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Lake Ontario Fruit Program

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Strawberry Harvest & Storage/Shipping Considerations

Craig Kahlke, Lake Ontario Fruit Program

With a certainly much more normal spring as compared to 2012, strawberry harvest will be underway shortly. Thus now is a good time to discuss handling of the fruit associated with harvest and post-harvest activities. Strawberries are among the most perishable of all fruits, and thus it is critical that marketing channels are open before harvest starts. Strawberries are extremely susceptible to bruising, and rough handling at harvest and during any time thereafter will encourage fungal growth and decay. It is critical that personnel be trained in the careful picking and handling of fruit. In addition, fruit quality declines as the season progresses, so the highest quality fruit will be earliest in the season. With varying degrees of ripeness in single plantings, it is also extremely important that the fruit is harvested as near peak ripeness as possible.

Worker Hygiene

From a food safety standpoint, (microbial contamination with the potential to cause foodborne illness) strawberries, raspberries, and blackberries are considered high risk. One reason is because often the last person to touch the fruit prior to it being eaten by the consumer is the picker, as postharvest on-farm washing soon after harvest reduces shelf-life considerably in soft berries. Therefore, proper worker hygiene training is critical. Workers should ALWAYS wash their hands before entering the fields, and before/after eating and during breaks, prior to re-entry into fields. This should be an enforceable rule. Workers should be trained in proper hand-washing techniques, and always use soap and potable water, with single-use paper towels. There should be no smoking or eating in the fields, and there should also be designated areas for breaks/lunches (these can be on the edges of harvest fields but not between the rows). For more information and to order proper worker hygiene training materials, please go to <http://www.gaps.cornell.edu>, and click on GAPS Educational Materials.

Strawberries Destined for Direct Markets

Since most strawberry markets in the Northeast are consumed very close to the farms in which they are produced, many growers lack and may not need the cooling methods and storage facilities used by long-distance shippers such as those employed by the production areas in California and Florida. Direct market channels are ideal for many growers in the Northeast, as fruit loss is further accentuated from shipping from the farm to wholesalers, and from the wholesalers to retail markets. By bypassing wholesale shipping, fruit loss due to bruising and fungal decay can be reduced by an average of 20%. For optimum quality, it is critical that direct market fruit is harvested at or very near peak ripeness. Top quality strawberries should be fully ripe, with a uniform red color, be firm, flavorful, and show no signs of decay or disease.

Temperature is the single most important factor affecting shelf life of strawberries.

If cooling down to the recommended 32 F is an issue for growers, research shows that strawberries held at 50F storage at high humidity will benefit storage life greatly as compared to room temperature storage. In addition, strawberries at 50F tend to retain their color and glossy appearance better than berries stored at 32F. Many direct-market local growers claim approximately 90% of their strawberries are consumed the day they are harvested, thus in these cases, it is very critical that the berries be at peak ripeness. The berries are most often harvested in morning only when field heat is low, are usually then shipped out to markets on refrigerated trucks the same morning, reach the retail shelves by afternoon, and are bought and consumed within a day or two.

Strawberries Destined for Long-Distance Markets

For strawberries that are being transported beyond local markets, there are two factors that impact on maximum shelf life potential. First, the fruit will hold up better if they are harvested at the white tip stage, rather than fully ripe. Second, cooling is critical. As soon as harvest occurs, it is imperative that field heat is removed from the fruit. It is recommended that cooling is started within an hour of harvest. Ideally, 32F forced-air cooling with high humidity (90-95% RH) is recommended. Refrigeration without forced air can also be used; however, shelf-life will be shortened. Proper forced-air cooling removes field heat from fruit in around 90 minutes, while simple refrigeration without forced air can take about 9 hours. Proper ventilation around, below, and above the fruit is essential for removing field heat quickly. Covering containers with plastic prior to cooling, and not removing plastic until berries are at room temperature for several hours after reaching market shelves will prevent condensation buildup on the inside of the bag and delay fungal growth. It is estimated that for each hour delayed in cooling the fruit results in reducing shelf life of fruit by one day.

Following field heat removal, shipping on refrigerated trucks to market destinations is essential. If cold storage will be limited at market destination, as stated in the section on direct marketing, research shows 50F storage at high humidity will benefit storage life greatly as compared to room temperature storage. If all precautions are taken from harvest to cooling to storage, shelf life from harvest to market and on the consumer's table can be up to 10-14 days maximum for strawberries, but likely averages more like 7 days in the Northeast. For growers interested in exploring the potential of longer distance markets, including more information on how to set up an inexpensive forced-air cooling system for berries and many other types of perishable produce, please contact Craig Kahlke at 585-735-5448, or email at cjk37@cornell.edu. In addition, see more information in a future Berry News.

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Resources:

- 1 Strawberry Production Guide for the Northeast, Midwest, and Eastern /Canada, NRAES-88. 2008
- 2 Pest Management Guidelines for Berry Crops, Cornell University, Cooperative Extension.
- 3 Shin, YJ, Liu, R.H., and Watkins, C.B. Temperature and relative humidity effects on quality, total ascorbic acid, phenolics and flavonoid concentrations, and antioxidant activity of strawberry. *Postharvest Biology and Technology* 45: 349-357, 2007.
- 4 Auger, S., M. Colindres, Editors E.A. Bihn, R.B. Gravani, and K Embrey. Did you know? In the Field there is a need for hygiene too! 2005. <http://www.gaps.cornell.edu>
- 5 USDA, ARS Agriculture Handbook Number 66, The Commercial Storage of Fruits, Vegetables, and Florist and Nursery Stocks.