

Production Technology For The Cultivation Of Jackfruit

ARTICLE ID: 0222

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www.agrirootsmagazine.in

ISSN: 2583-9071

Artocarpus heterophyllus (Syn. Kathal) belonging to family Moraceae is an integral part of common Indian diet and is freely available in Indian and adjoining continents, its medicinal properties are also mentioned in Ayurveda. The plant is reported to possess antibacterial, anti-inflammatory, antidiabetic, antioxidant and immunomodulatory properties. Artocarpus heterophyllus is an important source of compounds like morin, dihydromorin, cynomacurin, artocarpin, isoartocarpin, cyloartocarpin, artocarpesin, oxydihydroartocarpesin, artocarpetin, norartocarpetin, cycloartinone, betulinic acid, artocarpanone and heterophyllol which are useful in fever, boils, wounds, skin diseases, convulsions, diuretic, constipation, ophthalmic disorders and snake bite etc.

The Artocarpus heterophyllus is a species of tree of the mulberry family (Moraceae) is known by

other names jackfruit (Eng.), Kathal, Panas (Hindi), Kanthal (Beng.), Palaa (Tamil), Phanas (Guj & Mar) & Chakka (Malayalam). It is native to Western Ghats of India, Malaysia and also found in central and eastern Africa, south-eastern Asia, the Caribbean, Florida, Brazil, Australia, Puerto Rico and many Pacific Islands (1). It is a large, evergreen tree, 10-15m in height,



indigenous to the evergreen forests at altitude of 450-1,200m and cultivated throughout the hotter parts of India. Stem of this plant is straight rough whereas bark is green or black,

1.25cm thick, exuding milky latex, leaves broad obovate, elliptic, decurrent, glabrous, entire inflorescence solitary axillaries, cauliflorous and ramflours on short leafy shoots. Male head is sessile or on short peduncles receptacles, sometimes born on the ultimate twing, Female head are oblong ovoid receptacle, syncarpus, cylindrics (2). Seeds are separated horny endocarpus enclosed by sub-

gelatinous exocarpus (1mm thick) oblong ellipsoid in nature. The sweet yellow sheaths around the seeds are about 3–5 mm thick and have a taste similar to that of pineapple, but milder and less juicy Jackfruit (*Artocarpus heterophyllus* Lam) produces heavier yield than any other tree species, and bear the largest known edible fruit (up to 35 kg). The jackfruit tree has several uses. Flakes of ripe fruits are high in nutritive value; every 100 g of ripe flakes contains 287-323 mg potassium, 30.0-73.2 mg calcium and 11-19 g carbohydrates (4). In Bangladesh, it is commonly referred to as “poor man’s food” as it is cheap and plentiful during the season. The nutritious seeds are boiled or roasted and eaten like chestnuts, added to flour for baking, or cooked in dishes. The tree is also known for its durable timber, which ages to an orange or reddish-brown colour, with anti-termite properties (5). The leaves and fruit waste provide valuable fodder for cattle, pigs and goats. Jackfruit wood chips yield a dye, which is used to give the famous orange-red colour to the robes of Buddhist priests. In addition, many parts of the plant, including the bark, roots, leaves and fruits have medicinal properties (6). It requires a soil which is well drained but moist, with a pH of 4.3 to 8.0 and with medium soil fertility. The optimum temperature is 19 to 29°C, altitude at approx. 1600 meters above sea level and the annual rain fall between 1000 and 2400 mm (7) known as, kathal or kata-hai in Bengali and in Hindi. The Malayalam name chakka was recorded by Hendrik van Rheedee (1678-1703) in the Hortus Malabaricus,

Climatic and Soil Requirements

Jack grows well and gives food yield in warm humid climate of hill slopes and hot humid climate of plains. From sea level up to an elevation of 1200 M jack can be grown successfully. A temperature range of 22-35°C will be ideal. It cannot tolerate frost as well as drought. Under low humidity the bearing is poor and the fruits also do not develop and taste. The West coast plains with high humidity are found

Origin and Distribution of Jackfruit

Jackfruit is a tropical fruit species found in tropical, high rainfall, coastal and humid areas of the world. It belongs to family Moraceae. Scientifically known as *Artocarpus heterophyllus*, it is the favourite fruit of many owing to its sweetness. This family encompasses about 1,000 species in 67 genera, mostly tropical shrubs and trees, but also a few vines and herbs. The word *Artocarpus* is derived from the Greek words *artos* (bread) and *carpos* (fruit). The name “Jackfruit” is derived from the Portuguese *jaca*, which in turn, is derived from the Malayalam language term, *chakka*. The fruit is popularly to be very well suited. Though it tolerates a variety of soils, a deep rich alluvial or open textured loamy soil with slightly acidic condition (pH 6.0 – 6.5) and perfect drainage is ideal

Propagation

Seed: Jackfruit is commonly propagated by seeds. Seed should be sown immediately after extraction since they lose their viability during storage. Soaking seed in NAA (25 mg/L of water) for 24 hrs improve their germination and seedling growth.

Air layering: It is one of the best methods to obtain true to type plant. Air layering of one year-old shoot of

bearing plant gives higher success when treated with IBA (500 ppm)

Epicotyls Grafting: Jackfruit seeds should be sown in poly bags (10cm x 20cm) in the 1st week of July. The seedlings when reached 12-14 cm heights should be used as rootstock for grafting. Scions from the terminal shoot of selected good variety of one season old, having well developed buds should be used. At the base of the individual scion a wedge of 4.0 cm should be prepared and inserted in the split epicotyls region of the stock and tied firmly by polythene strips



Planting: Pits of size 1 cubic meter are dug and filled with top soil mixed with 10 kg FYM. The grafts are planted in the centre of the pits during June-December.

Spacing: Jackfruit is commercially planted at a distance of 8 m X 8 m. Varieties of Jackfruit Several studies including Hossain , Saha , and Jagadees, have reported diversity in jackfruit, based mainly on morphological, phenotypic, and organoleptic characteristics like the size of the tree, structure of the leaf, fruit form, age of fruit bearing, quality of the fruit

flesh, their size, shape, density of spines, colour, texture, odor, quality, and period of maturity . According to Singh and Vinning and Moody, there are at least 30 strains of jackfruit in the Indian subcontinent and 30 more types in Malaysia. In Sri Lanka, several jackfruit cultivars such as 'Vela', 'Varaka (Waraka)', 'Peniwaraka', 'Kuruwaraka', Singapore, or the Ceylon Jack are distributed.

However, there are two main varieties of jackfruit: firm and soft. In the firm variety, the perianth remains firm even at full ripeness, while in the soft variety the perianths become soft and fleshy on ripening. The soft variety has fruits with small, fibrous, soft, and spongy flakes with very sweet carpels, whereas the firm variety is crunchy with crisp carpels and not sweet as the soft variety. The firm variety is considered to be of high quality. Some studies have reported variations in the starch, total sugar, and reducing sugar contents of soft and firm types. Gulabi'(rose scented), 'Champa', Hazari, Rudrakshi, GKV-1, Swarna. Gumless jack, Muttan Varica, Singapore or Ceylon Jack, Burliar1, Palur-1, Pechiparai-1, Hybrid Jack

Chemical Composition and Nutritional Value

The chemical composition of jackfruit varies depending on the variety. When compared with other tropical fruits jackfruit flesh and seeds contain more protein, calcium, iron, and Thiamine. A study has explored that the ripe jackfruit is richer than apple, apricot, avocado, and banana in some minerals and vitamins.

The caloric content of jackfruit is low, where 100 g of jackfruit only contains 94 calories.

The composition of jackfruit according to the findings of several studies.

Manures and Fertilizers

Apply 80kg of FYM to a tree annually along with chemical fertilizers of 600:300:240g NPK/plant/year for obtaining higher productivity. The fertilizers are applied in split of two doses and applied twice in a year i.e., during June –July and September – October.

Intercropping

Short duration vegetables, leguminous crops cowpea, horse gram, black gram etc. can be grown as intercrop during the first 3 years of planting to obtain more income. After care: Jack trees are trained to a single stem, early side branches should be removed so that a uniform smooth trunk develops for a height of 1.5 – 2 M and then side branches should be permitted to arise. The flower buds appear on trunk which should be kept free of vegetative growth.

Weed Management

Integrated weed management should be encouraged by growing of cover crops, use of herbicides, inter cropping and hand weeding where ever necessary.

Water Management

Usually, Jackfruit is cultivated under rainfed condition. Protective irrigations are necessary initially at 12-15 days intervals depending on soil and climatic condition.

Harvesting and Yield

Jackfruit starts producing fruits from 7th - 8th year onwards in seedling trees. Grafted plants start to yield from 4th - 5th year. Harvest is done during March-July. On an average, Jackfruit yields about 30-40t/ha.

Post Harvest Management

Fruits are stored for 2-3 months at 50C with 85-90% relative humidity and 1 week under room temperature.

Plant Protection Measures Diseases

Fruit Rot: Spraying trees with young fruits using captan (0.2%) or Bordeaux mixture (1.0%) or copper oxy chloride (0.25%) at interval of three weeks during the months of jan-feb & March.



Dieback: Pruning of infected twigs followed by spraying with Carbendazim (0.1%) or Thiophenate methyl (0.2 %) or Chlorothalonil (0.2%) have been recommended.

Phytophthora Fruit Rot: Spraying with Benomyl @ 1g/lit completely controls the disease.



Pests

Brown Weevil: Destroying fallen fruits and buds, collection and destruction of grubs and adults and spraying the trees with monocrotophos (0.035 %).

Shoot And Fruit Borer: Spray monocrotophos 36 WSC 2ml/ litre or carbaryl 50 WP 0.1 %, 4gms or copper oxychloride at 0.25 % to check if there is fruit rot incidence.

Conclusion

Considering the easy availability of *Artocarpus heterophyllus* in our country and that almost all the parts of the plant, including wood & latex possess curative properties, it seems that still there is a scope for scientific studies to fully exploit its medicinal

properties to support the traditional claims as well as, exploring some new and promising 'leads'. This review is an effort to compile all major information on its phytochemical as well as pharmacological profile published till now

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