

Important Plant-Based Non-Wood Forest Products of Tons Valley, Uttarakhand

Meenakshi Rawat¹, Reenu Agarwal^{2*}, Shilpi Rijhwani²

¹Department of Botany, Garhwal University

²Department of Botany, The IIS University, Jaipur, Rajasthan, India

Abstract

The present study discusses the Non Wood Forest Product (NWFP) diversity and usage pattern of Tons Valley one of the rich biodiversity centres situated in Garhwal Himalayas of Uttarakhand. The primary occupation of the inhabitants of the valley is agriculture, cattle rearing and working as labourers. Collection of NWFPs is their secondary occupation. Data was collected from 300 households in 10 villages of three tehsils (Kalsi, Chakrata and Tiuni). Information on the uses of various plants has been gathered with the help of Questionnaire surveys and field visits. The present study comprises a total of 105 NWFPs belonging to 52 families and are used by the villagers for different purposes such as medicinal (70), edible plants (53), fodder (21), fibre (2), fuel (10) and others (9). NWFPs uses make an important contribution to rural livelihoods through the use and sale of products. As a result the dependence of many poor people NWFPs are significant in terms of income generation. NWFPs can therefore, be used as a development alternative for poor communities.

Keywords: Diversity, NWFPs, Rural livelihoods, Tons Valley

Introduction

NWFPs (Non wood forest products) have long been an important component for the survival of communities living in forested areas. It is as old as human existence. A report from International Expert Consultation on NWFP in Indonesia states that more than ¾ of the population in developing world depends on NWFPs for their sustenance (FAO, 1995). In many countries NWFPs are important export goods or products, but the national market is often more important (Alcorn, 1990)

Local inhabitants in the rural areas mostly depend upon wild plant during their lean seasons, which are often collected from nearby forest as their collection does not require any skills and capital investment (FAO, 1995; Ros-Tonen, 2000). The dependence on NWFPs is associated to cultural isolation, poor technology and economy and also poor access to markets (Arnold and Ruiz Perez, 1995).

About 85% people in western Himalayas lives in the remote area and they are completely or partly dependent on the forest in the vicinity of their household. Most of the biological resources are being utilised by the People living in a nearby forest cover for their livelihoods, as marginal agriculture and animal husbandry are the major source of their income (Kala, 2005; 2007).

The present study was conducted in the three tehsils, namely Kalsi, Chakrata and Tiuni of Dehradun District, Uttarakhand. These areas were selected because people

of the region have rich traditional knowledge of ethnomedicinal plants and non wood forest products (NWFPs) such as medicinal herbs, economically important shrubs and trees with commercial value.

The potential of non wood forest products has been threatened because of their unscientific exploitation. Site selection for locating tribal patches in the study area was done with the help of toposheets of the Survey of India and the data available at Tehsils of Kalsi, Chakrata and Tiuni. The people of selected tehsils having a traditional knowledge of products of non wood forest; are heavily dependent on these forests for their medicinal needs.

Materials and Methods

Study Area

Tons Valley (30° 35' and 30° 18' N latitude and 77° 49' and 78° 37' E longitude) is one of the most floristically rich area situated in Garhwal Himalayas of Uttarakhand. Shimla District of Himachal Pradesh forms the North and Northwest boundary of the valley and it is bordered in the southwest by Chakrata Forest Division of Dehra Dun District. In east it is flanked by Yamuna Valley located in the Uttarkashi District (Fig.1). The entire study area is located in the temperate zone.

Because of the topographic and climatic diversity of study area, there is a distinctive congregates of tropical,

temperate and alpine elements in the flora. Vegetation in Tons valley is mainly dominated by a genus *Cedrus*, *Pinus* *Quercus* and mixed type of forests which along with terraced farms gives an impressive landscape. The Tons river in this valley forms a irregular curves which intensify its beauty. Moreover, the area is a native of some primitive communities which is mainly dominated by Jaunsaris.

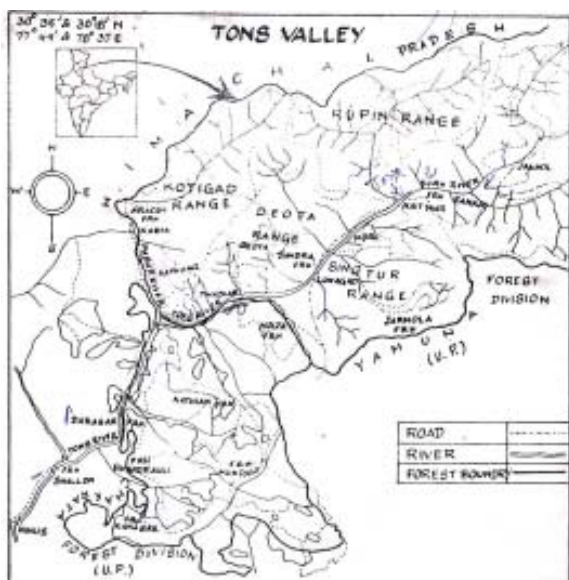


Fig. 1. Map of Study Area

The present survey was conducted in villages around the Tons Valley (three tehsils viz., Kalsi, Chakarata and Tuini), based on personal interviews among tribal. The primary data (Table 1) was collected through field surveys during which discussions and personal interviews were carried out with the help of semi structured questionnaires which includes household composition, availability of NWFP in wild for use. Information on wild plants is mostly extracted from old adults, housewives and middle aged people, who were fully aware about their forest wealth. District forest working plans, reports of forest department are the major source of secondary data. Standard methods were followed for the collection of plant materials, mounting, preparation and preservation of plant species.

Results and Discussion

The results of the investigation are presented in Table 1. The present study comprises a total of 105 Non Wood Forest Product (NWFP) belonging to 52 families.

These NWFP are used by the villagers for different purposes such as edible plants (53), fodder (21), medicinal (70), fibre (2), fuel (10) and others (9) (Fig. 2). Rosaceae, Poaceae, Asteraceae, Euphorbiaceae, Zingiberaceae, Lamiaceae, Moraceae, were the dominant families. The different Plant parts are used as NWFPs. are Leaves-40;

Fruit-27; Bark-6; Seed-12; Root-15; Flower-4; Tuber-4; Whole plant-9; Rhizome-7 (Fig. 3).

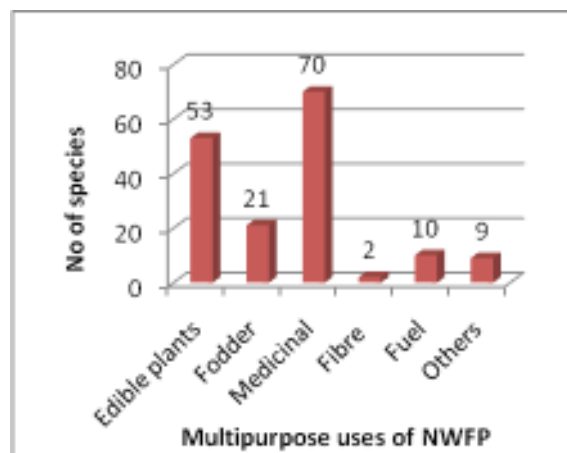


Fig. 2. Uses of Non Wood Forest Products

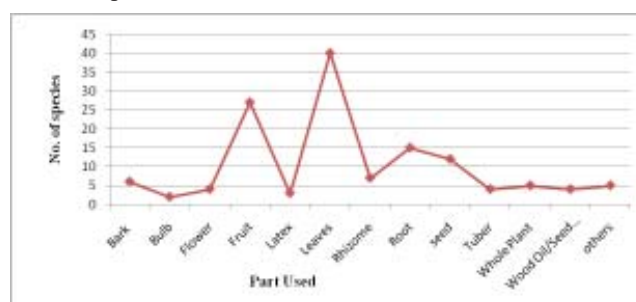


Fig. 3. Plant Parts Used as NWFPs.

All of the NWFPs species listed in Table.1 were collected from their natural habitats in the forest areas near villages for their bonafide use. At present, there is no conservation measures notified in these areas by the government NGOs or local communities. Informants revealed that there has been tremendous pressure from anthropogenic activities like unsustainable harvesting, expansion of agriculture land and forest fires due to human interference. Since collection of NWFPs is freely accessible without paying any royalty to the state government, it partly encourages over exploitation of some species (Balemie and Kebebew, 2006).

It is well established that wild plants have wider adaptability to adverse climatic conditions; possess increased vigour and growth and exhibit resistance to insects and pests. For reasons thereof, they may prove be a good stock for the development of new commercial varieties that may be utilised as horticultural crops as well as for restoration and reclamation of degraded land and revised cropping systems (Arora and Nayar, 1984). Awareness for the sustainable utilization of wild plants needs to be developed among the local people to maintain the ecosystem equilibrium and also to reduce reliance on conventional plants (Singh and Rawat 2011).

Table 1. Non Timber Forest Products and their Uses

Sl. No.	Botanical Name	Local Name	Family	Part(s) Used	Uses
1.	<i>Achyranthes bidentata</i> Bl.	Hwang	Amaranthaceae	Whole plant	Medicinal
2.	<i>Acorus calamus</i> L.	Bach	Araceae	Rhizome, leaves	Medicinal
3.	<i>Adhatoda zeylanica</i> Med.	Banshoi,	Acanthaceae	Leaves, flower	Medicinal
4.	<i>Agaricus campestris</i> L.	Chhattari, Chhatra	Agaricaceae	Aerial fruiting Bodies	Edible
5.	<i>Ageratum conyzoides</i> L.	Podina	Asteraceae	Leaves	Medicinal
6.	<i>Ainsliaea aptera</i> DC.	Dande ka kadu	Asteraceae	Root	Medicinal
7.	<i>Allium cepa</i> L.	Piaz	Amaryllidaceae	Bulb	Medicinal, edible
8.	<i>Apluda mutica</i> L.	Chari	Poaceae	Leaf	Fodder
9.	<i>Artemisia roxburghiana</i> Bess.	Chamur	Asteraceae	Whole plant	Medicinal, fodder
10.	<i>Arundinaria jaunsarensis</i> Freeman	Ningal, ringal	Poaceae	Root	Medicinal, other
11.	<i>Asparagus curillus</i> Buch.-Ham. ex Roxb.	Sharanoi	Asparagaceae	Tuber	Medicinal
12.	<i>Bauhinia vahli</i> Wright & Arn.	Maloo, Malo	Caesalpiniaceae	Leaves	Fodder
13.	<i>Bauhinia purpurea</i> L.	Guiral	Caesalpiniaceae	Leaves	Fodder
14.	<i>Bauhinia variegata</i> L.	Goiriao	Caesalpiniaceae	Leaves	Fodder
15.	<i>Berberis lycium</i> Royle	Kashmoi	Berberidaceae	Root	Medicinal, edible
16.	<i>Bergenia ciliata</i> (Haw.) Sternb.	Pattarchoor	Saxifragaceae	Tuber	Medicinal
17.	<i>Bistorta amplexicaulis</i> (D.Don) Greene	Ninai	Polygonaceae	Root	Medicinal
18.	<i>Boehmeria platyphylla</i> D.Don	Chauna	Urticaceae	Whole plant	Medicinal
19.	<i>Boerhaavia diffusa</i> L.	Phurnoi	Nyctaginaceae	Whole plant	Medicinal
20.	<i>Bombax ceiba</i> L.	Semal	Malvaceae	Bark, fruit, flower	Medicinal, edible
21.	<i>Butea monosperma</i> L.	Dhank, Puwas, Dhankoi	Papilionaceae	Leaves	Fodder, used as plates
22.	<i>Calotropis procera</i> (Ait.) R.Br.	Aank	Apocynaceae	Leaves	Medicinal
23.	<i>Cannabis sativa</i> L.	Bhang	Cannabaceae	Seeds, leaves	Edible, narcotic
24.	<i>Cedrus deodara</i> (Roxb.ex D. Don) G. Don	Deodar, Kelaon	Pinaceae	Wood(oil)	Medicinal, fuel
25.	<i>Celtis australis</i> L.	Kharik, Khadik	Urticaceae	Leaves, fruit	Fodder, fuel, edible
26.	<i>Centella asiatica</i> (L.) Urban	Brahmi	Apiaceae	Leaves	Medicinal, fodder
27.	<i>Chenopodium album</i> L.	Bethua	Chenopodiaceae	Young shoot, leaves	Edible, fodder
28.	<i>Chrysopogon fulvus</i> (Spreng.)Chiov.	Golda	Poaceae	Leaves	Fodder
29.	<i>Cinnamomum tamala</i> (Buch.-Ham.) Nees & Eberm.	Tej Patta	Lauraceae	Leaves	Medicinal, edible, spices
30.	<i>Citrus medica</i> L.	Nimbu	Rutaceae	Fruit	Medicinal, edible
31.	<i>Crataegus crenulata</i> Roxb.	Gingararu	Rosaceae	Fruit	Edible
32.	<i>Cucumis sativus</i> L.	Kheera, Kakdi	Cucurbitaceae	Leaves	Medicinal, edible
33.	<i>Cuminum cyminum</i> Linn.	Jira	Apiaceae	Seeds	Medicinal, edible
34.	<i>Curcuma domestica</i> Valetton	Kachchi haldi	Zingiberaceae	Rhizome	Medicinal, edible
35.	<i>Curcuma zedoaria</i> Roxb. Roxb.	Kachoor	Zingiberaceae	Rhizome	Medicinal
36.	<i>Cymbopogon martini</i> (Roxb.)Wats.	Babala	Poaceae	Leaves	Fodder
37.	<i>Cynodon dactylon</i> (L.)Pers.	Doob	Poaceae	Whole plant	Medicinal, fodder
38.	<i>Dicliptera bupleuroides</i> Nees	Saundi	Acanthaceae	Leaves	Medicinal
39.	<i>Dioscorea belophylla</i> Voigt	Tor, Turad, Tad	Dioscoreaceae	Tuber	Edible

40	<i>Diplazium esculenum</i> (Retz.) Sw.	Lingura	Athyriaceae	Curled leaves	Edible
41	<i>Ficus auriculata</i> Roxb.	Timla	Moraceae	Fruit	Edible, fodder
42	<i>Ficus bengalensis</i> L.	Baagad	Moraceae	Fruit	Edible
43	<i>Ficus racemosa</i> L.	Gular	Moraceae	Fruit	Edible
44	<i>Ficus palmata</i> Forsk.	Pheru/bedu	Moraceae	Latex, fruit, leaves	Medicinal, edible, fodder
45	<i>Ficus religiosa</i> L.	Peeple	Moraceae	Bark, fruit	Medicinal, edible,
46	<i>Glochidion velutinum</i> Wight	Chamari	Euphorbiaceae	Leaves	Medicinal
47	<i>Grewia oppositifolia</i> Roxb.	Bhimal	Tiliaceae	Bark, fruit, stem	Medicinal, edible, fodder, fuel, fibre
48	<i>Hedychium spicatum</i> Smith	Kachoor	Gingiberaceae	Rhizome	Medicinal
49	<i>Heteropogon contortus</i> (L.) P. Beauv. ex Roem. and Schult.	Kumra	Poaceae	Leaves	Fodder
50	<i>Juglans regia</i> L.	Akhor, Akhrot	Juglandaceae	Twig, leaves, fruit	Medicinal, edible, fuel
51	<i>Lonicera angustifolia</i> Wallich ex Candolle	Banchulu, Pirlu	Caprifoliaceae	Fruit	Edible
52	<i>Mahonia jaunsarensis</i> Ahrendt		Berberidaceae	Fruit	Edible
53	<i>Mallotus philippensis</i> (Lam.) Muell.-Arg.	Kamil, Kamlu	Euphorbeaceae	Seeds, leaves	Medicinal
54	<i>Mentha arvensis</i> L.	Pudeena	Lamiaceae	Leaves	Medicinal, edible
55	<i>Moringa oleifera</i> Lamk.	Sondi	Moringaceae	Leaves	Medicinal
56	<i>Morus serrata</i> Roxb.	Sahtut	Moraceae	Fruit, leaves	Edible, fodder
57	<i>Murraya koenigii</i> Spreng.	Gandheli	Rutaceae	Leaves	Medicinal, edible
58	<i>Myrica esculenta</i> Buch.-Ham. ex D. Don	Kaphal	Myricaceae	Fruit	Edible
59	<i>Nicotiana tabacum</i> L.	Tambaku	Solanaceae	Leaves	Medicinal
60	<i>Ocimum sanctum</i> L.	Tulsi	Lamiaceae	Leaves	Medicinal, edible
61	<i>Oxalis corniculata</i> L.	Salmudi, Khatti-mithi	Oxalidaceae	Leaves	Medicinal, edible
62	<i>Papaver somniferum</i> L.	Poast	Papaveraceae	Latex	Medicinal, edible
63	<i>Perilla frutescens</i> (L.) Britton	Bang-Jeera	Lamiaceae	Seeds	Edible
64	<i>Phyllanthus emblica</i> L.	Amla	Euphorbiaceae	Fruit	Medicinal, edible
65	<i>Pinus roxburghii</i> Sargent	Chir	Pinaceae	Gum, wood, leaves, seeds	Medicinal, others, fuel, edible
66	<i>Pinus excelsa</i> Wall. ex Lamb.	Kail	Pinaceae	Wood, leaves	Fuel, other
67	<i>Plantago major</i> L.	Jungli palak	Plantaginaceae	Young leaves	Edible
68	<i>Prinsepia utilis</i> Royle	Bhekkoi, Bhekkhal	Rosaceae	Root, seed oil	Medicinal, edible
69	<i>Prunus armeniaca</i> L.	Chullu	Rosaceae	Seed, seed oil, fruit	Medicinal, edible,
70	<i>Prunus cerasoides</i> D. Don	Phaja, Parya	Rosaceae	Fruit	Edible

71	<i>Prunus persica</i> (L.) Batsch.	Aru	Rosaceae	Twig, leaves, fruit	Medicinal, edible
72	<i>Punica granatum</i> L.	Damoi, Darim, Anar	Lythraceae	Fruit, fruit shell, seeds	Medicinal, edible
73	<i>Pyrus pashia</i> Ham.	Mole, Mehal	Rosaceae	Fruit	Edible
74	<i>Quercus dilatata</i> Lindl.	Moru	Cupuliferae	Leaves, wood	Fodder, fuel
75	<i>Quercus leucotrichophora</i> A. Camus	Ban, Baanj	Cupuliferae	Bark, leaves, wood	Medicinal, fuel, fodder
76	<i>Quercus semecarpifolia</i> Smith	Kharshu	Cupuliferae	Leaves, wood	Fodder, fuel
77	<i>Rheum australe</i> D. Don	Archa	Polygonaceae	Root	Medicinal
78	<i>Rhus parviflora</i> Roxb.	Ninas, Ninawa	Anacardiaceae	Leaves, fruit	Edible, fodder
79	<i>Rhododendron arboretum</i> Smith	Burans	Ericaceae	Flower	Medicinal, edible
80	<i>Ricinus communis</i> L.	Hedar, Indaru	Euphorbiaceae	Leaves, seed oil,	Medicinal
81	<i>Rubus ellipticus</i> Sm.	Hinsalu,	Rosaceae	Fruit	Edible
82	<i>Rubus niveus</i> Thunb.	kali heesar	Rosaceae	Root, leaves	Medicinal, edible
83	<i>Rumex hastatus</i> D. Don	Almoda/ halmoda	Polygonaceae	Root	Medicinal, edible, fodder
84	<i>Saccharum spontaneum</i> L.	Kans	Poaceae	Leaves	Fodder
85	<i>Sapindus mukorossi</i> Gaertn.	Reethachilka	Sapindaceae	Seed, fruit	Medicinal
86	<i>Sarococca saligna</i> (D. Don) Muell.-Arg.	Tiliari	Euphorbiaceae	Root	Medicinal
87	<i>Siegesbeckia orientalis</i> L.	Kachoori	Asteraceae	Aerial part	Medicinal
88	<i>Solanum tuberosum</i> L.	Aloo	Solanaceae	Tuber	Medicinal
89	<i>Solanum nigrum</i> L.	Khalarkoi	Solanaceae	Leaves, seed, fruit	Medicinal
90	<i>Stellaria media</i> L.	Charchara, Siadi	Caryophyllaceae	Leaves or young shoot	Edible
91	<i>Taraxacum officinale</i> Weber	Dudhla	Asteraceae	Root	Medicinal
92	<i>Taxus baccata</i> L.	Thuner	Taxaceae	Bark, seed	Medicinal, fuel, edible
93	<i>Terminalia bellirica</i> (Gaertn.) Roxb.	Baheda	Combretaceae	Fruit	Medicinal
94	<i>Terminalia chebula</i> Retz.	Harad	Combretaceae	Fruit	Medicinal
95	<i>Thalictrum foliolosum</i> DC.	Sapau	Ranunculaceae	Root	Medicinal
96	<i>Thymus linearis</i> Benth.	Jangli jwan	Lamiaceae	Seed	Medicinal
97	<i>Toona ciliata</i> M. Roem.	Toon	Meliaceae	Bark	Medicinal, others
98	<i>Trachyspermum ammi</i> (L.) Sprague	Ajowan	Apiaceae	Seed	Medicinal, edible
99	<i>Urtica ardens</i> Link.	Kushka	Urticaceae	Root	Medicinal, edible
100	<i>Urtica parviflora</i> Roxb.	Kandali	Urticaceae	Leaves, young shoot	Edible, fibre
101	<i>Viola pillosa</i> Bl.	Vanafsa	Violaceae	Flower	Medicinal
102	<i>Wolfenia amherstiana</i> Benth.	Dande ka kadu	Plantaginaceae	Root	Medicinal
103	<i>Zanthoxylum armatum</i> DC.	Timru, Timbur	Rutaceae	Stem, seed, leaves	Medicinal, edible, fuel
104	<i>Zingiber officinalis</i> Rose.	Adrak	Zingiberaceae	Rhizome	Medicinal, edible
105	<i>Zizyphus jujuba</i> L.	Ber	Rhamnaceae	Fruit	Edible

References

- Alcorn, J. B. (1990) Indigenous Agro forestry systems in the latin American Tropics', in Altieri, M., Hecht, S. (eds.), *Agroecology and small farm development*, CRC Press Boca Raton, Florida, pp.195-210.
- Arnold, J.E.M, Ruiz Perez, M. (1995) Farming the issues relating to Non-Timber Forest Products Research in Current issues in *Non Timber Forest Products Research*. Centre of International Forestry Research, Bogor-Indonesia, pp.1-18
- Arora, R.K., Nayar, E.R. (1984) Wild relatives of crop plants in India. *NBPGR Sci Monogr* **No. 7**: 97
- Balemie K., Kebebew, F. (2006) Ethnobotanical study of wild plants in Derashe and Kucha district, South Ethiopia. *J Ethnobiol Ethnomed* **2**: 53-59.
- FAO. (1995) Report of the International Expert Consultation on Non-Wood forest products. *Yogyakarta, Indonesia, 17-27 January 1995*, Non-Wood forest products 3. FAO, Rome.
- Ros-Tonen, M.A.F. (2000) The role of non- timber forest products in sustainable tropical forest management. *Holzals Roh -und Werkstoff*, Springer-Verlag **58**:196-201.
- Singh, G., Rawat, G.S. (2011) Ethnomedicinal survey of Kedarnath wildlife sanctuary in western Himalaya, India. *Ind J Fundam Appl Life Sci* **1**:35-36.
- Kala, C.P. (2005) Ethno medicinal botany of the Apatani in the Eastern Himalayan region of India. *J Ethnobiol Ethnomed* **1**: 11:doi:10.1186/1746-4269-1-11
- Kala, C.P. (2007) Prioritization of cultivated and wild edibles by local people in the Uttaranchal hills of Indian Himalayas. *Indian J Tradit Knowl* **6**:239-243.
- Ros-Tonen, M.A.F. (2000) The role of non- timber forest products in sustainable tropical forest management. *Holzals Roh -und Werkstoff*, Springer-Verlag **58**:196-201.