

An international team of researchers has developed nanotech packing to extend the shelf life of highly perishable mangoes and reduce post-harvest losses, particularly in the South Asian fruit sector. 

Developed by Canadian, Indian and Sri Lankan researchers in a collaborative project funded by the International Development Research Centre (IDRC), the nanotech mango boxes are said to improve the fruit's resilience and therefore boost quality over long shipping distances.

The project - which also includes the Tamil Nadu Agricultural University, India and the Industrial Technical Institute, Sri Lanka - has tested the use of the bio-compound hexanal, an artificially synthesized version of a natural substance produced by injured plants to reduce post-harvest losses.

Through several field tests in Indian mango orchards, scientists found that spraying a small concentration of hexanal delays ripening by an extra three weeks.

The extra time gives producers the chance to earn up to 15% more for their crops by staggering market access and receive optimum prices for produce, while also allowing them to reach previously unavailable lucrative export markets.

After harvest, mangoes can be sprayed with hexanal giving them a much longer shelf life of 26 days in cold storage and 17 days at room temperature, according to the IDRC report.

Following the discovery, special boxes have been designed which contain hexanal-impregnated banana fibers to retain the fruit's quality for longer.

### **The role of nanotechnology in farm to fork improvements in India**

The nanotech boxes could be particularly significant for India as a world leader in mango production, as well as Sri Lanka where approximately 90,000 metric tons (MT) are produced annually.

The IDRC report says although South Asian fruit production is globally competitive, the region only meets around half of its demand due to poor processing and preservation facilities. Waste can be as high as 35% and amounts to billions of dollars in annual losses.

Historically, the Indian mango sector has suffered severe post-harvest losses due to the lack of cold chain supply infrastructure across the country, and developing a smart packing system like nanotech boxes could therefore be one way to address such challenges.

"Special boxes have been designed to reduce losses during transport. The boxes are sturdy, and can be stacked without risking damage to the fruit, and this alone can reduce post-harvest losses by 10-15%," the IDRC report continues.

"In order to further improve the storage life of fruits during transport, the project has made a pioneering attempt to develop 'nano-matrices' using banana fibers to regulate the release of hexanal.

"In Sri Lanka, the research team has devised a system whereby wax-coated mangoes are packed in hexanal impregnated-fiber paper. This has been found to extend storage life of mangoes from just four days to 21 days, enabling long distance transport."

The report concludes that despite the fact that hexanal formulation was found to be effective, its storage life is only six to eight hours which means there needs to be further studies to produce a 'ready-to-use' formula.

"Since hexanal is a volatile compound, incorporating it within packing material may facilitate regulated release and help to reduce fruit losses during storage and transport, which will need to be investigated extensively during the scale up project, in order for the technology to be commercialised," the report said.

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