



Breadfruit: A POTENTIAL SUPERFOOD TO COMBAT WORLD HUNGER

Durga Prasad Moharana^{1*}, Anand K. Singh¹, D. R. Bhardwaj² and K. K. Gautam²

¹Department of Horticulture, I.Ag.Scs., Banaras Hindu University, Varanasi-221 005, UP, India, ²ICAR-Indian Institute of Vegetable Research, Varanasi-221 305, UP, India

*Corresponding Author's Email: dpmhort03@gmail.com

Abstract

About 80% of the hungry population of the globe resides in the tropical and subtropical regions, the areas that are very much suited for growing of breadfruit trees. Due to its richness in carbohydrate and fibre content, breadfruit has acquired its so called name. Breadfruit trees have a great prospective with respect to the food as well as nutritional security along with reforesting the barren lands. As revealed from the ethnobotanical studies, breadfruit has been utilized by various cultures and civilizations of Pacific regions for their survival for thousands of years.

Key words: Breadfruit, malnutrition, reforestation, multipurpose tree

Introduction

Breadfruit [*Artocarpus altilis*, 2n=56 (seeded), 81 (seedless)] of Mulberry family i.e., Moraceae, is one of the highest yielding trees of tropical region, producing about 200 or more football sized fruits per tree per season. Although it is one of major crop in most parts of the Pacific but still not promoted fully and considered as an underutilized crop especially in Asian countries.

Uses

Breadfruit has got multiple utilities. Both fruits as well as seeds are used for human consumption after cooking while can also be used as livestock feed in uncooked form. The tree acts as an important shade tree and offers support for crops like yam. The timber can be utilized for building houses, furniture, and for firewood purpose. The large leaves (over 30 cm long) that are leathery in nature can be used to cover the earthen pots, cooking pots, to wrap food, or even as fans. Various parts of the bread fruit tree are used for medicine. Latex excreted from all plant parts can be used for boat caulking.

Origin and Distribution

Breadfruit is a descendent of breadnut (*Artocarpus camansi*). The tree is native to the western Pacific islands and Malay Peninsula with New Guinea and associated islands being the centre of diversity for wild seeded forms of *Artocarpus altilis*.

Botany and Taxonomy

Breadfruit trees are evergreen in nature and attain the heights of about 15 to 20 metres. In appearance, bark is smooth and light coloured and the trunk may be as large as 1.2 m in diameter. The trees are highly branched, a feature that distinguishes them from those of breadnut that produce fewer branches. The thick leaves are leathery with a dark-green upper side which is often glossy. The underside is dull with an elevated midrib and main veins. (Jones *et al* 2011). The fruit i.e., syncarp is a highly specialized structure comprising of 1500-2000 flowers attached to the fruit axis or core. Fruits are globose to oblong in shape and

range from 12 to 20 cm in width and about 12 cm in length. The rind colour is light green, yellowish-green, or yellow at maturity and the flesh colour is creamy white or pale yellow.

Reproductive Biology

Breadfruit trees are monoecious in nature viz., staminate and pistillate flowers are present on the same tree separately. Male inflorescence originates first followed by female inflorescences. Pollen is shed about 10 to 15 days after the emergence of the male inflorescence for a period of about 4 days. Pistillate flowers are receptive after 3 days of the emergence of the female inflorescence from the bracts and open in sequential stages with basal flowers opening first. Breadfruit is cross pollinated with other members of this genus.

Soils and Climate

Breadfruit can be grown in a wide range of soil. It is found to be grown effectively in deep, fertile, well-drained soil, sandy coral soil, in freshwater swamps and even in salt-tolerant soils too. Under hot i.e., 21⁰C-30⁰C and wet climatic conditions, breadfruits are found to be grown efficiently. The trees thrive well in the areas receiving annual rainfall of about 1500-3000 mm that should well distributed throughout the year. Light is an important factor for obtaining good growth. Young trees, grown in partial shade, are less prone to wilting and stunting as the large leaves lead to heavy moisture loss. In order to avoid the older trees to be too tall quickly with few low branches, they should be grown in full sunlight.

Spacing

The recommended spacing is of 12-14 m, although less distance as close as 10 m or less than that can be practiced. Approximately 100 trees can be planted per hectare if spaced at 12 m x 8 m or 10 m x 10 m apart.

Propagation

In general, breadfruit is propagated through vegetative means. Root cuttings or shoots are traditionally are used for propagation. The roots grow at the ground surface level or slightly below and will often produce a shoot, exclusively if it is cut or damaged. Pacific islanders and others intentionally wound roots with the intention to induce shoot production. When the shoot is reaches a height of 0.5-0.75 m and has developed its own root system, it is discarded by cutting the root about 10-15 cm on either side of the shoot. Attention is given to avoid any damage to the new root system, and the top of the shoot is generally removed before planting. The shoot is the planted in a hole containing well decomposed organic materials. Root cutting is an important method for propagation for trees having not any root shoots. The time of collection of roots is the most important factor for successful propagation (Jones *et al* 2013).It is recommended to collect roots during the dormant season when the roots have highest carbohydrate storage. The dormant season begins immediately after the ripening of the crop and lasts for about 2-3 months. Roots having diameter of 1.5-6.0 cm are cut into sections varying from 12 to 30 cm long. These cut roots are then placed in clean, washed sand or potting media and kept moist to boost up the rooting. The roots can either be placed horizontally below the medium's surface or diagonally with the upper few centimeters exposed to the air. The rooting percentage ranges from 80 to 85% and in about 3-5 months, cuttings become ready enough to be transplanted from the propagating bed. Although these traditional methods of propagation are easy and effective but are relatively slow. To provide faster results, many experiments have been carried out utilizing vegetative material other than

that of roots. Breadfruit can be successfully propagated by inarching and budding using other *Artocarpus* species, such as jackfruit as root stocks and also through air layering (Ragone 2006).

Water Requirement

Planting should be set out at the onset of monsoon and supplementary irrigation may be provided for successful establishment of the trees.

Pruning

Pruning is not that much essential but being a tree with dense foliage, cross pruning of its branches will facilitate the easy air movement and light penetration.

Insect Pests and Diseases

Being a hardy tree, breadfruit is comparatively less infested with diseases and pests. Still insect pests like scale insects, mealy bugs, *etc.* and diseases like *Cercospora* leaf spot, *etc.* can be noticed. In Malaysia, root knot nematode (*Meloidogyne* sp.) has been identified as a severe problem and results in retarded plant growth, sparse branching, yellowing of the leaves, and very poor root development. Fruits can be infested with rot caused by *Phytophthora*, *Colletotrichum*, and *Rhizopus* but these can be controlled by prompt harvest of mature fruits and discarding of diseased fruits.

Harvesting

Breadfruits are harvested at maturity but prior to ripening. Breadfruits are usually harvested with a sharp scythe or curved knife attached to the end of a long pole and should be restricted to fall on ground to avoid damage and softening.

Yield

It is very difficult to accurately assess the yield on a per unit basis from yields of individual trees. Tentatively estimated yield is found to be 700 fruits per tree per year, each weighing about 1- 4 kg on an average.

Conclusion

Breadfruit has got an enormous potential to combat with the ever increasing hunger in the world. It not only provides health and environmental benefits but also offers economic opportunities accompanying with a handsome contribution towards the diversified sustainable agriculture.

References

- Jones A.M.P., D. Ragone, N.G. Tavana, D.W. Bernotas, and S.J. Murch. (2011).** Beyond the Bounty: Breadfruit (*Artocarpus altilis*) for food security and novel foods in the 21st Century. *Ethnobotany Research and Applications*, **9**: 129-149.
- Jones, A.M.P., S.J. Murch, J. Wiseman and D. Ragone. (2013).** Morphological diversity in breadfruit (*Artocarpus*, Moraceae): insights into domestication, conservation, and cultivar identification. *Genetic Resources and Crop Evolution*, **60**(1): 175-192.
- Ragone, D. (2006).** *Artocarpus altilis* (breadfruit), ver. 2.1. In: Elevitch, C.R. (ed.). Species Profiles for Pacific Island Agroforestry. Permanent Agriculture Resources (PAR), Holualoa, Hawaii.