

## A Longer Marketing Life For Bramble Fruits

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The major causes of short shelf life (or short marketing life) in raspberries and blackberries are physical injuries due to rough handling, shriveling due to water loss, fruit rotting by fungi, and loss of quality through physiological deterioration. The producer can expect nearly 100 percent loss of salability within 48 hours of harvest, if prescribed procedures are not conducted on a timely basis.

Physical injuries will be minimized by:

1. Choice of firm-fruited cultivars with tough skins.
2. Harvest at the earliest acceptable stage of maturity to obtain the greatest firmness that a given cultivar has to offer.
3. Choice of harvest containers to avoid sharp or rough edges that could cut or otherwise rupture the fruit. Choice of adequately ventilated containers.
4. Packing fruit no more than four berries deep to prevent crushing of fruit at lower levels in the container.
5. Proper training of each member of the picking crew.
6. Constant, strict, and detailed supervision to ensure that picking instructions are followed.
7. Combination of harvesting and grading into a single act.
8. Harvesting when fruit surfaces are dry.
9. Supervision to ensure gentle treatment of filled flats during every movement of the flat in the field, packing house, pre-cooler, cold storage, loading, shipping, etc.
10. Maintenance of smooth surfaces in field access roads or driveways.
11. Choice of vehicles to provide the smoothest possible ride throughout the berry's transport from the field

to the cold storage facility and ultimately to the consumer.

12. Emphasizing the benefits to be gained by gentle handling of the fruit, to wholesale and retail customers who may be unfamiliar with these commodities.

Rates of water loss, shriveling, softening, and rotting are directly affected by fruit maturity and temperatures within harvested fruit tissues. It is, therefore, critically important to:

1. Harvest frequently; a harvest interval of 36 to 48 hours is not too short.
2. Harvest fruit early in the day, while field heat is low; this requires the manager to accurately estimate labor requirements and to plan an efficient harvest rotation.
3. Protect harvested fruit from direct exposure to the sun by timely transfer of filled flats to a shaded field pick-up station or to a shaded transport vehicle.
4. Transport fruit from the field to the pre-cooler as soon as possible (preferably within 1/2 hour) after it is harvested.
5. Pre-cool fruit, as quickly as possible, to a storage temperature that is close to 32°F (and not lower than 31°F).
6. Transfer fruit from the pre-cooler to the main cold storage area when the fruit temperature has been reduced by 7/8 of the difference between its original temperature and the desired 32°F; longer exposure to rapidly moving air will increase water loss and shriveling.

The amount of time required for pre-cooling can be estimated by observing the length of time that is required to remove 1/2 of the excess heat from that particular load of fruit. Half of the excess heat has been removed when the fruit temperature has been

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reduced by 1/2 of the difference between the non-cooled fruit and 32°F. For example, if initial fruit temperature is 90°F, then the temperature change required to reach the half-cooled mark will be:

$$\frac{90^{\circ}\text{F}-32^{\circ}\text{F}}{2} = \frac{58^{\circ}\text{F}}{2} = 29^{\circ}\text{F}$$

In this example, 1/2 cooled fruit will have a temperature of [90°F minus 29°F] = 61°F. The length of time elapsed during cooling of the fruit from 90°F to the 1/2 cooled temperature of 61°F is then used to predict when the load of fruit should be removed from the pre-cooler. This prediction is based upon the ideas that the rate of cooling is constant, and that the fruit is adequately pre-cooled when 7/8 of the excess heat has been removed. Removing 7/8 of the excess heat takes three times longer than removing 1/2 of the excess heat. If the fruit were 1/2 cooled after one hour in the pre-cooler, it would be 7/8 cooled after two more hours; the total pre-cooling time would be three hours.

7. Monitor humidity in the cold storage; maintain 85-90 percent relative humidity. Avoid saturation of the atmosphere; free water on fruit can encourage mold development and it may damage fruit appearance.
8. Keep fruit temperatures as near as possible to 32°F throughout the storage, shipping, and merchandising process. To determine fruit temperature, insert a thermometer into the fruit container. Do not use storage room air temperature as an indicator of fruit temperature.
9. Prevent “sweating” of the fruit, after refrigeration, by sealing pallets or individual flats in moisture proof wraps before removal from the cold storage. This keeps moisture from condensing on cold fruit. These overwraps may be opened or removed, for display in the retail market, after the fruit has warmed to a temperature slightly above the dew point for surrounding air. If fruit has warmed during transit, overwraps definitely should be opened before being returned to low storage temperatures at the shipping destination. This minimizes condensation of transpirational moisture which may have accumulated inside the container during the warmer shipping period.

Post harvest fungal rots may be further reduced by certain cultural practices and procedures:

1. Select planting sites with good air drainage.
2. Orient rows in the direction of predominant summer winds to encourage evaporation of moisture from fruits and foliage.

3. Prune and train to optimize sunlight penetration and air circulation in the foliar canopy.
4. Use irrigation methods (eg., trickle) which avoid wetting the foliage and fruit.
5. Use practical sanitation procedures such as frequent, clean harvesting, and removal of over-ripe, damaged, or rotting fruit from the field.
6. Follow a preventative fungicide program that is based upon developmental cycles of the plant or fruit and upon cycles of rot-causing organisms. But, allow due consideration for climatic or meteorologic conditions and fluctuations.
7. Use an effective integrated management program for insects whose feeding activities may cause injuries that predispose the fruit to damage by rot-causing organisms; this may include types of insects which act as vectors of fungi during visits to multiple plants, flowers, or fruits.
8. Select fruit rot resistant cultivars (i.e., varieties) if they are environmentally adapted, and otherwise compatible with standards of quality, size, productivity, harvest season, etc., that are required for economic success in your chosen market.

#### **Some Additional Sources of Information Include:**

Pritts, M. P. and D. Handley (Editors). 1989. Bramble Production Guide. NRAES-35:1-189.

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Swartz H. J. (Editor). Newsletter of the North American Bramble Growers Association, published twice yearly.

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Yoder, K. S., D. G. Pfeiffer, and M. J. Weaver. (Revised biennially). Pest Management Guide for Commercial Small Fruit Production. VCE Publication 456-005.

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