

# HARVEST AND POSTHARVEST CONSIDERATIONS IN VERMONT ORCHARDS

Once the work has gone into producing a crop of apples, the grower must begin the largest and most important task of harvesting that fruit and selling it, hopefully for a positive return on investment. A crop of beautiful apples on the tree is of little value in keeping the orchard sustainable over the long-haul, and management of the harvest and marketing are critical operations.

## Fruit Maturity

As apples approach harvest, they undergo changes in maturity on the tree. These include changes in background color and red overcolor, the conversion of starch into sugars, development of flavonoid compounds, and a softening of the flesh. Changes in fruit maturity are driven by ethylene concentration in the developing fruits. Apples do not ripen in a linear model over time, but rather undergo and increase in fruit respiration just prior to ethylene biosynthesis. This generation of initial ethylene in the fruit feeds back to receptors in plant tissues which further promote ethylene production. Therefore as apples approach maturity there is a very definite point called the climacteric at which internal ethylene concentration begins to increase greatly. Ethylene is a gaseous plant hormone that stimulates the ripening process in fruits, eventually causing fruit abscission and drop.

[The Role of Ethylene in Determining Apple Harvest and Storage Life](#) - University of Maine Extension

An apple grower often must tread a fine line between maturity and ripeness of their fruit. Mature fruit are defined as those which have approached the climacteric and are ready for harvest based on the storage conditions intended. Ripe fruit are ready for fresh eating at that moment. Apples intended for storage will be harvested at the beginning of the climacteric but before full ripeness develops. Growers utilize a number of indices to measure harvest dates for their apples.

[Predicting Harvest Date Windows for Apples](#)

Starch index is an important indicator of fruit maturity, and a primary maturity index outlined in the Cornell 'Predicting Harvest Date Windows for Apple' bulletin linked above. Complex starches readily stain a blue color when coated with an iodine solution, so a sample of fruit collected prior to harvest may be sliced longitudinally and dipped to assess relative maturity. The Starch Index maturity test is one of the easiest and most effective methods available to determine harvest timings for apples, especially for fruit that will be stored. Stored fruit continue to undergo maturation, although at a slower pace due to the cold temperatures which retard chemical reactions in the fruit. Therefore, fruit intended for storage will be picked less mature than those that are intended for marketing sooner.

[Painless and Efficient Maturity Testing](#) - UMASS Extension

Many growers, especially with retail operations, rely on organoleptic fruit quality attributes to time harvest. As fruit mature, their flesh firmness decreases, soluble sugars and flavors increase, color and shine develop an attractive presentation. A fruit that is ripe on the tree, ready for immediate eating, must be picked immediately and sold or cold stored maintain that freshness. In pick-your-own operations signage or other directions should be used to direct customers to the ripest fruit to avoid loss of fruit quality and unharvested fruit drop.

Preharvest drop is a characteristic of some apple varieties and can become more severe when trees are stressed from drought, pest damage, or nutrient deficiencies. Commercial plant growth regulators can be used to retard ethylene synthesis in the trees and slow down fruit maturity development and delay drop. Alar was an ethylene inhibitor popular in Northeast orchards where McIntosh, a drop-prone variety, is a dominant part of the orchard mix. Due to health and safety concerns, Alar was removed from production during the 1980's, and several other compounds have been developed to replace it. Naphthalene Acetic Acid (NAA) and aminoethoxyvinylglycine (AVG) are now labeled for preharvest drop control, and are sprayed on the trees prior to harvest. Instructions for using these compounds can be found in the latest New England Tree Fruit Management guide, available from the Cooperative Extension Service of each New England state. Management of preharvest drop must first begin with management of the orchard to ensure that trees have adequate fertility and water and pest problems are controlled, since these compounds lose effectiveness on weakened trees. These harvest management hormones are successfully used by growers to spread harvest out over a number of weeks to allow for better labor management. Pick your own operations may also use them to retain certain fruit varieties later in the season when customer numbers may increase.

## Marketing and Retail Operations

Apple growers also must consider their marketing outlets for their crop, be they retail, wholesale, or a hybrid of the two. Retail operations, including pick-your-own, may see increased per-bushel returns, but management of customers and increased dropped fruit from untrained pickers becomes a concern. Liability, insurance, and customer amenity concerns must be considered when opening an orchard to the public. Retail operations often require increased staffing to manage customers over those needed to simply pick the fruit into boxes, and the skill set of those employees will be different as customer relations becomes an important part of the marketing system. Wholesale orchards have greater control over orchard conditions and can efficiently harvest a crop at optimum maturity and with minimum waste, but they must broker their fruit through one or more middlemen, reducing their profits per bushel.

Availability of harvest labor is also an important concern, with many growers utilizing foreign contract laborers through the H2A program administered by the US Department of Labor. Wholesale growers also must consider cold storage, shipping, and packing infrastructure needs. [Direct Marketing of Farm Produce](#)

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