

People's Biodiversity Register, a record of village's wealth: A case study of Koti village District Chamba (H.P)

Pawan K. ATTRI

Institute of Integrated Himalayan Studies, (UGC-Centre of Excellence)
Himachal Pradesh University, Summerhill, Shimla-5 (H.P.) India
dr_pk@rediffmail.com

Abstract: People's Biodiversity Register is expected to serve as a tool to establish claims of individuals and local communities over knowledge of uses of biodiversity resources and to bring to them an equitable share of benefits flowing from the use of such knowledge and such resources. The present study was conducted in Koti village of Chamba District of Himachal Pradesh. On the basis of the survey carried out in the village, different plant species and various uses of plants species were studied. A large number of cereals, pseudocereals, pulses, oilseeds, vegetables, spices, condiments and horticultural crops are grown in the hills. In addition to commonly used vegetables across northern India, there are other lesser known wild plants which are used as vegetables. A total of 12 vegetables including leafy vegetables were documented in the village. Beside this a total of 15 types of Ethnic food and 41 species belonging to 29 families of ethnobotanical important plant species for health care among the people of the area were also documented. Therefore, our continuing work on documentation of plant biodiversity and their multifarious uses will not only provide recognition to this knowledge but will also help in its conservation for the betterment of human society and to the coming generation.

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Introduction

We live in times of profound change, of unprecedented challenges and opportunities; we are in the midst of a biotechnology revolution, an information revolution and, alas an environmental crisis. We also live in a world that is becoming increasingly polarized with rich against poor nations; with the elite on one side and the disempowered on the other.

Humanity has responded to these changes in many ways; one is by accepting entirely new ways of managing living resources. These resources were till recently viewed as a common heritage of mankind. Now they are subject to two, somewhat conflicting systems of rights, embodied in the Convention on Biological Diversity and the General Agreement on Trade and Tariff. On the one hand they are viewed as sovereign property of nation states. On the other, they are being accepted as an intellectual property of enterprises which have manipulated or even simply discovered them. Intellectual property rights are also being established over the knowledge of many types of uses of these resources.

These are important challenges in all this for a country like India, rich as we are in biodiversity resources, and folk and traditional knowledge of properties and uses of these resources. Unfortunately, India is a poor country in terms of well-organized, well-substantiated, well-documented information. In the current information age, it is imperative that we overcome this weakness and establish sound systems

of information on our biodiversity resources and their known uses. Such a system is especially needed to protect the interests of the ecosystem people of India, people who have played such a vital role in conserving the country's biodiversity, in augmenting it through evolving thousands of varieties of cultivated plants and domesticated animals, and in developing a vast body of knowledge about their sustainable use.

Biodiversity resources

Biodiversity is one of the most defining features of nature, vital for the ecological security of a region and livelihood security of millions of those who critically depend upon it for their daily sustenance. It provides the materials we need for food, clothing and shelter. It helps to ensure health, and contributes to human well being in many other ways. The present trend in biodiversity degradation is affecting one and all on this planet. Halting its degradation and loss, and ensuring the equitable use of genetic resources, will require a host of new and stronger actions at all levels.

Floristic diversity or plant diversity is the natural biotic capital of biodiversity, being a major provider of ecosystem services, meeting its basic livelihood needs. Humanity derives its supply of food, medicines, energy and a multitude of industrial products from the plants. Some of the products obtained from plants, without which life would be difficult, include timber, fuel, fodder, medicines, material for clothing and housing, etc. The very survival of mankind depends on these core ecological

functions. The indirect ecosystem services provided through floristic- photosynthesis, pollination, and transpiration are nutrient cycling, climate regulation, maintaining the balance of atmospheric gases and hydrological cycles, etc.

The judicious management of floristic resources is therefore, paramount to ensure the conservation of biodiversity, its sustainable utilization and equitability in benefit sharing as ordained in the Convention on Biological Diversity. In this context the floristic inventories play a significant role in increasing our understanding and information level on the availability of resource and its relationship with mankind.

Biodiversity, besides its ecological and intrinsic values, represents a considerable socio-economic and monetary asset as well. Human society relies on biological resources and their diversity, and the ecosystems that sustain them to provide essential goods and services. Values attached to biodiversity can be classified into 3 categories: Productive use value, consumptive use value and indirect values. Productive use value is a value assigned to products that are commercially harvested from exchange in formal markets and is therefore the only value of biological resources that is reflected in national income accounts. Products such as fuel wood, timber, fish, animal skin, musk, fodder, fruits, cereals and medicines come under this category. On the other hand consumptive use value is the value placed on natural products that are consumed directly i.e., goods do not enter the normal channels of trade. The value of such goods can be considerable. A significant number of such non-timber forest products such as soft broom grass and cane fall under this category. Indirect values are related primarily with the functions of ecosystems and do not normally appear in national accounting systems, but they may far outweigh consumptive and non-consumptive values. Maintenance of ecological balance and prevention of soil erosion are the examples of such indirect values (Negi, 1993).

The theme of International Day for Biological Diversity, "*Biodiversity: Life Insurance for our Changing World*", reminds us of central role of biodiversity in underpinning sustainable development, and in protecting society from the consequences of unexpected shocks such as water shortage, the emergence of infectious diseases, extreme weather events and the genetic vulnerability of crops and livestock.

"For millennia man has had an influence upon earth. The presence of humans can be traced back to approximately a few million years ago. From the beginning, man's influence irreversible changed the world. This was a relatively slow process compared

with the modern mass eradication of land. As a result, it is becoming urgent to document the rich biodiversity so that informed choices on its management can be made".

Threats to Biodiversity

Plundering and unscrupulous exploitation of the forest resources by the local populace as well as pressure of production-oriented forestry system are said to be the main causes of forest loss in the region, and consequently a threat to the biodiversity. Recurrent natural calamities like forest fires, earthquake, landslides, floods and unconventional climatic behaviour, are also big threats to the floristic diversity in the Himachal Himalayas. Alongside multifarious destructive anthropogenic activities and natural calamities, some ecological changes like the constant anthropogenic pressures for agriculture and horticulture, building of hydro-electric projects, construction of roads, etc., and outbreak of diseases in the recent time also pose serious threats to the rich biodiversity of the state.

Conservation Needs

Maintaining the biological integrity of the forest ecosystems, whose importance we often appreciate but do not as yet understand, presents difficulties to researchers developing a sustainable management system especially under current levels of natural and man made threat to the forests. It is estimated that a great number of species among plants are threatened with extinction for various reasons. Therefore, taking appropriate measures for conservation of biodiversity should be the highest priority. There is an urgent need for a holistic and integrated approach to biodiversity conservation involving *in situ* and *ex situ* strategies along with community participation and use of indigenous knowledge. We must preserve the biodiversity for the future generations to come.

The Himalayan ecosystem is unique and perhaps no other singly geographical feature had greater influence on the life, culture and history of the people of Indian subcontinent than these mountains. In addition, these are extremely rich repositories of natural resources and biological wealth. Though breath-taking beautiful, the Himalayan environment is largely inaccessible and hence far less degraded ecologically than the mainland but is rather extremely fragile and vulnerable to even small biophysical changes. The mountain ranges are approximately 2200 kms long with a total width varying between 40-400 kms. It is situated between latitudes 27° and 36° North and longitudes 70° and 96° East. Geographically, Himalaya is divisible into east Himalaya, the central or Nepal Himalaya and northwest Himalaya which includes the state of Himachal Pradesh.

Himachal Pradesh: An Overview

Himachal Pradesh lies in the lap of the Himalayas. Stretching in an area over 55,673 square kilometers, the state of Himachal Pradesh includes 12 districts. It is almost entirely mountainous with altitudes ranging from 450 meters to 7,025 meters above the mean sea level. Being located between latitude 30°22' 40" N to 33° 12' 20" N and longitude 75° 45' 55" E to 79° 04' 20" E. The topography is deeply dissected with complex geological structure with a rich temperate flora in the sub-tropical altitudes. In the north it is bounded by Kashmir, in the south east by Uttaranchal; In the south Haryana and in the west by Punjab.

Floristic Diversity of Himachal Pradesh

The biogeographically strategic location of Himachal Pradesh, coupled with varied phyto-climatic conditions met in its different physiographic divisions, makes it one of the hyper-biodiversity states of the North West Himalayas. The rich biodiversity of the state and its scenic grandeur have attracted the botanists, naturalists and the travellers, who all have contributed to our knowledge about its flora, since the early nineteenth century.

The floral analysis of Himachal Pradesh (3 Volumes) by Chowdhery and Wadhwa (1984) has been an excellent work, providing a comprehensive account of the flora of the state. The work being an outcome of a comprehensive survey of the floristic by botanists of the Botanical Survey of India, and the previous collections made by a number of eminent plant explorers like, William Moorcroft (1865 – 1825), Victor Jacquemont (1801 – 1832), J. Royle (1800-1858), and the likes of Brandis, Hooker, Duthie, Lace, etc. Since, the publication of this flora (1984), many other comprehensive floristic studies have been undertaken, during the past 20 years. In order to provide a complete account of the flora of the state, and exhaustive enumeration of the plants has been undertaken. Prominent works include Flora of Lahaul Spiti (Aswal and Mehrotra, 1994), Flora of Sirmour (Kaur and Sharma, 2004). The Scrophulariaceae of the Western Himalayas (Pennel, 1997), Flora of Great Himalayan National Park (Singh and Rawat, 2000), Floristic composition of Chamba (Sharma and Singh, 1990,1996), Medicinal Wealth of Kinnaur (Singh, 1990a), Trees of Kinnaur (Singh, 1990b) and Medicinal and Aromatic Plants of Himachal Pradesh (Chauhan, 1999). Collett (1908) has made a comprehensive floristic survey of district Shimla and documented almost complete flora of the district in his book *Flora simlensis*.

People's Biodiversity Register is expected to serve

(a) As a tool to document, monitor and provide information for sustainable management of local biodiversity resources;

(b) As a tool to promote biodiversity- friendly development in the emerging process of decentralized management of natural resources;

(c) As a tool to establish claims of individuals and local communities over knowledge of uses of biodiversity resources and to bring to them an equitable share of benefits flowing from the use of such knowledge and such resources; (d) as a tool for teaching environment and biology, and finally

(e) As a tool to perpetuate and promote the development of practical ecological knowledge of local communities and of traditional "slow" sciences such as Ayurveda and Unani medicine.

Objectives of the PBR

a) Status of biodiversity resources such as populations of, cultivars of crops, fruit, trees, medicinal plants or faunal diversity.

b) Various factors such as harvests from natural populations, changes in agricultural practices or discharge of industrial effluents, affecting the biodiversity resources.

c) Ongoing involvement of local communities/ individuals in sustainable use and conservation of biodiversity resources, such as systems of regulated grazing on pastures, maintenance of varieties of fruit plants, in sacred manners.

d) Local knowledge, widely shared and publically disclosed of properties and uses of biodiversity resources e.g. Drought-resistance of a certain cultivar, methods of preservation of food or use of certain plants in treating human or livestock diseases.

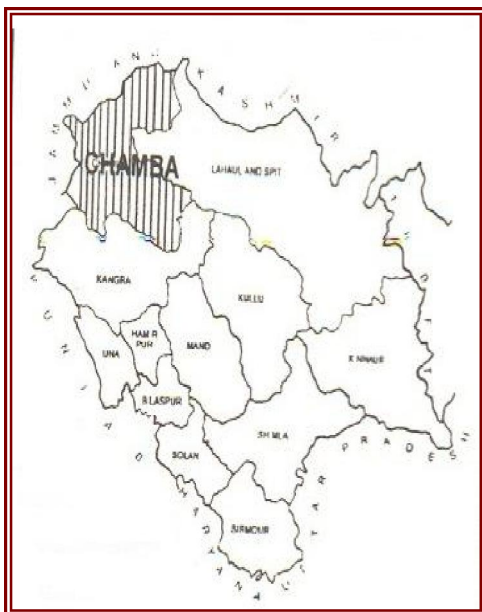
e) Local knowledge only partially disclosed; for instance, a claim that a particular medicine woman knows of a cure for asthma.

Study area

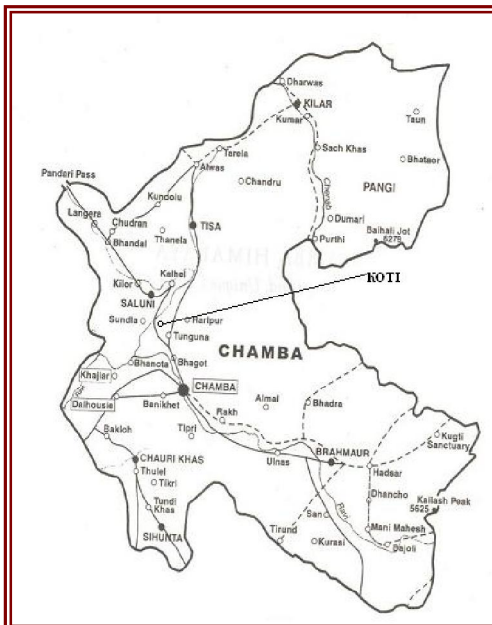
Nestling in the bosom of the Himalaya, Chamba district of Himachal Pradesh is unique in all aspects. Situated in the extreme north- west of the state of Himachal Pradesh, Chamba district is stretched between the upper Ravi (Vedic name-Purusni) valley and Chandra-Bhaga (Vedic name-Asikni) valley between North Latitude 32°10' and 33°13' and East Longitude 75°45' and 77°33' with an estimated area of 6,92,419 hectare. The district is surrounded on all sides by lofty hill ranges and the altitude in this entire mountainous territory ranges between 2,000 and 21,000 feet above sea level. The climate is warm, rainy season is well marked, the winter is mild and the snowfall is light.

Koti village is located in the catchment of the Seul River in Chamba tehsil of Chamba District of Himachal Pradesh. It is about 25 km. from Chamba town (district headquarter) toward Tissa. The area studied intensively lies roughly between N 32°39' 52.77" and 76°02' 41.54" E). The study area is situated near by Chamera Dam –I adjoining to Suel

River. The forests around them are of a forestation of chir pine and some are natural. This village are part of Prahuni Panchayat of Chamba district in Himachal Pradesh.



Map of Himachal Pradesh



Map of District Chamba

The extent of the study area is roughly 472 hectares. There are four main approach routes to the study area. The easiest is from Chamba on the Chamba- Tissa main road. This route is oldest one. The other approach road is via Chamera Dam, which

is accessible by road from the Banikhat to Sundla. Another one is From Chamba to Koti via Chakloo link road.

This entire document is centered on Koti village with the focus on the village, its five hamlets and land within its village boundaries. However, since local people from this village use part of the area adjoining the village boundary for their livelihood and sustenance, we have documented these areas as well.

Methodology

Extensive field survey was conducted in village Koti of tehsil Chamba. The study was carried out on various communities and villager's dependence upon biodiversity for various purposes in day to day life. Keeping the objective in mind, intensive use explorations were undertaken in village. These villagers are dependent on the forests for timber, fuel wood, fodder, and other minor forest produce to a large extent. The society is largely agrarian. Wheat, maize and vegetable are the main crops. Different categories of people like family heads, healers, and old experienced and knowledgeable informants were repeatedly interviewed. Specific questions based upon performa designed by **Madhav Gadgil, IISc, Bangalore** were asked and the resultant information was recorded.

Result & discussion

On the basis of the survey carried out in the village, different plant species and various uses of plants species are as follows:

Cultivated plant species

In view of heterogeneity in geographical condition, topography, temperature, moisture, elevation and soils, a large number of cereals, pseudocereals, pulses, oilseeds, vegetables, spices, condiments and horticultural crops are grown in the hills. Cereals, pulses, vegetable and oilseeds are grown in mixed in the same piece of land as a measure to ensure the food security. The details of the cultivated plant species grown in the village is given below:-

Cereals and psedocereals

Barley/ Jao (*Hordeum vulgare* Linn.), Maize/Makki (*Zea mays* Linn.), Rice/Chaval (*Oryza sativa* Linn.), Wheat/Kanak (*Triticum aestivum* Linn.), Amaranth/ Siyunl (*Amarantus paniculatus* Linn.), Amaranth/Kedari chillwa (*Amaranthus caudatus* Linn.), Buckwheat (*Fagopyrum esculentum* Linn.) and Chenopodium (*Chenopodium album* Linn.)

Mittets

Finger millet (*Eleusine coracana* Linn.), Proso millet (*Panicum miliaceum* Linn.), Kodo (*Paspalwll serobiculatum* Linn.) and Sorghum (*Sorghum vulgare* Linn.)

Pulses

Rajmah (*Phaseolus vulgaris*), Maah

(*Phaseolus radiatus*), French bean (*Phaseolus vulgaris* Linn.), Blackgram (*Vigna mungo* Linn.), Garden pea or Pea (*Pisum sativum* Linn.), Green gram (*Vigna radiata* Linn.), Soybean (*Glycine max* Linn.).

Oilseeds

Yellow sarson, Indian mustard (*Brassica juncea* Linn. cv. yellow sarson), Brown sarson (*B. juncea* Linn. cv. brown sarson), Toria (*B. campestris* Linn.), Sesame (*Sesamum orientale* Linn.).

Vegetables

Okra (*Abelmoschus esculentus* Linn.), Spinach (*Spinacea oleracea* Linn.), Cabbage (*Brassica oleracea* vaL *capitata* Linn.), Elephant ear yam/ Kachalu/Arbi (*Colocasia esculenta* Linn.), Cucumber (*Cucumis sativus* Linn.), Pumpkin (*Cucurbita moschata* Duch. ex PoiL), Bitter gourd (*Momordica charantia* Linn.), Tomato (*Lycopersicon esculentum* Miller), Radish (*Raphanus sativus* Linn.), Brinjal (*Solanum melongena* Linn.), Potato (*Solanum tuberosum* Linn.), Broad bean (*Vicia faba* Linn.), and Bell pepper (*Capsicum annum* var. *aviculare* Dierb.), Pipli/ mirch (*Capsicum annum*), Kakhari/kheera (*Cucumis melo*).

Spices

Wild Allium spp., Onion /Pyaj(*Allium cepa*) Garlic /lahsun(*Alleum sativum*), Coriander (*Coriandrum Sativum* Linn.), Turmeric (*Curcuma longa* Linn.), Fenugreek (*Trigonella foenlln-graeclln* Linn.), Ginger (*Zinziber officinale* Rose.),

Fruits

Papaya (*Carica papaya* Linn.), Orange [*Citrus sinensis* (Linn.) Osbeck], Lemon [*Citrus limon* (Linn.) Burm. f.], Loquat [*Eriobotrya japonica* (Thunb.) Lindl.], Walnut (*Juglans regia* Linn.), Mango (*Mangifera indica* Linn.), Pear/ Nakh/ Nashpati (*Pyrus communis* Linn.), Peach/ Aroo [*Prunus persica* (Linn.) Batsch.], Banana (*Musa bauensis* Hakkinen & Meekion), Guava (*Psidium guajava* Linn.), Pomegranate (*Punica granatum* Linn.), Grape (*Vitis vinifera* Linn.) and Apricot / Chir(*Prunus armeniaca* Linn.)

Wild edible plant species

Apart from the cultivated crop plant species, there are a large number of wild plant species identified by local inhabitants, which provide them vegetables and fruits round the year. Wild edible plant species are not only helpful in supporting the livelihood, but address the economic needs by selling them in the local market.

Wild edible fruits

Kaibel (*Berberis arislala* DC.), Kingora (*B. asiatica* Roxb ex DC.), Karaunj (*Carissa opaca* Stapf ex Haines), Kharik (*Celtis australis* Linn.), Jamir (*Citrus medica* Linn.), TusharITushiyari [*Debrigeasia longifolia* (Burm. f.) Wedd.], Anjir (*Ficus carica* Linn.), Dudila (*F. cunia* Buch.-Ham. ex Roxb.), Gular

(*F. glomerata* Roxb.), Bedu (*F. palmata* Forssk.), Bhimal (*Grewia oplil'll* J.R. Drumm. ex Burret), Akhrot (*Juglalls regia* Linn.), Chil' (*Pinus roxburghii* Sarg.), chir (*Prunus cerasoides* D. Don), Nakh (*Prunus napaulensis* Ser.), Dadu (*Punica granatum* Linn.), chir (*Pyrus pashia* Buch.-Ham. ex D. Don), Barah/chiu (*Rhododendron arboreum* Smith), Sirkuti (*Ribes alpestre* val'. *giganleum* Wall. ex Decne), Kareri (*Rosa macrophylla* Lindl.), Aakhre (*R. sericea* Lind.), Kala Aakhre [*Rubus niveus* (Hook f.) Kuntze], Aakhre (*Rubus ellipticus* Smith), Makoi/Makhou (*Solanum nigrwn* Linn.), Mat kakari [*Soleum amplexicaulis* (Lam.) Gandhi], Purain (*Vitis lanata* Roxb.), Ber (*Ziziphus mauritiana* Lam.).

Wild edible vegetables

Ficus carica Linn., *Bauhinia variegata* Linn., *Rhododendron arboretum* Sm, *Ficus benJamina* Linn, *Fagopyrum esculentum* Moench, *Diplazium escuien/l'lll* (Retz.) Sw.], *Portulaca oleracea* Linn.), *Unicu parviflora* Roxb, Rambans (*Agave americana* Linn.), (*Berberis asiatica* DC.), Bathua (*Chenopodium album* Linn.), Timila/Timul (*Ficus auriculala* Lour.), Bedu (*Ficus palmata* Forssk), [*Morchella esculenta* (Linn.) Pers.],

Traditional wild vegetables

In addition to commonly used vegetables across northern India, there are other lesser known wild plants which are used as vegetables. A total of 12 vegetables including leafy vegetables were documented in the village (Table:1). These vegetables are very special cuisines, famous for their taste and nutritious values.

Phkudi/ Bhruni

Phkudi/ Bhruni is the dish made from tender leaves of fig (*Ficus carica* Linn.). For its preparation, tender leaves are boiled in an earthen pot for 10-15 minutes till soft and then ground well. Heat mustard oil in a pan. Add coriander seeds, cumin seeds, red chilies, asafoetida and turmeric powder, heat till brown and put boiled buds to it. Add salt and spices according to taste. Cook it on slow *fire* for 5 minutes and serve along with *chapati*

Karayaei/Kachnar

Boil the buds of Karayaei/Kachnar/ (*Bauhinia variegata* Linn.) for 10-15 minutes till they become soft. Heat mustard oil in a pan. Add coriander seeds, cumin seeds, red chilies, asafoetida and turmeric powder, heat till brown and put boiled buds to it. Add salt and spices according to taste. Cook it on slow *fire* for 5 minutes and serve along with *chapati*.

Barah ki chutney

Rhododendron (*Rhododendron arboretum* Sm.) locally known as *brah* is a flower present in the hilly areas of Himachal Pradesh. It is red to maroon in colour and slightly sour to taste. For making *chutney*, paste of fresh flowers of *barah*, onion, mint leaves,

basil leaves, green chillies, salt and spices is prepared. It can accompany the main meal which is appetizing in nature.

Chhachha

Raw mangoes (*Mangifera indica* Linn.) are used for making *chhachha*. Onion and raw mangoes are taken in equal amount, peeled and grind together coarsely. Chillies, salt and sugar are added to taste.

Phafru ka sag

Buckwheat (*Fagopyrum esculentum* Moench.) leaves locally known as *Phafru* are available in the hilly areas. For making *sag*, buckwheat leaves are washed, cut into fine shreds and then boiled by adding salt till soft. After boiling make its paste. Mustard oil is heated in a pan; coriander seeds and red chillies are added to the heated oil and then paste of buckwheat leaves is added. Cook for some time and serve hot with rice or *chapattis*; it tastes a bit sour.

Kasrod ki sabji

Vegetable fern/ *Kasrod* /*Lungru* [*Diplazium esculentum* (Retz.) Sw.] available in hilly areas of Himachal Pradesh look like stems with curled top and with hairy growth over it. For its preparation, remove hair of *Kasrod* /*lungru* stems with the help of cotton cloth and then cut into small pieces after washing. It is fried in an open pan with slightly more amount of mustard oil. Add a pinch of asafetida also along with other spices. Curd can also be added at the time of frying.

Patrodu

Patrodu are prepared from healthy leaves of colocasia (*Colocasia antiquorum* Schott). and Make the paste of black gram flour of pouring consistency. Now take few leaves of *bhavri* (*Ocimum basilus* Linn.), 2-3 medium sized onion, one piece of garlic, green chillies and salt according to taste. Ground all the ingredients and add these to the dough of Bengal gram flour. Take one leaf of colocasia keeping its lower side upwards; apply the dough over it properly. Cover the leaf with another leaf in reverse manner and again put paste over it' and repeat this process for 4-6 leaves. Fold sides of the leaves inside and then roll like bedding. Apply paste on all sides of bed while folding. For making it one piece, wrap it in a leaf of turmeric and tie with thread. Take a big pan and add small amount of water to it Put small sticks inside the pan to make rack over water. Place the folded leaves on the rack and let it steam cook. It will take about 20-25 minutes to cook. Take out the leaves, let it cool and cut it into small pieces. Before serving, these pieces can be shallow fried or can be deep fried depending upon the requirement, occasion and availability of time. *Patrodu* are specifically prepared during rainy season.

Seul ke Patrodu

Patrodu are prepared from healthy leaves of Seul/ *Chenopodium* / *Chenopodium album* L/ and Make the paste of black gram flour of pouring consistency. Now take 2-3 medium sized onion, one piece of garlic, green chillies and salt according to taste. Ground all the ingredients and add these to the dough of Bengal gram flour. Take one leaf of Seul keeping its lower side upwards; apply the dough over it properly. Cover the leaf with another leaf in reverse manner and again put paste over it' and repeat this process for 4-6 leaves. Fold sides of the leaves inside and then roll like bedding. Apply paste on all sides of bed while folding. For making it one piece, wrap it in a leaf of turmeric and tie with thread. Take a big pan or *tavva* and add small amount of Mustard oil it. Cook it on slow fire for 5-10 minutes and serve along with *chapati*.

Kulfa ka sag

Pigweed plant locally called, *kulfa* (*Portulaca oleracea* Linn.) is wildy grown near water channels. It is bit spongy and contains gum like substance. Pigweed leaves are washed, cut into fine shreds, boiled by adding salt till soft and ground into paste. Mustard oil is heated in a pan; Coriander seeds and red chilies are added to the heated oil and then add paste of pigweed leaves, cook for some time and serve hot *Kulfa ka sag* tastes bit sour and is served with rice or *chapati*.

Bicchu buti/ Aynni ka saag

In whole district, leaves of *bicchu buti*/ *Ayn* (*Unicu parviflora* Roxb.) are relished as vegetable. Boiled and mashed leaves (100 gm) are cooked in oil with spices like cumin seeds (1/2 tsp), coriander powder (Y2 tsp) and turmeric powder (lit tsp). It is locally called as *bicchu buti ka saag*.

Documentation of Ethnic food recipes

Diversity can be found in india's culture, geography as well as climate and same is true with its food also. In Himachal Pradesh various ethnic food recipes are famous not only for source of nutrition, but in larger part of rural area it constitutes stable food, while others are consumed during local festivals, marriages and special occasions. Earlier, when hilly state did not have well developed means of transport, people were more or less dependent on locally/ naturally available food materials as well as seasonally for preparing ethnic food recipes. However, during last many decades' fruits, vegetables, herbs have been available round the year. But these ethnic food recipes are still in craze among local people and can be seen prepared in all the homes during the availability of plant material.

Table: 1 List of Plants used in local recipes according to seasonal availability

S. No.	Name of Recipe	Plant name/ Common Name / Family	Parts used	Time Availability of
1.	Fakudi	Fakuda / Fig / <i>Ficus carica</i> Linn. / Moraceae	Buds	Feb-March
2.	Karayaei	Karayaei / Kachnar / <i>Bauhinia variegata</i> Linn. / Leguminosae	Buda & Flowers	March –April
3.	Chu ki chatni	Barah / Rhododendron / <i>Rhododendron arboretum</i> Sm./Ericaceae	Flowers	March-April
4.	Aam ka Chhacha	Aam / mango / <i>Mangifera indica</i> Linn. / Anacardiaceae	Fruit	May- June
5.	Chir ka Chhacha	Chir / Wild Apricot / <i>Prunus armeniaca</i> L. / Rosaceae	Fruit	April-May
6.	Phafru ka Sag	Phafru / Buckweat / <i>Fagopyrum esculentum</i> Moench/ Polygonaceae	Leaves	May- June
7.	Sarson Ka Sag	Sarson / Mustard / <i>Brassica campestris</i> / Brassicaceae	Leaves	May-June
8.	Aynni ka Sag	Ayn / Bichchhu buti / <i>Urtica dioica</i> / Urticaceae	Leaves	Nov-Fab
9.	Kasrood	Kasrood / Vegetable Fern / <i>Diplazium esculentum</i> (Retz.) Sw	Stems	May-July
10	Kachalu ke Patrodu	Kachalu / Colocassia/ <i>Colocassia antiquorum</i> Schott. / Araceae	Leaves	Aug-Sept.
11	Seul ke Patrodu	Seul / Chenopodium / <i>Chenopodium album</i> L/	Leaves	May-July
12	Kulfe ka Sag	Kulfa / Pigweed / <i>Portulaca oleracea</i> Linn / Portulacaceae	Leaves	Aug-Oct

Table: 2 Name of some ingredients used in indigenous recipes

Plant name	Family	Common name	Local Name
<i>Allium cepa</i>	Alliaceae	Onion	Payaj
<i>Allium sativum</i> Linn.	Alliaceae	Garlic	Lahsun
<i>Coriandum sativum</i> Linn.	Umbelliferae	Coriander	Dhania
<i>Mentha arvensis</i>	Lamiaceae	Mint	Pudina
<i>Tamarindus indica</i>	Fabaceae	Tamarind	Imli
<i>Brassica campestris</i>	Brassicaceae	Mustard	Sarson
<i>Cuminum cyminum</i>	Umbelliferae	Cumim	Jeera
<i>Curcuma longa</i>	Zingiberaceae	Turmeric	Haldi
<i>Ferula asafoetida</i>	Apiaceae	Asafoetida	Heeng
<i>Capsicum Frutescens</i>	Solanaceae	Red chillies	Lal Mirch
<i>Trachyspermum ammi</i>	Umbelliferae	Omum	Ajwain
<i>Trigonella foenumgraecum</i>	Fabaceae	Fenugreek	Methi
<i>Zingiber officinale</i>	Zingiberaceae	Ginger	Adrak

Table 3-List of traditional /ethnic foods of study area

Item	Ingredients	Importance of food/Time of consumption	Method of preparation
Pindari	Maize & Codra flour, green leaf, whey, gur	Baisakhi, occasion	Fermentation with butter milk and eaten with milk and gur
Babroo	Wheat flour	Snack food/ Festive occasion	by deep frying after Fermentation
Chabru/chele	Wheat flour/ sugar	Snack food	griddle(like <i>dosa</i>)
Rot	Wheat, jaggery, ghee	Religious ceremony	Shallow frying on griddle (like parantha)
Terkeera	Wheat sugar, ghee	Snack food	Natural fermentation followed by frying in ghee
Madra	Rajmah, Curd, ghee	Social ceremony, Special dish in marriage feast	Boiled Rajmah followed by slow heat cooking in curd

<i>Kadi</i>	Buttermilk, spices, gram flour, ghee	Accompanimento the main diet, marriage feast	Boiling & slow cooking
<i>Redu</i>	Buttermilk, rice	the main diet-To relieve indigestion	Boiling & slow cooking
Chrori	Wheat flour	Special occasion	griddle(like <i>dosa</i>)
Ghadi roti	Wheat flour	Accompanimento the main diet	Fermentation and make like chapati
Kodre ki roti	Kodra flour	Special occasion	Simple making like chapatti
Liched	Chenopodium flour	Special occasion	Making like Haluwa
Alsi ke ladoo	Crushed Alsi seed	Occasionally	Mixed with crushed seeds with wheat flour and dry fruits and make ladoo.
Kanak ke ladoo	Wheat flour	Occasionally	Make ladoo and steamed
Maki ke Ladoo	Maize flour	marriage feast	Make ladoo and steamed

Table: 4 List of ethnobotanical plants in study area

S. No.	Botanical Name	Family	Part(s) used	Uses
1.	<i>Agave americana</i>	Agavaceae	Leaves	Leaves are used to increase the menstrual discharge in ladies.
2.	<i>Allium carolinianum</i>	Liliaceae	Leaves and pseudo-bulbs	Leaves and bulbs are used in indigestion, cold and also as apices and condiments.
3.	<i>Aloe barbadensis</i>	Liliaceae	Whole plant	The mucilaginous inner portion is warmed and applied on boils to induce puss formation.
4.	<i>Asparagus adscendeus</i>	Liliaceae	Roots	Roots are used as tonic, demulcent and in dysentery with milk. In headache, the paste of root is applied on forehead.
5.	<i>Bauhinia vahlii</i>	Poaceae	Roots, eeds	Root juice with curd is used in dysentery. Roasted seeds are eaten as tonic.
6.	<i>Berberis spp.</i>	Berberidaceae	Ripen fruits	Ripen fruits are edible and are given as a mild laxative to children.
7.	<i>Betula utilis</i>	Betulaceae	The fungal growth	The fungal growth on bark is used against muscular pain and swellings.
8.	<i>Bombax ceiba</i>	Bombaceae	Throns	Thorns are crushed in cow milk and paste is applied on pimples. Paste of roots is also taken with unboiled cow milk to regulate the menstruation and with black pepper it is used to control the white discharge.
9.	<i>Cannabis sativa</i>	Cannabinaceae	Leaves and flower heads	The leaves are rubbed with hands to make bhang. This bhang is applied on the boils. Bhang is made into a paste with water, mixed with milk and sugar is taken as intoxicating on Shivratri. Bhang is used as an appetizer.
10.	<i>Carissa carandus</i>	Apocynaceae	Fruits, roots and leaves	Fruits are used in cough. Leaves are given at the commencement of remittent fever. The leaf juice with honey is used in whooping cough.
11.	<i>Cedrus deodara</i>	Pinaceae	Wood, bark	The decoction of bark is used in diarrhoea and dysentery. Wood oil is extracted which is used in skin diseases.
12.	<i>Celtis australis</i>	Urticaceae	Fruits	Fruits are edible and used in stomachache.
13.	<i>Chenopodium album</i>	Chenopodaceae	Leaves	Leaves are used as laxative and used in the form of vegetable in piles.

14.	<i>Cynodon dactylon</i>	Poaceae	Entire Plant	The juice of plant is put in nose to check the bleeding. This juice is used to reduce the acidity, constipation. Also used in Puja.
15.	<i>Dalbergia sissoo</i>	Leguminosae	Bark, Leaves and Wood	Bark is used as abortifacient. Leaves are used as fodder. Wood is strong, used in building construction, for furniture and legs of beds.
16.	<i>Datura stramonium</i>	Solanaceae	Leaves	Leaves of datura, opium poppy and dried ginger are ground and applied on swellings. The smoking of leaves is good for asthma patients.
17.	<i>Dioscorea deltoidea</i>	Dioscoraceae	Dried rhizomes	Used in rheumatic diseases, certain ophthalmic disorders. Rhizomes are used for washing silk, wool, hair and also in dyeing.
18.	<i>Dioscorea sativa</i>	Dioscoraceae	Roots, Seeds	Seeds are crushed and applied on the boils. Roots are used as vegetable.
19.	<i>Dodonea viscosa</i>	Sapindaceae	Leaves, Barks	Leaves are boiled in water and this water applied on stiff areas. The paste of leaves is also used on burns. Seeds are edible. Bark contains tannin. Decoction of leaves is taken once a day for two days to stop excess menstrual flow.
20.	<i>Emblica officinalis</i>	Euphorbiaceae	Fruits, Leaves	Powder of fruits mixed in rose water and applied on forehead. It relieves headache. Fruits powder used in indigestion. The poultice of fruits is used to stop bleeding from cuts.
21.	<i>Euphorbia hirta</i>	Euphorbiaceae	Entire plant	Juice of plant is given to stop bleeding in piles.
22.	<i>Ficus glomerata</i>	Moraceae	Fruits, Roots	The juice of roots, sugar and black zeera, are mixed together. This juice is given to treat the 'Sujak Rog' (gonorrhoea). Green and dried fruits are ground in the water and mixed with Mishri.
23.	<i>Ficus palmata</i>	Moraceae	Fruits, Latex	Dip two dry fruits in water for a night and eat them in the morning. Similarly, 2 dry fruits are dip in the water in the morning and eat them in evening. It removes pile in one week only. Latex is used for ringworms.
24.	<i>Ficus religiosa</i>	Moraceae	Bark, Fruits	In urinary trouble 10 gm of bark is boiled in half litre water and when it remains 1/4th it is filtered. This filtrate should be taken twice a day. If this decoction is taken with honey to purify the blood.
25.	<i>Juglans regia</i>	Juglandaceae	Fruits, Leaves, Bark	Nuts are edible and also used for extraction of oil. Oil is considered as digestive, carminative and stimulative. Bark and leaf is used as dye and also for cleaning teeth.
26.	<i>Justicia adhatoda</i>	Acanthaceae	Leaves, Roots	The juice of leaves provides relief in problems related to cough, nose, throat and urinary infections. Dried root powder is given in malarial fever.
27.	<i>Lantana camara</i>	Verbenaceae	Leaves	Crushed leaves are applied swellings. The paste of leaves is also used in snake bites to reduce the effect of poison.
28.	<i>Mallotus philippinensis</i>	Euphorbiaceae	Seeds,	Seeds are dried in shade and then ground. Small tablets are made of the powder and are given with cold water in Jaundice.
29.	<i>Mengifera indica</i>	Anacardiaceae	Leaves	Powder of young leaves of mango is useful in diabetes. Decoction of the bark or the leaves used to wash the wounds to heal them soon.

30.	<i>Mentha longifolia</i>	Lamiaceae	Leaves	The aerial part is mainly used for making chutney and is considered as good remedies in cold, cough. Paste of the leaves is used on stiff and painful joints.
31.	<i>Nicotiana tabacum</i>	Solanaceae	Leaves, Seeds	The paste of leaves applied on scorpion stings and in skin disease. Plant is given in stomachache in cattle.
32.	<i>Ocimum canum</i>	Lamiaceae	Entire plant	Juice of the leaves is put in earache. Seeds are used in stomachache. Decoction of plant is used in cold.
33.	<i>Ocimum sanctum</i>	Lamiaceae	Whole plant	Plant is used in cough and cold.
34.	<i>Oxalis corniculata</i>	Oxalidaceae	Entire plant	Juice of plant with salt is used in dysentery. Juice of the leaves is useful in cataract of the eyes.
35.	<i>Prinsepia utilis</i>	Rosaceae	Roots	The paste of roots is used on wounds for healing.
36.	<i>Prunus armeniaca</i>	Rosaceae	kernels	The oil of kernels is warmed and applied on joints to get relief from rheumatic pain
37.	<i>Prunus cerasoides</i>	Rosaceae	Wood	The paste of inner wood with sugar is given in bone fracture.
38.	<i>Punica granatum</i>	Punicaceae	Seeds	The juice of seeds, ghee and syrup of sugar is given in vomiting and are good in jaundice.
39.	<i>Pyrus pashia</i>	Rosaceae	Young leaves	Young leaves are ground and applied on the head for cooling effect.
40.	<i>Rhododendron arboreum</i>	Ericaceae	Leaves, Flowers	Crushed leaves applied on forehead to cure headache. Sherbat is prepared from flowers. The dried flowers are fried in ghee and used to check the bloody dysentery.
41.	<i>Ricinus communis</i>	Euphorbiaceae	Leaves, Seeds	Leaves are heated and tied over aching joints and swellings caused by Vat Rog. The paste of the seeds is used on ulcers to cure it soon.
42.	<i>Rosa moschata</i>	Rosaceae	Flowers	Flowers are dried and powdered in mustard oil. The paste of flower is used on skin burning.
43.	<i>Rubia cordifolia</i>	Rubiaceae	Entire plant	The decoction of roots with sugar is given to women to cure irregular menstruation. Infusion of plant with mustard oil is used in eyes and ear disease. The paste of stem is applied on pimples and blemishes.
44.	<i>Urtica dioica</i> L. (Bichhu Buti.)	Urticaceae	leaves, roots, flowers and seeds.	The leaves of the plant are crushed to pulp and then it is applied to reduce swelling
45.	<i>Vitex negundo</i>	Verbenaceae	Leaves	Leaves are smoked in headache. Flowering tips are chewed in mouth ulcers. Twigs used as 'Datun'. The leaves are used in gastric problems and also in leprosy.
46.	<i>Woodfordia fruticosa</i>	Lythraceae	Flowers, Leaves	Powder of the flowers is given in dysentery and cough. Oil is used in uterus pain. The paste of leaves used in skin diseases. The juice of leaves is applied three times a day for one week in conjunctivitis.
47.	<i>Xanthoxylum armatum</i>	Rutaceae	Fruits, Leaves, Twigs	Fruits are used in toothache. The leaves and fruits are used as tooth brush and mouth purifiers.

Observations

Ethnic *food* of Himachal Pradesh is rich and varied, while relying heavily on local ingredients. It can be a healthy choice with a balanced diet of steamed rice or *roti*, lots of vegetables, *dal* (lentils), yogurt and saag (a spinach and/or mustard leaf based dish). Thus, the natives of the state consume a range of foods prepared from cereals, pulses, milk, fruits and vegetables. These foods have been described below (Table: 3)

Ethnobotany

The history of plant exploration is concomitant with the evolution of human beings. Our ancestors have studied the plants around them to meet their basic requirements, which laid the foundation of civilization. Our knowledge of the intimate relationship between early man and plants has come to us mainly through surviving traditions. This relationship which forms the core of inter-disciplinary science known as Ethnobotany has attracted much attention. The enquiry of early man into nearby plant wealth was primarily to cater for basic needs like food, clothing and shelter. Incidentally some of them might have proved to be curative against certain ailments, which took wider range and scope by the experimentation on human beings with different plant parts through trial and error (Pandey and Verma, 2005) A number of workers have explored the utility of Himalayan flora (Dutie, 1906; Osmaston, 1927; gupta, 1968; Rau, 1975). But, however, more emphasis was laid on their systematic rather than their ethnobotanical use.

An analysis of data in the present communication reveals the uses of 41 species belonging to 29 families for health care among the people of the area (Table: 4). Dominant species are Fabaceae, Asteraceae, Lamiaceae, Solanaceae, Ranunculaceae, Labiatae and Euphorbiaceae etc. The plant species have been arranged alphabetically according to botanical names with their family, local names, and parts used.

Although, due to increase in urbanization and regularly increased literacy rate are leading the district towards the new heights of development. But, these developments are migrating the youths of the area towards mainstreams, leading to the disappearance of the indigenous knowledge day by day. Younger generation is ignorant about the vast medicinal resources available in their surroundings and is more inclined towards market resources. It is interesting to know that, males are involved in this vast important knowledge comparatively more than females. The main reason is that the female of these age group mostly household workers and could have been a little hesitant. *Ficus religiosa* and *Ficus benghalensis* are considered as sacred plants and no one can cut them for their individual interest. Villager's uses the flowers

of *Bauhinia variegata* as a vegetable by removing its stigma because they know it is poisonous. This clearly indicates their deep knowledge towards the importance of natural resources. Several types of studies from time to time in different areas of Himachal Pradesh have been carried out for the documentation and inventorization of biodiversity in the form of Medicinal and aromatic plants study, floral diversity, ethno botanical investigation and indigenous / traditional knowledge of Himachal Pradesh. Although, this paper provides a information of several plants, which have been used as traditionally as well as edible purposes by the local people in the study area. Rapidly growing urbanization of this area unfortunately posing a threat to its biodiversity, traditional knowledge and cultural practices of the rural peoples. Therefore, our continuing work on documentation of plant biodiversity and their multifarious uses will not only provide recognition to this knowledge but will also help in its conservation for the betterment of human society and to the coming generation.

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Corresponding Author:

Dr. Pawan K. ATTRI

Institute of Integrated Himalayan Studies, (UGC-Centre of Excellence)
Himachal Pradesh University, Summerhill, Shimla-5 (H.P.) India
dr_pk@rediffmail.com

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