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Wild Edible Plants used by Rural People of Tirthan Wildlife Sanctuary in District Kullu, Himachal Pradesh

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ABSTRACT: In the present study extensivefield surveys was doneduring 2018 to 2021 atTirthan Wildlife Sanctuaryin district Kullu, Himachal Pradesh. In current study,data was collected through interviews, group discussions, participatory observations and pretested questionnaire.In the sanctuary area a total of 23 wild edible plants were documented which belonged to different categories as 13 herbs, 5shrubs and5 trees. These documented plants are used by the rural people of sanctuary area as wild vegetables, juices, chutneys, and fruits. It was found that the highest number of wild edible plants 6 belonged to Rosaceae family, followed by 3 in Polygonaceae family.These wild plants are easily available from the surrounding without any cost. Rural people of sanctuary area reported that these wild plants are highly nutritious. Due to modern culture in the society new generation is not interested in traditional knowledge so there is an urgent need to document traditional knowledge of wild edible plants before its elimination from the society.

Keywords: Sanctuary, wild edible plants, rural people, traditional knowledge, Tirthan Wildlife sanctuary.

I. INTRODUCTION

India has the world's second largest human populations, with 75% of the population residing in rural areas. In times of food crises, most rural populations rely on natural resources, especially wild edible plants, to meet their food demands, as well as for supplementary food supplements (Thakur,2017). It is estimated that over 800 species of plants are being used as food in India, primarily by indigenous people. Wild plants have played a significant role in human life from ancient times; they have been utilized for food, medicine, fiber and other purposes, as well as fodder for domestic animals (Janjua et al., 2020). In order to maintain a balance between exponential population growth and agricultural output, many wild edible plants have been identified, many of which are potentially valuable for humans, particularly in developing nations (Thakur, 2017). The Himalayas are famed for their abundance of wild edible plants. The Tirthan Wildlife Sanctuary's climatic and topographic diversity provides a diverse range of conditions for the luxuriant growth of potential medicinal plant species (Kumar et al., 2021). Locals in distant and inaccessible places use several of these. People commonly collect wild edible plants for food and other plants from natural areas to suit their subsistence needs, in addition to planting a few crops. The use of wild edible plants as a supplemental food source has a lot of potential (Prakash et al.,2021). This is an area that requires further exploration in order to encourage the domestication of commercially relevant species. This has demanded a study of the area's wild edible plant species. Wild edibles are consumed as part of many people's diets and are intricately linked to practically every element of their socio-cultural, spiritual, and health lives. It also contributes significantly to supporting the nutritional needs of the indigenous population in distant areas of the country throughout the year (Thakur, 2017). In many developing nations, wild food plants play an essential role in rural communities' lives as an intrinsic part of people's subsistence strategies. Such area, with its rich and diversified floral and faunal features meets the criteria to be assigned as a Protected Area (Prakash et al., 2021). The rich age-old biodiversity is also used by the locals for medicine, food, fodder, fuel, and timber as well as to make agriculture implements and for numerous

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religious purposes. Due to western culture new generation is not much interested in traditional knowledge of plants so there is urgent need to document traditional knowledge of wild edible plants from unexplored regions of Himachal Pradesh (Radha et al., 2021). This study might be helpful for future researchers and scientists who are working on some nutraceutical properties of wild edible plants (Prakash et al., 2021).

II. MATERIALS AND METHODS

Kullu district is one of the most beautiful districts of the state blessed with beautiful flora and fauna. It covers an area of 5,503 km^2 and lies in between 76° 9' and 77° 9' East longitudes and 31° 25' and 32° 35' North latitudes(Thakur, 2017). In-fact, Kulludistrict is one of the richest districts in terms of its biodiversity and supports: 1 National Park (Great Himalayan National Park), 6 Wildlife Sanctuaries (Manali, Kanawar, Khokhan, Kais,Sainj and Tirthan) and many biodiversity rich forests (Thakur et al., 2020).Tirthan Sanctuary is connected to the Great Himalayan National Park, a well-known national park in the vicinity. The Tirthan Valley runs up southeast from the Kullu Valley's south end into the Inner Seraj area (Fig.1). It is surrounded from north by Shupakuni Dhar and Gargarsan Dhar, from the south by Bung Dhar and Deori Dhar (dividing line between Beas and Satluj catchment, while on the east side it is bordered by Shrikhand Dhar and west by Nasrupa Thatch to Bischul Thatch to Basico Thatch (Thakur et al.,2020).

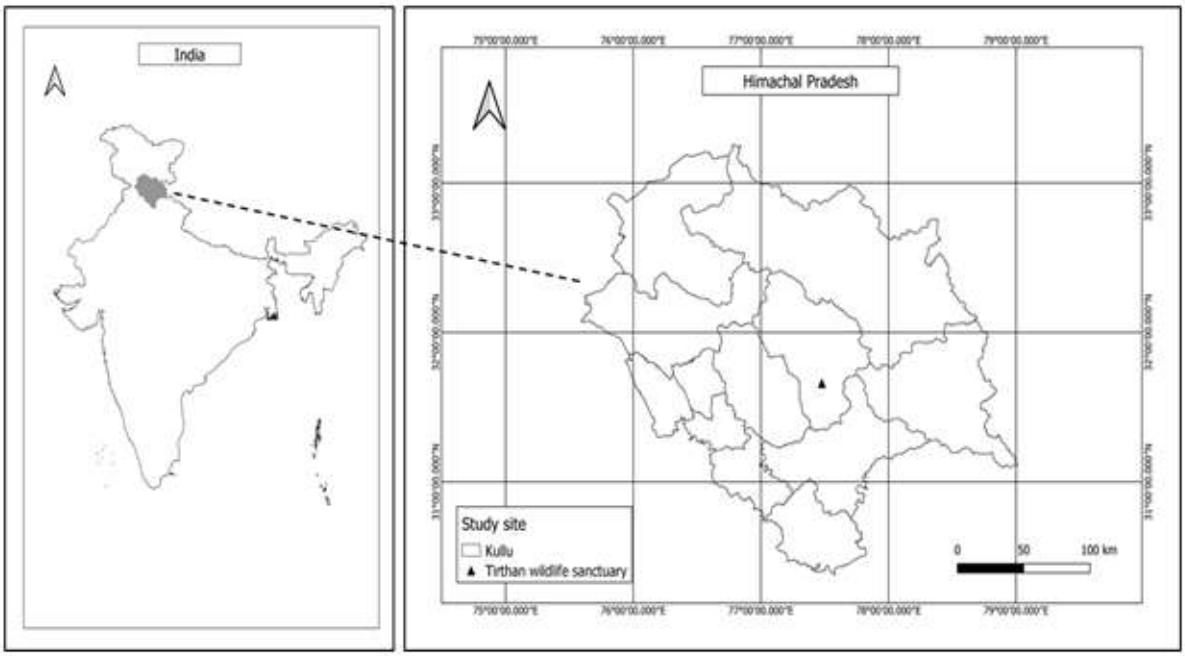

Figure 1. Scale map showing study site

III. RESULTS AND DISCUSSION

In current study a total of 23 wild plants were reported from the Tirthan Wildlife Sanctuary. Data was collected through direct observations, interviews, group discussions and through pretested questionnaire. It was found that older people of Sanctuary area possessed vast traditional knowledge of wild plants as compared to younger generation. These plants were used by the inhabitants of the study area as vegetables, juice, chutneys, and fruits.The documented 15plant species from Sanctuary area belonged to 15families. It was observed that most of the wild plants were reported from Rosaceae, Polygonaceae, Lamiaceae and Berberidaceae families. Rosaceae family was represented by total 6 species, followed by Polygonaceae represented by 3 species while families Lamiaceae and Berberidaceae were represented by 2 species each, while the other families reported during the current survey were represented 1 species each (Fig. 2).

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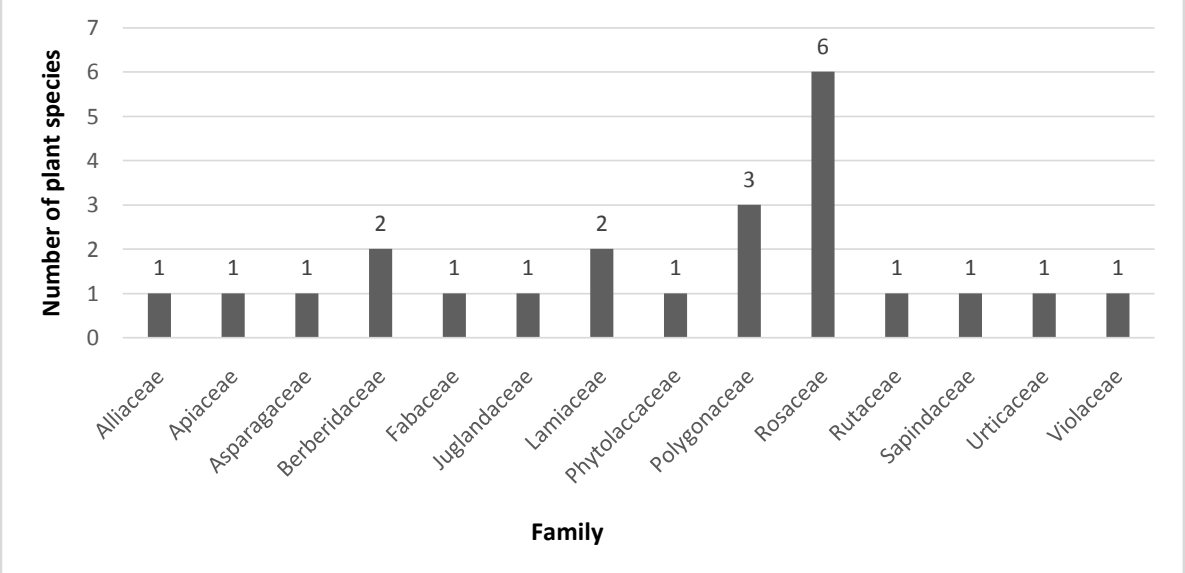

Figure 2. Representation of plants families reported from Tirthan Wildlife Sanctuary.

From the results of the present survey, it was observed that most of the edible plant species reported from Tirthan Wildlife Sanctuary were herbs (56%) followed by shrubs (22%) and trees (22%).Present study reported that 23 wild edible plant which were used by inhabitants of the Tirthan Wildlife Sanctuary (Table 1). From the results of the present survey, it was noticed that fruits were most commonly used edible plant part followed by leaves, shoots, flowers, and twigs. In current study a total of 23 plant parts were edible.Aesculus indicafruits were edible; Allium humileKunthleaves were used as spice; Angelica glaucaroot powder was used as spice and as flavoring agent; Asparagus racemosus young and tender shoots were cooked and consumed as vegetable; Berberis aristata and B. lycium fruits were edible; Fagopyrum esculentum leaves and tender shoots were cooked and consumed as vegetable; Frageriavescaripe fruits were eaten; Gerardinia heterophyllaleaves were boiled and consumed as spinach; Indigofera heterantha flowers were edible; Juglans regia nuts were consumed after sun drying the fruits.; Mentha longifolialeaves and tender shoots were used in the preparation of 'chutney'; Origanum vulgare leaves were edible; Phytolacca acinosaleaves wre used to prepare vegetable and local dish called 'Patrodu'; Prinsepia utilis, Prunus cornuta, Pyrus pashia, Rubus ellipticusandRubus occidontalisripe fruits were eaten; Rumex hastatus leaves were eaten raw or as 'chutney'; Rumex nepalensis leaves were cooked and used as vegetable; Viola odorata flowers were edible; Zanthoxylum armatum fruits and leaves were edible.

Table 1. Wild edible plants consumed by local people of Tirthan Wildlife Sanctuary, Kullu.

Botanical name	Family	Local name	Habit	Voucher no.	Part used	Edible uses
Aesculus indica (Wall.exCamb.) Hook.	Sapindaceae	Khanor	Tree	SUBS/BOT-3706	Fruits	Fruits are dried and crushed into flour which is consumed mainly by women to cure body weakness and menstrual problems.
Allium humileKunth	Alliaceae	Janglilahsan, Farna	Herb	SUBMS/BOT-4781	Leaves	Leaves are used as spice.

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Angelica glaucaEdgew.	Apiaceae	Chaura	Herb	SUBMS/BOT-3709	Roots	Root powder is used as spice and as flavoring agent.
Asparagus race mosus Willd.	Asparagaceae	Safed musli	Herb	SUBMS/BOT-3712	Shoots	Young shoots are cooked and used as vegetable.
Berberis aristata DC.	Berberidaceae	Kashmal, Kashmale	Shrub	SUBMS/BOT-3713	Fruits	Fruits are edible.
Berberis lycium Royle	Berberidaceae	Kashmal	Shrub	SUBMS/BOT-3714	Fruits	Fruits are edible.
Fagopyrum esculentum Moench	Polygonaceae	Kotu, Fafra	Herb	SUBMS/BOT-3726	Leaves, Tender shoots	Leaves and tender shoots are cooked and consumed as vegetable.
FrageriavescaL.	Rosaceae	Bumbra	Herb	SUBMS/BOT-3727	Fruits	Ripe fruits are eaten.
Gerardinia heterophylla (Decne)	Urticaceae	Kugus	Herb	SUBMS/BOT-3729	Leaves	Leaves are boiled and consumed as vegetable.
Indigofera heter antha Brandis	Fabaceae	Kali kathi	Shrub	SUBMS/BOT-3732	Flower	Flowers are consumed after mixing with gram flour, making pancakes of it.
Juglans regia L.	Juglandaceae	Akhrot	Tree	SUBMS/BOT-3733	Fruits	Nuts are consumed after sun drying.
Mentha longifolia (L.) L.	Lamiaceae	Jangli Pudina	Herb	SUBMS/BOT-3735	Leaves, Tender shoots	Leaves and tender shoots are used in the preparation of 'chutney'.
Origanum vulgare L.	Lamiaceae	Ban Tulsi	Herb	SUBMS/BOT-3738	Leaves	Leaves are used flavoring agent.
Phytolacca acinosaRoxb.	Phytolaccaceae	Jharka	Herb	SUBMS/BOT-3739	Leaves	Leaves are used to as vegetable.
Prinsepia utilis Royle	Rosaceae	Bhekhal	Shrub	SUBMS/BOT-3742	Fruits	Ripe fruits are eaten.
Prunus cornuta (Wall. ex Royle) Steud.	Rosaceae	Jamu	Tree	SUBMS/BOT-3743	Fruits	Ripe fruits are eaten.
Pyrus pashia Buch. -Ham. ex D.Don	Rosaceae	Kainth	Tree	SUBMS/BOT-4786	Fruits	Ripe fruits are eaten.
Rubus ellipticusSm.	Rosaceae	Aakhe	Shrub	SUBMS/BOT-3747	Fruits	Ripe fruits are eaten.
Rubus occidontalisL.	Rosaceae	Aakhe	Herb	SUBMS/BOT-3748	Fruits	Ripe fruits are eaten.
Rumex hastatus D. Don	Polygonaceae	Khatibuti	Herb	SUBMS/BOT-3749	Leaves	Leaves are eaten raw or as

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						'chutney'.
Rumex nepalensis Spreng.	Polygonaceae	Malori	Herb	SUBMS/BOT-3750	Leaves	Leaves are cooked and used as vegetable.
Viola odorata L.	Violaceae	Banafsha	Herb	SUBMS/BOT-3759	Flowers	Flowers are used to prepare decoction, known as 'kaadha'.
Zanthoxylum armatum DC.	Rutaceae	Timru	Tree	SUBMS/BOT-3760	Fruits, Leaves, Twigs	Fruits and leaves are used as spice. Twigs are used to brush teeth.

IV. CONCLUSION

Wild edible plants have shown a significant role in human life, particularly in rural and tribal groups that rely on wild food resources for food and medicinal purposes. As a result, tribal communities living in isolated, mountainous, or close to forest areas, where no proper transportation, health care infrastructure was accessible. According to existing evidence, the rural people of Himachal Pradesh's Kullu district, particularly those living in remote and high-altitude locations relied heavily on plant resources to meet their daily needs. However, today's generation continues to forget the use of local resources as a source of food, relying entirely on staple food plants. There is anurgent need to document how to replace the current reliance on staple crops to meet the needs of the society. Plant nutritional potential must be investigated in order to overcome nutritional shortages, particularly in remote areas of Himachal Pradesh. In conclusion, it was discovered that the wildest edible plants were used as fruit and leaf, followed by other components. Fruits were normally eaten raw when they were ripe, whereas unripe fruits, seeds, flowers, and leaves were usually cooked as vegetables.It is recommended that documentation and conservation of wild edible plants is very important before its elimination from the society. This study might be helpful for food industry to develop new edible food products.

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