Red Tart Cherry Fruit Quality: Preventing Soft or Scald Fruit
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Red Tart Cherry Fruit Quality: Preventing Soft or Scald Fruit

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What causes soft cherries? Maturity or abuse.

What causes scald cherries? Maturity or abuse.

INTRODUCTION

Maturity:

As red tart cherries mature and ripen on the tree they become progressively softer. After reaching a certain stage of softness on the tree, the cherries will not re-firm adequately when cooled with water after harvest. When this condition exists, scald may also become more severe due to greater bruising during harvest and because compaction in the tank will not permit rapid cooling.

Abuse:

Each handling of cherries reduces firmness. Mechanical harvesting may reduce firmness most. Cooling in cold water for the proper period re-firms the cherries to near pre-harvest firmness with little or no scald. If not properly cooled, scald becomes excessive although re-firming may occur.

GUIDELINES FOR COOLING

Techniques for harvesting and handling red tart cherries in water and operating the cooling pad have been reported in several publications. However, the most common errors in the handling of sour cherries continue to occur between harvest and delivery to the processing plant and during handling at the processing plant.

Research indicates a need to improve handling red tart cherries in water. The following guidelines are recommended to improve quality of cherries:

1. **Fill the tank with cold water immediately before taking it to the field.**
   This is most critical on hot days. Cherries in

the sun may be 10-15 degrees above air temperature. Hot cherries quickly warm the water. Warm water promotes the development of scald.

Cherries from the mechanical harvester should be delivered to the tank with water overflowing.

2. **Fill the tank with cherries quickly in the field.**

The tank in the field should be filled with fruit within 30 minutes. If not, change it for another tank filled with cold water. Take the warm or partly filled tank to the cooling pad and refill with cold water or cool as a partly filled tank. (This time factor is more critical on hot days.)

Do not overfill the tank. Cherries dropping on cherries soften more than cherries dropping on water.

3. **Cool the filled tank quickly.**

When filled, the tank should be put on the cooling pad immediately and cooled quickly. A high flow of water should be used to quickly remove the field heat. Use flow rate of 10 gallons per minute (gpm) for 30 minutes.

4. **Keep the tank cool.**

After rapid cooling, keep the water flowing to keep the cherries cool. Maintain continuous flow of 2 gpm. If water flow is too low, the fruit will increase in temperature through respiration. If they get too warm, air from the water will collect as bubbles on the fruit.

5. **Leave the tank on the cooling pad until cherries have re-firmed.**

Time required for re-firming increases as fruit ripeness advances. Re-firming may occur within 1 hr at the beginning of harvest season but may require 12 hr or more at the end of harvest (2-3 weeks later).

With proper cooling, cherries will not soften, scald, or lose color during a prolonged soak of 24 hr or more.

MANIFOLD CONSTRUCTION

Cherries are cooled in tanks by delivering cold water to the bottom of the tank and allowing it to overflow. Good distribution of water at the bottom is essential to properly cool the cherries near the bottom. Most tanks use a manifold for this purpose. However, manifold type and construction are important for uniform fast cooling of the fruit (Fig. 1).

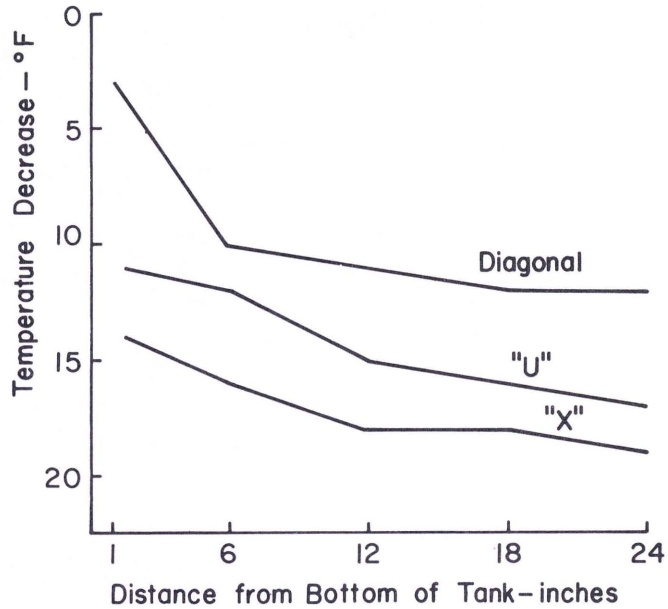


Fig. 1. Effect of Manifold design on rate of cooling as measured over 30 minutes. Beginning temperatures essentially equal.

Manifold Openings

Holes in the manifold should direct the water toward the bottom (not upward).

Small openings increase pressure and will force water further than large openings. Ten ¼-in. openings on a diagonal manifold have been recommended (8). With a flow rate of 10 gpm/tank or 1 gpm/opening, the force of the water will not penetrate far from the manifold.

Diagonal Manifolds

A manifold that releases water on a diagonal (from corner to opposite corner) will usually leave a "hot" spot in the lower 12-18 in. of the opposite corners. The distance from the tank center to corner is too great for water movement.

"U" or "X" Manifolds

A "U" manifold (two parallel pipes dividing the bottom of the tank into three areas–½ between them and ¼ on the outside of each) will provide better water distribution than a diagonal manifold.

An "X" manifold (two crossing diagonal manifolds served with one riser) will deliver water to the corners not reached with a single diagonal manifold.

Permanent Manifolds

Perhaps the best manifold arrangement would be to spot-weld the manifold to the tank so it is permanently in place. It can be arranged to prevent damage upon stacking and plugging when taken to the field.

FLOW REGULATING VALVES

To assure proper water flow, flow regulating valves can be used. These valves are rated to deliver a given amount of water providing 15 lb pressure is lost going through them.

Each opening from the water main line can be equipped with two flow regulating valves and two closing valves: 1) to provide 10 gpm and 2) to provide 2 gpm. These can be arranged to supply one manifold.

DELIVERY TO PROCESSING PLANT

Do not drain water down to or below the cherries when delivering to the processing plant. Use a cover instead.

Draining water down to or below the cherries will allow compaction in the tank, if it is hauled any distance, and will cause cherries to re-heat more rapidly. Properly cooled cherries, if allowed to heat before processing, will develop scald.

Leave the manifold in the tank. This will permit reconnection to cold water at the processing plant.

HANDLING AT PROCESSING PLANT

Heat can cause scald. If cherries are handled in field tanks, keep cold water running through them. On hot days, if the field tank is left standing an hour or more, cherries can re-warm enough to start scald development.

After the cherries are received, place them on the cooling (holding) pad and re-connect the manifold. This requires that manifold connections at the processing plant be the same as those on the farm and that manifolds be left in the tank. Running water through a hose into the tank may not be enough for proper cooling.

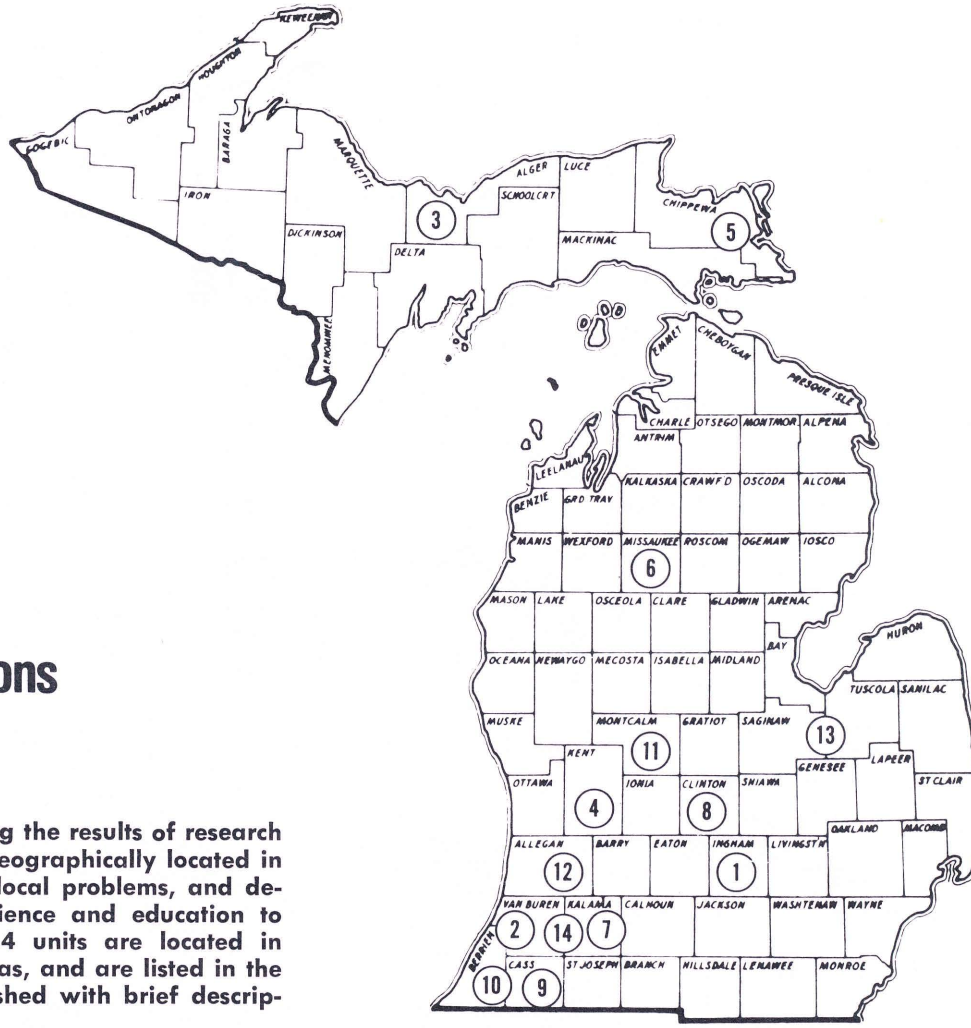
TANK COLOR

Dark colors absorb heat from sunlight. Light colors reflect heat. Aluminum painted tanks may reduce temperatures (or amount of warming) as much as 5 degrees on hot sunny days.

Publications Related to Red Tart Cherry Fruit Handling

1. Bolen, J. S.; B. F. Cargill and J. H. Levin (1970). Mechanized harvest systems. Coop. Ext. Bul. E-660
2. Cargill, B. F.; G. McManus, Jr., J. S. Bolen and R. T. Whittenbuger (1969). Cooling stations and handling practices for quality production of red tart cherries. Coop. Ext. Bul. 659.
3. Levin, J. H. and R. T. Whittenbuger (1970). Buying and selling tart cherries by volume. Great Lakes Fruit Growers News. 9:37-38.
4. Mitchell, A. E. and J. H. Levin (1969). Tart Cherries: growing, harvesting and processing for good quality. Coop. Ext. Bul. E-654.
5. Parker, R. E., J. H. Levin and H. P. Gaston (1966). Cherry firmness and its relationship to pitter loss. Memo Rpt., ARS 5:42-119.
6. Tennes, B. R.; R. G. Diener, J. H. Levin and R. T. Whittenbuger (1970). Firmness and pitter loss studies of tart cherries. Trans. Amer. Soc. Agr. Engr. 13:810-813.
7. Whittenbuger, R. T.; H. P. Gaston and J. H. Levin (1964). Effect of recurrent bruising on the processing of red tart cherries. Mich. Agr. Exp. Sta. Res. Rep. No. 4.
8. Whittenbuger, R. T., M. B. Harris, C. H. Hills, and J. H. Levin (1967). Many factors affect cherry scald. Conner/Packer.

Outlying Field Research Stations



These research units bring the results of research to the users. They are geographically located in Michigan to help solve local problems, and develop a closeness of science and education to the producers. These 14 units are located in important producing areas, and are listed in the order they were established with brief descriptions of their roles.

(1) Michigan Agricultural Experiment Station. Headquarters, 101 Agriculture Hall. Established 1888. Research work in all phases of Michigan agriculture and related fields.

(2) South Haven Experiment Station, South Haven. Established 1890. Breeding peaches, blueberries, apricots. Small fruit management.

(3) Upper Peninsula Experiment Station, Chatham. Established 1907. Beef, dairy, soils and crops. In addition to the station proper, there is the Jim Wells Forest.

(4) Graham Horticultural Experiment Station, Grand Rapids. Established 1919. Varieties, orchard soil management, spray methods.

(5) Dunbar Forest Experiment Station, Sault Ste. Marie. Established 1925. Forest management.

(6) Lake City Experiment Station, Lake City. Established 1928. Breeding, feeding and management of beef cattle and fish pond production studies.

(7) W. K. Kellogg Farm and Bird Sanctuary, Hickory Corners, and W. K. Kellogg Forest, Augusta. Established 1928. Forest management, wildlife studies, mink and dairy nutrition.

(8) Muck Experimental Farm, Laingsburg. Plots established 1941. Crop production practices on organic soils.

(9) Fred Russ Forest, Cassopolis. Established 1942. Hardwood forest management.

(10) Sodus Horticultural Experiment Station, Sodus. Established 1954. Production of small fruit and vegetable crops. (land leased)

(11) Montcalm Experimental Farm, Enrican. Established 1966. Research on crops for processing, with special emphasis on potatoes. (land leased)

(12) Trevor Nichols Experimental Farm, Fennville. Established 1967. Studies related to fruit crop production with emphasis on pesticides research.

(13) Saginaw Valley Beet and Bean Research Farm, Saginaw. Established 1971. Studies related to production of sugar beets and dry edible beans in rotation programs.

(14) Kalamazoo Orchard, Kalamazoo. Established 1974. Research on integrated pest control of fruit crops.

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