



Chapter 7

Comparative analysis of moisture, total ash & fibre content of ethnomedicinally important selected *Dioscorea* species of India

Smita Basole¹, Sugimani Marndi^{2*} and Sanjeet Kumar²

¹Department of Botany, Balbhim College, Beed, Maharashtra, India

²Ambika Prasad Research Foundation, Odisha, India

*Email-id: sugimani2marndi@gmail.com



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Abstract: The present study evaluated the proximate composition of two ethnomedicinally important *Dioscorea* species of India (*Dioscorea pentaphylla* and *Dioscorea pubera*) with a focus on moisture, total ash and fibre content. Physico-chemical analysis revealed notable variations between the species, with *D. pubera* showed higher moisture content, whereas *D. pentaphylla* exhibited significantly higher fibre and total ash levels. These differences highlighted the nutritional and potential therapeutic relevance of the species, particularly for rural and tribal communities that depend on wild tubers as supplementary food resources. The findings reinforce the value of *Dioscorea* species as an important wild edible group and provide scientific support for their sustainable use, documentation, and conservation.

Keywords: Crude fibre, *Dioscorea*, ethnomedicine, moisture content, nutritional analysis, proximate composition, total ash, wild edible tubers

Introduction

Dioscorea species, commonly known as yams, represent one of the most important traditional food resources for rural and tribal communities in India (Obidiegwu et al., 2020; Manjula et al., 2022). These tubers are not only consumed as staple substitutes but are also valued for their ethnomedicinal properties (Wang et al., 2025). Despite their wide use, the nutritional composition of many *Dioscorea*



species remains understudied, particularly with respect to key physicochemical traits such as moisture, fibre, and total ash content (Lal et al., 2024). Understanding these parameters is crucial because they determine the edibility, storage potential, therapeutic value, and overall nutritional quality of the tubers (Yiblet and Adamu, 2023). Given the increasing emphasis on documenting underutilized wild edible plants, a scientific evaluation of these species contributes to both nutritional ethnobotany and sustainable food resources management (Mohanty et al., 2021). The present study holds significant importance as it provides a comparative analysis of *D. pentaphylla* and *D. pubera*, two ethnomedicinally important species commonly consumed in different parts of India. Quantifying moisture, fibre, and ash content, the study provides valuable insights into their nutritional strengths, supporting their use as accessible food sources for marginalized communities. The data generated not only helps to validate traditional knowledge but also contributes to identification of the species with higher nutritional potential for promoting food security, value addition, and conservation planning. Such scientific evidence is vital for promoting these wild tuber crops as reliable alternatives in regions facing nutritional deficiencies and shifting dietary patterns.

Methodology

For experimental works, plant material of selected *Dioscorea* were collected in the year 2023-24 from Cuttack, Odisha, India.

Estimation of moisture: Selected experimental materials were collected and washed thoroughly with tap water followed by distilled water. The plant materials were soaked with tissue paper and initial weight was taken (W_1). The plant materials were then kept inside the oven at 70 °C for total drying until a constant weight was obtained and this was W_2 . The moisture % was calculated using the formula given below of fresh weight (Lavekar, 2010).

$$\text{Moisture \%} = \frac{W_1 - W_2}{W_1} \times 100$$

Estimation of total ash: The initial weight (X) of dry and clean black silica crucible was taken. 4 gm of sample (Y) was taken. The sample was ignited with crucible inside the muffle furnace at 600-650 °C for 2 h, until it was white in colour indicating the absence of carbon. The crucible with sample was taken out and



cooled inside the desiccators for 30 minutes (Lavekar, 2010). Cooled silica crucible with sample was weighted as final weight (Z).

Initial weight of crucible = X g

Sample weight = Y g

Final weight of crucible with sample = Z g

$$\text{Total Ash \%} = (Z - X) / Y \times 100$$

Estimation of total crude fibre: 2.0 g of plant samples was extracted with petroleum ether at 55 °C for 6 hrs in Soxhlet apparatus. The residue of thimble was collected and dried. Dried material was mixed with 20 mL of sulphuric acid and bumping chips then heated in water bath for 30 minutes. The mixture was cooled and filtered through muslin cloth and the residue was collected and washed with warm water thoroughly. Residue was again heated with 200 mL of Sodium hydroxide for 30 minutes. Mixture was filtered and washed with solution containing 25 mL of 1.25 % sulphuric acid, 50 mL of distilled water and 25 mL of ethanol. The residue was collected and transferred to a pre-weighted (W_1) silica disc. Sample with silica disc was placed in oven at 130 °C for 3 hrs. The dried residue was cooled in desiccators and weighted (W_2). The sample with silica disc was placed in muffle furnace at 600 °C for 45 minutes. The sample was cooled in desiccator and weighted (W_3). The percentage of crude fibre of plant sample was calculated at last (Sadasivam and Manickam, 2010).

$$\text{Total fibre \%} = (W_2 - W_1) - (W_3 - W_1) / \text{Sample weight} \times 100$$

Results and discussion

The present physio-chemical analysis confirmed that the selected *Dioscorea* species (*D. pentaphylla* and *D. pubera*) contain appreciable amounts of moisture, fibre, and total ash, which contribute to their dietary value (Table 1; Figure 1). The study revealed that *Dioscorea pubera* exhibited the highest moisture content (6.05 %), followed by *D. pentaphylla* (3.21 %). Moisture percentage directly reflects the water content in food, and species with higher moisture levels can help meet the basic hydration needs of consumers, especially in resource-limited tribal regions.



In contrast, the crude fibre content was highest in *D. pentaphylla* (17.56 %), followed by *D. pubera* (3.03 %). This high fibre content has considerable health implications, including improved digestion, cholesterol reduction, and stabilization of blood sugar levels. Fibre-rich tubers also serve as effective dietary supplements for individual with inadequate fibre intake from other sources.

Table 1: Proximate compositions of some species of *Dioscorea*

Species	Proximate composition (in %)		
	Moisture	Total ash	Fibre
<i>Dioscorea pentaphylla</i>	3.21	7.2	17.56
<i>Dioscorea pubera</i>	6.05	4.04	3.03

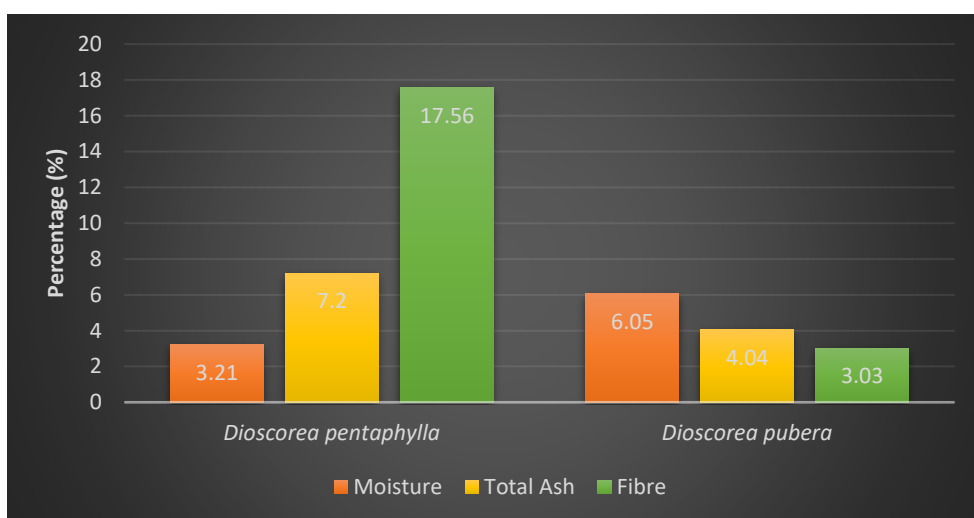


Figure 1: Physiochemical parameters of selected *Dioscorea* species

The total ash content, which indicates the overall mineral composition of the tubers, was also higher in *D. pentaphylla* (7.2 %) compared to *D. pubera* (4.04 %). A higher ash percentage generally reflects a richer mineral profile, contributing to the nutritional significance of the species. The present findings align with previous reports by Shajeela et al. (2011), who documented moisture, crude fibre, and total ash percentages in *D. pentaphylla*, and Sahoo et al., (2023) analysed the proximate compositions of multiple *Dioscorea* species. Together, the results reinforce the



importance of these species as reliable food resources for rural and tribal populations.

Conclusion

The comparative analysis of *Dioscorea pentaphylla* and *Dioscorea pubera* demonstrated that both species possess valuable nutritional attributes, supporting their traditional use as food resources among rural and tribal communities. *D. pubera* showed higher moisture content, while *D. pentaphylla* contains greater amounts of fibre and total ash, indicating richer mineral and dietary fibre composition. These findings highlight the significance of *Dioscorea* tubers as accessible, nutritious, and ethnomedicinally important wild edible tubers. Continued documentation and evaluation of such underutilized species can contribute to enhance the local food security and promoting their conservation.

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