

Chapter 6

Dioscorea oppositifolia (Dioscoreaceae): a medico-food of tribal India

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Abstract: About 650 species of the *Dioscorea* genus are reported throughout the world. Most of the species have starchy tubers with excellent food and medicinal values, but they are yet to be explored scientifically. *Dioscorea oppositifolia* is a medicinal yam, commonly known as Pani Alu, consumed by local communities as medico-food in India. There is a very little documentation on its medicinal-food values. Therefore, an attempt has been made to document their importance through the field and literature survey. The results revealed that tubers are consumed after different traditional practises to remove the toxic elements. The tuber is also consumed as a medicinal agent, particularly in women's related problems. Further studies are required to evaluate the food and medicinal values to do the value addition for providing livelihood opportunities to the locals and to establish a sustainable health care system.

Keywords: Tuberous plants, Women health care, Medicinal food, Value addition

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Introduction: Yam represents the species of the *Dioscorea* genus of the Dioscoreaceae family under the order Dioscoreales. They are initially consumed by the communities of New Guinea and then slowly spread across Africa, Asia, Europe, The Caribbean and Oceania (Kumar and Jena 2017). It spreads quickly due to the presence of starch in their tubers and rhizomes. They are popular but have less palatability due to the presence of anti-nutritional factors and some toxic elements. There are a number of traditional practices that are observed to remove these unpalatable factors (Present study). They play a significant role in food security, medicine, and the economy of the developing countries. Among the *Dioscorea* species, *Dioscorea oppositifolia* is very common, having a wide distribution in the world. *D. oppositifolia* is a deciduous perennial, twining vine, that may reach up to 16 feet in height, taking support from trees and shrubs. Terete stem, twining spirally from left to right (clockwise: identification key) and glabrous. Underground, it has a deep, persistent, root-like tuber up to 1 metre long that resprouts annually. Leaves are opposite, although they may be alternate in the upper nodes, coriaceous, simple, pointed to long-pointed with a heart-shaped base, 5-7 nerved, 5.0 to 8.2 cm long and are typically ovate, hastate, or sagittate in shape. Petiole up to 3.5 cm long. Spike 2.0-6.5 cm long, slender, 3-6 together along the peduncle; peduncle 15-22 cm long; bracts lanceolate. Flowers are small, greenish-yellow in colour. The flowers are unisexual and arise from the leaf axils in spicate or paniculate inflorescences. Male tepals ovate, obtuse, stamens 6. Female flowers distant, tepals 1 mm long, orbicular, glabrous. Fruits are membranous, three-angled glabrous capsules (Present study; Plate 1-3; Kumar 2016; Kumar and Jena 2017). *D. oppositifolia* can grow in a number of different habitats and environmental conditions, but it is commonly found at the edges of forests, along stream banks, and water bodies (Present study). It is native to India, Bangladesh, East Himalaya, Myanmar, and Sri Lanka. Some of the food, medicinal and economic values are reported by some researchers, but detailed studies are needed. Therefore, an attempt has been made to gather information on the above aspects of *D. oppositifolia*. In this chapter, the authors discussed the utilisation of this tuberous plant.

Methodology: For the present study, literature and field surveys were carried out. For the field survey, from 2014 to 2022, the authors visited the selected areas of Odisha state under different projects and gathered information on *D. oppositifolia* using a random questionnaire method. The plant was identified by the authors.

Results and discussion: The observations and collected information from the field are presented under the following heads:

Food values: During the survey, the authors found that tubers of *D. oppositifolia* are collected from December to February and consumed as food. The authors observed a number of traditional processes that were carried out prior to consumption. The observed practises are as follows:

1. Tubers are cut into small pieces and boiled. Boiled tubers are cooked with tomatoes and tamarind water.



Plate 1: Habit and habitat of *D. oppositifolia*



Plate 2: Plant parts of *D. oppositifolia* (Leaves, Flowers and Fruits)



Plate 3: Mature fruits of *D. oppositifolia* in wild

2. The young tuber is washed and consumed raw by the children.
3. The mature tubers are collected and burned. The burned tubers are consumed as snacks.
4. The tuber is left in running water (24 hrs), then boiled and consumed as a salad with a meal or country liquor.

Medicinal values: Most of the yam species are used to cure different types of diseases and disorders. The most common observed therapeutic values of *D. oppositifolia* are:

1. The juice of rhizome is taken to reduce the complications related to menopause.
2. The tuber decoction is used for early menstruation.
3. The decoction of the tuber is used as a birth control agent and to reduce obesity.
4. The tuber is boiled and consumed as a snack to give strength to the mother after delivery.
5. The boiled tuber is consumed to enhance the appetite.

Economic values: Most of the yams are cultivated for economic purposes. The tuber of *D. oppositifolia* is not cultivated in the study areas, but the authors observed that the tribal people collect it from near forest areas and use it to sell in their local markets.

Propagation as a future food: *D. oppositifolia* can reproduce both sexually and asexually. Although it is capable of sexual reproduction, it has not been documented to reproduce sexually, because it is a dioecious species, and female plants have not been observed in the wild. Asexual reproduction could be done using tubers.

Discussion: Many researchers have reported the food and medicinal values of this yam species. Felix et al. (2009) reported that the *D. oppositifolia* is traditionally used as antiseptics, in ulcers and abscesses. The root is chewed to cure toothache and aphthae. The whole plant extract is used in secondary syphilis and psoriasis. According to their work on phytochemical analysis petroleum ether extract of *D. oppositifolia* shows the presence of steroids, triterpene, sugar, tannin, and amino acid. Methanol extracts show the presence of sugar, alkaloid, phenolic group, flavone, tannin, and amino acid. Benzene and chloroform extracts show the presence of steroid, sugar, and steroid, triterpene, and sugar respectively. The aqueous extract shows the presence of steroids, triterpene, sugar, and tannin. According to Shajeela et al. (2011) *D. oppositifolia* content higher crude lipid compared to other *Dioscorea* species. Sheikh et al. (2013) reported that the *D. oppositifolia* shows the presence of saponin, terpenoid and cardiac glycosides which might be responsible for treating fungal and yeast infections, bacterial infections and cardiac failure respectively. Kumar (2016) documented the uses of the tuber of *D. oppositifolia* in swelling, scorpion and snake bites due to the presence of flavonoids and alkaloids, tuber powder with honey is used in oral administration and increases the number of sperm due to the presence of Diosgenin. Vivek and Prakash (2018), reported the presence of alkaloids, saponins, tannins, triterpenoids, steroids, phenols, flavonoids, glycosides, and reducing sugars in the tuber of *D.*

oppositifolia and the nutritive evaluation showed that the tubers are a good source of protein, lipid, crude fibre, starch, vitamins, and minerals. Mustafa et al. (2018) reported that the tubers are used as nutrition tonic after pregnancy and also used as an antiseptic. Rani and Raju (2020) reported the presence of alkaloids, phenols, flavonoids, steroids, tannins, glycosides in *D. oppositifolia* and produce significant antimicrobial and anti-inflammatory activities. Gavad and Khade (2021) documented that the tubers of *D. oppositifolia* is given to women once a day for nearly a month after delivery to revive their strength. Leaf paste is used as an antiseptic for ulcers. Powered root mixed with cow urine is applied to a scorpion bite.

Conclusion: The study concluded that *D. oppositifolia* has sound therapeutic values against problems related to women. It has food value too and is popular among the tribal communities of India in general. Therefore, a medico-food can be developed to reduce the problems related to women as well as can do the value addition to provide livelihood opportunities to the locals. The present study indicates that there is a lack of scientific evaluation on food and medicinal values of *D. oppositifolia*. Hence, there is a need to evaluate all possible bioactivities of its plant parts.

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