

of the pickers. Pickers only have to travel a few feet to empty their buckets. The harvest aid then conveys the fruit up an elevator and into the gondolas. Use of this harvest aid can minimize bruising because the most damaging step of emptying the picking buckets into the gondolas is eliminated. When operated properly the harvest aid can virtually eliminate impact bruising which may affect as much as 20 percent of the fruit.

Once the field trucks with the pallet bins or gondolas have been filled, they are transported to the packinghouse. While awaiting unloading, fruit should be kept in a shaded area to minimize heating. Fruit held in the sun for an hour on a hot, sunny day can be as much as 25°F hotter than fruit held in the shade.

Packinghouse operations

Most tomato packinghouses are large, sophisticated, high volume operations. Generally, tomatoes are dumped and washed, presized, waxed, sorted and graded, sized, packed into shipping containers, and unitized for shipment in the packinghouse.

Dumping and washing Water dump tanks are routinely used for receiving tomatoes at the packinghouse. In Florida, pallet bins are emptied into the dump tank or tomatoes are water flumed from gondolas into the dump tank. In each case, tomatoes in the dump tank are flumed to an elevator where they are spray washed and conveyed to the packing lines.

Serious losses due to decay occur periodically in tomato shipments during transit or at destination. Florida research has shown that poor dump tank and wash water management practices can be major contributors to decay problems (13). Bacteria and fungi present on the fruit when harvested can be spread to uncontaminated tomatoes in the water. Organisms that cause bacterial soft rot *Erwinia carotovora*, sour rot or watery rot *Geotrichum candidum*, Rhizopus rot *Rhizopus stolonifera*, and gray mold *Botrytis cinerea* can inoculate the fruit during dump tank and washing procedures. Decay of inoculated fruit after packaging can spread to other fruit during marketing and increase product losses.

The following is a summary of the suggested dump tank management practices to eliminate these problems. **1.** Minimize the depth to which tomatoes are submerged when dumped, to less than 24 inches if possible. **2.** Maintain a single layer of tomatoes in the dump tank. **3.** Minimize the time tomatoes spend in

the dump tank, less than 2 minutes if possible. Never leave tomatoes standing in the water during packinghouse crew breaks. Modify dump tanks to eliminate "dead" spots. **4.** Chlorinate dump tank and wash water to maintain a free chlorine concentration of 100 to 150 parts per million (mg/L). Check concentration frequently (at least twice a day) with a DPD test kit. Chlorine may be added to the water as Cl₂ gas or the liquid and dry formulations of calcium or sodium hypochlorite labeled for such use. **5.** Maintain the dump tank water temperature 10°F higher than highest fruit pulp temperatures. Water heating requirements can be minimized by keeping harvested fruit in the shade. Temperatures should be monitored with a thermometer. **6.** These management practices represent additive control efforts — not alternative methods. Use of a single control parameter (like chlorination) has not proved to be sufficient to prevent postharvest decay during disease-favorable conditions.

Presizing Following washing, tomatoes pass over a presizer. Most presizers are continuous perforated belt sizers with holes 2 5/32 inches in diameter, except during a marketing order where the minimum size is 2 8/32. Smaller tomatoes drop through the belt and are conveyed to the cull chute. This step eliminates undersized fruit and prevents them from congesting the packinghouse operations which follow.

Waxing Most Florida tomatoes are waxed prior to packing. Waxing is done with a heated formulation of a food grade wax labeled for use on tomatoes. Waxing serves to reduce water loss during marketing, but it is done primarily to improve the luster of tomatoes.

Sorting and grading In most packinghouses these operations are done by hand and may involve several hundred people. One of the first steps involves separating green fruit from fruit showing any color (U.S.D.A. color stages 2 and above). From this point on, green fruit and colored fruit are handled on similar, but separate packing lines. Electronic color sorters based on reflectance readings have been developed for tomatoes and are available from several manufacturers.

Following color sorting, fruit are hand separated into grades according to U.S.D.A. standards for grades of fresh tomatoes (1) as modified by the Florida Tomato Committee under authority of the Federal Marketing Order. Grades are U.S. No. 1, U.S. Combination, U.S. No. 2, and U.S. No. 3. When not