press, New Delhi, India.
- Pradhan, B.K. and H.K. Badola 2008. Ethnomedicinal plant use by Lepcha tribe of Dzongu valley, bordering Khangchendzonga Biosphere Reserve, in North Sikkim, India. *Journal of Ethnobiology and Ethnomedicine* **4**: 22.
- Press, J.R., K.K. Shrestha and D.A. Sutton 2000. *Annotated checklist of the flowering plants of Nepal*. The Natural history Museum, London.
- Rai, S.K. 2004. Medicinal plants used by Meche people of Jhapa district, Eastern Nepal. *Our nature* **2**: 27-32.
- Rao, R.R. 1996. Traditional Knowledge and sustainable development key role of ethno-biologist. *Journal of Ethnobotany* **8**: 14-24.
- Rokaya, M.B., Z. Münzbergová and B. Timsina 2010. Ethnobotanical study of medicinal plants from the Humla district of western Nepal. *Journal of Ethnopharmacology* **130**: 485-504.
- Sharma, M., C.L. Sharma and P.N. Marak 2014. Indigenous uses of medicinal plants in North Garo Hills, Meghalaya, NE India. *Res. J. Recent. Science* **3**: 37-46.
- Shrestha, K. 1998. *Dictionary of Nepalese plant names*. Mandala Book Point, Kantipath, Kathmandu, Nepal.
- Singh, A.G. and J.P. Hamal 2013. Traditional phytotherapy of some medicinal plants used by Tharu and Magar communities of Western Nepal, against dermatological disorders. *Scientific World* **11(11)**: 81-89.
- Srithi, K., H. Balslev, P. Wangpakapattanawong, P. Srisangac and C. Trisonthia 2009. Medicinal plant knowledge and its erosion among the Mien (Yao) in northern Thailand. *Journal of Ethnopharmacology* **123**: 335-342.
- Stainton, A. 1988. *Flowers of the Himalaya: a supplement*. Oxford University Press, New Delhi, India.
- Thapa, L.B., T.M. Dhakal, R. Chaudhary and H. Thapa 2013. Medicinal plants used by Raji ethnic tribe of Nepal in treatment of gastrointestinal disorders. *Our Nature* **11(2)**: 177-186.
- Thapa, S. 2012. Medico-ethnobotany of Magar community in Salija VDC of Parbat District, Central Nepal. *Our nature* **10**: 176-190.
- Uprety, Y., H. Asselin, E.K. Boon, S. Yadav and K.K. Shrestha 2010. Indigenous use and bio-efficacy of medicinal plants in the Rasuwa District, Central Nepal. *Journal of Ethnobiology and Ethnomedicine* **6(3)**.