

Lakoocha: A Multipurpose Tree of Warm Climate

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INTRODUCTION

Artocarpus lakoocha Roxb., Moraceae, is a valuable tropical tree species native to India and used for fruit, furniture, timber, and feed. The lakoocha fruits are generally eaten fresh. Each fruit contains 20–30 seeds that are fleshy with thin seed coat. The edible fruit pulp is believed to act as a tonic for the liver. Raw fruits and male flower spike (acidic and astringent) are utilized in pickles and chutney (sauce). The lakoocha tree is also valued for feed and timber. The hardwood sold as *lakuch*, is comparable to famous teak wood. Lakuch which is durable outdoors as well as under water, is used for construction, furniture, boat making, and cabinet work. Tree bark containing 8.5% tannin is chewed like betel nut, and is also used to treat skin ailments. It yields a durable fiber good for cordage. The wood and roots yield a lavish color dye. Lakoocha seeds and milky latex are purgative. Seeds contain artocarpins (ALA I and ALA II), the isolectins which exhibit high haemagglutination activity (Wongkham 1995). However, the agglutinin (ALA) from *Artocarpus lakoocha* is not organ specific. Moreover, the haemagglutination activity of ALA was demonstrated in various organs of the plant except fruit flesh. The highest and the lowest activities were found in the seeds (14,400 units/g fwt) and leaves (5 units/g fwt), respectively.

BOTANY AND DISTRIBUTION

The genus *Artocarpus*, Moraceae, which consists of jackfruit (*Artocarpus heterophyllus*), lakoocha or monkey jack (*A. lakoocha*), chempedak (*A. integer*), breadfruit or breadnut (*A. altilis*), and marang (*A. odoratissima*), comprises over 50 distinct species of monoecious evergreen trees (Drew 1997). Compound fruits are derived from swollen flower heads. *Artocarpus* species display high levels of genetic variability, both between and within species. This is evident from the wide range of locally distributed *Artocarpus* genotypes. Breadfruit cultivars are triploid and seedless. Lakoocha seedling trees take five years to come into bearing. The orange-yellow male flowers and reddish female flowers of lakoocha are borne separately on the same trees. Fruits are nearly round or irregular, from 5 to 12 cm in diameter and have a velvety surface (Fig. 1). The lakoocha fruits are dull-yellow with pink tinge and sweet-sour pulp. Fruit yield can be up to 80 kg/tree with fruit weight ranging from 200 to 350 g.

The lakoocha is popularly known as “monkey jack” or “*lakuchi*” in India, “*badahar*” in Nepal, “*tampang*” in Malaya, and “*lokhat*” in Thailand. A native of the humid sub-Himalayan regions of India, it grows up to 1,200 m altitude. The lakoocha trees grow 6 to 9 m tall with large, leathery and deciduous leaves (Fig. 2).

PROPAGATION

There are a number of Important problems associated with regeneration and propagation of lakoocha: (1) tree population of lakoocha is gradually decreasing due to poor seed viability and extensive exploitation for food, timber, and other uses; (2) seeds, once extracted from the fruit, quickly loose viability within

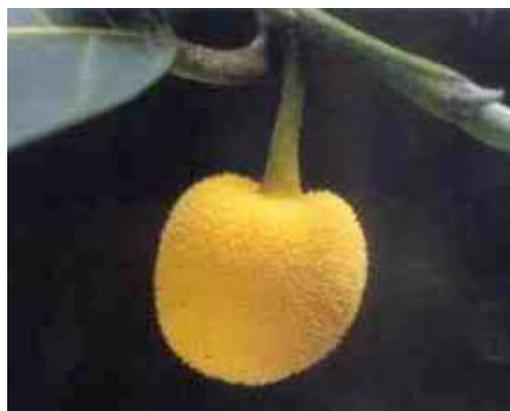


Fig. 1. A developing fruit (60%) of *Artocarpus lakoocha*.



Fig. 2. A mature tree of *Artocarpus lakoocha*.

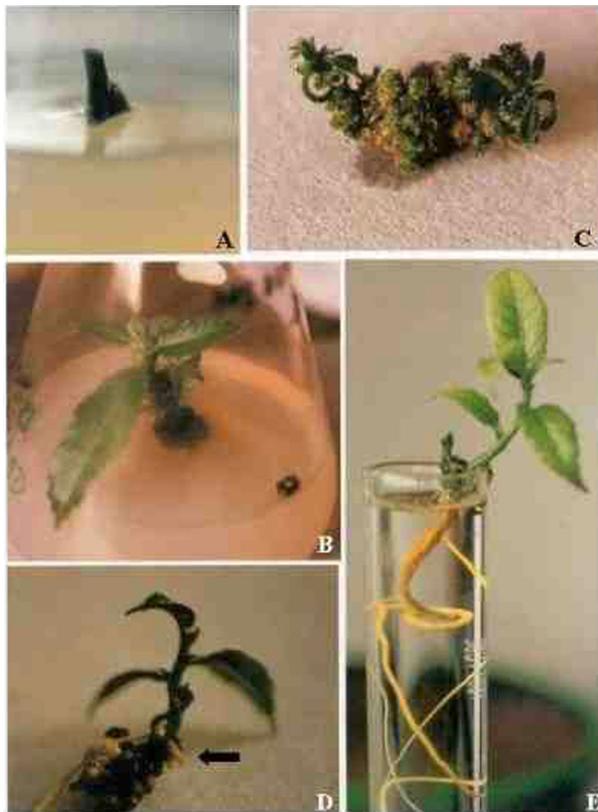


Fig. 3. Sequential stages in the complete in vitro regeneration of lakoocha plantlets. A. Nodal explant. B. Elongation of axillary bud in nodal explant. C. Shoot tip producing callus and numerous shoot bud primordia. D. Elongated shoots initiate rooting in the induction medium, arrow points to a root. E. Complete plantlet developed with well defined shoot and root at the end of 4–5 months in culture.

a week, or sometimes even in few days; and (3) vegetative propagation methods such as rooting of hardwood or softwood stem cuttings have not been successful (Napier and Robbins 1989).

Protocols were developed for micropropagation of lakoocha seedlings. Lakoocha fruits were collected just before maturity and stored at 4°C. Fruits were washed under running tap water for 1 hr, then washed with detergent and rinsed 3 times with sterile distilled water. Fruits were dipped in 70% ethanol for 1 min, air dried and flamed to evaporate ethanol. Following this, fruits were cut open to remove seeds. Air dried seeds were germinated on sterile sand and slanted agar in test tubes. Germination medium contained 0.8% agar and 0.5% sucrose with pH adjusted to 5.7–5.8. Six-week-old seedlings were utilized to prepare leaf disc, nodal segment, and shoot tip explants.

Aseptic cultures using leaf discs, nodal segments and shoot tip explants were initiated on MS basal medium containing NAA and BA alone and in combination along with a control without growth regulators. Leaf discs did not show any response in different media. Nodal and shoot tip explants (Figs. 3A, C) initiated calli at cut ends. Shoot tips were more responsive and highly prolific in initiating shoot buds. Optimum results for multiple shoot induction were obtained with MS supplemented with 1.0 to 2.0 mg L⁻¹ BA. Rooting was observed in 2 to 3 weeks in MS medium supplemented with 2.0 mg L⁻¹ IBA (Fig. 3D).

CONCLUSIONS

In vitro micropropagation protocol for rapid multiplication of lakoocha is required to maintain an adequate supply of plants to establish new plantations and to conserve desirable genotypes. It is also considered important to develop somatic embryogenesis protocols for in vitro regeneration to enhance genetic improvement of desirable lakoocha genotypes.

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