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Traditional use of non-timber forest products: Boon for livelihood security of people in Shivalik range of Jammu region

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Non-timber forest products (NTFPs) play an important part in forest dwellers' livelihoods. The people are completely reliant on the forest for their survival. The forest provides people with a sense of well-being in their daily lives as well as economic benefits. The present exploratory study was conducted in Shivalik range of Jammu region to ascertain the role of identified NTFPs in the livelihood security of peasants. Participatory Rural Appraisal techniques were used to identify and document traditional NTFPs. The documented NTFPs were Patis (*Aconitum chasmanthum*), Gucchi (*Morchella esculenta* L.), Nag chhatri (*Trillium govanianum*), Banafsaha (*Viola canescence*), Dhoop (*Jurinea macrocephala*), Kaurd (*Picorhiza kurroa*), Muskbala (*Valeriana hardwickii*), Kasrot (*Diplazium esculentum*), Zakham-e- hiyat (*Bergenia ciliata*) which play a catalyst role in the livelihood of people of Shivalik range of Jammu region. The peasants of the area used to collect NTFPs from the nearby forest area and sell it to the local traders to earn their livelihood. It was evident from the data that NTFPs contribute to the tune of 29% to the average annual income of the collectors.

Keywords: Collection and marketing, Livelihood, Non-timber Forest Products, Traditional knowledge

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Forests play a vital role for maintaining ecological, biological and environmental balance, as well as play a unique role in the socioeconomic well-being of Indians[1]. Forests have the ability to improve people's lives by supplementing income and acting as safety nets[2]. Given the importance of forests in sustaining life on land, humans were wise to set aside one-third of the natural terrestrial plant cover. The United Nations designated 2011 as the 'International Year of Forests' in the 'Decade for Biodiversity,' in recognition of the global forest degradation.

As per World Bank indicator, the total geographical area of the world under forest is 39,991,336 sq km which is 30.825% of total geographical area. About 1.6 billon people of the world depend on forests for livelihood[3]. India is the world's seventh largest country, with 1.8% of the world's forests and 2.5% of the world's land area. In India, it was reported that 706,820 sq km (23.80%) of the area is under forests[4].

NTFPs are an essential component of the livelihood strategy of communities living in the vicinity of forests[5-7]. Many researchers from many regions of the world have looked into the function of NTFP in the economic development of forest inhabitants and sustainable forest management[8,9]. NTFPs have the ability to revolutionize the forest inhabitants' economic situation. More than two billion people live in and around forests around the world, relying on NTFPs for subsistence, income and livelihood security[10]. NTFP is used by an estimated 80% of the poor world's population to address some of their health and nutritional needs[11]. In developing nations, forest-based activities, which are largely in the NTFPs sector, generate the equivalent of 17 million full-time jobs in the formal sector and another 30 million in the informal sector, as well as 13-35% of all non-farm employment in rural areas[12]. Over 50 million tribal people are estimated to be reliant on NTFPs for sustenance and monetary earning in India alone[13]. The woods of India offer the farming and forest-dwelling communities with all of the supplies they require. Because they are offered at minimal cost on common property areas, NTFPs are particularly important for the poor. Collection and processing of non-timber forest produce can provide seasonal

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employment to the rural poor to a large extent. They rely on forest products to meet their basic needs, such as animal fodder, medicine, shade, and soil fertilization, particularly edible plants whose leaves, fruits, seed, roots, and other parts are consumed and contribute significantly to dietary habits, particularly among those living near the vicinity of forest[14-17].

In many parts of the world, NTFPs are recognized as a component of culture, identity, mythologies and spiritual activities, and tribal populations still have a wealth of information about how to use indigenous plants for food and other purposes. Many plant species found in the forest are used in traditional medicine to treat coughs, fevers, colds, intestinal disorders such as diarrhea, dysentery, indigestion, ear infections, renal issues and other ailments[18]. Traditional knowledge held by diverse indigenous tribes has proven to be extremely valuable in resource selection, exploitation and conservation. With the fast-growing technologies and modern way of living traditional knowledge on forest resources is fast degrading. The loss of traditional knowledge in a rapidly changing culture is as reversible as the extinction of plant species[19]. As a result, efforts should be made to document traditional knowledge and traditions before they are completely lost.

Jammu and Kashmir (J&K) region of India has 20,230 sq km of the forest area which is around 20% of its geographical area. In Jammu, Kashmir and Ladakh regions total forest area was reported to be 12,000 sq km, 8,128 sq km and 36 sq km, respectively[20]. The forests of the region have one of the richest biodiversity with high medicinal and aromatic plants along with other NTFP resources distributed in different agro-climatic zones namely sub-tropical, intermediate and temperate zones. The main tree species abundantly found in sub-tropical region with paramount NTFP importance are *Acacia catechu* Willd (Mimosaceae), *Acacia nilotica* (L.) Willd ex Del. (*Kikar/ Ferlai*), *Aegle marmelos* L. Corr. Serr (*Bael*), *Carissa spinarum* L. (*Garna*), *Cordia dichotoma* var. wallichii (*Lasura*), *Ficus palmate* Forsk. syn. F. *virgata* roxb (*Fakhana/ Fakuaara/ Fakura*), *Flacourtia indica* (Burm.f.) Merr (*Kakoa*), *Ficus roxburghii* Wall (*Trimbal/ Rumbel*), *Ziziphus xylopyrus* (Retz.) Willd. (*Keth Ber*), *Ziziphus nummularia* (Burm. f.) Wight & Walk.-Arn. In intermediate zone, *Pinus roxburghii* Roxb. ex Lamb., olive, *Pyrus pashia* Buch.-Ham. ex D. Don etc are found. The temperate region comprises of *Cedrus deodara*, *Juglans regia*, *Pinus gerardiana* etc which are of crucial economic importance from NTFP point of view[21].

Some important non-timber forest products (NTFP) available in J&K are *Saussurea costus* (Falc) Lipsch (Kuth), *Berberis lyceum* Royle (Rasount), *Viola canescens* (Bunafsha), wild apricot, *Dioscorea deltoidea* (Kins), *Aloe vera Tourn.* Ex Linn. (Aloe) & *Morchella esculenta L.* (Guchhi) etc. The people living in the vicinity of the forest collect the NFTPs for their livelihood sustainability as an off-farm income for them.

Many studies have thrown some light on the traditional knowledge in Jammu and Kashmir[22-32]. However, still there are some areas and species which remain undocumented. East forest circle of J&K is one for where only few data records are available for the medicinal and other useful plants. When compared to timber products, NTFPs have historically been given less priority by governments, resulting in a lack of promotion of sustainable NTFP use and supply of financial advantages to local users as incentives for forest protection. There are gaps in understanding the variety of products available and used from forests, their taxonomic classification, socio-economic values, technical packages and the policy contexts for their long-term use in J&K. NTFPs are a significant resource for poor and are used by people who have less alternative access to other economic activities. The present study has been conducted keeping in view the paramount importance of NTFPs in the livelihood of people of Jammu region.

Methodology

The present study was conducted in Jammu region of J&K, India employing Exploratory Research Design. Multistage sampling was followed for selection of ultimate sampling units. Jammu region is divided into three forest circle namely East circle, West circle and Chenab circle. The East circle is purposively selected as it comprises of seven forest divisions namely Jammu, Kathua, Billawar, Ramnagar, Udhampur, Basholi and Samba. Out of these seven forest divisions, Basholi, Ramnagar and Udhampur were selected by employing random selection procedure. From each randomly selected forest division, forest ranges having maximum NTFP availability were selected (Bani range from Basholi, Basantgarh range from Ramnagar and Dudu range from Udhampur). From these forest ranges 50 NTFP collectors were selected by employing snowball sampling method. Thus, a total of 150 numbers of

respondents were surveyed to collect data for the present study. And the process of detailed data collection was performed from October, 2018 to May, 2019. Participatory rural technique was used which included transact walk of the area. Accordingly, the respondents were interviewed separately to avoid group influence and the responses were collected on a predesigned semi-structured interview schedule.

Results and Discussion

Patis, Aconite, Dhar Buti, Attees & Bis Mohra (Aconitum heterophyllum Wall.ex Royle)

Aconitum heterophyllum Wall.ex Royle (Vernaclar name Patis, Aconite, Dhar Buti, Attees, Bis Mohra) belongs to the family Ranunculaceae. Its roots are collected and used for various purposes. It is collected in the months of August-October by uprooting the whole plant manually by hand. After collection, the collectors pack the material in gunny bags. Collectors stay in the dhokes (seasonal house) during the collection season which are situated near the collection area, far away from their homes. Roots are separated out and packed in gunny bags dried it for 20-25 days. Half of the weight is reduced by drying. After drying, patis is stored in gunny bags. Locals reported that it expels intestinal worms, and used for diarhoea, dysentery, high fever, and as an anti-rheumatic. Collectors sold an average quantity of 10.79 kg (±8.85) per season and at the rate ranging from Rs. 2000/- to 6000/- per kg.

Gucchi (Morchella esculenta L.)

Morchella esculenta L., is often known as morels or *gucchi* in India. The entire plant is used as food with high nutritional and medicinal value. In the study area gucchi was collected during the months of February-March. Collectors go for collection early morning and collection of *gucchi* is time consuming. It was reported that emergence of *gucchi* is more during thundering, lightening and snowfall. They collected *gucchi* in polythene bags or in cotton cloth. Not only adults but also school-going children went in groups to nearby forest areas. Immediately after collection, *gucchi* was dried using traditional methods. Collectors often use one of two ways for drying gucchi: lying them out on the floor or on a cloth in the open air, or by putting it in thread in the form of garland and hanging it on the wall near stove/chulla (furnace) in the kitchen. It was reported that *gucchi* shed a significant amount of weight after drying. After drying, *gucchi* can be stored for even after 2-3 years. It can be used for curing stomach pain. Some collectors also reported that it has also proven benefit in children having problem of bleeding from ear and nose. In a season collectors collect an average quantity of 1.27 kg (±1.11) and sold at the rate of Rs. 3000 to 17000/- per kg (Fig. 1).

Nag chhatri, Tri- pattri, Satva (Trillium govanianum Wall. ex D. Don) Kunth

Trillium govanianum Wall.ex D.Don (Vernacular name Nag Chhatri, Tri- pattri, Satva) belongs to family Melanthiaceae. It is collected in the months of May-August. The plant is a tiny herb with three leaves arranged in one whorl at the summit of the stem and a single, purple flower in the centre. Uprooting was done for collection of nag chhatri with the help of shovel. Collectors stay in the *dhokes* (seasonal house) during the collection season which are situated near the collection area, far away from their homes. After collection roots are separated from other parts and are dried for 10-15 days under sunlight. More than 60% of the weight is reduced by drying. Dried roots are stored in gunny bags. Many collectors sold the nag chhatri without drying. Collectors' household sold an average quantity of 16.16 kg (±16.98) of nag chhatri to the local agents of contractors in a season at the price of Rs. 1500/- to 2500/- per kg (Fig. 2).

Bnafsaha, Wild Violet, Sweet Violet (Viola odorata L.)

Viola odorata L. (Vernaclar name Bnafsaha, Wild Violet, Sweet Violet) belongs to family Violaceae. It is collected in the months of January, February and March. Flowers are picked up manually and collected in cotton cloth. After collection flower of bnafsaha are dried in open air in shadow. About 50% of the weight is reduced by drying. Flowers are used to cure cough and sore throat. Members of a household on an

Fig. 1 — Gucchi (*Morchella esculenta* L.)

Fig. 2 — Kasrot (*Diplazium esculentum*)

average sold 0.28 kg (±0.16) of bnafsaha with the price of Rs. 3000/- to 50000/- per kg.

Dhoop (Jurinea macrocephala Boiss)

Jurinea macrocephala Boiss (Vernacular name Dhoop), belongs to family Asteraceae. Root/tubers are the main parts used. It is collected in the months of September-October. It is a small shrub which is highly scattered in the forest areas. A shovel is used for digging out the roots. Leaves are separated by hand, leaving only the roots. The collectors go on collection till evening and after collection they pack the material in gunny bags. Collectors stay in the dhokes (seasonal house) during the collection season which are situated near the collection area, far away from their homes. Dhoop is collected by the male members of the family in groups. Roots are sun dried for four to five days. During the process of drying dhoop it reduces to 50% of the fresh weight. It has cultural significance for local ethnic groups, for instance dhoop is widely used in religious ceremonies as incense. The aromatic roots are used as incense and form a chief intergradient of dhoop industry. During collection there is a fear of wild animals, sloppy and slippery areas and wild weeds which were faced by collectors. On an average, collectors collect 26.18 kg (±20.29) of dhoop annually and sell to local contractors. The collectors could sell at a rate about Rs. 100 to 400/- per kg.

Kaud, Kaur, Kutki (Picrorhiza kurroa Royle ex Benh)

Picrorhiza kurroa Royle ex Benh (Vernaclar name Kaud, Kaur, Kutki) belongs to family Scrophulariaceae. It is collected in the months of July-September. When the shoots or aerial components begin to wither and dry, the roots and rhizomes are manually picked. Collectors combine this with other activities such as cattle grazing and fuel wood gathering. The entire plant is excavated and stored in gunny sacks. The first step in processing *kaur* is to spread the material out to dry in the sun. The leaves, sludge, and other undesired debris are then physically removed. For a day's collecting, this process takes 1–2 h. The weight of fresh material is reduced by half after drying is completed. After proper drying, the material is packed in gunny bags to ensure protection from moisture. It is used in fever, cold and cough, hypertension, muscle spasms, parasitic worms, malaria etc. Dried roots and rhizomes are sold to local traders by the collectors. On an average 18.53 kg (±27.89) was sold annually. The collectors got the exorbitant rate to the tune of Rs. 700/- to Rs 800/- per kg.

Mushkbala, Jatamansi, Balchhari, Mansi, Nihani (Valeriana jatamansi D.Don)

Valeriana jatamansi D.Don (Vernaclar name Mushkbala, Jatamansi, Balchhari, Mansi, Nihani) belongs to family Valerianaceae. It is collected in the months of June-September. Its roots are collected and used for various purposes. Roots of mushkbala are collected by digging and collected in gunny bag. Thereafter**,** it is cleaned and roots are separated out followed by sun drying. It takes about 15 days for drying. After drying, grading of roots was done - thick and long roots were separated from thin and tiny roots. Drying process was mainly done by the female members. It is considered useful in eye, blood and liver problems. It is also used as a remedy for hysteria, nervous unrest and emotional stress, as well as clearing voice and acting as a stimulant in fever and nervous disorder. Its roots are ground into a paste and applied on wounds for faster healing. It carries aesthetic value also and is used in *Havana* of Lord Shiva (Maha Murtanjay). On an average 30.71 kg (±21.08) of mushkbala was sold by a collector in a season at a rate of Rs 150/- to Rs. 190/- per kg.

Kasrot, Kusrod (Diplazium esculentum sw.)

Diplazium esculentum sw. (Vernacular name *Kasrot, Kusrod*), belongs to family Athyriaceae. It is collected in the months of April-June**.** Kasrot is placed like other vegetables in open air. For cooking, the skin of the kasrot is shaved off with light hands. Thereafter, it is cleaned with water so that no trace of sand or dust can left behind, and then allowed to dry off. Many people also prepare pickle of kasrot. It is used as an appetizer by the peasants of the area. A household sold 267.04 kg (±228.67) of kasrot in a

Fig. 3 — Nag Chhatri (*Trillium govanianum*)

Fig. 4 — Zakham-e- hiyat, *(Bergenia ligulata)*

season to the local traders with selling price ranging from Rs. 10 to 15/- per kg (Fig. 3).

Zakham-e- hiyat, patharchoor, pashanbeda (*Bergenia ligulata* Wall. Engl.)

Bergenia ligulata Wall. Engl. (Vernaclar name Zakham-e- hiyat, patharchoor, pashanbeda) belongs to family Saxifrugaceae. It is collected in the months of June-September. Its roots are collected and used for various purposes. Digging of roots was done with the help of shovel and roots are collected in gunny bags. Roots are cleaned and sun drying is done which takes about 15 days for drying. The weight of roots is reduced to 50%. Collectors reported that powder of roots is applied on wound for fast healing. Root powder with warm water is also used for curing diarrhea. Respondents' household sold 45.9 kg (±12.14) of Zakham-e- hiyat in a season to local traders and got the price of Rs. 20/- to 22/- per kg. (Fig. 4).

Conclusion and Suggestions

Most of the area of these forest divisions lies in the Shiwaliks including Basantgarh, Bani and Dudu ranges. Each of these ranges has many villages and majority of them are inaccessible because of lack of road connectivity and undulated terrains. According to findings, these documented plants/ herbs play a vital role in the livelihood of the peasants of the study area. These NTFPs contribute 29% of the average annual income of farmers. Moreover, inhabitants use herbs/ shrubs to cure day to day ailments related to their health. Further, it is reported that the knowledge of medicinal plants in the region descending from generation to generation. There is a fear of extinction of traditional knowledge and hence there is a need for taking initiatives to identify the local herbalists and incorporate their knowledge in scientific research. Government agencies should take initiatives to promote scientific cultivation, storage, processing, packing and marketing of these valuable species. Community people should be mobilized for the conservation of such type of species to restrict the overexploitation of herbs/sherbs. Moreover, these forest species will be conserved in such a way that this NTFPs collection will remained in continuation in the incoming times which will provide the continuous source of livelihood for the farmers of that area.

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Conflict of Interest

Authors declare there is no conflict of interest on this article.

Authors' Contributions

YSB collected the data and drafted and edited this manuscript. RN and LKS supervised this study. NSR contributed in taxonomic explanation of plant species. All the authors read and approved the articles.

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