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Advances in Storage of Stone Fruits

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Stone fruits are considered a crucial component of a healthy and balanced diet. They are an excellent source of dietary fiber, antioxidants, vitamins, and carbohydrates. The name "stone fruits" comes from the pit or "stone" at their center, which is surrounded by a fleshy outer layer. These fruits are often referred to as drupes. Stone fruits, such as peaches, nectarines, plums, cherries, and apricots, are characterized by thin skins that can be either fuzzy or smooth. Due to their high perishability, especially during the post-harvest phase, where they are susceptible to microbiological diseases, disorders, transpiration, and senescence, stone fruits require protection from spoilage during storage and cannot be stored at room temperature for long periods.

India is the world's second-largest producer of fruits and vegetables, following China. The country's position in the Global Hunger Index 2021 has declined to 101 from 94 in the 2020 index, out of 116 countries. In India, the issue lies not in food scarcity but in the unequal distribution and significant loss and wastage of food. According to the National Horticulture Database (Second Advance Estimates) published by the National Horticulture Board, India produced 99.07 million metric tonnes of fruits from 6.66 million hectares during 2019-20.

A significant amount of agricultural produce is lost during various handling and marketing stages. According to an unpublished national-level study conducted by AICRP on PHT, ICAR, approximately 13% of the produce is lost during farm handling operations such as harvesting, sorting, grading, and packing. Additionally, about 6% is lost during farm storage, and around 12% is lost during storage at godowns, wholesale, and retail levels. It is worth noting that, on average, approximately one third of horticultural produce never makes it to the end consumer. This creates a significant disparity between total food production and actual availability. Both qualitative and quantitative losses occur in horticultural goods from harvest to consumption. Qualitative losses, such as reduced edibility, nutritional quality, caloric value, and consumer acceptability of fresh produce, are more challenging to evaluate than quantitative losses. Different committees in India have estimated quantitative post-harvest losses to range between 25-33% depending on the crop. These losses can only be minimized through proper handling, marketing, and processing of agricultural goods.

To effectively manage these losses, it's imperative to transition from traditional storage methods to advanced storage solutions. This shift provides various cutting-edge technologies that optimize product quality by controlling factors such as nutrition, water, and light to minimize post-harvest issues and quality degradation. This approach ultimately results in improved quality and extended shelf life for fruits. Key strategies for managing

post-harvest decay, without harming the environment or public health, include the use of plant growth substances and chemicals (such as Polyamines, Melatonin, Calcium nitrate, Salicylic acids, Jasmonic acids, and 1-MCP), physical methods (e.g., High hydrostatic pressure, Pulse pressure, Pulse electric field, and Cold plasma technique), irradiation, edible coating, innovative packaging, and nanotechnology. The latest techniques to prolong the shelf-life of fruits are based on various principles. For instance, the use of polyamines aids in maintaining fruit weight and firmness (Kibar et al., 2021). Additionally, sodium nitroprusside enhances chilling tolerance and reduces ethylene production (Saba et al., 2017), while methyl jasmonic acid helps control internal breakdown (Ezzat, 2020). Moreover, the application of edible coatings like CMC, gum arabica, and others, contributes to the retention of total phenolics, ascorbic acid, and other key quality parameters for extended storage (Jayarajan and Sharma, 2020). Ionizing techniques, such as gamma radiation, help fruits retain firmness and reduce weight loss (Parveen et al., 2015). Implementing these advanced techniques could greatly improve post-harvest loss control.