

Post-Harvest Management Practices and Policy Issues for Promoting Dragon Fruit Production in India

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In India consumes largely fresh dragon fruit than the processed products. Hence, focus should be on standardizing post-harvest management practices for fresh dragon fruits. Four major physiological disorders namely chilling injury, mechanical injury, animal injury, and water loss reduces the shelf-life of fresh dragon fruit drastically if timely care is neglected. Diseases of bacterial (*Xanthomonas campestris*) and fungal (*Dothiorella* spp.) origin affect the storage quality of fresh dragon fruits. Hence, disease management should be controlled in the fields and during the postharvest handling stage. In addition to short shelf-life at ambient conditions; variable fruit size & unique taste of dragon fruit are the key factors to be considered for efficient post-harvest management practices viz., precooling, vapour heat treatment for diseases control, controlled atmospheric storage facility, modified atmospheric packaging (MAP) and use of corrugated boxes for transportation to minimize the yield losses. During glut production, different value-added products viz., jam, jelly, cosmetics in addition to edible colours from the skin and flesh-pulp of dragon fruit can be prepared. Overall, practices that facilitate maintenance of better quality, higher prices, larger markets, constant supply can enhance income of farmers; standardised post-harvest management can effectively address following components of value chain which are often found weaker at Indian scenario for different vegetables and fruits including dragon fruit.

- Size, color, and TSS-based quality and maturity indices must be standardized.
- Inadequate facilities for packing, shipping, and pre-cooling.
- Lack of controlled storage facility to prevent the chilling injury, ethylene production, respiration rate, optimum temperature for enhancing shelf life of fresh fruits.
- Dragon fruits are fly host and can be disinfected through irradiation treatment.
- Absence of uniform packaging materials such as corrugated boxes, polypropylene, HDPE, etc.
- Encouraging small-scale businesses to use dragon fruit as a rich source of essential nutrients, such as fiber, calcium, vitamin B,

vitamin C, and phosphorus. Many value-added products can be made from the fruit, especially in the months of June through November when surplus production is occurring.

- Lack of round the year supply of dragon fruits for continuous operation of processing plant.
- Lack of knowledge on value added products for long-term use.
- Poor marketing infrastructure and network.
- Lack of research, market and policy guidelines for post-harvest management of dragon fruit.



Fig. 1 Post-harvest management practices (grading and packaging) in India

Post-harvest management and marketing:

1. Losses in dragon fruit after harvest. Enhancing varieties appropriate for processing, adding value, and marketing dragon fruit should be the main focus.
2. Creation of a database containing information on producers, business owners, and related scientists in order to facilitate joint research and development aimed at popularizing the dragon fruit.
3. It is crucial to conduct research on developing infrastructure and implementing aggressive marketing strategies.

Policy issues for promoting dragon fruit in India

1. Since dragon fruit is a relatively new crop in India, a national policy framework must be developed in order to popularize the fruit in various agro-ecological regions. State and federal governments, as

well as public and private funding organizations, should work closely together to promote dragon fruit for both medical and economic purposes, particularly in degraded and desert areas.

2. Standardization of a region-specific bundle of farming, harvesting, and post-harvest procedures to enable year-round dragon fruit production.

3. Increasing research and technical assistance: To increase the income of farmers and popularize dragon fruit in resource-poor dry land areas, a collaborative effort involving scientists, entrepreneurs, progressive growers, and policy makers is necessary. Through research organizations supported by the Indian government, state governments, the private sector, and cooperative bodies, the major researchable issues pertaining to natural resource management technologies, cultural practices, disease management, and the improvement of varieties suitable for processing, processing and value addition, and marketing of dragon fruit must be addressed immediately.

4. Standardization of farming practices, development of nurseries and trellis systems, and licensing of only authorized owners are necessary to guarantee the availability and quality of trellis and sapling materials for farmers at fair costs.

5. A database of the area used for dragon fruit cultivation, crop yield and production, and information about dragon fruit farmers, business owners, and related scientists must be created.

6. Need to develop training module on package of practices for profitable dragon fruit farming and entrepreneurship.

7. It is necessary to create a center of excellence for growing dragon fruit and fostering entrepreneurship. The center's dissemination of information, education, and communication (IEC) resources as a component of extension initiatives is another goal.

8. Providing soft loans and subsidies, among other financial supports, in the form of bank loans and cooperative organization subsidies, to marginal or small-scale farmers for their dragon fruit farming. Given that the initial capital investment for dragon fruit production is approximately INR 6.5–7.5 lakhs per hectare, financial help is very necessary.

9. Due to the constant influence of cultural requirements, harvesting stages, intrinsic product features, ambient environment, transportation needs,

and storage requirements, post-harvest management is becoming a crucial factor in the successful marketing of dragon fruit. Since perishable fruits are typically consumed fresh and have a short shelf life, post-harvest losses should be kept to a minimum. Consequently, focus should be placed on developing post-harvest infrastructure, such as a cold chain for storage and transportation, and standardizing post-harvest activities, such as cleaning, grading, and packaging. Small-scale business owners and growers must be encouraged to develop new goods using value-adding technologies in order to supplement their revenue during the dragon fruit glut.

10. Pricing and marketing: Due to the great demand for fruits and the scarcity of commercial farmers, there is currently a guaranteed market in India. The market prices ranged from INR 55–250/kg depending on weight based different grades (A>400 g, B between 200–400 g and C<200 g) prevailing in market. During offseason prices persisted as high as INR 300–400/kg for Indian dragon fruit. Even huge numbers of health-conscious consumers in cities paying up to INR 500–600/kg for dragon fruit imported from Vietnam and Thailand. There are report saying that more than 20,000 MT of dragon fruits are being imported into India from Vietnam, Thailand and China every year. Apart from it demand for dragon fruit in rural areas is also increasing, which will give it a wide market reach. It is predicted that production and area under dragon fruit will rise drastically; hence marketing strategies need to be critically examined including fixation of minimal support price. There is also need of developing marketing infrastructures and quality standards in view of exploring potential of future export.

11. Import tactics Indian dragon fruit growers firmly believe that unrestricted imports from nations like Vietnam and Thailand cause the largest market problems since they coincide with seasonal surplus output from India, which eventually drives down prices and causes farmers' losses. Therefore, strict quality control measures for imported dragon fruit are required to safeguard the interests of Indian growers.

12. Agrotourism Similar to other nations, India must determine the best locations for dragon fruit cultivation in arid regions, such as Gujarat's Kutch, which has the capacity to draw a constant flow of visitors and outdoor enthusiasts and so increase agricultural tourism there.

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