International Journal of Botany Studies
www.botanyjournals.com
ISSN: 2455-541X
Received: 22-11-2025, Accepted: 28-01-2026, Published: 13-02-2026
Volume 11, Issue 1, 2026, Page No. 184-188

Diversity and potential of *Dioscorea Spp.* as an underutilised vegetable in Himachal Pradesh

Ajay Kumar Rawat*
Assistant Professor, Vijay Memorial college of Education, Barsu, Himachal Pradesh, India

Abstract
The current study, entitled "Diversity and potential of *Dioscorea spp.* as an underutilised vegetable in H.P" was carried out between April -July of 2025. The study is intended to understand the diversity and potential of *Dioscorea* species as an underutilised vegetable in H.P. The genus *Dioscorea* belongs to the Dioscoreaceae family, generally known as yam. It has more than 600 species all over the world, predominantly in tropical areas. In India, 41 species were reported. Some of them are also present in Himachal Pradesh, including *Dioscorea alata, Dioscorea belophylla, Dioscorea bulbifera, Dioscorea deltoidea, Dioscorea pentaphylla* and *Dioscorea melanophyma.* These species are found in various districts of H.P including Mandi, Hamirpur and Shimla. *Dioscorea spp*. are the underutilized vegetable in Himachal Pradesh. The study reveals a lack of taxonomic clarity and highlights the absence of focused research on *Dioscorea* in this region. The unknown diversity of *Dioscorea* in H.P., with a diverse range of local varieties and agroecosystems, provides a knowledge gap for breeding. The reason for the negligence of underutilised vegetable is that people are unaware of the benefits of these vegetables as food and many health-promoting properties. This research emphasizes the need to recognize *Dioscorea* species as a valuable component of regional agrobiodiversity and food security.

Keywords: *Dioscorea*, species, underutilized, vegetable, diversity

Introduction
Himachal Pradesh is a hilly state with a diverse range of plants. It is also renowned as a repository of locally adopted indigenous, traditional and naturalised species (perhaps exotic) that provides vegetables, fruits, and medicines that are less well-known or underutilised (Chand, 2017). The current study was done to determine the diversity, status, edibility, utilisation efficiency and consuming mode of underutilised plant. In recent years, demand for therapeutic herbs has risen tremendously and Himachal Pradesh is a rich repository of medicinal plant species [1]. A lot of wild crops remain unknown on our globe and among them, some might have great medicinal and nutritional benefits.

One such underexplored genus is *Dioscorea* (family: Dioscoreaceae), commonly known as yam. Globally, over 600 species of *Dioscorea* have been reported, with around 50 found in India, including *D. alata*, *D. belophylla*, *D. bulbifera*, *D. deltoidea*, and *D. pentaphylla* [2]. Several of these are found across different agro-climatic zones of Himachal Pradesh, particularly in districts like Mandi, Hamirpur, Shimla, and Kullu.

Despite their nutritional, economic, and medicinal significance, Dioscorea species remain largely underutilized in Himachal Pradesh. Most local communities are either unaware of their health benefits or have abandoned their use due to the spread of commercial crops [3]. Moreover, the taxonomy of the genus remains poorly understood, with considerable confusion in species identification due to a lack of comparative field, herbarium, and molecular studies. This has resulted in the neglect of potentially valuable germplasm for food, health, and livelihood purposes.

Traditionally, certain Dioscorea species, including *D. deltoidea and D. bulbifera,* have been employed to alleviate symptoms of typhoid, tuberculosis, fever, and digestive disorders. Nevertheless, certain species contain anti-nutritional compounds and necessitate appropriate processing to ensure safety [4]. In this context, *Dioscorea* species are a significant yet unexplored group that is of ecological and socio-economic importance.

Objective of the study
The Main objective of the study is:

a. to determine the diversity, utilisation efficiency, and mode of consumption of species;
b. to investigate traditional information on *Dioscorea spp*. used for edible purposes by local people; and
c. to determine the likelihood of proper utilisation of these underutilised plants.

Review of Literature
The study of genetic diversity in the genus *Dioscorea* has received very sporadic attention. Since no studies were carried out on the genetic diversity of *Dioscorea* spp. by the researchers in H.P. These species are likewise also considered as neglected vegetables. *Dioscorea alata* has been studied globally using microsatellite markers, revealing significant genetic variation in Asia, Africa, and the South Pacific [5]. Within Himachal Pradesh, Kumar *et al.* investigated the biodiversity conservation strategies and potential of underutilised vegetables [6]. Similarly, Negi and Sharma identified *D. deltoidea* as endangered in the Kinnaur district. Marpa *et al*. and Gulshan Kumar and Hem Chander and conducted ethnobotanical research on Dioscorea tubers in the Mandi district, focusing on their local food and medicinal uses [7]. Badhan *et al*. discovered significant morphological and genetic variation among wild and cultivated *Dioscorea* species in Koraput, Odisha. Various studies from other regions, such as Singh *et al*. and Padhan *et al* studied the potential of neglected and underutilised Yams for improving nutritional security and health benefits in Orissa, India [8].

These findings highlight *Dioscorea* spp. has significant potential for food security, traditional medicine, and crop diversification, while also emphasizing the need for more focused regional research, particularly in Himachal Pradesh.

Methodology

The present study was conducted in selected regions of Himachal Pradesh. Himachal can be found between 30° 22 40" and 33° 12 40" north latitude and 75° 47'55" and 79° 04'22" east longitude. It covers a total area of 55,673 km^2. At elevations between 350 and 6500 meters above sea level, the terrain is almost mountainous. The state has a rich floral biodiversity and a varied topography. The Mandi district, specifically the regions of Drang, Sahal, and Padhar, was the subject of survey.

An ethnobotanical survey was conducted in the study area to investigate the diversity of *Dioscorea* species in H.P. Some parts of the Mandi district (Drang, Sahal, and Padhar) were visited and information was collected. Local knowledgeable people from each of the sites were interviewed during the survey, and information about the diversity, utilization and traditional uses of the various *Dioscorea* species was gathered. Three fundamental methods were employed to obtain additional data:

1. **Interview-based method:** that concentrated on preparation methods, traditional uses, and plant parts.
2. **Inventory-based approach:** Recorded local significance, flowering/fruiting times, and species diversity.
3. **Engaging conversations:** Examined cultural significance, economic applications, and knowledge exchange at the local level.

During the surveys, local names were meticulously documented and photographs were taken. To support field observations, secondary sources were also consulted, such as scientific publications and databases like Google Scholar.

Results and Discussions

Secondary Data Findings

The results of the current study, "Diversity and Potential of *Dioscorea* as an Underutilised Vegetable in H.P.", are presented in this chapter. The majority of the secondary data used to present the species, diversity, and distribution of *Dioscorea* in Himachal Pradesh came from a thorough review of the literature. To gather data on the existence of different *Dioscorea* species in various H.P., as well as their botanical traits and documented applications, existing scientific publications, reports, and databases were reviewed.

Diversity and Distribution

Secondary literature sources show that there are 6 species of *Dioscorea* that are found in various district of H.P. They include *D. bulbifera, D. alata, D. pentaphylla, D. melanophyma, D. villosa and D. deltoidea.* These species are found in a different range of altitude:

Table 1: Different altitudinal range of Dioscorea sp. in H.P

Species	Elevation above the sea level
Dioscorea bulbifera	700 - 1400m
Dioscorea pentaphylla	900 – 3000m
Dioscorea melanophyma	1500-2400
Dioscorea deltoidea	1500-3000m
Dioscorea alata	1800m
Dioscorea villosa	1800m

Importance in terms of Ethnobotany and Economics

D. bulbifera is usually found between 700 and 1400 meters above sea level, and its bulbils and tubers are edible [9]. It is usually eaten after being roasted or boiled, and it is also used as medicine to treat skin and respiratory problems. It costs between Rs. 100 and 300 per kg in the area.

D. pentaphylla grows between 900 and 3000 meters and is used as food and medicine, for example, to treat anaemia and joint pain. It is worth more on the market.

D. deltoidea grows between 1500 and 3000 meters and has diosgenin, which is a useful starting material for drugs. After detoxification, its tubers are used in traditional foods and drinks. Overharvesting has raised concerns about conservation, which has led to the planting of nurseries [10].

D. melanophyma grows between 1500 and 2400 meters, is a wild species that isn't very well known but is collected for seasonal use. Even though it is available, it is still not used enough. It is boiled or roasted in ash.

D. alata is a plant that grows at a medium altitude, up to 1800 m. It has both health and dietary benefits, and people often eat it when they are fasting [11]. It is also grown in institutional gardens to protect it.

D. villosa, a plant that was brought to McLeodganj and Dharamshala, is used to treat women's health and stomach problems.

In H.P., Dioscorea species are still mainly underutilized despite their widespread distribution and historical significance. Their potential to support food security and rural income is limited by the absence of systematic documentation and commercial cultivation. These species j' value and conservation status could be improved by raising awareness, harvesting them sustainably, and incorporating them into agroforestry models [12].

Primary Data Findings

A field survey was carried out in Mandi district (Drang, Sahal, and Padhar regions) to augment the secondary data. The survey involved interviewing local residents about their usage and understanding of *Dioscorea* species.

Ethnobotanical and Cultural Usage

Local communities continue to use *Dioscorea* for food and ethnomedical purposes, according to the survey [13]. Traditional knowledge that has been passed down through the generations was shared by community leaders and elderly villagers. In addition to being eaten, *Dioscorea* tubers are used to treat skin infections, joint pain, reproductive health problems, and digestive disorders [14].

Cultivation Practices and Prospects: Although *Dioscorea* is primarily a wild plant, a few farmers in the area do small-scale cultivation. The plant is a potential crop for marginal areas because it can grow in soils with low nutrient levels. However, cultivation calls for particular techniques, like the use of deep containers or pits for easy harvesting, because of the deep root system [15].

Table 2: showing the name of grower, age, area, year of growth in Mandi district

S.No.	Name of grower	Age	Area	Year of grown
1.	Neetu Devi	35	Sahal	2020
2.	Suresh Kumar	45	Sahal	2017
3.	Ravi Kumar	37	Drang	2019
4.	Roshani Devi	34	Mandi	2020
5.	Meena	44	Padhar	2016
6.	Rajni	40	Kunnu	2022
7	Deepak	48	Pali	2017
8.	Reena	40	Padhar	2022

According to the report, Suresh Kumar of village Sahal has been growing *Dioscorea alata* for ten years and has a good tuber yield. Neetu Devi of Drang planted a *Dioscorea species* in a steel container, with promising results.

Fig 1: *Dioscorea* plant

Fig 2: growing in steel container

Fig 3: Farmer holding *Dioscorea* vines

Fig 4: Dioscorea grown in small drums

Fig 5: Tubers of *Dioscorea*

Fig 6: *Tardoloos* for sowing

Fig 7: Seeds of some *Dioscorea sp*

Why *Dioscorea* is an underutilised vegetable?

The word "underutilised" is used to describe "categories of wild and farmed plants whose promise has yet to be completely realised" [16]. These crops have the potential to contribute to health, food security, revenue creation and environmental services that are currently underutilised [17]. Because they are no longer competitive with the crops that have grown to dominate the global food supply and are supported by seed supply systems, production and postharvest technology, and extension services, farmers are cultivating them less than in the past [18]. Underutilization is caused by a variety of variables, including a lack of competitiveness, but this alone tells us little about the geographical, social, and economic factors that contribute to the demise of local crops. Underutilized crops are frequently marketed as' new crops, 'rather than' old crops' not because they are "new," but because commercial companies and researchers have adopted them for a new market. These species have been used by local communities for decades, but their traditional uses are being forgotten due to a lack of local knowledge [19]. *Dioscorea spp*. is an underutilized vegetable in Himachal Pradesh. Surprisingly, botanists and agricultural scientists appear to have overlooked *taradi.* The exact taxonomic status of this plant, which belongs to the *Dioscorea* genus of the *Dioscoreacea* botanical family, is unknown. Almost no research on this important food plant has ever been done. The unknown genetic diversity of *Dioscorea* in H.P, with a diverse range local variety, provides a knowledge gap for breeding and conservation efforts.

Reasons for the negligence of underutilised vegetables

People are unaware of the benefits of underutilised vegetables as food, particularly their health-promoting properties. Indigenous knowledge related to the cultivation, utilisation and conservation of underutilised vegetables is also threatened [20]. Priority is given to high-value commercial high-yielding varieties, which are being replaced by a small number of cultivated species.

The US Agency for International Development (USAID) and the International Centre for Underutilized Crops (ICUC) both encouraged research on these underutilised species in order to expand the range of plant species cultivated [21]. This has helped to raise awareness and concern about the safe conservation and long-term use of genetic resources from underutilised plant species.

Conclusion

In H.P, *Dioscorea* is an underutilised vegetable because people are unaware of the benefit of this vegetable as a portion of food. The cultivation practices of this vegetable are threatened and no study on the genetic diversity of *Dioscorea* has been done in H.P. The whole study indicated that we should encourage people to produce this valuable vegetable and reap its benefits. This vegetable is also a valuable source of income for locals who can easily earn money by selling the tubers in the markets. Because only a limited study of the genetic diversity of *Dioscorea* has been conducted, more research on this topic is recommended in the future for a better understanding of the species. The integration of primary and secondary data reveals that *Dioscorea* is a valuable underutilized plant with ethnobotanical, nutritional, and pharmacological potential. Its adaptability, traditional significance, and nutritional richness make it suitable for promoting in food security and ethnomedicine. However, awareness, scientific cultivation techniques, and value addition are crucial for mainstreaming *Dioscorea* in Himachal Pradesh and similar regions.

References

1. Arnau GA. Yams. In: Bradshaw JE, editor. Root and Tuber Crops, Handbook of Plant Breeding. Singapore: Springer Science Business Media, LLC, 2017, 127–148.
2. Aderiye BI. Antifungal properties of yam (*Dioscorea alata*) peel extract. Folia Microbiol,1996:41:407–412.
3. Chen RY, S W. Chromosome Atlas of Major Economic Plants Genome in China, Chromosome Atlas of Crops and their Wild Kindred Plants in China Relatives. Beijing: Science Press, 2003, 2.
4. Engle LM. Conserving the indigenous vegetable germplasm of Southeast Asia. Acta Horticulturae,2007:752:55–59.
5. Jaenicke H, *et al*. Strategic framework for research and development of underutilized plant species with special reference to Asia, the Pacific and Sub-Saharan Africa. Colombo, Sri Lanka: International Centre for Underutilized Crops; Rome, Italy: Global Facilitation Unit for Underutilized Species, 2006.
6. Kumar DS. Potential and biodiversity conservation strategies of underutilized or indigenous vegetables in Himachal Pradesh. International Journal of Agricultural Sciences,2014:10(1):459–462.
7. Negi. Phytochemical screening to validate the ethnobotanical importance of root tubers of *Dioscorea* species of Meghalaya, North East India, 2016. Journal of Medicinal Plant Studies,2013:1:62–69.
8. Sheikh N, YK. Phytochemical screening to validate the ethnobotanical importance of root tubers of *Dioscorea* species of Meghalaya, North East India, 2017. Journal of Medicinal Plant Studies,2013:1:62–69.

9. Nayaboga ET. Agrobacterium-mediated genetic transformation of yam (*Dioscorea rotundata*): an important tool for functional study of genes and crop improvement. Frontiers in Plant Science,2014:5:463.
10. Padhan B. Potential of neglected and underutilized yams (*Dioscorea* spp.) for improving nutritional security and health benefits. Frontiers in Pharmacology,2020:11:496.
11. Pal A, SA. Analysis of cytotypes of *Dioscorea* and scope of increasing the diosgenin content. Cellule,1980:79:117–134.
12. Ram Chand, AN. Ethnoecological survey of underutilized plant diversity of Hamirpur District, Himachal Pradesh, India: an edibility assessment. Environment and Ecology Research,2017:5(1):13–29.
13. Ramachandran. Cytological studies in Dioscoreaceae. Cytologia,1968:33:401–410.
14. Thakur ts. some wild edible plants of the western himalayas volume ii (some wild edible plants of the western himalayas volume iii, iv) kindle edition, 2019.
15. Bhattacharjee RG. *Dioscorea*. In: Ranjana MG, editor. M G Ranjana Bhattacharjee, 2017.
16. Waris R, S. An overview of the genus *Dioscorea* L. (Dioscoreaceae) in India. Plant Science Today,2021:8(1):72–78.
17. Girach RD, AS. The medicinal flora of Similiphar forests, Orissa State, India. Journal of Ethnopharmacology,1999:65:165–172.
18. Roy SC, GS. A cytological survey of eastern Himalayan plants. Cell Chromosome Research,1988:11:93–97.
19. Sharma. Seed germination and seedling growth of dioscorea deltoidea wall. Ex griseb. From kinnaur (himachal pradesh) as affected by zinc and copper. J. Indian bot. Soc, 2016.
20. Siqueira MV. Yam: a neglected and underutilized crop in Brazil. Horticultura Brasileira, 2011.
21. Swarnkar SA. Ethnobotanical observation on tuberous plants from tribal area of Rajasthan (India). Ethnobotanical Leaflets,2008:12:647–666.