



# Healthy Fruit

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Prepared by the University of Massachusetts Fruit Team

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## Apple Maturity Moving

Apple maturity is finally starting to advance, but is still several days behind historical norms. Seasonable weather has helped move things along, and McIntosh harvest has started in all but the higher hills west of the Connecticut River. Color could be better, but is acceptable, and fruit size has been very good except in under-thinned trees. Many Honeycrisp growers are doing a first-pick as you read this, however, Gala harvest seems to be delayed. Here are some results of a recent round of apple maturity testing:

| Date | Location    | Cultivar            | Size (in.) | Color (% red) | Firmness (pounds) | Soluble Solids (%) | Starch Index |
|------|-------------|---------------------|------------|---------------|-------------------|--------------------|--------------|
| 9/8  | Deerfield   | McIntosh            | 2.8        | 55            | 16.5              | 11                 | 3            |
| 9/8  | Shelburne   | McIntosh            | 2.8        | 65            | 17                | 11                 | 3.5          |
| 9/8  | Belchertown | McIntosh (ReTain)   | 3.0        | 45            | 16                | 10.5               | 2.5          |
| 9/9  | Bolton      | McIntosh            | 2.8        | 65            | 15                | 11                 | 4            |
| 9/9  | Berlin      | McIntosh (ReTain)   | 2.8        | 65            | 17                | 12                 | 3.5          |
| 9/9  | Sterling    | McIntosh            | 2.8        | 65            | 15                | 11                 | 4.5          |
| 9/9  | Sterling    | McIntosh (ReTain)   | 2.9        | 60            | 16                | 10                 | 3.5          |
| 9/9  | Harvard     | McIntosh            | 2.9        | 45            | 15                | 10.5               | 4            |
| 9/8  | Shelburne   | Honeycrisp (ReTain) | 3.2        | 45            | 16                | 11.5               | 1.5          |
| 9/8  | Belchertown | Honeycrisp          | 3.2        | 55            | 14.5              | 11.5               | 4.5          |
| 9/9  | Bolton      | Honeycrisp          | 3.2        | 60            | 15.5              | 12                 | 3.8          |
| 9/9  | Sterling    | Honeycrisp          | 3.2        | 55            | 15                | 13.5               | N/A          |
| 9/9  | Harvard     | Honeycrisp          | 3.3        | 35            | 17                | 12                 | 1.5          |
| 9/8  | Shelburne   | Gala                | 2.7        | 70            | 22                | 11                 | 1.2          |
| 9/8  | Belchertown | Gala                | 2.7        | 50            | 19                | 11                 | 4            |
| 9/9  | Harvard     | Gala                | 2.8        | 75            | 25                | 12                 | 1            |

### Comments on the cultivars:

**McIntosh** are moving from mostly immature to early maturity. Many growers are on their first-pick, based on color, which could still use some improvement. Drop has been nil, and some blocks are still nice and tight, however, there are signs fruit is loosening up. Expect some drop if we get any wind or rain. ReTain appears to be performing well this year based on starch-index tests. Cool nights will help advance maturity now, and expect most of the CA crop to be picked later this week into next week. (Starch-index 5–6.) The majority of the Mac harvest will occur over the next two weeks.

**Honeycrisp** are moving along, and many growers are doing at least a first-pick based on red skin color as well as a lightening of the green background color. Size is excellent. Honeycrisp, like McIntosh, are prone to drop so close observation is advised.

**Gala** seem more behind than the other cultivars. Gala like a little heat, so the recent weather has not been conducive to ripening. A change in background color from green to cream is a good indication of proper harvest maturity. Expect some Gala to be harvested later this week. Don't let Gala get too ripe, when cracking can become a problem.

## Getting The Most From That 'Old' Stop-Drop NAA

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The use of NAA (Fruitone N, K-Salt Fruit Fix) for control of preharvest drop has been over-shadowed in recent years by that of ReTain; however, ReTain use must be planned weeks prior to harvest. With the effective application time so close to the onset of drop, NAA offers a "rescue" treatment, should the threat of pre-harvest drop be increased due to unforeseen circumstances. Examples of such situations include unavoidable delays in harvest due to bad weather or labor issues, slow red color development, and overlapping harvest schedules of varieties with similar maturity windows, such as McIntosh with Macoun, or Empire with Delicious. While it is not the purpose of this article either to promote or condemn the use of ethephon (Ethrel, Ethephon II) to promote fruit coloring, those growers using one of these products also need to use NAA to prevent excessive fruit drop resulting from accelerated fruit maturation. The following tips and reminders are offered to help growers brush up on using NAA to best effect.

Timing NAA stop-drop sprays is a little like a game of chicken, requiring both steely nerves and a good understanding of your opponent. The label says to apply NAA when the first sound fruit begin to drop. A single spray of 10–20 ppm NAA offers drop control for about seven days from the date of application, but it takes two or three days to "kick in". Apply NAA three days too early and the window of effective drop control is about halved. Apply three days too late and perhaps a quarter of the crop will be on the ground before the NAA takes effect!

Stem loosening coincides with the climacteric rise in ethylene that signals fruit ripening. Unlike ReTain, which delays drop by delaying fruit maturation, NAA stops drop by delaying stem loosening. Predictive degree-day models and the pattern of starch disappearance measured by the starch index test do not provide a precise guide to timing NAA stop-drop sprays. These techniques can indicate whether the threat of drop is earlier or later than normal, but more direct monitoring is required for the actual timing of the sprays.

Varieties such as McIntosh that are highly susceptible to pre-harvest drop require careful monitoring to determine when fruit drop is beginning. Limb tapping should be used to determine the onset of drop as fruit near maturity. Bump several scaffold limbs of three or four inches in diameter throughout the block on a daily basis. Use the palm of your hand with a short firm stroke, striking the limb at its mid-point (just like golf, this skill improves with practice and experience). If zero to one apples per limb drop on average, it's too soon to apply NAA. If the average is about two, check again later the same day or the next morning. When several apples drop in response to limb bumping, it's time to harvest within two days or apply NAA.

When NAA is used to control drop on ethephon-treated rees, the two may be tank-mixed if the fruit is to be harvested within seven days. If the fruit is to be left on the tree longer than seven days after the ethephon, then NAA should be applied three days after the ethephon.

Rates of 10–20 ppm NAA are usually needed to be an effective stop-drop. To obtain the maximum drop control, use a split application of 10 ppm in the first spray, followed by a second spray of 10 ppm five days after the first. Split applications can provide drop control for about 12 days from the date of the first application.

Research in Virginia showed that the deleterious effects of NAA sprays on fruit maturity and fruit softening were minimized in Red Delicious by making repeated applications of 5 ppm NAA at four weekly intervals prior to harvest. This "pre-loading" technique has recently been included as an application option in the Fruitone N label. I have not repeated this research on Delicious, but using this technique on McIntosh resulted in more advanced ripening and softening, not less! I do not recommend NAA pre-loading for McIntosh and other early season, high-ethylene varieties. I suggest that growers use caution when trying pre-loading on later varieties. Use it only on a trial basis until more is known about

how varieties other than Delicious grown in different climates will respond.

As with thinning sprays, stop-drop sprays of NAA work best when applied with good coverage and plenty of water. Concentrating beyond 4X (less than 75 gallons of water per acre for 300 gallon TRV trees) may diminish the effectiveness. Use a non-ionic or organo-silicone surfactant to enhance uptake.

When used as a stop-drop, NAA may advance ripening, especially at the maximum label rate of 20 ppm. The primary impact of his advance in maturity is reduced storage potential of the fruit, particularly in the loss of firmness. This effect is not consistent from year to year or block to block. The question then arises whether NAA-treated fruit has potential for CA storage or treatment with SmartFresh (1-MCP).

Perhaps the simplest way to answer the question with regard to CA is to remember the adage "garbage in, garbage out". If the fruit was left on the tree to the bitter end of the drop control, is measurably softer than previously harvested fruit, and has elevated starch index values, then it should be marketed in the short term. On the other hand, if the fruit was harvested within a week after treatment and has good firmness and starch values for CA storage for the variety (e.g., McIntosh with 14 lb pressure and a Cornell chart starch index rating of 6 or lower), there is little reason to expect it to perform differently than similar fruit that received no NAA.

The question of whether NAA stop-drop sprays have advanced fruit maturity may be most critical when using SmartFresh on McIntosh, where the maturity of the fruit is an overwhelming influence on whether the fruit will respond to 1-MCP. Quoting Dr. Chris Watkins in the Proceedings of the 2003 Apple Storage Workshop: "We do not have any data yet, but we assume that induced ethylene production that results from use of NAA will deleterious[ly] affect fruit responses to 1-MCP. If you use stickers [NAA stop-drop], your storage operator should be informed."

Finally, a comment about use of NAA on trees previously treated with ReTain. The use of both stop-drops at the respective correct times results in drop control that is superior to that obtained by using either one alone. Fruit treated in this manner, then left for an extended time on the tree, often have limited storage potential (see above); however, this combination can be an effective way of getting the ultimate in drop control. This drop control comes at a high price and should therefore only be used on high value fruit with little or no storage period, such as for a few rows of trees held for late picking in PYO blocks.

## **Mark Your Calendar**

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Several meetings should be on your calendar:

October 23, 2003: Twilight Meeting, Cider Hill Farm, Amesbury. 4:00 P.M. Sponsored by Massachusetts Association of Roadside Stands. For more information, see <http://www.massfarmstands.com/twilight.html>

December 16, 2003: New England Stone Fruit School, Holiday Inn, Manchester, NH. Details TBA.

December 16–18, 2003; New England Vegetable and Berry Growers Conference '03 AND New England Fruit Meeting, Holiday Inn, Manchester, NH. Details TBA.