

## DIVERSITY, UTILIZATION AND THREAT STATUS OF ETHNO-MEDICINAL PLANTS IN BETALGHAT BLOCK, NAINITAL DISTRICT (KUMAUN HIMALAYA)

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### ABSTRACT

The present study main aim is the documentation of ethno-medicinal plants which traditionally used for the treatment of various ailments and diseases by the local communities of Betalghat block of district Nainital. The present study was carried out in 12 sites in Betalghat block of district Nainital (Kumaun Himalaya). A PRA (Participatory Rural Appraisal) tool was used. A total of 184 species of ethno-medicinal plants belonging to 71 families and 157 genera includes 40 species of trees, 43 shrubs, 10 climbers and 91 herbs were recorded. Out of 71 families, Fabaceae, Asteraceae, Lamiaceae, Rutaceae, Orchidaceae, Euphorbiaceae, Solanaceae, Apiaceae, Apocynaceae and Asparagaceae were the dominant families of the region. A total of 184 medicinal plants were used to cure 62 diseases such as fever, cough, dysentery, cuts and wounds, asthma, diarrhoea, skin diseases, stomach-ache, arthritis, headache, jaundice, cold, bone fracture, urinary disorders, diabetes, toothache, earache, itching etc. Among these, 25 species belonging to 23 families were categorized under different threatened categories. Therefore, there is an urgent need for sustainable utilization and conservation of threatened plants, by mass cultivation in nearby areas and awareness creation to the local communities.

**KEYWORDS:** Diversity; Utilization; Ethno-medicinal plant; Conservation status; Betalghat Block.

### INTRODUCTION

The Himalayan region is well-known around the world due to its unique phyto-geography, climatic conditions, rich floral and faunal diversity and socio-cultural heritage (Samant et al., 1998). Plants are widely used by the inhabitants of the region for food, fodder, fuel, medicine, socio-cultural, agricultural equipments, timber and a variety of other functions (Samant & Dhar, 1997; Samant et al., 1998). The region is known for a variety of non-formal (traditional) medical procedures. Among the various ethnic tribal groups of the region, the Bhotiyas, Bukshas, Tharu and Rajis largely depend upon wild resources (Maikhuri et al., 2000; Nautiyal et al., 2000; Bhatt et al., 2017). Due to the harsh conditions, tribal societies rely on the collection and trading of medicinal plants, and they have progressively learned about the healing capabilities of the plants that are available.

According to World Health Organization (WHO, 2003), the plants which can be used for therapeutic purposes and contain properties or compounds that synthesize metabolites to produce useful drugs are considered medicinal plants. Medicinal plants are widely distributed throughout India and form an important part of floral

diversity. The estimation of the present demand for medicinal plants which is being used for therapeutical drugs is about US\$14 billion a year. The demand for medicinal plant-based raw materials is increasing at a 15% to 25% annual rate. As a result, there is an increasing threat to the usage of medicinal plants, their products and indigenous traditional knowledge as deforestation and human encroachment are rapidly leading to agriculture land and urbanization in the former forest (Bhatt et al., 2020).

The International and national institutions as well as number of people seeking information on plants and their associated traditional indigenous knowledge is increasing very rapidly as a result the demand for medicinal plants also increases everyday day by day. Floristically this region has been studied by various workers (Atkinson, 1882; Duthie, 1906; Jain & Sastry, 1980; Chopra et al., 1986; Kalakoti & Pangtey, 1988; Pangtey et al., 1989; Rao, 1994; Farooque & Saxena, 1996; Samant et al., 1998; Kala, 2005; Srivastava, & Singh, 2005; Uniyal et al., 2007; Tewari et al., 2008; Pant & Samant, 2010; Tewari et al., 2010; Kumari et al., 2011; Singh & Atteri, 2014; Tewari et al., 2014; Pandey et al., 2016; Bhatt et al., 2017; Pandey et al., 2017; Joshi et al., 2018; Bhatt et al., 2020; Chandra et al., 2021; Joshi et al., 2021) but the

documentation of ethno-medicinal plants and their indigenous knowledge is still lacking. Therefore, this study aims to document the diversity, utilization pattern and conservation status of ethno-medicinal plants in Betalghat block of district Nainital (Kumaun Himalaya).

## MATERIALS AND METHODS

### Study area

The present study was carried out in twelve sites (Amel, Bhatrojkhana, Bhowali, Chaurasa, Kanda, Korar, Lohali, Niglaat, Pankatara, Ratighat, Simtaya and Thapal) of Betalghat block in the year 2017-2021 to covers the whole study area as a part of random sampling. These selected sites represent the temperate, sub-tropical and tropical types of forest. Betalghat block belongs to district Nainital which lies between 29°33'33" to 29°29'36" N Latitude, 79°18'27" to 79°24'24" E longitude and altitude ranges from 700 to 1800 meters above sea level (**Fig.1**). The block is surrounded on the north by the Bhikyasain and Tarikhet block of district Almora, on the south by the Kotabagh block of district Nainital, on the east by the Ramgarh block of district Nainital and on the west by the sult block of district Almora (Pandey *et al.*, 2016).

### Climate

The climate of the study area is characterized by long snowy winter and short summer season. It is monsoon and temperate type (Singh & Singh, 1992) having four different seasons viz., monsoon (July to September) and post-monsoon (October to November), winter (December to February) and summer (April to mid-June). An annual average rainfall is about 1800 mm. The temperature range in this area varies usually in between -5.4°C to 42.2°C (Pandey *et al.*, 2017).

### Data collection and sample identification

A PRA (Participatory Rural Appraisal) tool was used. The aim of the study is identification and documentation of ethno-medicinal plants (Table-1) from local communities and traditional healers and practitioners with the help of semi-structured scheduled questionnaire (Bargali *et al.*, 2007, Pandey *et al.*, 2011) by interviews and observations. People of different age groups and genders (Up to 30, 31- 60, above 60) were interviewed. The herbarium were prepared following the method of Jain & Rao (1976) and identified with help of the relevant floras (Osmaston, 1927; Gupta, 1968; Naithani, 1984-1985; Gaur, 1999) and herbarium specimens of regional herbaria. The specimens collected from the field were deposited in the herbarium division of the Botany Department, D.S.B. Campus, Nainital.

### Taxonomic Enumeration

The APG IV system of classification (APG, 2016) was followed for the arrangement of families. Tropicos (Tropicos.org. Missouri Botanical Garden, 2018) was followed for the nomenclature of plants. Within the species, genus and families were arranged in alphabetical order. The correct botanical name with valid author citation, family name, altitudinal range (m), habit, flowering and fruiting period, plant parts use and ethno-medicinal uses have been provided for each species.

### Categorization of threatened plants

For the inventorization of threatened medicinal plants of Betalghat block, available literature (Nayar and Shastry, 1987, 1988, 1990; CAMP, 1998, 2003; Srivastava & Singh, 2005; Kumari, 2011; Kumari *et al.*, 2012; Bhatt, 2012; IUCN, 2017) was followed.



**Fig. 1:** Map of the study sites (Source- <http://www.uttaranchal.org.uk>).

**RESULTS AND DISCUSSION**

**Diversity of Ethno-medicinal plants**

A total of 184 species of ethno-medicinal plants under 157 genera and 71 families were used by local people for their various ethno-medicinal purposes (Table- 1). Within the documented species, herbs (91 species) cover the maximum number of species and climbers (10 species) covers the minimum number of species (Fig.2). Out of 71 families recorded, ten dominant families are Fabaceae (16 species), Asteraceae (13 species), Lamiaceae (12 species), Rutaceae (7 species), Orchidaceae, Euphorbiaceae and Solanaceae (6 species each), Apiaceae, Apocynaceae and Asparagaceae (5 species each) (Fig.3).

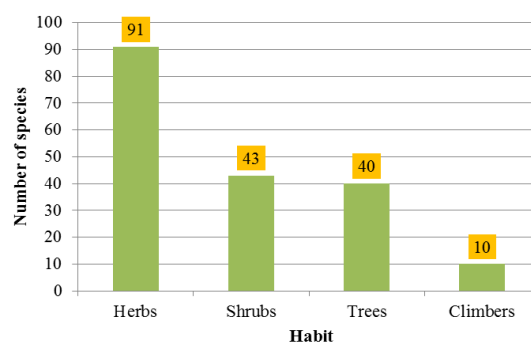
**Utilization Pattern of Ethno-medicinal plants**

A total of 184 plant species were used to cure 62 diseases. The highest numbers of medicinal plant species were documented to cure fever (34 species), followed by cough (32 species), dysentery (30 species), cuts and wounds (28 species), asthma, diarrhoea (22 species), skin diseases (21 species), stomach-ache (19 species), arthritis (18 species), headache, jaundice (16 species), cold (14 species), bone fracture, urinary disorders (12 species), diabetes, toothache (11 species), boils, bronchitis, earache, itching (10 species), intestinal worm infection (9 species), conjunctivitis, joints pain, swelling (8 species), gastric disorder, piles (7 species), indigestion, insect and scorpion sting, leprosy (6 species), general debility, leukoderma, vomiting (5 species), bleeding, blood purification, body-ache, cholera, constipation, eczema (4 species), burns, leucorrhoea, scrofula, stone, ulcer (3 species), cataract, gonorrhoea, high blood pressure, liver disorders, mental disorders, pneumonia (2 species) and allergy, dermatitis, digestive and respiratory disorders, epilepsy, heel cracks, menstrual disorders, mouth blisters, nervous affection, paralysis, sinus, sprain, syphilis, utensil (1 species) (Table-1). In the various formulations leaves (27%) were most commonly used ingredient, followed by roots (19%), barks (14%), whole plant (9%), fruits (7%), seeds (6%), flowers (4%), rhizomes (3%), stems/latex/bulbs/tubers and twigs (2% each), and resin (1%) (Fig. 4).

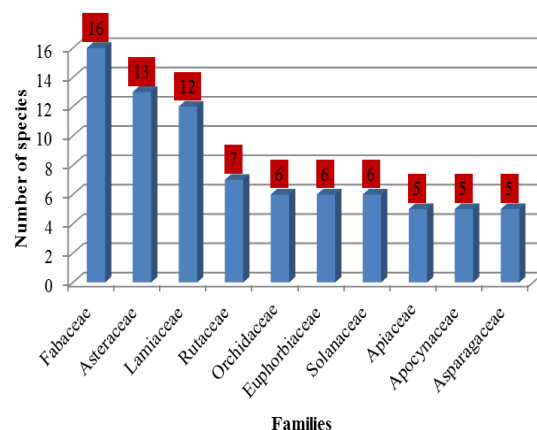
**Threatened plants**

In terms of threatened plants, a total of 25 species belonging to 23 families and 25 genera were recorded as per categories provided by International Union for Conservation of Nature (IUCN), Conservation Assessment and Management Prioritization (CAMP, 1998, 2003) and other existing literature (Nayar & Sastry, 1987, 1988, 1990, Kumari, 2011, Kumari et al., 2012, Bhatt, 2012, Srivastava & Singh, 2005) (Table- 2). As per IUCN, 9 species were recognized under different threat categories. One species was vulnerable, 2 species were endangered and 6 species were least concern. According to CAMP (1998), 17 species were under different threat categories. Two species were endangered, 4 species were critically endangered and near threatened and 7 species were vulnerable. As per

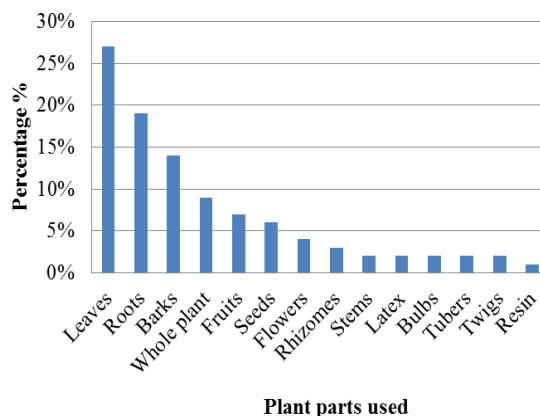
CAMP (2003), 10 species were under different threat categories. One species was critically endangered, 3 species were endangered and 6 species were vulnerable. Considering other existing literatures, 19 species were threatened (10 vulnerable, 5 endangered, 2 near threatened and 1 least concern and critically endangered) (Table- 2).



**Fig. 2: Habit distribution among the ethno-medicinal plants of Betalghat block.**



**Fig. 3: Diversity of dominant families of ethno-medicinal plants in Betalghat block.**



**Fig. 4: Plant parts used for ethno-medicinal purposes in Betalghat block.**

Documentation of traditional indigenous knowledge through ethno-botanical studies is important for the conservation of natural resources and their sustainable

utilization (Bağcı, 2000; Muthu et al., 2006). Traditional societies of this region are highly depending on natural resources such as food, medicine, fuel, fodder, agriculture equipments, timber and other miscellaneous uses. Most of the medicinal plants of the Himalayas are being extracted for drug and pharmaceutical industries from wild population. About 90% of the diseases of primitive aborigines, ethnic and local inhabitants are being cured by the natural plant resource.

Among these species some are recorded under various threat categories by Conservation Assessment and Management Prioritization (CAMP, 1998, 2003) workshop, International Union for Conservation of Nature (IUCN), other existing literature (Nayar & Sastry, 1987, 1988, 1990; Kumari, 2011; Kumari et al., 2012; Bhatt, 2012; Srivastava & Singh, 2005) viz. *Acorus calamus* L., *Bacopa monnieri* (L.) Pennell, *Baliospermum montanum* (Willd.) Muell.-Arg., *Bergenia ciliata* (Haw.) Sternb., *Celastrus paniculatus* Willd., *Cinnamomum tamala* (Buch.-Ham.) T. Nees & Nees, *Clerodendrum serratum* (L.) Monn., *Costus speciosus* (J. Koenig) Sm., *Curculigo orchioides* Gaertn., *Delphinium denudatum* Wall. ex Hook. f. & Thoms., *Dioscorea deltoidea* Wall. ex Griseb., *Drimia indica* (Roxb.) Jessop., *Gloriosa superba* L., *Habenaria intermedia* D. Don, *Hedychium spicatum* Buch.-Ham. ex Sm., *Heracleum lanatum* Michx., *Malaxis acuminata* D. Don, *Oroxylum indicum* (L.) Kurz, *Pittosporum eriocarpum* Royle, *Symplocos paniculata* (Thunb.) Miq, *Taxus wallichiana* Zucc., *Thalictrum foliolosum* DC., *Ulmus wallichiana* Planch., *Valeriana wallichii* DC., *Zanthoxylum armatum* DC. All the species used to treat health problems, are extracted and exploited unscientifically from the natural habitat by the local healers and traders, which causes remarkable destruction in the natural population of the flora. Unscientific harvesting, habitat degradation, over exploitation and to meet the demands of illegal trade in medicinal plants have led to the extinction of more than 150 plant species in the wild (Singh & Rawat, 2011; Kumari et al., 2012; Pandey et al., 2017).

Earlier, Gaur (1999) reported 2035 species under 189 families and 978 genera from district Garhwal, north-west Himalaya, Upreti (2005) reported 1305 species under 56 families and 755 genera from Uttarakhand, Singh (2008) reported 474 species recorded from Garhwal Himalaya, Singh et al., (2009) reported 354 species of medicinal plants under 76 families and 208

genera from Lahaul valley, Himachal Pradesh, Gangwar et al., (2010) reported 102 species of ethno-medicinal plants under 48 families from Kumaun Himalaya, Pant & Samant (2010) documented 337 ethno-botanical plant species under 111 families and 260 genera from Mornaula Forest of West Himalaya, India, Kumari et al., (2011) reported 187 species of ethno-medicinal plants under 80 families from district Almora, Uttarakhand, Singh (2011) reported 89 species under 50 families and 77 genera from sacred groves of Pithoragrah district, Mathur & Joshi (2013) reported 206 species belonging to 66 families from Tarai Region of Kumaun, Uttarakhand, Rawat et al., (2013) reported 415 species under 108 families and 313 genera from Kedarnath forest division of Garhwal Himalaya, Lone et al., (2014) reported 23 species of threatened plants from Kashmir Himalaya, India, Kanwal & Joshi (2015) reported 136 species of ethno-botanical plant under 61 families and 112 genera from Alaknanda river basin of Western Himalaya, India, Agarwal (2017) documented ethno-botanical uses of 254 plants from Jaunsar-Bawar (Chakrata Hills, Western Himalaya), Pandey (2017) reported 201 ethno-botanical species under 84 families and 169 genera from Uttarakhand, Arya et al., (2018) reported 300 species of medicinal plants under 96 families and 261 genera from Terai region of Uttarakhand, Bisht et al., (2018) reported 614 species belonging to 277 genera and 70 families from Valley of Flowers National Park, District Chamoli, Uttarakhand, Bohra (2018) reported 113 species under 57 families and 87 genera, Bhatt et al., (2020) documented 256 ethno-medicinal plants belonging to 96 families from Kumaun Himalaya, Mehta et al., (2020) reported 112 species of threatened plants belonging to 71 families and 157 genera, Chandra et al., (2021) reported 50 species from alpine regions of Uttarakhand. The present study records 184 species belonging to 157 genera and 71 families.

Information has been collected through the PRA tool and the some of the key informants were Shri Daleep Singh, Smt. Tulsi Devi, Smt. Anandi Devi, Shri Lalit Mohan, Shri Anand Singh, Shri Laxman Singh, Smt. Kamla Devi, Shri Kailash Ram, Smt. Prema Devi, Smt. Bhagwati Devi, Smt. Hanshi Devi, Smt. Nisha Pant, Shri Hema Pant, Smt. Shanti Devi, Smt. Leelawati, Smt. Chandra Devi, Smt. Hema Devi, Shri Roop Ram, Shri Gopal Ram, Shri Vijay Ram, Shri Nandan Ram, Shri Chanra Lal, Shri Vijay Kumar, Smt. Hema Devi, Shri Ani Ram etc.

Table 1: Ethno-medicinal plants of Betalghat Block, Nainital District (Kumaun Himalaya).

S. No.	Taxa/Family	Vernacular Name	Habit	Altitudinal Range (m)	Flowering & Fruiting	Part Use	Ethno-medicinal uses
Family- Acanthaceae							
1.	<i>Adhatoda zeylanica</i> Medik.	Basing	Sh	700-1500	Jan-Apr	Lv	Leaves are boiled with Jiggery and decoction is given to cure chronic cough and asthma.
2.	<i>Barleria cristata</i> L.	Jhinti	H	700-1800	Sep-Dec	Lv	Leaves paste is applied externally on wounds and cuts for healing purpose. Decoction of leaves is used in headache.
3.	<i>Dicliptera bupleuroides</i> Nees.	Kawgori	H	700-1800	Apr-Nov	Lv	Leaves extract used as an ear drop in conjunctivitis. Decoction of leaves is given to cure cough, dysentery.
Family- Acoraceae							
4.	<i>Acorus calamus</i> L.	Buch	H	700-1500	Jun-Sep	Rh	Rhizome powder used in children in intestinal worm infection. Rhizome powder is given with milk in stomach-ache, cough, bronchitis and general debility.
Family- Amaranthaceae							
5.	<i>Achyranthes aspera</i> L.	Apamarg	H	700-1500	Mar-Nov	Rt	Decoction of roots is used in stomach-ache and an aqueous extract for stones in the bladder.
6.	<i>Achyranthes bidentata</i> Blume.	Apamarg	H	700-1500	Sep-Dec	Rt, Sd	Decoction of roots and seeds is used in conjunctivitis, cough, asthma, fever, bronchitis, headache, pneumonia, piles.
Family- Amaryllidaceae							
7.	<i>Allium sativum</i> L.	Lahsun	H	700-1800	Apr-Jun	Bl	Extract of bulbs is used in arthritis and joints pain.
Family- Anacardiaceae							
8.	<i>Lannea coromandelica</i> (Houtt) Merr.	Jhingan	T	700-1500	Mar-Jul	Br	Decoction bark is used in stomach-ache, diarrhoea and dysentery.
9.	<i>Pistacia khinjuk</i> Stocks	Kakar	T	700-1500	Mar-May	Lv	Horn-shaped galls (Kakra-singi) found on the leaves and petioles used in cough, dysentery, skin diseases.
10.	<i>Rhus parviflora</i> Roxb. ex DC.	Tang	Sh	700-1500	May-Nov	Lv, Br	Decoction of leaves and bark given at intervals during cholera and stomach-ache.
Family- Apiaceae							
11.	<i>Centella asiatica</i> (L.) Urban.	Brahmi	H	700-1800	Apr-Nov	Lv	Leaves juice or powder used in fever and mental disorders.
12.	<i>Heracleum lanatum</i> Michaux	Kakhriya	H	1500-1800	Apr-Oct	Lv, Fl, Rt	Leaves, flowers and roots paste is applied on arthritis, toothaches, and leucoderma.
13.	<i>Pimpinella diversifolia</i> DC.	Teroi	H	1200-1800	Jul-Sep	Lv, Fl, Rt	Leaves, flowers and roots paste is taken with water to relieve form gastric disorder, stomach-ache and

							leucorrhoea.
14.	<i>Selenium candollii</i> DC.	Teroi	H	1500-1800	Aug-Oct	Rt	Roots powder with honey useful in cough and asthma. Roots are also used as fragrance stick to fumigate.
15.	<i>Trachyspermum ammi</i> (L.) Sprague	Ajwain	H	700-1800	Mar-Jan	Sd	Seeds are taken orally with warm water to cure cough, cold and gastric problems.
Family- Apocynaceae							
16.	<i>Calotropis procera</i> (Aiton) R. Br.	Ak, Madar	Sh	700-1200	Dec-Aug	Lv, Br	Powder of dried leaves and bark mixed with Jiggery given to cure headache, skin diseases and leprosy.
17.	<i>Carissa opaca</i> Stapf ex Haines	Karounda	Sh	700-1300	Apr-Mar	Rt	Extract of roots is used in fever and jaundice.
18.	<i>Cryptolepis buchanani</i> Roem. & Schult.	Dudhi-Bel	Sh	700-1600	Mar-Dec	Lv, Br	Extract of leaves and bark is used in fever, cough and cold.
19.	<i>Holarrhena pubescens</i> Wall. ex G. Don	Kwera	T	700-1300	Apr-Feb	St, Br	Stem bark is chewed in burning sensation and stomach-ache.
20.	<i>Vallis solanacea</i> (Roth) Kuntze	Dudhi bel	Cl	700-1200	Mar-Oct	Lt	Milky latex is applied on wounds and cuts.
Family- Araceae							
21.	<i>Arisaema tortuosum</i> (Wall.) Schott	Sanpka Bhuta	H	1300-1800	May-Aug	Rt	Decoction of roots is used in head ache, stomach-ache. Paste of roots is applied on wounds and cuts.
22.	<i>Scindapsus officinalis</i> (Roxb.) Schott.	Gajpipli	Cl	700-1200	Sep-Nov	Fr	Extract of fruits given in asthma and bronchitis.
Family- Asparagaceae							
23.	<i>Agave cantala</i> Roxb.	Rambans	Sh	700-1800	Jul-Dec	Rt, Lv	Extract of roots and leaves used as purgative and diuretic and also used in syphilis, scrofula, menstrual disorders, jaundice and insect sting.
24.	<i>Asparagus adscendens</i> Buch.-Ham. ex Roxb.	Kairu	Sh	800-1400	Aug-Nov	Rt	Roots pounded in water and administered orally in dysentery.
25.	<i>Asparagus curillus</i> Buch.-Ham.ex Roxb.	Kariu	Sh	1200-1800	Jul-Nov	Rt	Roots decoction is given to cure diarrhoea and gastric disorder.
26.	<i>Asparagus racemosus</i> Willd.	Kairua	Sh	700-1200	Apr-Nov	Rt	Roots pounded in water and administered orally in allergy. Root decoction is given to cure blood disease, diarrhoea, dysentery, arthritis.
27.	<i>Drimia indica</i> (Roxb.) Jessop.	Ban Pyaj	H	700-1800	May-Sep	Bl, Lv	Paste of bulbs and leaves fried in mustard oil is applied over joints pain/arthritis.
Family- Asphodelaceae							
28.	<i>Aloe vera</i> (L.) Burm. f.	Aloe vera	H	700-1800	Sep-Mar	Lv	Leaves juice is taken in fever, jaundice, liver disease, skin diseases and piles.
Family- Asteraceae							
29.	<i>Ageratum conyzoides</i> L.	Bhubhani Jhar	H	700-1800	Jan-Dec	Lv, Rt	Leaves and roots paste is applied on wounds and cuts.
30.	<i>Ageratum houstonianum</i> Mill	Bhubhani Jhar	H	700-1800	Jan-Dec	Lv, Rt	Leaves and roots paste is applied on wounds and cuts.
31.	<i>Anaphalis busua</i> (Buch.-Ham. ex D. Don) DC.	Bakol	H	1100-1800	Aug-Oct	Wp	Plant paste is applied on wounds and cuts.

32.	<i>Artemisia nilagirica</i> (Cl.) Pamp.	Pati	H	700-1800	Jul-Aug	Lv, Fl	Leaves and flowering topes are used in asthma, bronchitis, nervous affection and skin disease.
33.	<i>Bidens biternata</i> (Lour.) Merr. & Sherff ex Sherff	Kumariya	H	700-1800	Aug-Oct	Lv	Juice of leaves rubbed on itching feet during rainy season.
34.	<i>Bidens pillosa</i> L.	Kumariya	H	700-1800	Aug-Nov	Lv	Juice of leaves rubbed on itching feet during rainy season.
35.	<i>Echinops niveus</i> Wall. ex Royle	Kantela	H	900-1800	Jul-Oct	Rt	Roots juice is taken in urinary disorders and fever.
36.	<i>Eclipta prostrata</i> L.	Bhangri	H	700-1200	Sep-Nov	Wp	Plant paste is applied on wounds and cuts. Decoction of plant used in asthma, fever and cough.
37.	<i>Eupatorium adenophrum</i> Spreng.	Kala basing	H	700-1800	Mar-May	Lv	Paste of leaf is applied on wounds and cuts.
38.	<i>Galinsoga parviflora</i> Cav.	Marchia Jhar	H	700-1800	Apr-Oct	Lv	Two to three drops of leaves juice is dropped in earache.
39.	<i>Galinsoga quadriradiata</i> Ruiz & Pavon	Marchia Jhar	H	700-1800	Mar-Oct	Lv	Two to three drops of leaves juice is dropped in earache.
40.	<i>Inula cappa</i> (Buch.-Ham. ex D.Don) DC.	Pushkar-mool	Sh	700-1800	Sep-Dec	Rt	Decoction of roots is given in gastric, indigestion. Root paste is applied externally on skin disease.
41.	<i>Tagetes erecta</i> L.	Hazari	H	700-1800	Aug-Mar	Lv	Leaves juice apply in earache and boils.
Family- Berberidaceae							
42.	<i>Berberis asiatica</i> Roxb. ex DC.	Kilmora	Sh	700-1800	Mar-Jun	Br, Rt	Paste of bark is applied over eyelids to cure conjunctivitis. Root decoction is used in jaundice, dysentery and diabetes.
43.	<i>Berberis chitria</i> Buch.-Ham. ex Ker Gawl.	Chetar	Sh	1500-1800	May-Dec	Br, Rt	Paste of bark is applied over eyelids to cure conjunctivitis. Root decoction is given in fever.
Family- Bignoniaceae							
44.	<i>Oroxylum indicum</i> (L.) Kurz	Tarulu	T	700-1200	Jun-Dec	St, Rt, Br	Water extract of stem and root bark is given in stomach-ache, dysentery, diarrhoea and insect and scorpion stings.
Family- Brassicaceae							
45.	<i>Raphanus sativus</i> L.	Muli	H	700-1800	Feb-May	Lv, Rt	The fresh leaves and roots is given in jaundice.
Family- Cannabaceae							
46.	<i>Cannabis sativa</i> L.	Bhang	H	700-1800	May-Oct	Sd	Oil extracted from dry seeds is applied to cure paralysis and joint pain It is also applied to cure fever caused by severe cold.
Family- Capparaceae							
47.	<i>Capparis zeylanica</i> L.	Kiari	Sh	700-1200	Mar-Sep	Rt, Br	Roots and bark paste is applied on arthritis and paralysis.
Family- Caprifoliaceae							
48.	<i>Valeriana hardwichii</i> Wall.	Sameo	H	1200-1800	Jun-Oct	Wp	Leaves juice is taken in diarrhoea and fever. Roots also

							used as insecticide.
49.	<i>Valeriana wallichii</i> DC.	Sameo	H	1500-1800	Feb-Oct	Wp	Decoction of roots used in epilepsy, urinary disorders and cholera. Roots also used as insecticide.
Family- Caryophyllaceae							
50.	<i>Stellaria media</i> (L.) Vill.	Badyau	H	700-1800	Jan-Jun	Lv	Paste of leaves is externally applied on burns, boils, wounds and cuts.
Family- Celastraceae							
51.	<i>Celastrus paniculatus</i> Willd.	Malkaghni	Sh	300-1200	Mar-Dec	Sd	Oil extracted from seeds is applied on arthritis and itching.
Family- Colchicaceae							
52.	<i>Gloriosa superba</i> L.	Kalihari	H	700-1500	Aug-Oct.	Rt	Paste of roots is applied externally on joints to cure rheumatoid arthritis.
Family- Combretaceae							
53.	<i>Anogeissus latifolia</i> Wall.	Bakla	T	700-1200	May-Mar	St, Br	The decoction of stem bark is given in diarrhoea and dysentery.
54.	<i>Terminalia bellirica</i> (Gaertn.) Roxb.	Bahera	T	700-1200	Apr-Feb	Fr	Powdered fruits of <i>Terminalia chebula</i> And <i>T. bellirica</i> are mixed in equal quantity and taken with Ghee in cough. Dry fruits powder is given in dysentery and diarrhoea, stomach-ache.
55.	<i>Terminalia chebula</i> Retz.	Harar	T	700-1500	Apr-Mar	Fr	Dried fruits powder with honey is given in cough and asthma. Powder boiled with cow-urine is applied on piles.
Family- Convolvulaceae							
56.	<i>Cuscuta reflexa</i> Roxb.	Aakash-bel	H	700-1800	Jun-Dec	Wp	Paste of the plant applied to painful joints and eczema.
57.	<i>Evolvulus alsinoides</i> (L.) L.	Shankhpuli	H	700-1800	Aug-Nov	Wp	Decoction of plant used for cold, cough, bronchitis and asthma.
Family- Costaceae							
58.	<i>Costus speciosus</i> (Koenig) J. E. Sm.	Kevkand	H	700-1200	Aug-Oct	Rh	Cooked rhizomes are used in stomach-ache, cold, cough and arthritis.
Family- Cucurbitaceae							
59.	<i>Momardica charantia</i> L.	Karela	Cl	700-1800	Apr-Nov	Fr	Extract of fruits is used in diabetes and jaundice.
60.	<i>Trichosanthes tricuspidata</i> Lour.	Indrayan Bel	Cl	1200-1800	Jun-Dec	Rt	Decoction of roots is administrated orally in fever.
Family- Dioscoreaceae							
61.	<i>Dioscorea bulbifera</i> L.	Gethi	H	700-1800	Jul-Jan	Tb	Roasted tubers with salt are used to cure old cough.
62.	<i>Dioscorea deltoidea</i> Wall. ex Griseb.	Jangli Gethi	H	1500-1800	Jul-Sep	Tb	Powder of tubers used in dysentery, fever. Dry tuber paste is applied on skin diseases.
Family- Dipterocarpaceae							
63.	<i>Shorea robusta</i> Gaertn. f.	Sal	T	700-1300	Mar-May	Rs	Aromatic resin useful in indigestion and chest pain.



Family- Ericaceae							
64.	<i>Rhododendron arboreum</i> Sm.	Burans	T	1200-1800	Mar-Nov	Fl, Lv	Decoction of corolla mixed with 1 table spun sugar is used to cure digestive and respiratory disorders. Dried flowers powder is given in dysentery. Leaves paste is applied on forehead in head ache.
Family- Euphorbiaceae							
65.	<i>Baliospermum montanum</i> (Willd.) Muell.-Arg.	Danti	Sh	700-1200	Jan-Jul	Lv, Rt	Decoction of leaves and roots is given in jaundice, arthritis and bronchitis diseases.
66.	<i>Euphorbia heterophylla</i> L.	Dudhi	H	700-1800	Feb-Aug	Lt	During toothache the latex of plant is dropped on the root of tooth.
67.	<i>Euphorbia hirta</i> L.	Dudhi	H	700-1800	Aug-Nov	Lt	During toothache the latex of plant is dropped on the root of tooth.
68.	<i>Euphorbia royleana</i> Boiss.	Suin	Sh	700-1800	Mar-Jul	Lt	The latex obtained from fresh stem is used in earache and toothache.
69.	<i>Jatropha curcas</i> L.	Safed Arand	Sh	700-1300	Oct-Mar	Lt, Sd	Milky latex of plant is applied on affected part to check bleeding. Paste of seed is applied on itching and arthritis.
70.	<i>Ricinus communis</i> L.	Arandi	Sh	700-1800	Feb-Dec	Lv, Sd	Few drops of oil mixed with milk relives from constipation. To cure arthritis, leaves are heated over utensil and fastened around affected joints.
Family- Fabaceae							
71.	<i>Abrus precatorius</i> L.	Ratti	Cl	700-1200	Aug-Mar	Rt, Sd	Decoction of roots used for fever and cough. Seeds powder is given in diarrhoea. Paste of seeds is applied as plaster for bone fracture.
72.	<i>Acacia catechu</i> (L.f.) Willd.	Khair	T	700-1300	May-Jan	Br	Bark decoction is given in diarrhoea.
73.	<i>Bauhinia vahlii</i> Wight & Arn.	Malujhan	Cl	200-1500	Apr-Sep	St, Br	Stem bark is pasted and applied on skin diseases.
74.	<i>Bauhinia variegata</i> L.	Kanchnar	T	300-1700	Feb-Aug	Br	Decoction of bark is used to cure leprosy, leucoderma, asthma, ulcers and stomach-ache.
75.	<i>Cassia fistula</i> L.	Amaltas	T	300-1400	Apr-Jan	Fr, Lv	The fruit pulp is used in dysentery and diarrhoea. Paste of leaves is applied externally cure on eczema, arthritis, skin diseases and swelling.
76.	<i>Cassia tora</i> L.	Banar	H	200-1300	Jul-Dec	Br, Rt, Lv,	Bark, roots and leaves are applied externally on leprosy and skin diseases. Leaves are eaten raw to expel intestinal worms.
77.	<i>Dalbergia sissoo</i> Roxb.	Sisham	T	700-1500	Mar-Jun	Fl, Lv	Extract of flowers and leaves is given in liver disorders, jaundice, diarrhoea and dysentery.
78.	<i>Desmodium elegans</i> DC.	Chamlai	Sh	1400-1800	Apr-Oct	Rt	Roots juice is given in cholera. Root decoction is given in urinary disorders.

79.	<i>Erythrina suberosa</i> Roxb.	Rungar	T	700-1500	Mar-Jun	Lv, Br	Leaves juice is used in dysentery, ulcers, gonorrhoea, and intestinal worms. Decoction of bark is given in fever.
80.	<i>Indigofera heterantha</i> Wall. ex Brandis.	Sakina	Sh	700-1800	May-Nov	Lv	Leaves juice is used in diarrhoea, dysentery and cough.
81.	<i>Macrotyloma uniflorum</i> (Lam.) Verdc.	Gehat	H	700-1800	Aug- Oct	Sd	Decoction of seeds is given for curing stone problems, cough and cold.
82.	<i>Mimosa pudica</i> L.	Chhui-mui	H	700-1200	Aug-Nov	Lv	Paste of leaves is applied on wounds and cuts. Leaves juice is used in dressing for sinus and also for piles.
83.	<i>Pueraria tuberosa</i> (Roxb. ex Willd.) DC.	Bilaikand	Sh	700-1500	Mar-Dec	Lv, Rt	Decoction of roots and leaves is used in stomach-ache, fever, arthritis, headache and skin diseases.
84.	<i>Ougeinia oojeinensis</i> (Roxb) Hochst.	Sandan	T	700-1600	Mar-Jun	Br, Lv	Bark used in diarrhoea and dysentery. Paste of leaves is applied on wounds and cuts.
85.	<i>Trifolium repens</i> L.	Tipatiya	H	700-1800	Apr-Jul	Wp	Plant paste is applied as poultice on wounds and cuts.
86.	<i>Trigonella foenum-graecum</i> L.	Methi	H	700-1800	Mar-May	Sd	Seeds used in diabetes.
Family- Gentianaceae							
87.	<i>Swertia angustifolia</i> Burkill	Chiratta	H	1400-3200	Jul-Nov	Wp	Decoction of plant is used to cure fever, cold, cough and pneumonia.
Family- Ginkgoaceae							
88.	<i>Ginkgo biloba</i> L.	Ginkgo	T	1300-1800		Lv	Leaves are used in asthma, bronchitis and headaches.
Family- Hypoxidaceae							
89.	<i>Curculigo orchioides</i> Gaertn.	Kali Musali	H	700-1800	Jun-Aug	Rh, Lv	Rhizome is used in diarrhoea, jaundice, urinary disorder and piles. Paste of leaves is applied on wounds and cuts.
Family- Juglandaceae							
90.	<i>Juglans regia</i> L.	Akhrot	T	1300-1800	Feb-Sep	Br, Tw	Bark paste is applied on itching, scrofula and bone fracture. After filtration it is used as mouthwash, very useful in toothache. Twigs are used for teeth cleaning.
Family- Lamiaceae							
91.	<i>Ajuga parviflora</i> Benth.	Ratpati	H	700-1800	Mar-Oct	Lv, Rt	Decoction of leaves and roots is given orally to cure headache, fever. Root infusion is given orally in stomach-ache.
92.	<i>Callicarpa macrophylla</i> Vahl.	Daiya	Sh	300-1500	Jun-Feb	Lv, Fr, Sd	Paste of leaves is applied on body ache and swelling. Fruits edible, useful in urinary disorders and mouth blisters. Seeds are chewed to cure stomach-ache.
93.	<i>Clerodendrum serratum</i> (L.) Monn.	Barangi	Sh	700-1400	Aug-Jun	Lv, Rt	Paste of leaves is applied on headache and used in skin disease. Decoction of roots is used in fever, cough and asthma.
94.	<i>Clerodendrum viscosum</i> Vent.	Bhanti	Sh	700-1000	Feb-Jun	Lv, Rt	Decoction of leaves is used in fever. Root paste is

							applied externally on skin diseases.
95.	<i>Colebrookea oppositifolia</i> Sm.	Bursong	Sh	700-1800	Jan-Feb	Rt	Root paste mixed with cow's urine is applied over boils to squeeze out pus and cuts and wounds.
96.	<i>Coleus barbatus</i> (Andr.) Benth	Pathar Choor	H	700-1800	Jul-Nov	Rt	Roots juice is administrated orally in constipation and intestinal worm infection.
97.	<i>Mentha arevensis</i> L.	Podina	H	700-1800	Jun-Oct	Lv	Leaves juice is given to cure indigestion, gastric disorder, headaches, vomiting, common cold and fever.
98.	<i>Menta piperita</i> L.	Podina	H	700-1600	Aug-Oct	Lv	Plant extract used in vomiting and indigestion.
99.	<i>Ocimum tenuiflorum</i> L.	Tulsi	H	700-1800	Sep-Nov	Wp	Plant used in fever, cold, cough, urinary troubles, diabetes and vomiting.
100.	<i>Origanum vulgare</i> L.	Ban Tulsi	H	1500-1800	Aug-Oct	Wp	Leaves used as tea to cure cold and cough. Decoction of plant is used in urinary disorders.
101.	<i>Premna barbata</i> Wall. ex Schaner.	Agniu	T	600-1300	Mar-Jul	Lv, St, Br	Decoction of leaves, stem and bark are used in eczema, boils and rheumatic arthritis.
102.	<i>Vitex negundo</i> L.	Siwain	Sh	700-1600	Mar-Oct	Lv	Leave juice is instilled in nostril to cure headache. Decoction of leaves is used to cure arthritis.
Family- Lauraceae							
103.	<i>Cinnamomum tamala</i> (Buch.-Ham.) Nees. & Eberm.	Tejpat	T	1200-1800	Feb-Oct	Lv, Br	Decoction of leaves and bark is used in gonorrhoea, cold and cough.
104.	<i>Neolitsea pallens</i> (D. Don) Momiy. & Hara.	Chirar	T	1500-1800	Mar-Nov	Br	Bark paste is applied over bone fracture to set it.
Family- Linaceae							
105.	<i>Reinwardtia indica</i> Dumort.	Piuli	Sh	700-1800	Dec-May	Lv, Fl,	Leaves and flowers paste is applied on wounds and cuts.
Family- Lythraceae							
106.	<i>Punica granatum</i> L.	Darim	Sh	700-1800	Apr-Sep	Fr	Fruits juice is used in diarrhoea and cough.
107.	<i>Woodfordia fruticosa</i> (L.) Kurz.	Dhaura	Sh	700-1800	Feb-May	Fl, Rt	Infusion of flowers is given to cure urinary disorders. Roots paste is applied over burn scars.
Family- Malpighiaceae							
108.	<i>Hiptage benghalensis</i> (L.) Kurz	Madhavilata	Sh	300-1200	Feb-Jun	Lv	Leaves paste is applied on skin diseases and arthritis. Decoction of leaves is given in asthma and cough.
Family- Malvaceae							
109.	<i>Abutilon indicum</i> (L.) Sweet.	Kanghe	Sh	700-1400	Aug-Apr	Rt	Infusion of roots used in fever.
110.	<i>Bombax ceiba</i> L.	Semal	T	700-1500	Jan-May	Rt	Root decoction of <i>Bombax ceiba</i> and <i>Curculigo orchioides</i> is filtered and given to the patient twice a day for period of 10-15 days to cure leucorrhoea.
111.	<i>Sida cordifolia</i> L.	Bala	H	700-1500	Sep-Dec	Rt, St, Br,	Powder of roots, stem and bark used in asthma and general debility. Infusion of roots is beneficial in urinary disorders, dysentery.

112.	<i>Urena lobata</i> L.	Chatkura	Sh	700-1600	Jun-Nov	Wp	Plant paste applied on body ache.
Family- Meliaceae							
113.	<i>Azadirachta indica</i> A. Juss.	Neem	T	700-1000	Mar-Jul	Br, Lv, Fr, Sd, Tw	Decoction of bark and leaves is used in fever, blood purification. Paste of seeds is used in arthritis and skin diseases. Twigs are used as datun for teeth's brushing.
114.	<i>Melia azedarach</i> L.	Batain	T	700-1500	Mar-Feb	Lv, Br, Fl, Sd	Bark and leaves powder is used externally and internally in scrofula and leprosy. Seeds oil is used for piles, earache and blood purifier. Decoction of bark and leaves is used to cure dermatitis, swelling.
Family- Menispermaceae							
115.	<i>Cissampelos pareira</i> L.	Pari Patel	Cl	700-1800	Apr-Nov	Lv, Rt	Paste of leaves is applied over eyelids to cure conjunctivitis. Roots juice is given to the infants to cure diarrhoea.
116.	<i>Stephania elegans</i> Hook. f. & Thoms.	Ganjaroo	Cl	700-1800	Jul-Sep	Tb	Crushed tubers are dipped in water and the filtrate is given orally to cure diabetes. Decoction of roots is given in asthma, dysentery and fever.
117.	<i>Stephania glabra</i> (Roxb) Mierr.	Ganjaroo	Cl	900-1800	Jun-Oct	Tb	Crushed tubers are dipped in water and the filtrate is given orally to cure diabetes. Decoction of roots is given in asthma, dysentery and fever.
118.	<i>Tinospora sinensis</i> (Lour.) Merr.	Giloe	Cl	700-1800	Mar-Jun	Br	Bark decoction is used to cure various diseases such as fever, malarial fever, arthritis, jaundice and diabetes.
Family- Moraceae							
119.	<i>Ficus palmata</i> Forsk.	Bedu	T	700-1800	May-Aug	Lt	Milky latex is applied on wounds and cuts.
120.	<i>Ficus religiosa</i> L.	Pipal	T	700-1600	Oct- May	Br	Bark grounded with turmeric powder is applied externally on skin diseases and cuts and wounds.
Family- Myricaceae							
121.	<i>Myrica esculenta</i> Buch.-Ham. ex D. Don	Kaphal	T	300-1609	Oct-Jun	Br	Bark paste is inhale to cure cold and headache. Bark decoction is used as mouth freshener and to cure toothache.
Family- Myrtaceae							
122.	<i>Syzygium cumini</i> (L.) Skeel.	Jamun	T	300-1613	May-Jul	Lv, Fr	Tender leaves are chewed to cure bleeding piles. Powder of leaves with honey useful in diarrhoea, dysentery and diabetes. Fruits are also used in diabetes.
Family- Nyctaginaceae							
123.	<i>Boerhavia diffusa</i> L.	Punarnava	H	700-1600	Aug-Dec	Rt	Roots juice is used in urinary disorder, asthma and jaundice.
Family- Oleaceae							
124.	<i>Nyctanthes arbor-tristis</i> L.	Harsingar	Sh	700-1400	May-Nov	Lv	Young leaves are used for cough and cold.

Family- Orchidaceae							
125.	<i>Coelogyne cristata</i> Lindley	Gondya	H	700-1800	Mar-Jun	Bl	Plant paste is applied in bone fractures.
126.	<i>Dendrobium denudans</i> D.Don	Harjon	H	700-1600	Sep-Nov	Wp	Plant paste is applied in bone fractures.
127.	<i>Habenaria intermedia</i> D. Don	Vridhi	H	1600-1800	Jul-Sep	Bl	Bulbs extract used as health tonic and also used in fever, cough, asthma and skin diseases.
128.	<i>Malaxis acuminata</i> D. Don	Jivak	H	1300-1800	Jun-Aug	Bl	Powder of bulbs is used as tonic in general debility and bronchitis. Used as an ingredient of Chyawanprash.
129.	<i>Vanda cristata</i> (Wall.) Lindl.	Harjon	H	700-1200	May-Jul	Wp	Plant paste is applied in bone fractures.
130.	<i>Vanda testacea</i> (Lindl.) Rchb. f.	Harjon	H	700-1200	Jun-Aug	Wp	Plant paste is applied in bone fractures.
Family- Oxalidaceae							
131.	<i>Oxalis corniculata</i> L.	Chalmori	H	300-2900	Feb-Dec	Lv	Leaves juice is useful for toothache, cataract and earache. Leaves paste is applied on wounds and cuts.
132.	<i>Oxalis dehradunensis</i> M. Bieb. Raizada	Chalmori	H	300-2400	Jun-Sep	Lv	Leaves paste is applied on wounds and cuts.
Family- Papaveraceae							
133.	<i>Fumaria indica</i> (Hausskn.) Pugsley.	Pitpapara	H	700-1800	Feb-May	Wp	The whole plant is boiled in water and used in skin diseases and itching.
Family- Phyllanthaceae							
134.	<i>Phyllanthus emblica</i> L.	Amla	T	700-1500	Mar-Jan	Fr	Fruits juice act as diuretic also given in dysentery, diarrhoea, and jaundice.
135.	<i>Phyllanthus urinaria</i> L.	Bhumiamla	H	700-1400	Jul-Oct	Wp	Whole plant powder is given to cure stomach-ache and jaundice.
Family- Pinaceae							
136.	<i>Cedrus deodara</i> Loud.	Deodar	T	1400-1800	Sep-Dec	Oil	Oil extracted from heart wood is massaged over joints pain, leukoderma and itching.
137.	<i>Pinus roxburghii</i> Sarg.	Chir	T	700-1800	Feb-Jun	Rs	Resin is used in boils, heel cracks, skin disease, sprain, swelling, cuts and wounds.
Family- Pittosporaceae							
138.	<i>Pittosporum eriocarpum</i> Royle.	Agni	T	1000-1600	Mar-Nov	Br, Rt	Bark is used in bronchitis and root paste applied on rheumatic swellings.
Family- Plantaginaceae							
139.	<i>Bacopa monnieri</i> (L.) Pennel	Brahmi	H	700-1200	Jun-Sep	Wp	Plant juice is used in conjunctivitis and mental illness.
140.	<i>Plantago erosa</i> Wall.	Lahuryia	H	1200-1800	Jul-Oct	Sd	The husk of the seeds yields colloidal mucilage, used to cure gastric and dysentery.
Family- Plumbaginaceae							
141.	<i>Plumbago zeylanica</i> L.	Chitrak	H	800-1600	Apr-Dec	Rt	Decoction of roots is given in intestinal worm infection, dysentery, leukoderma and body ache.
Family- Poaceae							
142.	<i>Cynodon dactylon</i> (L.) Pers.	Doob	H	Up to 3000	Jan-Dec	Wp	Extract of plant is useful in dysentery, diarrhoea,

							general debility, nose bleeding and cuts and wounds.
Family- Polygonaceae							
143.	<i>Rumex hastatus</i> D. Don	Bhilmora	H	700-1800	Feb-Oct	Lv, Rt	Leaves paste is applied on wounds and cuts, insect sting and to check bleeding. Root extract used in jaundice.
144.	<i>Rumex nepalensis</i> Spr.	Jangli Palak	H	800-1800	Apr-Oct	Lv	Leaves paste is applied on wounds and cuts, insect and scorpion sting, urinary disorder, swelling and itching.
Family- Ranunculaceae							
145.	<i>Anemone vitifolia</i> Buch.-Ham.ex DC.	Ratanjot	H	1500-1800	Jul-Nov	Rt, Lv	Roots and leaves paste applied externally on ringworm and eczema.
146.	<i>Delphinium denudatum</i> Wall. ex Hook. f. Thoms.	Nirbishi	H	1200-1800	Apr-Jun	Rt	Roots decoction is used in stomach-ache, cough and toothache.
147.	<i>Thalictrum foliolosum</i> DC.	Mamiri	H	1200-1800	Jul-Oct	Rt	Roots juice is given in jaundice, stomach-ache and conjunctivitis. Root paste is used to cure boils.
Family- Rhamnaceae							
148.	<i>Zizyphus mauritiana</i> Lamk.	Ber	Sh	700-1400	Jun-Feb	Fr	Fruit juice given in diarrhoea.
Family- Rosaceae							
149.	<i>Duchesnea indica</i> (Andr.) Focke.	Bhikafal	H	800-1800	Jun-Sep	Lv	Leaves juice given in diabetes, gastric disorder, ulcer, cuts and wounds.
150.	<i>Prinsepia utilis</i> Royle.	Bhekal	Sh	1200-1800	Apr-Nov	Rt	Roots extract is taken orally as an antidote to neutralize the effect of insect and scorpion sting. Roots paste is applied on wounds and cuts.
151.	<i>Prunus cerasoides</i> Buch.-Ham. ex D. Don	Padam	T	1200-1800	Oct-May	Br	Decoction of bark is effective in swelling and joint pain.
152.	<i>Rubus ellipticus</i> Sm.	Hisalu	Sh	800-1800	Feb-Jun	Fr	Juice of fruits is administered orally in cholera.
Family- Rubiaceae							
153.	<i>Catunaregam spinosa</i> (Thunb.) Tirveng.	Maindul	Sh	700-1600	Mar-Jun	Fr, Rt	Fruit pulp is used in dysentery. Root decoction is used in diarrhoea.
154.	<i>Haldina cordifolia</i> (Roxb.) Ridsdale	Haldu	T	700-1200	Jun-Jul	Br, Rt	Decoction of bark is given to cure diabetes. Roots chewed in dysentery.
155.	<i>Leptodermis lanceolata</i> Wall.	Padera	Sh	1300-1800	Jun-Dec	Lv, Fl	Leaves and flowers juice used in fever and earache. Leaves paste applied externally on head-ache.
156.	<i>Rubia manijth</i> Roxb. ex Fleming.	Majethi	H	1200-1800	Jul-Nov	Wp	Plant paste is applied over cuts and wounds, boils, insect sting, joints pain and leucorrhoea. Decoction of roots is used as blood purifier.
Family- Rutaceae							
157.	<i>Aegle marmelos</i> (L.) Correa	Bel	T	700-1200	Feb-Aug	Lv, Fr, Rt	Extract of leaves is used in asthma, fever, intestinal worms and skin diseases. Fruits and roots juice used in

							cough, diarrhoea, diabetes and high blood pressure.
158.	<i>Boennighausenia albiflora</i> (HK) Reichb.ex Meissn.	Pisumar	H	1200-3300	Jul-Oct	Lv	Leaves paste is applied on wounds and cuts.
159.	<i>Citrus aurantifolia</i> (Christm. & Panz.) Swing.	Kagji Nimbo	Sh	1000-2400	Jan-Dec	Fr	Fruits juice is effective in indigestion, constipation and vomiting.
160.	<i>Citrus jambhiri</i> Lushington.	Jamir	T	1000-1800	Mar-Jun	Fr	Fruits juice is effective in dysentery and to expel intestinal worms.
161.	<i>Citrus medica</i> L.	Nimboo	T	1000-2000	Apr-Dec	Fr	Fruits juice is effective in indigestion, dysentery, vomiting and constipation.
162.	<i>Murraya koenigii</i> (L.) Spr.	Karipatta	Sh	300-1500	Mar-Oct	Lv, Br, Tw	Extract of Leaves and bark used as health tonic and also used in diarrhoea, dysentery, leprosy and skin diseases. Twigs uses as tooth brush.
163.	<i>Zanthoxylum armatum</i> DC.	Timur	Sh	800-1800	Apr-Nov	Lv, Fr, Tw	Leaves and fruits chewed for mouth wash, toothache, head ache and asthma. Twigs are used for teeth cleaning.
Family- Sapindaceae							
164.	<i>Cardiospermum halicacabum</i> L.	Kanphuti	H	300-1200	Jul-Nov	Sd, Lv	Decoction of seeds is used to cure arthritis and fever. Juice of leaves is dropped in ear during earache.
Family- Saxifragaceae							
165.	<i>Bergenia ciliata</i> (Haworth) Stenb.	Silphora	H	1300-1800	Feb-Jun	Rh	Decoction of rhizome is given orally to cure kidney stone, asthma and cough.
Family- Scrophulariaceae							
166.	<i>Verbascum thapsus</i> L.	Akulbir	H	700-1800	Jul-Oct	Fl, Lf	Powder of flowers mixed with mustard oil is applied on boils. Leaves juice is dropped in eyes to cure cataract.
Family- Solanaceae							
167.	<i>Datura innoxia</i> L.	Dhatura	H	700-1800	Apr-Oct	Wp	Decoction of plant is given in fever. Paste of root bark and leaf is applied over eyelids to cure conjunctivitis and boils.
168.	<i>Datura stramonium</i> L.	Kala Dhatura	H	700-1800	Mar-Sep	Fl, Sd	Juice of flowers is dropped in ear during earache. The paste prepared from roasted seeds is applied on skin diseases, itching, and bronchitis.
169.	<i>Physalis divaricata</i> D. Don	Damriya	H	500-1600	Jul-Nov	Lv	Juice of leaves mixed with mustard oil is used in earache.
170.	<i>Solanum nigrum</i> L.	Makoi	H	600-1800	Apr-Oct	Wp	The extract of plant used in jaundice and fever.
171.	<i>Solanum surattense</i> Burm. f.	Kantkari	H	300-1800	Jun-Oct	Fr	Smoke of fruits is inhaled to cure toothache.
172.	<i>Withania somnifera</i> (L.) Dunal	Aswagandha	H	700-1800	Dec-Jun	Lv, Rt	Decoction of the leaves is taken as remedy for intestinal worm infestation. The Roots powder mixed with black pepper used in rheumatic swellings.

Family- Symplocaceae							
173.	<i>Symplocos paniculata</i> (Thunb.) Miq.	Lodh	T	1300-1800	Mar-Dec	Br	Decoction of bark is given in dysentery, leukoderma, leprosy and bleeding.
Family- Taxaceae							
174.	<i>Taxus wallichiana</i> Zucc.	Thuner	T	1300-1800	Mar-Nov	Lv, Br	Decoction of leaves and stem bark is used as tea to cure cough, general debility and stomach-ache.
Family- Ulmaceae							
175.	<i>Ulmus wallichiana</i> Planch.	Chamarmua	T	1600-1800	Mar-Jun	Br	Bark used in bone fracture.
Family- Urticaceae							
176.	<i>Boehmeria rugulosa</i> Wedd.	Gheti	T	700-1600	Jul-Nov	Br	Bark paste is applied over boils. Bark paste is applied over bone fracture to set it.
177.	<i>Debregeasia longifolia</i> (Brum. f.) Wedd.	Tusiara	Sh	700-1800	Feb-Jul	Br	Bark used in bone fracture.
178.	<i>Debregeasia salicifolia</i> (D. Don) Rendle	Tusiara	Sh	1200-1800	Feb-Aug	Br	Bark used in bone fracture.
179.	<i>Urtica ardens</i> Link	Bichhu-ghas	H	1000-1800	Aug-Jan	Lv	Flogging of leaves is done during bone fracture.
Family- Violaceae							
180.	<i>Viola canescens</i> Wall. ex Roxb.	Vanfsa	H	1200-1800	Feb-Nov	Wp	Decoction of plant is used during cough, fever, headache, jaundice and high blood pressure.
Family- Zingiberaceae							
181.	<i>Curcuma domestica</i> Valetton	Haldi	H	700-1800	Apr-Jun	Rh	Rhizome paste is applied on wounds and cuts. It is also used as antiseptics.
182.	<i>Hedychium spicatum</i> Buch.-Ham. ex J.E. Sm.	Ban Haldi	H	1400-1800	Jul-Oct	Rh	Powder of rhizome is used in asthma, headache and stomach-ache.
183.	<i>Roscoea purpurea</i> J.E. Smith	Kakoli	H	1300-1800	Jul-Aug	Rt	Decoction of roots is used in jaundice.
184.	<i>Zingiber officinale</i> Roscoe.	Adrak	H	700-1800	Jul-Oct	Rh	Rhizome juice is used in asthma, cold and cough.

**Abbreviations Used-** T- ; Sh-; Cl-; H-; Lv- Leaves; Fr- Fruits; Fl- Flowers; Br- Bark; Rh- Rhizome; St- Stem; Bl- Bulbs; Tu- Tubers; Tw- Twigs; Rt- Root; Sd- Seeds; Lt- Latex; Wp- Whole plant.



**Table 2: Diversity of threatened plants in Betalghat Block, Nainital District (Kumaun Himalaya).**

S. No.	Taxa	CAMP		IUCN	Other existing literatures
		1998	2003		
1.	<i>Acorus calamus</i> L.	VU	-	LC	-
2.	<i>Bacopa monnieri</i> (L.) Pennell	-	-	LC	VU
3.	<i>Baliospermum montanum</i> (Willd.) Muell.-Arg.	NT	-	-	NT
4.	<i>Bergenia ciliata</i> (Haw.) Sternb.	VU	-	LC	VU
5.	<i>Celastrus paniculatus</i> Willd.	NT	-	-	VU
6.	<i>Cinnamomum tamala</i> (Buch.-Ham.) T. Nees & Nees	NT	VU	LC	-
7.	<i>Clerodendrum serratum</i> (L.) Monn.	VU	-	-	VU
8.	<i>Costus speciosus</i> (J. Koenig) Sm.	NT	-	-	NT
9.	<i>Curculigo orchioides</i> Gaertn.	VU	-	-	VU
10.	<i>Delphinium denudatum</i> Wall. ex Hook. f. & Thoms.	CR	-	-	CR
11.	<i>Dioscorea deltoidea</i> Wall. ex Griseb.	CR	EN	-	EN
12.	<i>Drimia indica</i> (Roxb.) Jessop.	VU	-	-	EN
13.	<i>Gloriosa superba</i> L.	EN	VU	LC	VU
14.	<i>Habenaria intermedia</i> D. Don	-	EN	-	EN
15.	<i>Hedychium spicatum</i> Buch.-Ham. ex Sm.	VU	-	-	-
16.	<i>Heracleum lanatum</i> Michx.	EN	VU	-	-
17.	<i>Malaxis acuminata</i> D. Don	-	-	-	EN
18.	<i>Oroxylum indicum</i> (L.) Kurz	-	CR	-	VU
19.	<i>Pittosporum eriocarpum</i> Royle	-	-	EN	VU
20.	<i>Symplocos paniculata</i> (Thunb.) Miq	-	VU	-	-
21.	<i>Taxus wallichiana</i> Zucc.	CR	EN	EN	EN
22.	<i>Thalictrum foliolosum</i> DC.	VU	-	-	LC
23.	<i>Ulmus wallichiana</i> Planch.	-	-	VU	-
24.	<i>Valeriana wallichii</i> DC.	CR	VU	-	VU
25.	<i>Zanthoxylum armatum</i> DC.	-	VU	LC	VU

**Abbreviations Used-** CR: Critically Endangered; EN: Endangered; VU: Vulnerable; NT: Near Threatened; LC: Least Concern.

## CONCLUSION

The present study documented the traditional knowledge along with the conservation of local flora by creating the awareness among farmers and local inhabitants with their involvement in cultivation of important medicinal plants at least on their barren and fallow land. Another way to conserve the biodiversity is to preserve the traditional health care systems which are prevailing in the local community.

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## REFERENCES

1. Agarwal S. Flora of Jaunsar Bawar (Chakrata Hills, Western Himalaya) with Ethnobotanical Notes. Bishen Singh Mahendra Pal Singh Dehradun, 2017; 1001.
2. APG. 2016. An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG IV. Botanical Journal of the Linnean Society, 2016; 181(1): 1-20.
3. Arya JC, Joshi GC, Tewari LM, 2018. Medicinal Flora of Tarai Region of Uttarakhand. Shree Publishers & Distributors New Delhi, 2018; 344.
4. Atkinson ET. Gazetteer of the Himalayan District of the NW Provinces of India, 1882; 3(2): 87-266.
5. Bagci Y. Ethnobotanic characteristics of aladağlar (Yahyali-Kayseri) and its vicinity. The Herb Journal of Systematic Botany, 2000; 7: 89-94.
6. Bargali SS, Singh SP, Shrivastava SK, Kolhe SS. Forestry plantations on rice bunds: Farmers' perceptions and technology adoption. International Rice Research Notes, 2007; 32(2): 40-41.
7. Bhatt D. Assessment of RET plants used in Traditional Medicinal Systems in Kumaun Himalaya. Ph.D. thesis submitted to Kumaun University, Nainital, 2012.
8. Bhatt D, Joshi GC, Tewari LM, Kumar R. Diversity and use pattern of ethno medicinal plants of Kumaun Himalaya. Journal of Research in Biology, 2017; 7(3): 2205-2230.
9. Bhatt D, Joshi GC, Tewari LM, Pandey NC. Traditional Medicinal Systems and Threatened Medicinal Plants of Kumaun, Western Himalaya, India. Indu Book Services (Publishers & Distributors) New Delhi, 2020; 126.

10. Bisht M, Sekar KC, Kant R, Kumar A, Singh P, Arya D. Floristic diversity in Valley of Flowers National Park, Indian Himalayas. *Phytotaxa*, 2018; 379(1): 1-26. <https://doi.org/10.11646/phytotaxa.379.1.1>
11. Bohra N. Regeneration status and ethnobotanical study of wild edible plants in Kumaun Himalaya, Ph.D. thesis submitted to Kumaun University, Nainital, 2018.
12. CAMP 1998, 2003. Conservation Assessment and Management Prioritization of Selected Medicinal Plants of Jammu & Kashmir, Himachal Pradesh & Uttaranchal. In: Ved DK, Kinhal GA, Ravikumar K, Prabhakaran V, Ghate U, Vijayashankar R, Indresha JH. (Eds.) FRLHT (Foundation for Revitalization of Local Health Traditions), Bangalore, Karnataka, India.
13. Chandra N, Singh G, Lingwal S, Rai ID, Tewari LM. Alpine Medicinal and Aromatic Plants in the Western Himalaya, India: An Ecological Review. *Indian Journal of Ecology*, 2021; 48(2): 319-331.
14. Chopra RN, Nayar SL, Chopra IC. Glossary of Indian Medicinal Plants, Council of Scientific and Industrial Research, New Delhi, 1986.
15. Duthie JF. Catalogue of the Plants of Kumaun and of the adjacent portions of Garhwal and Tibet based on the collections made by Strachey and Winterbottom during the years 1946-1949. London, 1906.
16. Farooquee NA, Saxena KG. Conservation and utilization of medicinal plants in high hills of the central Himalayas. *Environmental Conservation*, 1996; 23: 75-80.
17. Gangwar KK, Deepali, Gangwar RS. Ethnomedicinal Plant Diversity in Kumaun Himalaya of Uttarakhand, India. *Nature and Science*, 2010; 8(5): 66-78.
18. Gaur RD. Flora of District Garhwal North- West Himalaya (with Ethnobotanical Notes). Trans Media House, Shri Nagar (Garhwal), India, 1999; 811.
19. Gupta RK. Flora Nainitalensis: A Handbook of the flowering plants of Nainital. Navayug Traders, New Delhi, 1968; 489.
20. IUCN. The IUCN Red List of Threatened Species Version 2016, 4. IUCN Red List, Unit, Switzerland, Cambridge, UK. Available from: <http://www.iucnredlist.org/> (accessed April 2017.)
21. Jain SK, Sastry ARK. Threatened plants of India state of art Report. Botanical Survey of India, Howrah, 1980; 48.
22. Joshi GC, Tewari LM, Pandey NC, Upreti BM. Flora of Ranikhet West Himalaya. India. Indu Book Services (Publishers & Distributors) New Delhi, 2018; 375.
23. Joshi GC, Pangtey YPS, Pandey NC, Singh G, Tewari LM. Legume and Thistle Flora of Kumaun, Western Himalaya, India, Indu Book Services (Publishers & Distributors) New Delhi, 2021; 268.
24. Kala CP. Indigenous uses, population density, and conservation of threatened medicinal plants in protected areas of the Indian Himalayas. *Conservation Biology*, 2005; 19(2): 368-378.
25. Kalakoti BS, Pangtey YPS. Ethnomedicine of Bhotiya tribe of Kumaun Himalaya, Uttaranchal. *Bulletin of Medico-Ethnobotanical Research*, 1988; 9: 11-20.
26. Kanwal KS, Joshi H. The impact of hydroelectric project development on the ethnobotany of the Alaknanda river basin of Western Himalaya, India. *Eurasian Journal of Biosciences*, 2015; 9: 61-77.
27. Kumari P. Biodiversity assessment with particular reference to threatened ethnomedicinal plants of Almora district. Thesis submitted to Kumaun University, Nainital, 2011.
28. Kumari P, GC, Tewari LM. Diversity and status of ethnomedicinal plants of Almora District in Uttarakhand, India. *International Journal of Biodiversity and Conservation*, 2011; 3: 298-326.
29. Kumari P, Joshi GC, Tewari LM. Biodiversity status, distribution and use pattern of some ethnomedicinal plants. *International Journal of Conservation Science*, 2012; 3(4): 309-318.
30. Lone PA, Bhardwaj AK, Shah KW, Tabasum S. Ethnobotanical survey of some threatened medicinal plants of Kashmir Himalaya, India. *Journal of Medicinal Plants Research*, 2014; 8: 1362-1373.
31. Maikhuri R.K., Nautiyal, S., Rao, K.S., Semwal, R.L., Indigenous knowledge of medicinal plants and wild edibles among three tribal sub-communities of the Central Himalayas, India. *Indigenous Knowledge and Development Monitor*, 2000; 8: 7-13.
32. Mathur A, Joshi H. Ethnobotanical Studies of the Tarai Region of Kumaun, Uttarakhand, India. *Ethnobotany Research and Applications*, 2013; 11: 175-203.
33. Mehta P, Bisht K, Sekar KC. Diversity of Threatened Medicinal Plants of Indian Himalayan Region, *Plant Biosystems - An International Journal Dealing with all Aspects of Plant Biology*, 2020; <https://doi.org/10.1080/11263504.2020.1837278>.
34. Muthu C, Ayyanar M, Raja N, Ignacimuthu S. Medicinal plants used by traditional healers in Kancheepuram district of Tamil Nadu, India. *Journal of Ethnobiology and Ethnomedicine*, 2006; 2: 43.
35. Naithani BD. Flora of Chamoli district. Vols. I-II. Botanical Survey of India, Calcutta, 1984-85.
36. Nautiyal S, Rao KS, Makhuri RK, Semwal RL, Saxena KG. Traditional knowledge related to medicinal and aromatic plants in tribal societies in a part of Himalaya. *Journal of Medicinal and Aromatic Plants Sciences*, 2000; 22/4A: 528-441.
37. Nayar MP, Sastry ARK. Red Data Book of Indian Plants, eds. 1-3. Botanical Survey of India, Howrah (Calcutta), India, 1987, 1988, 1990.
38. Osmaston AE. A forest flora for Kumaun, Bishen Singh Mahindra Pal Singh, Dehradun, India, 1927; 605.

39. Pandey K. An Investigation into Ethnobotany of Gujjar Community in Uttarakhand. Ph.D. Thesis submitted to Kumaun University, Nainital, 2017.
40. Pandey K, Bargali SS, Kolhe SS. Adoption of technology by rural women in rice base agroecosystem. *International Rice Research Notes*, 2011; 36: 1-4.
41. Pandey NC, Bhatt D, Arya D, Chopra N, Upreti BM, Joshi GC, Tewari LM. Diversity of ethno-medicinal plant: A case study of Bageshwar district Uttarakhand. *Journal of Medicinal Plants Studies*, 2017; 5(2): 11-24.
42. Pandey NC, Joshi GC, Tewari LM. Ethnobotanical plant diversity of Betalghat region, Kumaun Himalaya. *Biolife*, 2016; 4(4): 629-649.
43. Pandey NC, Joshi GC, Tewari LM, Pangtey YPS. Diversity of Fodder Plants of Betalghat Block, Nainital District, Western Himalaya. *International Journal of Environment*, 2017; 6(4): 1-27.
44. Pangtey YPS, Samant SS, Rawat GS. Ethnobotanical Notes on the Bhotia Tribes of Kumaun. *Indian Journal of Forestry*, 1989; 12(3): 191-196.
45. Pant S, Samant SS. Ethnobotanical Observation in the Marnaula Reserve Forest of Kumaun, West Himalaya, India. *Ethnobotanical Leaflets*, 2010; 14: 193-217.
46. Rao RR. Biodiversity in India, Bishen Singh Mahendra Pal Singh, Dehradun, 1994; 315.
47. Rawat DS, Tiwari JK, Tiwari P, Ballabha R, Rana CS. Plant Diversity in the Lohba Range of Kedarnath Forest Division in Garhwal Himalaya, Uttarakhand, India. *Annals of Plant Sciences*, 2013; 2(8): 302-320.
48. Samant SS, Dhar U. Diversity, endemism and economic potential of wild edible plants of Indian Himalaya. *International Journal of Sustainable Development and World Ecology*, 1997; 4: 179-191.
49. Samant SS, Dhar U, Palni LMS. Medicinal plants of Himalaya, diversity, distribution and potential values. Gyanodaya Prakashan, Nainital, 1998; 163.
50. Singh A, Lal M, Samant SS. Diversity, indigenous uses and conservation prioritization of medicinal plants in Lahaul valley, proposed Cold Desert Biosphere Reserve, India. *International Journal of Biodiversity Science & Management*, 2009; 5(3): 132-154.  
<https://doi.org/10.1080/17451590903230249>.
51. Singh G, Rawat GS. Ethnomedicinal survey of Kedarnath wildlife sanctuary in Western Himalaya, India. *Indian Journal of Fundamental and Applied Life Sciences*, 2011; 1: 35-46.
52. Singh G. Diversity of Vascular Plants in Some Parts of Kedarnath Wildlife Sanctuary Western Himalaya. Ph.D. thesis submitted to Kumaun University, Nainital, 2008.
53. Singh H. Floristic Diversity of Sacred Groves of Pithoragarh, Uttarakhand. Ph.D. Thesis submitted to Kumaun University, Nainital, 2011.
54. Singh JS, Singh SP. Forest vegetation of Himalaya. *Botanical Review*, 1987; 53(1): 80-192.
55. Singh P, Attri BL. Survey on traditional uses of medicinal plants of Bageshwar valley (Kumaun Himalaya) of Uttarakhand, India. *International Journal of Conservation Science*, 2014; 5(2): 223-234.
56. Singh HS, Singh K. Status and needs of pasture and fodder management in Uttarakhand. In: Bisht JK, Srivastava AK. (eds), Road Map for Pasture and Fodder Development in NWHR for Livestock Sustenance. Vivekananda Parvatiya Krishi Anusandhan Sansthan (ICAR), Almora, Uttarakhand, India, 2005; 39-64.
57. Srivastava SK, Singh DK. Glimpses of Plant Wealth of Uttarakhand. Bishan Singh Mahendra Pal Singh, Dehradun, Uttarakhand, India, 2005.
58. Tewari LM, Pangtey YPS, Tewari G. Biodiversity Potentials of the Himalaya. Gyanodaya Prakashan, Nainital, 2010; 574.
59. Tewari LM, Singh N, Upreti K, Pangtey YPS. Medicinal plants of Ranikhet. Consal Book Depot, Nainital, 2008; 104.
60. Tewari S, Paliwal AK, Joshi B. Medicinal Use of Some Common Plants among People of Garur Block of District Bageshwar, Uttarakhand, India. *Octa Journal of Biosciences*, 2014; 2(1): 32-35.
61. Tropicos. org. Missouri Botanical Garden. [www.tropicos.org](http://www.tropicos.org). (Accessed March 2018).
62. Uniyal BB, Sharma JR Choudhary U, Singh DK. Flowering Plants of Uttarkhand (A Checklist). Bishan Singh Mahendra Pal Singh, Dehradun, 2007; 404.
63. Upreti K. Taxonomy and Ecology of Useful Plants Resources of Uttaranchal. Ph.D. thesis submitted to Kumaun University, Nainital, 2005.
64. WHO. Traditional Medicine, WHO, Geneva, 2003.