Aerial yam (*Dioscorea bulbifera*): A potential tuber crop for regular income, food and nutrition security

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Introduction

Yams (*Dioscorea spp.*) serve as a primary/secondary staple food in many countries in Africa, Asia and South as well as Latin America. It provides food and nutrition security to several millions of people in tropical region. In India, *Diosocrea alata, Dioscorea esculenta* and *Diocorea bulbifera* are grown on a commercial scale as a starchy food crop species.

Dioscorea bulbifera is commonly known as the air potato, air yam, bitter yam, cheeky yam, potato yam, aerial yam, and parsnip yam. This Dioscoreaceae family species is native to Africa, Asia and northern Australia. However, it is widely cultivated and has become naturalized in many regions.

Tubers on vines

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Aerial yam is a trailing herb with broad and alternate leaves. The stems/vines trail in clock wise direction. It has two types of storage organs. The plant forms bulbils in the leaf axils of the twining stems/vines, and tubers beneath the ground. Aerial yam is one of the yam species producing aerial tubers, which is modification of auxillary buds into bulbils. Their aerial bulbs as well as subterranean tubers are edible. The carbohydrate rich aerial bulbs are consumed after boiling, baking, roasting and frying as a vegetable in India. Aerial yam is the only starchy tuber available for consumption to those who don't eat underground root and tubers.

Aerial yam offers a variety of health benefits due to their rich nutrient content. They are a good source of fiber, vitamins, and minerals, and can contribute to improved digestion, blood sugar regulation, and potentially even reduced inflammation. It has been used as a folk remedy to treat conjunctivitis, diarrhoea, and dysentery, among other ailments. The aerial yam (bulbil) is having dry matter 32.24%, starch 13.93% (fresh weight basis) and crude protein 5.85% (fresh weight basis).

Field view of Arial yam

Harvested Tubers of Konkan Kalika

The plant is vine and needs support for their growth. Usually aerial yam is cultivated under pandal or trellis systems. This will allow plants to grow longer (up to 6 m) and spread more area and also it will be easy to locate and harvest aerial bulbs. When aerial yam plant is mature to certain extent, then bulbils develop in leaf axils. Production of bulbil will then continue until the end of season with old bulbils maturing and dropping off while new-ones are formed closer to the shoot tips. This type of bulbil bearing habit leads to bear a greater number of bulbils per vine.

Aerial yam is one of the important tuber crops grown in tribal areas of eastern Ghats in Odisha, Chhattisgarh and Jharkhand as well as western Ghats in Karnataka, Maharashtra and Goa. In Maharashtra, more specifically Konkan region, it is grown and consumed to a large extent. The soil and climatic condition of these regions are suitable for aerial yam. This crop has also potential for growing in eastern part of Sahyadri ranges, including eastern part of Nandurbar, Dhule, Nasik, Ahmadnagar, Pune, Satara and Kolhapur. This crop is already grown in eastern Vidarbha region (Gadchiroli, Bhandara, Chandrapur, Gondia and some part of Satpura hills) of Maharashtra.

There is a great scope for cultivation of aerial yam on marginal lands and in backyard of houses as well as intercropping in the mango and cashew orchards. The duration of aerial yam is relatively lesser compared to other yam spp.

PACKAGE OF PRACTICES

Field preparation	Two to three ploughings followed by planking then digging of pits (L x W x D 30 x 30 x 30 cm)
Varieties	Konkan Kalika
Seed rate	300-500 kg/ha having 30-50 g weight bulbils
Seed treatment	Dithane M-45 or Carbendazim @ 2.0 g per lit
Time of planting	April-June
Spacing	1.0 x 1.0 m
Staking	Pandal or trellis system
Fertilizer dose	FYM/Compost 10.0 t/ha; NPK 80-60-80 kg/ha (Full dose of FYM/Compost, P and 1/2 dose of N and K to be applied in pits before planting and remaining dose of N and K to be applied during intercultural operation and earthing up between 30-40 days after planting (DAP)).
Gap filling	Gap filling required after sprouting of bulbils or at 20-30 DAP preferably during rainy days
Weed management	Pre-emergence herbicide metribuzine @ 0.25 kg/ha should be applied at 1-2 DAP and 2 hand weedings at 30-40 and 60-70 DAP
Plant protection	Need based
Harvesting stage	At physiological maturity stage on pale yellow and after drying of leaves, petioles and vines
Duration	150-180 DAP
Bulbil yield	10-12 t/ha
Tuber yield	5-6 t/ha
Storage	Well ventilated cool place in 2-3 layers

ECONOMICS

Bulbils yield	:	10 t/ha
Tuber yield	:	5 t/ha
Sale price of bulbils	:	Rs 30,000/t
Sale price of tubers	:	Rs 20,000/t
Gross income	:	Rs 4,00,000/ (Rs 3,00,000 + Rs 1,00,000)
Cost of cultivation	:	Rs 1,25,000/-
Net profit	:	Rs 2,80,000/-
B:C Ratio	:	3.20

CONCLUSION

Aerial yam has special niche in tribal food systems. Staggered harvesting of matured aerial bulbils brings regular income to the tribal farmers. The nutrient rich starchy aerial bulbils provide food and nutrition security to poor, marginal and tribal farmers. Though, it is cultivated in small patches in backyards of tribal houses, it has great potential to cultivate in large areas in open fields. The acceptance of aerial tubers is very high in towns and cities and the market potential is growing continuously. Benefit cost (3.20) analysis showed that it is a remunerative potential cash crop in future.

Aerial and underground tubers of Konkan Kalika

Aerial tubers in the value chain

Production
- Good agricultural practices for higher yield & quality

Curing
- Bulbils are cleaned with dry cloths and stored in 2-3 layers for 2-3 days in a well ventilated house

Packaging
- Bulbils are packed in a corrugated box or gunny bags

Marketing
- Bulbils are marketed as rare and nutri-vegetable in urban market

Technical Folder: TF-19/2025/TSP **August 2025** **Published by** G. Byju, Director

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