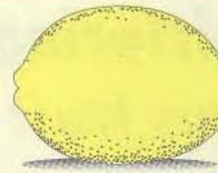
Storage of *kinnow fruits*

Limited shelf-life of the fruit leads to the problem of decay and reduced juice content. Prolonging the storage life of kinnow (***Citrus reticulata* Blanco**) can help transportation of fruits to long distance metropolitan cities, even during hot summer months, when citrus fruits are in great demand. Storage life of the fruit has been extended using chemical treatment, waxing, coating and controlled atmosphere storage, but success has been limited.

Raghav and Gupta at Punjab Agricultural University, Ludhiana, propose an alternate technique for prolonging the shelf-life of fruits, that will be a boon to farmers, traders as well as exporters. Fresh kinnow fruits harvested from the orchard were washed with chlorinated water and shrink-wrapped individually in polyolefin films. The wrapped and unwrapped fruits were stored at 12-20°C and 63-78% RH. Unwrapped fruits were found unacceptable after two weeks, whereas shrink-wrapped fruits were firm and fresh during storage period. Under ambient conditions, the shelf-life of wrapped fruit was 8 weeks as compared to 2 weeks for unwrapped fruits (Raghav & Gupta, *J Food Sci Technol*, 2000, **37**, 613).

Improving the viability of *mango seeds*

Development of quality seedlings is a pre-requisite to produce good quality mango fruits which in turn depends on the good quality root stalk and ultimately on the viability of the seed. The mango seed due to its recalcitrant nature loses viability within 5 to 8 days of de-pulping. To evaluate the use of locally available techniques for improving the viability of mango seeds, study was undertaken on two cultivars viz., 'Neelum' and 'Goa'. Studies revealed that coating the stones in wood ash and covering them with wet gunny bags retained viability for a maximum period of 10 weeks at room temperature. This technique is superior to storage in mud pots, keeping in saw dust or heaping under shade. The stones stored in ash alone could retain 50 per cent viability for four weeks while those stored in wet gunny bags retained 50 per cent viability for two weeks only (Girija & Srinivasan, *Madras Agric J*, 2000, **87**, 113).



Storing Lemon for a longer time

Reduction of postharvest decay with or without minimal use of synthetic fungicides is one of the long standing goals of citrus industry. In citrus fruits, the green and blue moulds, caused by *Penicillium digitatum* and *P. italicum*, respectively are the main causal agents of postharvest decay. Both pathogens require wounds to enable them to penetrate the fruit through the exocarp.

A hot-water dip for 2 min. at 52-53°C prevented decay for at least one week in lemon fruits inoculated with ***Penicillium digitatum***. The hot water dip had a transient inhibitory effect on the pathogen, arresting growth for 24-48 hours. During this lag period the combined effects of the pathogen and the hot- water dip induced the build-up of resistance in the peel.

The presence of lignin in plant tissue increases resistance to infections as lignins serve as a strong mechanical barrier against pathogen invasion. Lignin production in the inoculated sites began within 24 hours after inoculation or wounding. When inoculation was followed by the hot-water dip, lignin accumulation continued for a week. Inoculated lemons that were not dipped in hot water rotted completely within 3 days after inoculation and their lignin content did not rise or even decreased (Nafussi *et al*, *J Agric Food Chem*, 2001, **49**, 107).

Debittering *Citrus fruit juice*

A strain of ***Aspergillus terreus*** (a fungus) secretes α-L-rhamnosidase enzyme in liquid culture medium. The enzyme hydrolyses naringin present in orange fruit juice and hence it is suitable for debittering these juices.

Naringin (4',5,7-trihydroxy flavanone-7-rhamnoglucoside) is the main bitter component of citrus fruit juice. The α-L- rhamnosidase splits naringin in to rhamnose and prunin(4'-5-7-trihydroxy flavanone-7-glucoside) which is further hydrolysed by β-glucosidase to naringenin (4'-,5,7-trihydroxy flavanone) and glucose. Bitterness of prunin is only one-third of that of naringin (Yadav & Yadav, *J Sci Indusr Res*, 2000, **59**, 1032).

Shine and preserve Citrus fruits at cheaper rates

The shine that helps fruits glisten may soon be the only most visible manifestation of a more natural way to preserve fruits. New fruit coatings are being made from reformulated shellac and sucrose ester, a compound derived from combining sugar with a fatty acid. Shellac (refined lac) is a varnish made with alcohol that gives a smooth shiny appearance to wood, metal or the like.

These natural product coatings help to maintain quality and flavour by promoting the growth of beneficial bacterial and yeast populations naturally present on the fruit. The chemicals commonly used to preserve harvested fruit are relatively costly and have been found to kill beneficial microorganisms [*Agric Res*, 2000, **48**(8), 23].

Checking possible adulteration in *orange juice*

All fruit juices have very distinct organic acid profiles which can be used as fingerprints for checking possible adulteration. A large quantity of orange juice is consumed in the world but fraudulence related to adulteration is enormous therefore, it is necessary to detect this practice. Some of the adulterants commonly used are sugar solution, citric acid, colorants, tartaric acid, etc. In a recent study on Spanish oranges in Spain a capillary electrophoresis method has been developed for determining citric, isocitric, tartaric and malic acids in commercial orange juices. In this process sample preparation requires only dilution and filtration (Saavedra *et al*, *J Agric Food Chem*, 2001, **49**, 9).

A tomato-like fruit *Tamarillo*

In India new promising fruit called Tree-Tomato or Tamarillo (***Cyphomandra betacea*** **Sendt.**) is grown at altitudes ranging from 800-2000m in Shillong, West Bengal, Maharashtra, and parts of India where climate is more cooler, humid and receive more rains. It requires citrus like climate. The plant is a native to South America, grown for its edible fruits. It is also found very commonly in other countries like New Zealand, South Africa, Hong Kong, China, Australia, Jamaica, Kenya, New Guinea, etc.

The plant is 1-5 m in height and at 2 m of its trunk forms a spreading crown; leaves simple, 20-40 cm long and 20-35 cm wide; flowers in the cluster 10-50 have pink-white corolla and are fragrant; fruits contain many seeds which are larger than those of the tomato. The plant is propagated by seeds or cuttings and it is a fast- growing tree. The tree starts producing fruit in the first or second year. In New Zealand and California 'Goldmine', 'Inca Gold', 'Orata Red', 'Solid Gold', 'Red Beam', Rothamer','Ruby Red' etc are famous for cultivation. In New Zealand commercial yield reach 15-17 tonnes/ha. Tamarillo flowers and sets fruit throughout the year and ripen in autumn or winter. Artificial ripening is also done with ethylene so fruits are available in all seasons. The shelf- life of the fruit is about 12-14 weeks at 3.5 to 4.5°C. Taxonomically it is very closely related to the genus **Solanum Linn**. Tamarillo name is given due to its resemblance with Tomato.

The Tamarillo fruits are juicy with a characteristic acidic taste; it is consumed in many ways such as eaten raw, as a dessert fruit, in salad as an appetizer or prepared in a number of other ways. Prior to use, the exocarp and the internal part of the mesocarp is removed as they have a bitter taste. The fruits contain ascorbic acid 338 mg/100g, carotenoids, 92.1μg/g and pectic substances, 2.29%. The acids found are: citric, 87, malic, 5.0; and galacturonic acid, 7.6%. The fruits can be stewed and made in to jam or jelly. The leaves are reported to contain an alkaloid solasodine (0.01%) [Prohens & Nuez, *Small Fruits Review*, 2000, **1**(2), 43; Wealth of India, suppl 2, 2001, 338].