



Prevent kinnow produce from post harvest disorders and diseases

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Citrus occupies a place of considerable importance in the fruit economy of the country and mandarin is the most important citrus cultivar. The introduction of Kinnow (King mandarin × Willow leaf mandarin) mandarin in arid-irrigated and mountainous region of North-Western India, especially Punjab, has witnessed unpredicted response to extending area and increasing demand of this fruit in the markets of North India.

It is a well known fact that horticultural produce is highly perishable. Post harvest losses in fruits are estimated between 10 to 40%. These losses are largely due to post harvest physiological disorders and diseases caused due to poor management practices. Understanding the actual causes and its methods of prevention may help to reduce these losses. This article is written with a view to acquaint the fruit growers with the pre-hand information for preventing the post harvest losses.

Physiological disorders: The physiological disorders influence the quality of fruits and consequently its marketing. These disorders may result due to pre harvest as well as post harvest factors. The post harvest factors viz., temperature, humidity, mechanical stress and ageing induce various physiological disorders. The most important physiological disorders are Oleocellosis, styler end breakdown and chilling injury.

Oleocellosis : The oil in the oil glands and in the flavedo are toxic to the surrounding living cells and may cause oleocellosis. Rupture of the oil glands result in necrosis of the adjacent epidermis inducing formation of irregularly shaped yellow, green or brown spots in which the oil glands of the skin stand predominant because of slight sinking of the various tissues between them. Harvesting in early morning or when dew is on the fruit should be avoided in

order to prevent this kind of malady. Oil spotting can also be prevented or reduced by picking the fruits when the surface is completely dry.

Stem end Rind breakdown: Stem end rind breakdown is the collapse and subsequent darkening of the rind around the stem end of mandarins. A narrow band rind around the stem usually remains undamaged. The collapse of the tissue is due to loss of excess of moisture from the rind. This loss can be reduced by irrigating prior to harvest during dry weather and by waxing of the fruits.

Chilling injury: Mandarins are sensitive to chilling temperatures and develop chilling injury in chilled storage and transit. Symptoms of chilling injury are pitting, discoloured patches, superficial brown staining of rind, browning of albedo and watery breakdown. The incidence of chilling injury can be overcome by waxing and film wrapping.

Post harvest diseases : Pathological diseases of citrus fruits are responsible for major losses of the crop during marketing. Certain post harvest diseases are initiated by infection of the fruit during growing period whereas other diseases originate in injuries which are created during harvest and their subsequent handling. Some of the important post harvest diseases are listed below.

Stem-end-rot: The stem end rot incited by *Diplodia natalensis* and *Phomopsis citri* is the principal post harvest disease of citrus fruits. The symptoms are more pronounced in the fruits harvested from older trees having more dead twigs and branches as compared to younger ones. The spores of *Diplodia* and *Phomopsis* develop saprophytically on the dead bark of the trees and they are splashed by rain onto developing fruits where they initiate as incipient infection in the button of the fruit. These do



not attack the button of the fruit during the period of growth of the fruit but survive in a quiescent stage. After harvest the button of the fruit begins to lose vitality and ultimately separates from the fruit at a preformed abscission zone. These fungi resume active growth and give rise to typical symptoms on the fruit.

The decay begins as water soaked spots at the stem end of the fruit that turn brown and continue to spread down the rind. The infected tissue sinks and a clear line of separation is formed between the diseased and healthy rind. The decay proceeds either down the rind or unevenly producing finger like projections of brown tissue

Green mould : This is the most important post harvest disease of mandarins. The initial symptoms appear as soft watery, slightly discoloured spots on the rind. Later the spot enlarges to a diameter of about 2.5 cm. Olive green spores are produced inside a zone of white fungal growth and softened rind tissue.

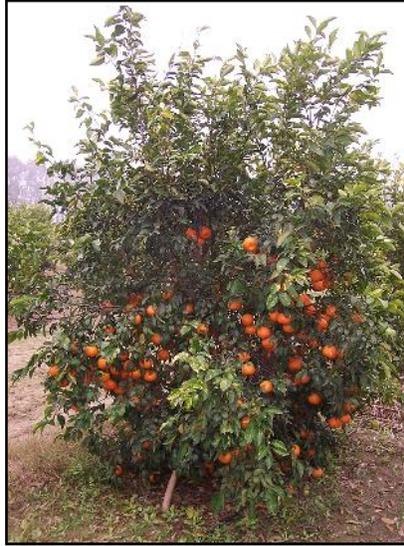
Blue mould: This disease incited by *Penicillium italicum* is of less importance but may become a major problem under conditions which suppress the development of green mould. Blue mould is initiated in the same pattern as green mould. Green mould overgrows blue mould in a mixed infection on fruits at room

temperature.

Pruning of dead wood from the trees and destroying, fallen fruits on the ground have been recommended as practices which reduce the inoculums caused by *Penicillium* and *Diplodia*. Spraying the fruit in the grove protects against infection by these two pathogens but it is not an efficient method because spores are disseminated throughout the growing season and the button of the fruit is continuously susceptible to infection. Mechanical injuries to the peel created during harvest and handling of the fruit are the principal sites of infection by the pathogens. Careful picking to minimize injury to the fruit is recommended to reduce post harvest damages.

The proper stage of maturity is the prime factor for harvesting of kinnow fruits for storage in order to avoid all the above said maladies. Fruits harvested too early or late in the season do not store well. Harvesting during early hours of the day, when there is dew on the fruits or immediately after rainfall should be

avoided. The spoilage due to post harvest diseases can be reduced by dipping of kinnow fruits in 125 ppm Benlate for one minute, drying them in air followed by wrapping in 100 gauge perforated bags.



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