Ethnobotanical Leaflets 14:491-510, 2010.

Floristic Diversity and Indigenous Uses of Forest Vegetation of Dabka Watershed in Indian Central Himalaya

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Issued: April 01, 2010

Abstract

A species check list of flora is presented in and around Dabka watershed, District Nainital of Uttarakhand, together with preliminary Phytosociological data for the major species of communities. A total of 45 tree species, 09 shrubs and 32 species of grasses and herbs recorded. Results of quantitative sampling indicate that *Adina cordifolia* (IVI 66.26) species dominated in the watershed area. Other important woody associates include *Quercus incana* (IVI 26.74), *Pinus roxburghii* (IVI 14.64). The diversity range for tree layer was 3.16 followed by herbs (2.92) and then shrubs (1.84); all of the tree species were contagious distribution. Analysis of use diversity showed that the recorded species provide 8 Different uses to local communities. About 56% of the species are used for more than one use categories. Although some species have multiple uses, the average number of uses per species is three. The uses were placed under three major use categories, which had highest contribution of the total uses. These include food, medicinal and fuel/fodder/timber/ dye etc. use value of species shows that about 38% species use in medicinal purposes, 32% species used for edible purposes and 33% use as various purposes. The current work provide the baseline floristic and ecological data and documents the structure and composition of vegetation and also collect information about ethno-botanic used to explore the conservation status and folk medicinal knowledge of the surrounding peoples of the study area, for managers planners and policy makers to understand such simple method assessing the biodiversity of any potential area for conservation in any region. The finding suggest that, public awareness and community based management need to be encouraged at all levels in order to overcome the threats; further investigation into nutritional properties of all the species reported; study on the pharmacological attributes would help to understand their medicinal application. Furthermore urgent collection of germplasm from areas under human pressure is recommended.

Keywords: Floristic diversity, Forest vegetation, Indigenous uses, Dabka Watershed, Central Himalaya.

Introduction

The Himalaya mountain system stretches over 2500 km in length from west to east and 240-340 km wide, covering

a total area of about 236000 sq km in India. The area is considered very rich in endemics (Khoshoo, 1992). Human history on this planet will never be completed without a look at the role of plants. A completed record of many thousands of the plant species used by human being during past shows their importance in health, economy, shelter, clothing and food (Rizwana, *et. al* 2006). Regional floristic survey are required to know the species range, floristic variability and economic value and assess the conservation status of community in any area (Sundriyal, 2003) over last two decades, the species area relations, environmental gradient and natural features, distribution pattern of the specific taxa and bio-geographic region are considered the best criteria for declaring and management the world (Macarthur and Wilson, 1967, Dimond, 1998, Miller and Harvis 1977, Terborgh, 1974, Wilson and Willer 1975, Miller and White, 1980). One of the most critical issues on the national and global agenda is need preserve biodiversity for future generations while trying to understand and document the indigenous knowledge of resource management practices (Nehal *et. al*, 2004).
The concern of biodiversity preservation has highlighted the importance to described vegetation at regional and small scale (Lunt *et al*, 1987, Lunt, 1990, Brown *et al*, 1988, Specht, 1981, Frood and Calcler, 1987, Kirkpatrick *et al*., 1988; Whittaker *et al*., 1979; Brown and Hopkins, 1983). The modern concept of Ethnobotany was given by Aumeeruddy (1996) according to him, it is the science which studies the relationship between given society and environment and particular, the plant word. So we can say that Ethnobotany is a multi-disciplinary science of Botany, Ecology and Anthropology. There is limited information available about the species composition, variation and ecology of many forest communities in Himalaya in general (Khoshoo, 1992, see compilation in Maikhuri *et al.,* 1998; Dhar *et al*., 1999). A plant containing active chemical constituents in any part or parts like root, stem, leaves, bark, fruit and seed which produces a definite curing physiological response in the treatment of various ailments in humans and other animals is termed as medicinal plant. The various chemicals work together to reach equilibrium in the body as they do it the plant, and so produce gentle progressive healing within the body tissues (Muhammad *et al*., 2006). It has been estimated that about 20,000 plant species are used for medicinal purposes throughout the world (W. H. O 2002). The present study provides a floristic check list for a stretch of Dabka River, together with brief floristic diversity and local knowledge/use of vegetation.

Study area

The present study carried out in Nainital forest division, in Kotabag Block for study of community composition and plant diversity, which is the part of undulating hills of Kumaun (latitude 29 degree 29 minute 44 second N and longitude 79 degree 20 minute 05 second E) Himalaya in district Nainital of the Uttarakhand state in India. The total area of Dabka watershed is 68 sq km. kilometers (Fig. 1). The Altitude of the study area stretch from 1800 to 2500m asl and slope found between 51 degree to 81 degree. The soil of the watershed varies with the slope and vegetation. The soil of the hill bottom is

Fig. 1- Location Map of Dabka Watershed in Kumoun Region of Central Himalaya, India.

deeper and darker in color. In some area they were fine loamy in texture and richer in organic matter content. The climate of study area is comparatively temperate and humid. The temperature reached up to 36 degree in the month of May to June where as the higher peaks of the area receive forest snow fall in winter season.

Methodology

The phytosociological analysis of the forest of study area was carried out during the period of January 2007 – December 2008 by using 20× 20m quadrates for trees. Each quadrate was subdivided into 5×5 m sample plot for recording shrubs and 1×1 m for herbs. The quadrates were laid out randomly throughout the study area. The size and the number of quadrates were determined by the species area curve (Misra, 1968) and the running means methods (Kershaw, 1973). Twenty quadrates were randomly placed in the entire area, representing all the vegetation type and localities. In each quadrate, tree were recorded with >31.5 cm cbh (circumference at breast height i.e., 1.37 m above the ground) individually measured. Individuals within the cbh range of 10.5 to 31.4 cm were considered as shrubs + saplings and individuals <10.5 cm cbh were considered as herbs+ seedlings. The vegetation data were quantitative analyzed for abundance, density and frequency according to the formulae given by Curtis and Mc Intosh (1950) and Mishra (1968). The relative values were summed up to represent Important Value Index (IVI) as per Curtis (1959). The distribution of the species was studied using the ration of abundance to frequency if below 0.025 indicates regular distribution; between 0.025- 0.050 indicates random distribution and when exceeds 0.050 indicate contagious distribution (Whitford 1949). The diversity Index (H) was computed by using Shannon-Wiener information Index (Shannon and Wiener, 1963).

Ethnobotanical information of local communities was collected using semi-structured and structured questionnaires and schedules. Interviews and group discussion both formal and informal and empirical observations in the fields was carried out. Extensive field visits was made with local herbal practitioners to gather information on the identity and occurrence of medicinal plants and mode of their utilization. Randomly selected households in the study area were surveyed to gather information on quantity of extraction of these medicinal plants from wild. Verification of data was repeated through interviews with more than one informant. The information related to quantity/dosage of medicine prepared from different medicinal plants and prescribed to the patient for particular period of time was obtained from the local medical practitioners (Maikhuri *et al.,* 1998). The plant species collected were maintained in to herbarium specimens, and identify with the help of literature, and taxonomical experts of the Institute/University. Specimens of each species identified were brought to the G.B. Pant Institute (Garhwal Unit) herbarium for scientific identification where they were subsequently deposited.

Results

The detailed characteristics of forest composition carried out, floristic structure and composition of the Dabka watershed is mixed type vegetation. The number of species in trees, herbs, shrubs and sapling indicate that these forest stands are comparatively species rich. Although dominance was shared by a number of species, no single species was found to complete climax stage. A total of 86 species (45 species of trees, 09 species of shrubs and 32 species of herbs) were recorded from the study area.

The dominant and co-dominant tree species were *Adina cordifolia* and *Quercus incana,* showing their value of IVI of 66.26 and 26.74 respectively, where as the highest value of density was recorded *Quercus incana*. The data of abundance frequency ration showed that all tree species showed contagious distribution pattern (table-1). In the shrub layer the highest value of IVI (64.04) was recorded for *Rulens eleipicus* where as, lowest IVI (14.00) for *Utrica urdense*. Among the shrubs species *Rulens eleipicus* showed highest value of density. The lowest value of density was recorded for *Utrica urdense* (table-2). In the herb layer the highest value of IVI (37.49) was recorded for *Viola* where as second highest value of IVI recorded (29.72) *Dryopteris* and highest value of

density recorded *Viola*. Among the 32 species of herbs 27 species shows contagious distribution, 5 species showed random distribution (Table-3). The diversity of the study sites have been described in table-3. The maximum (3.16) value of diversity for tree layer was recorded, followed by herbs (2.92) where as minimum value of species diversity (H) found in shrubs layer (1.84). Rich11ness index is highest in tree layer followed by herbs and then shrubs (Table-4). The number of species in trees, herbs, shrubs and sapling indicate that these forest stands are comparatively species rich. Although dominance was shared by a number of species, no single species was found to complete climax species. On the basis of density, basal cover and important value index, *Quercus incana* was found to be the most important and dominant species in all the forest stand of Dabka watershed.

Table 1. Phytosociological analysis of tree species.

Species	**Ind.**	**Density**		**Dominance**		**Frequency**		IVI
		ADen.	RDen.	ADo	RDo	AFer	RFer	
Boehmeria rcegolosa	14	0.08	3.20	4.67	0.58	17.65	2.73	6.51
Bauhinia species	3	0.18	0.68	1.50	0.14	11.76	1.82	2.64
Schleichera trijuga	5	0.29	1.14	1.25	0.02	23.53	3.64	4.80
Ficus species	6	0.35	1.37	2.00	0.11	17.65	2.73	4.20
Sapium insigne	5	0.29	1.14	1.67	0.07	17.65	2.73	3.94
Cassia fistula	8	0.47	1.83	1.60	0.02	29.41	4.55	6.40
Grewia oppositifolia	26	1.53	5.94	8.67	2.01	17.65	2.73	10.67
Cedrela toona	5	0.29	1.14	1.67	0.07	17.65	2.73	3.94
Lannea coromandelica	13	0.76	2.97	2.17	0.03	35.29	5.45	8.45
Syzygium cumini	2	0.12	0.46	1.00	0.06	11.76	1.82	2.34
Mallotus philippensis	24	1.41	5.48	6.00	0.54	23.53	3.64	9.66
Erythrina suberosa	13	0.76	2.97	4.33	0.50	17.65	2.73	6.20
Albiza species	1	0.06	0.23	1.00	0.24	5.88	0.91	1.38
Pinus roxburghii	39	2.29	8.90	6.50	0.28	35.29	5.45	14.64
Quercus incana	86	5.06	19.63	12.29	0.74	41.18	6.36	26.74
Cupressus torulosa	14	0.82	3.20	7.00	2.95	11.76	1.82	7.97
Prunus species	3	0.18	0.68	1.00	0.03	17.65	2.73	3.44
Myrica esculenta	1	0.06	0.23	1.00	0.24	5.88	0.91	1.38
Rhododendron arboreum	20	1.18	4.57	5.00	0.38	23.53	3.64	8.58
Lyonia ovalifolia	10	0.59	2.28	5.00	1.51	11.76	1.82	5.61
Quercus semecarpifolia	18	1.06	4.11	9.00	4.88	11.76	1.82	10.81
Machilus duthiei	2	0.12	0.46	2.00	0.96	5.88	0.91	2.33
Holarrhena antiaysenterica	16	0.94	3.65	4.00	0.24	23.53	3.64	7.53
Terminalia bellirica	5	0.29	1.14	5.00	6.03	5.88	0.91	8.08
Anogeissus latiolius	21	1.24	4.79	7.00	1.31	17.65	2.73	8.83
Flacourtia indica	3	0.18	0.68	1.50	0.14	11.76	1.82	2.64
Emblica officinalis	2	0.12	0.46	1.00	0.06	11.76	1.82	2.34
Nyctanthes arbortristis	2	0.12	0.46	2.00	0.96	5.88	0.91	2.33
Ehretialaevis	2	0.12	0.46	1.00	0.06	11.76	1.82	2.34

Ziziphus jujube	1	0.06	0.23	1.00	0.24	5.88	0.91	1.38
Casearia tomentosa	2	0.12	0.46	1.00	0.06	11.76	1.82	2.34
Dalbergia sissoo	2	0.12	0.46	1.00	0.06	11.76	1.82	2.34
Melia azedarach	1	0.06	0.23	1.00	0.24	5.88	0.91	1.38
Leucaena leucocephala	1	0.06	0.23	1.00	0.24	5.88	0.91	1.38
Artocarpus heterophyllus	1	0.06	0.23	1.00	0.24	5.88	0.91	1.38
Celtis australis	6	0.35	1.37	3.00	0.54	11.76	1.82	3.73
Cordia species	8	0.47	1.83	2.00	0.06	23.53	3.64	5.52
Cinnamomum tamala	2	0.12	0.46	1.00	0.06	11.76	1.82	2.34
Ficus religiosa	4	0.24	0.91	1.33	0.05	17.65	2.73	3.69
Shorea robusta	14	0.29	3.20	5.00	6.03	5.88	0.91	10.13
Engelhardtia colebrookeana	5	0.12	1.14	2.00	0.96	5.88	0.91	3.01
Aegle marmelos	1	0.06	0.23	1.00	0.24	5.88	0.91	1.38
Mitragyna parvifolia	4	0.24	0.91	4.00	3.86	5.88	0.91	5.68
Flacourtia indica	1	0.06	0.23	1.00	0.24	5.88	0.91	1.38
Adina cordifolia	16	0.94	3.65	16.00	61.70	5.88	0.91	66.26
Total	438	24.32	100.00	150.14	100.01	647.06	100.00	300.01

Ind., number of individuals recorded in plot; **ADen**., absolute density; **RDen**., relative density; **ADo**., absolute dominance; **RDo**., relative dominance; **AFer**., absolute frequency(%); **RFer**., relative frequency; **IVI**, important value index.

Table 2- Phytosociological analysis of herb species.

Species	**Ind.**	**Density**		**Dominance**		**Frequency**		IVI
		ADen.	RDen.	ADo	RDo	AFer.	RFer.	
Viola	35	0.51	18.04	1.00	0.93	51.47	18.52	37.49121
Swertia agustifolia	5	0.07	2.58	1.00	2.10	7.35	2.65	7.318581
Fern	3	0.04	1.55	1.00	4.89	4.41	1.59	8.025414
Freqaria	4	0.06	2.06	1.00	1.11	5.88	2.12	5.292539
Stellaria	3	0.04	1.55	1.00	1.01	4.41	1.59	4.144379
Achyranthus	11	0.16	5.67	1.00	3.27	16.18	5.82	14.76483
Petridium	2	0.03	1.03	1.00	4.46	2.94	1.06	6.546255
Rumex	7	0.10	3.61	1.00	3.93	10.29	3.70	11.24001
Dryopteris	23	0.34	11.86	1.00	5.70	33.82	12.17	29.72067
Cynodon	8	0.12	4.12	1.00	0.57	11.76	4.23	8.925026
Oxalis	4	0.06	2.06	1.00	0.57	5.88	2.12	4.746769
Eupatorium	17	0.25	8.76	1.13	4.89	22.06	7.92	21.59111
Sonchus	1	0.01	0.52	1.00	5.82	1.47	0.53	6.866117
umex Dentatus	2	0.03	1.03	1.00	1.46	2.94	1.06	3.544517
Origanum	1	0.01	0.52	1.00	5.82	1.47	0.53	6.866117
Cyperus Rotundus	1	0.01	0.52	1.00	3.27	1.47	0.53	4.319187
Reinwardtia indica	7	0.10	3.61	1.00	2.97	10.29	3.70	10.28213
Poa annua	2	0.03	1.03	1.00	0.82	2.94	1.06	2.907785

Viola Betonicifolia	1	0.01	0.52	1.00	5.82	1.47	0.53	6.866117
Fumaria Indica	3	0.04	1.55	1.00	3.27	4.41	1.59	6.408316
Galium	3	0.04	1.55	1.00	0.36	4.41	1.59	3.49754
Flemingia	11	0.16	5.67	1.10	3.73	14.71	5.29	14.6869
Aster	1	0.01	0.52	1.00	1.46	1.47	0.53	2.499952
Fragaria	14	0.21	7.22	1.17	2.12	17.65	6.35	15.69067
Hedychium	12	0.18	6.19	1.00	6.83	17.65	6.35	19.36701
Adiantum lunulatum	4	0.06	2.06	1.00	2.27	5.88	2.12	6.452302
Eragrostis	1	0.01	0.52	1.00	0.36	1.47	0.53	1.408411
Ageratum conyzoides	1	0.01	0.52	1.00	3.27	1.47	0.53	4.319187
Allium sativam	1	0.01	0.52	1.00	0.36	1.47	0.53	1.408411
Ageratum houstonianum	1	0.01	0.52	1.00	13.10	1.47	0.53	14.14306
Oplismenus	2	0.03	1.03	1.00	1.46	2.94	1.06	3.544517
Fragaria	3	0.04	1.55	1.00	1.98	4.41	1.59	5.114638
Total	194	2.85			99.9	277.9		299.9

Ind., number of individuals recorded in plot; **ADen**., absolute density; **RDen**., relative density; **ADo**., absolute dominance; **RDo**., relative dominance; **AFer**., absolute frequency(%); **RFer**., relative frequency; **IVI**, important value index.

Table 3- Phytosociological analysis of shrub species.

Species	**Ind.**	**Density**		**Dominance**		**Frequency**		IVI
		ADen.	RDen.	Ado	RDo	AFer.	RFer.	
Berberis	15	0.22	15.96	1.25	8.78	17.65	14.64	39.37206
Cotoneuster	11	0.16	11.70	1.10	22.16	14.71	12.20	46.00342
Rulens ellipicus	2	0.03	2.13	1.00	25.81	2.94	2.44	30.37051
Asparagus	13	0.19	13.83	1.18	5.63	16.18	13.41	32.87751
Debregeasia longifolia	2	0.03	2.13	1.00	9.80	2.94	2.44	14.36697
Rubus eliptius	25	0.37	26.60	1.14	10.62	32.35	26.83	64.04881
Berberis asitica	22	0.32	23.40	1.16	5.97	27.94	23.17	52.54569
Dioscorea deltoidea	2	0.03	2.13	1.00	1.85	2.94	2.44	6.412307
Urtica urdense	2	0.03	2.13	1.00	9.43	2.94	2.44	14.00064
Total	94	1.38						299.9979

Ind., number of individuals recorded in plot; **ADen**., absolute density; **RDen**., relative density; **ADo**., absolute dominance; **RDo**., relative dominance; **AFer**., absolute frequency(%); **RFer**., relative frequency; **IVI**, important value index.

Among the natural resource of Uttarakhand, forest are the important, both economically and environmentally. The alpine and tropical rainforests that cover most part of the stage make natural habitats of some of the best known wildlife creatures. The Uttarakhand Himalaya is very rich in forest resources and diversity. The plant diversity is found extremely rich from the valley regions to the higher elevation alpine meadows.

India has rich heritage medicines and ethno-pharmacological tradition which has developed into an established scientific faculty dealing in plant-based Medicare, called ‘Ayurveda’. India who once depended heavily

on wild plants for food and medicinal purpose, are fast losing their traditional wisdom of naturopathy due to change in their culture value system and exposure to modern medicines. The difficulty in procurement of forest plants because of loss of natural vegetation and easier availability of drugs has had a significant effect in molding their attitude into not accepting herbal medicines administered by the Vaidyas (local healers). Economic value of the existing flora is an important consideration for any forested area. Large number person of the hilly area depends on forest resources. They are the vital component to sustaining the life supporting system on earth. There role in ecological balance, environmental stability biodiversity conservation, food security and sustainable development have been widely recognized. Forest are the source of various components i.e. food, fodder, fiber, medicine, tannin, oil, gum and many other things for human benefit (table-). It has been estimated that about 20,000 plant species are used for medicinal purposes throughout the world. According to World Health Organization report (2002), 70% of the world population use medicinal plants for curing diseases through their traditional practitioners. In sub-continent, plant oriented drugs are used extensively and form a very long time. According to a survey conducting by World Health Organization, traditional healers treat 65% patients in Srilanka, 60% in Indonasia, 75% in Nepal, 85 % in Mayanmmar, 80% in India and 90% in Bangladesh.

Table 4- Diversity Index (H) of forest vegetation.

	Shannon-Wiener Index	**Richness Index**
Tree layer	3.16	45.83
Shrubs	1.84	9.77
Herbs	2.92	32.81

Analysis of use diversity showed that the recorded edibles species provide 8 different uses to local communities. About 56% of the species are used for more than one use categories. Although some species have multiple uses, the average number of uses per species is three. The uses were placed under three major use categories, which had highest contribution of the total uses. These include food, medicinal and fuel/fodder/ timber/ dye etc. use value of species shows that about 38% species use in medicinal purposes, 32% species used for edible purposes and 33% use as various purposes (Table-5).

Table 5- Indigenous uses of forest vegetation of Dabka Watershed in Central Himalaya.

Botanical Name	**Local Name**	**Uses**
Achyranthes aspera	Latjiri	Root infusion taken in malarial fever; root power used in making local beverage.
Adina cordifolia	-	Young twigs made into vegetable, supposed to be good for cough and cold, leaves and roots use as medicine
Aegle marmelos	belpatri	Fruit edible, made refreshing drink, leaves offered to lord shiva

Ageratum conyzoides	Gundrys	Plant with the roots of *Thalictrum foliolosum* made into past and applied on sores, cut and various skin ailments.
Ageratum houstonianum	Kunrja	Skin disease
Albiza species	Kala siris	Fuel wood
Allium sativam	Lahsun	Frequently used as medicine in bronchial, respiratory, digestive and blood diseases. Leaves and bulbs added to food preparation as spice.
Artocarpus heterophyllus	Kathal	Edible
Asparagus racemosus	Jhirni kairu	The tuberous roots are pickled, young shoots eaten as vegetable, tuber with honey giving in diabetes and dysentery
Aster peduncularis	Phulyan	Root powder as stomachic.
Bauhinia species	Kachnar	Fodder, fuel, timber, fiber
Berberis aristata	Kingore	Fruits edible, bark yellow dye, juice from bark of stem or root often known as "Rasad" dropped in ophthalmic, infusion of root given in fever
Berberis asiatica	Chatru	Fruits edible, wood and bark yield yellow dye root extract in ophthalmia
Boehmeria rcegolosa	Genthi	Fodder, plaster of bark applied on fractured bones
Casearia tomentosa	-	Fuel wood, leaf part used to check bleeding of wounds
Cassia fistula	Kirala, amaltas	Fruit and bark use in medicine, fruit pulp in asthma, skin disease
Toona ciliata	Tun, toon	Timber, fodder
Ciltis australis	khairk	Fruit edible, bark yellow dye, bark past applied on bone fracture
Cinnamomum tamala	Dalchini, tejpata	Bark and dried leaves used for flouring tea and various food preparation, bark medicinal use
Cotoneaster	Cham-ruins	Fuel wood, fruits edible
Cupressus torulosa	Bugla	Timber, leaf oil use in perfumery
Cynodon dactylon	Doob	Roots taken in fever and in internal injury. Plant believed pious and used in several Hindu religious ceremonies.
Dalbergia sissoo	Sisham	Timber, fodder, the resin used in skin ailments
Debregeasia longifolia	Tusara, sausaru	Fodder, bark yield fiber, plaster made from pulverized bark for bone- fracture
Dioscorea deltoidea	Disquari	Fodder, tubers edible as well as medicinal
Emblica offinalis	Anwala	Fruit eatern, rich source of vitamin C, Ayurvedic medicine (one of the constituents of "Triphala")
Engelhardtia colebrookiana	mahwa	Fuel wood, bark extract used in diarrhea
Erythrina suberosa	Madaru	Fuel wood
Ethreticalaevis	Chamror	Timber, fodder, fruit edible
Ficus religiosa	Peepal	Religious value & medicinal use
Ficus ariculata	Timla	Fodder, fruit edible, religious significance, leaves made into cup and plates

Flacourtia indica	Kandai	Fruit edible, fodder, medicinal use
Galium elegans	Manjeethee	Plant juice used in treatment of urinary disorders.
Grewia oppositifolia	bhimal	Fiber, fuel, fodder, medicinal use, fiber use as a sop
Hedychium spicatum	Ban-haldi	Boiled underground parts eaten with salt; roasted powder of rhizome given in asthma; seed believed to cause abortion; decoction of rhizome with sawdust of Deodar taken in tuberculosis.
Holarrhena antiausenterica	Kuru, kuri	Medicinal bark
Lannea coromandelica	kalmina	Bark for tanning, fuel, fodder, gum
Lyonia ovalifolia	Anyar	Fuel
Mallotus philippensis	Rohini, runi	Dye, fuel wood, fodder
Mitragyna parvifolia	-	Bark past externally applied in migraine
Myrica esculenta	Kaphal	Edible fruit, refreshing drink, fuel, timber
Nyctanthes arbortristis	kura	Medicinal use, orange dye
Ocimum gratissimum	Bantulsi	Branches hung on the houses to get rid of bad spirits. Plant extract used in bronchitis colic and diarrhea; leaves eaten as vegetable and flavouring agent.
Oxalis species	Bhilmori	Leaves taken as salad or cooked as vegetable.
Pinus roxburghii	Chir	Timber, resin, bark use preparing coal
Prunus species	Aaru	Fruit edible
Quercus floribunda	Tilonj Banj	Timber, fuel wood, fodder, gum
Quercus incana	Banj	Timber, fuel wood, fodder
Rhododendron arboreum	Burans	Fuel wood, sauce, jellies, jam, refreshing drink, medicinal use
Rubus biflorus	Hinsara	Fruit edible
Rubus ellipticus	Hinssar	Fruit edible, root extract used in local beverages as intoxicating ingredient, plant acts as soil binder
Rumex dentatus	Jangli-palak	Used as vegetable
Sapium insigne	Khinna	Medicinal use
Schllichera trijuga	Kusum	Edible fruit, timber, medicinal pour poses
Shorea robusta	Shal	Fodder, fuel wood, timber
Sonchus species	Pili-dudhi	The plant used as a tonic to purify blood and in hepatitis; leaf past applied on wounds.
Stellaria midea	Badyalu	Plant used as green vegetable, as well as fodder; plant past externally applied on burns, boils and wounds
Swertia agustifolia	Chirata	The plant is well known for Ayurvedic medicine ‘Chiretta’ which is used in blood diseases and as febrifuge.
Syzygium cumini	Jamun	Timber, fruit edible
Terminalia bellirica	Behera	Timber, fuel wood, edible, Ayurvedic medicine (one of the constituents of "Triphala")
Urtica urdense	Kandali	Medicinal

Viola betonicifolia	Vanfsa	The whole plant either in the form of extract or powder taken as diaphoretic, useful in skin and blood disease; flowers and leaves boiled with tea, supposed to be good for fever and cough.
Ziziphus jujube	Ber	Fruit edible

Conclusions

Floristic structure and composition of the Dabka watershed is mixed type vegetation. Higher value of the density and high value of basal cover suggest that the Dabka watershed forest stands are younger and mature forest. High tree density suggests that the diversity and luxuriance of these community forest stands may be maintained in healthy state if the extent of biotic pressure is maintained to an optimum limit. The distribution pattern (A/F) ration showed that 43 species among trees, 3 species among shrubs and grasses and 33 species of herbs indicate contagious pattern(>0.05). The important value index values of the particular species in the ecosystem exhibit their dominance in trapping the available resources; higher the value of IVI higher will be the dominance of particular species thereby reflecting the maximum utilization of available resources. Richness index the change in species composition can be affected by positive feedback from nutrient cycling in the eco system (Berendse and Elberse 1990). This positive feedback modifies the environment and makes it more suitable to facilitate natural invasion and long term succession change (Wilson and Agnew, 1992)

It was reported that the open canopy on the site invites more and more species to establish. Between the plants where alteration in soil condition favors their germination and establishment canopy cover was found to be main factor to modify composition of plant species (Tylor, 1989). Low species richness in shrub layers may be due to relatively high developed canopy in this type of forest which does not allowed sufficient light to reach the ground resulting to low growth rate of shrub species. Shrubs and herbs generally not dominant compression to tree richness that clearly indicate that the site is developed. Indigenous practices of rural people of Himalaya for the treatment of different health related problem were found to be effective and most of these are also scientific medicines. However, use of plants for treating other health related problems as practiced by the rural people still need to be explored so that such uses can be popularized among those who are completely unaware about traditional health care system. This suggests a strong need for extension education and training for rural and urban people about the applications and methodologies of their effective health technologies, so that they too can make use of indigenous knowledge for health management. It is also urgent need that indigenous knowledge should be preserved and integrated or blended with scientific knowledge. The current rapid deforestation in the whole country may endanger medicinal plant species which need to be preserved for future use without disturbing the ecosystem.

The result of the study revealed that knowledge about the edibility, habitat destruction and use of most wild edible plant species is still maintained among the study communities. The preservation of this knowledge appears to be the result of continued reliance of local communities, most of the edible plants. The result also reveals that many wild species are under growing pressures from various anthropogenic factors. Thus, public awareness and community based management need to be encouraged at all levels alongside of urgent collection of germplasm. The finding suggest further investigation into nutritional profile and processing method of all the species reported and study of the value addition, pharmacological properties for the nutraceutical species since they are also used for medicinal application.

Therefore, there is an urgent need to conserve the forest resource both macro and molecular level for human and sustainable development of environment, beside that awareness to the villagers is essential how they can develop suitable techniques for sustainable utilization of forest resources.

Acknowledgements

The authors are thankful to the Director, G.B. Pant Institute of Himalayan Environment and Development, Kosi-Katarmal Almora for providing necessary facilities. We are grateful to Prof. R.D. Gaur and Prof. M.C. Nautiyal for identification of the plant species.

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