

Harvest Maturity Indices

The most commonly used guide of orange harvest maturity is peel colour. Fruit are considered mature if they have a yellow-orange colour on 25% or more of the fruit surface.

Internal fruit quality signs of harvest maturity include soluble solids (SS) content (sugars) and acidity of the juice. The juice should have a SS of 8.5% or higher. SS content is determined by squeezing a few drops of juice on a hand-held refractometer.



Harvest Methods

Oranges should be harvested using a pair of clippers or by carefully twisting and pulling the fruit from the tree so the button remains attached to the fruit. Stems left on the fruit should be cut off because they can puncture other fruit, causing postharvest decay and fruit spoilage.

Never shake the tree to harvest the fruit. Fruit that fall to the ground are likely to be bruised and subject to postharvest decay. The harvested fruit should be carefully put into padded field crates, well-ventilated plastic containers, or picking bags. Picking bags are either strapped around the waist or put over the shoulder and made with a quick-opening bottom. Picking bags are designed to empty from the bottom so that fruit can roll out of the sack onto the bottom of a larger field container or atop fruit already present.

Preparation for Market

Cleaning

Fruit can be cleaned manually by hand rubbing individual fruit dumped in a tank of sanitized water. The wash water should be sanitized with 150 ppm hypochlorous acid (household bleach) maintained at a pH of 6.5. This is equal to 2 oz of household

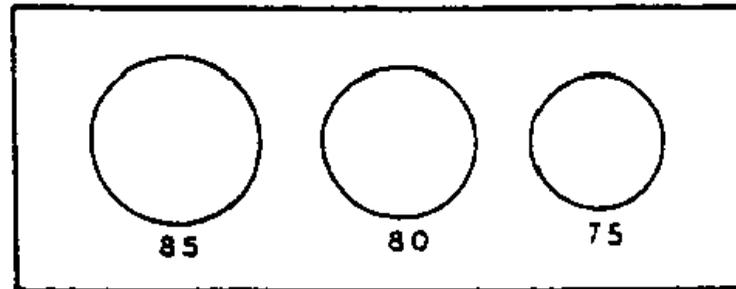
bleach (such as Marvex) per 5 gallons of water, or .3 l of bleach per 100 l of water.

Fruit can also be cleaned mechanically by passing the oranges over a series of roller brushes wetted from above with spray nozzles. Benomyl (500 ppm), imazalil (1000 ppm), or thiabendazole (1000 ppm) are the most effective postharvest fungicides and can be applied as high-pressure sprays after washing. These fungicides can also be applied in water-emulsion wax, at double the concentration. Follow manufacturer's instructions for use.

Grading/Sorting

Oranges should be graded according to size, shape, and colour of the peel, and amount of scarring, insect damage, and decay. This is typically done by hand in small operations, or semi-automatically in larger volume packinghouses as the fruit is passing down a slow moving conveyor.

Only fruit of like sizes should be packed in the same container. The different size categories can be checked by using hand-held rings of different diameters.



Waxing

Most of the natural wax on the peel surface is removed during washing. Waxing the fruit will add shine to the surface, reduce moisture loss, and extend market life. Wax can be applied by manually rubbing it onto the fruit surface or by spraying/dripping it on a bed of slowly rotating horsehair-grade

brushes. Water-emulsion waxes do not require a completely dry fruit surface. Orange waxes are carnauba or shellac based.

Packing

Oranges should be packed in strong well-ventilated containers that can be stacked without collapsing. The most commonly used container for domestic market sales are large sacks often filled with more than 30 kg (66 lb) of fruit. However, they do not provide enough protection against bruise damage and cannot be stacked without causing injury to the fruit. Wooden crates provide much better protection to the fruit. The preferred containers for export marketing are full-telescope fiberboard cartons or wire-bound crates that holds 18 kg (40 lb) of fruit.



Temperature Management

The best postharvest temperature to store oranges is between 2°C to 3°C (36°F to 38°F). Market life at this temperature range will be up to 4 months, depending on maturity stage at harvest. For short-term storage of several weeks and during transit, 10°C (50°F) is adequate. Storage at ambient temperature will result in rapid moisture loss, flavour deterioration, and decay. Oranges may lose up to 10% of the moisture in the peel after 3 weeks at ambient temperature and relative humidity. Oranges should be stored at their optimum relative humidity (RH) of 90% to 95%. At a low RH, the peel becomes thin, dry, and shrivelled.

Peel De-Greening

Oranges can be treated with ethylene to de-green the skin to improve external peel colour. This is especially important for the export market. Ethylene treatment is solely cosmetic and does not alter the flavour of the fruit. The de-greening process involves exposing green-skinned orange fruit to low levels of ethylene (usually between 1 ppm to 10 ppm) at 20°C to 25°C (68°F to 78°F), 90% RH for several days. Good internal air movement is needed so that the air circulates every 2 to 3

minutes. The CO₂ levels inside the treatment chamber should not rise above 2000 ppm. Do not wash the fruit before de-greening.

A liquid ethylene-releasing compound, called ethephon is another de-greening material. It is applied by dipping the fruit in a tank of sanitized water at room temperature with 500 ppm ethephon for 1 minute. This is equal to 6.6 oz of ethephone to 5 gl water or 0.2 l to 19 l of water.

Principal Postharvest Diseases

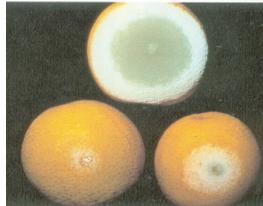
Postharvest decay can be reduced by the use of appropriate pre-harvest and postharvest fungicides, good sanitation of the wash water, and appropriate storage temperature and RH conditions.

Green Mould

Green mould is generally the worst postharvest disease of oranges. The initial symptom appears as a soft, watery, slightly discoloured spot on the rind. After 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

Blue mould decay and symptoms are similar to green mould, except the fungal spores are bluer in colour. Blue mould grows better than green mould below 10°C (50°F). Unlike green mould, blue mould spreads in packed containers.



Stem-end Rot

Stem-end rot is caused by several different fungal species and symptoms vary. 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 shrinks and a clear line of separation is formed between the diseased and healthy rind. The decay proceeds either evenly down the rind (Phomopsis), or unevenly, producing finger-like projections of brown tissue (Diplodia). Stem-end rot can be retarded by postharvest applications of 2,4-

dichlorophenoxy acetic acid (500 ppm), which slow button maturity.

Postharvest Disorders

Oleocellosis (Oil Spotting)

Oil spotting results from damage to the peel that ruptures the oil glands. The extruded oil kills the rind cells, causing them to turn brown and form spots on the fruit surface. Harvesting in the early morning or while dew is on the fruit should be avoided. Oil spotting can be prevented or reduced by picking fruit when the surface is completely dry, waiting to pick 2 or 3 days after a rain, using foam-lined or padded field containers, and having pickers wear cotton gloves.

Stem-end Rind Breakdown (SERB)

SERB is a collapse and subsequent darkening of the rind around the stem end of oranges. A narrow band of rind around the stem usually remains undamaged. The collapse of tissue is due to excessive moisture loss from the rind. The incidence of SERB is reduced by irrigating prior to harvest during dry weather and waxing the fruit.

Technical bulletins also available on Waxing Fruits and Vegetables and De Greening Citrus. Contact:
New Guyana Marketing Corporation (NGMC) 87 Robb & Alexander Sts., Georgetown, Guyana
Tel: 226-8255, 226-2219

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Mon Repos, East Coast Demerara, Guyana
Tel: 220 2950



With the assistance of
The United States Agency for International Development



New Guyana Marketing Corporation

ORANGES

Postharvest Care and Market Preparation Information Sheet



This information sheet provides growers and agriculture extension personnel with a summary of the recommended harvest and postharvest handling practices for oranges. A more technical and detailed bulletin is available from the New Guyana Marketing Corporation (NGMC) and the National Agricultural Research Institute (NARI).