

Stem End Rind Breakdown of Washington Navel Oranges

By Dr Brian Wild (NSW Agriculture, Gosford) 2002

The occurrence of Stem-end Rind Breakdown (SERB) of Washington Navel oranges has been particularly bad this last season. This disorder results from the early aging and desiccation of the rind making it very susceptible to mechanical injury particularly after harvest. Fruit rind in this susceptible condition collapses under the slightest pressure and within 24 to 48 hours of processing and packing a brownish discoloration develops on the surface. This not only results in a downgrading of fruit but in some situations the breakdown is so severe that it opens up avenues for infection by green or blue moulds (*Penicillium digitatum* or *P.italicum*). Rind tissue around the stem-end is generally more susceptible to this pressure however, it can occur on other sections of the fruit.

Research has shown that much of this increased fruit susceptibility to mechanical injury is due to thinning of the cuticular surface waxes around the button area. This loss of protective coating increases the rate of water loss from these cells resulting in their collapse during processing. Research here and in Florida has shown that certain factors are important in regulating the occurrence of this wax thinning. Some of these are as follows:

Age of Fruit

The physiological age of the rind appears to be the most important factor in determining the degree of susceptibility or the fruit to SERB. The rind of over-mature fruit is far more susceptible to this problem than fruit picked early in the season. The incidence of the disorder in susceptible fruit can therefore be reduced by harvesting fruit early; however this often means selling on a poor, low return market. Other factors must therefore be considered.

Lemon Rootstock

It is well documented that Navel oranges grown on rough lemon rootstock are more susceptible than fruit grown on other rootstocks. Oranges from these trees should therefore be harvested earlier than fruit on other rootstocks.

Hot, dry weather before harvest

Because the rind around the button area is susceptible to desiccation, low humidities and high temperatures in the orchard increase the rate of water loss from the surface and therefore aggravate the rind breakdown problem. Water stress at harvest is also regarded as increasing the incidence of SERB.

Storage Conditions and Time Between Harvest and Packing

The rind of fruit: that have been held for 2 to 3 days after harvest, before processing, develop a higher incidence of SERB than fruit processed promptly. Research data from Florida show that by delaying treatment for 3 days after harvest the incidence of SERB was increased from 8% to 53%. It appears that loss of moisture after harvest is the critical factor in determining susceptibility so that by either promptly treating fruit or holding fruit at low temperatures and high humidity after harvest, the incidence of SERB can be reduced. A thorough application of wax to the fruit will also reduce the rate of water loss and therefore help in this regard.

Mineral Nutrition

High nitrogen and low potassium nutrition are reported to increase the susceptibility of fruit rind to the mechanical injury that causes this disorder. This therefore emphasises the need to maintain balanced fertilizer programmes. The usefulness of additional potassium sprays to possibly reduce SERB will require further investigation to determine if a response is obtained under Australian conditions and to determine if this response is worthwhile.

Brushing

Because susceptible fruit are more prone to mechanical injury than normal fruit, any method by which fruit handling can be minimised will reduce the likelihood of the problem. Ensuring that conveyor belts and rollers are clean, free from grit and not moving too fast will also help alleviate the problem.

Fruit Size and Skin Thickness

Research reports from Florida indicate that SERB is prevalent in smaller fruit and in fruit with thin skins. Smaller fruit are possibly more susceptible because their fruit surface would be in contact with brushes and conveyor belts longer than larger fruit, thus again emphasising the importance of careful handling.

Gibberellic Acid

It is well established that preharvest sprays of gibberellic acid will reduce the rate of rind aging. This subsequent reduction in physiological rind age reduces the susceptibility of fruit to SERB. If it is planned to market fruit late it would therefore be good insurance to apply a gibberellic acid spray early in the season.

Photos of Various SERB symptoms

