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Tree Fruit News

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Regional Updates*:

North Country—Clinton, Essex, northern Warren and Washington counties

Tree phenology: Apple=harvest.

Current growing degree days 1/1/13 to 9/9/13	Base 43°F*	Base 50°F*
Chazy	3143	2144
Peru	3177	2202
South Hero, VT	3330	2330
Willsboro, NY	3152	2155
Shoreham, VT	3342	2349

Pest focus—Apple: scab, sooty blotch, flyspeck, fruit rots.

Capital District—Albany, Fulton, Montgomery, Rensselaer, Saratoga, Schenectady, Schoharie, southern Warren and Washington counties

Tree phenology: Apple, pear=harvest.

Current growing degree days 1/1/13 to 9/9/13	Base 43°F*	Base 50°F*
Granville	3166	2192
North Easton	3444	2422
Clifton Park	3349	2353
Guilderland	3393	2389

Pest focus—Apple: scab, sooty blotch, flyspeck, fruit rots.

Mid-Hudson Valley—Columbia, Dutchess, Greene, Orange, Sullivan and Ulster counties

Tree phenology: Apple, pear=harvest.

Current growing degree days 1/1/13 to 9/9/13	Base 43°F*	Base 50°F*
Hudson	3652	2627
Highland	3688	2623
Marlboro	3590	2542
Montgomery	3587	2547

Pest focus—Apple: scab, sooty blotch, flyspeck, fruit rots, codling moth, apple maggot, leafhoppers, brown marmorated stink bugs, San Jose scale. Stone fruit: brown rot, oriental fruit moth, aphids. Pear: Fabraea leaf spot, pear psylla.

Expected Harvest Timing

Region	Week of 9/9/13	Week of 9/16/13
North Country	McIntosh, Honeycrisp;	Mcintosh+Retain, Honeycrisp;
Capitol District	McIntosh, Honeycrisp, Gala;	(McIntosh, Honeycrisp, Gala)+Retain;
Mid-Hudson	(McIntosh, Honeycrisp, Gala)+-Retain;	Aceymac, Spartan, Early Fuji, Cortland, Macoun, Bosc Pear;

**All degree day data presented are BE (Baskerviile-Emin) calculations.*

Serving the educational and research needs of the commercial small fruit, vegetable and tree fruit industries in Albany, Clinton, Columbia, Dutchess, Essex, Fulton, Greene, Montgomery, Orange, Rensselaer, Saratoga, Schoharie, Schenectady, Sullivan, Ulster, Warren and Washington Counties

Harvest Maturity Evaluations

Based on selected comments from Craig Kahlke (CCE LOFT), Mike Fargione and Kevin Iungerman (ENYCH)

Apple harvest should be timed to provide the best quality fruit for a specified market. Fruit destined for immediate sales and eating can be picked "just in time" at optimal flavor, while fruit for sale following long-term storage must be picked less mature while it is responsive to refrigerated and/or CA storage regimens that deter over-ripening prior to removal from storage or the intended market endpoint. Harvest protocol calls for growers to begin evaluating fruit maturity in each block at least 2 week before expected harvest. Several criteria can be used to estimate fruit maturity and readiness for harvest.

Internal ethylene concentration: Ethylene is a plant hormone (in the form of a gas) that induces fruit ripening, drop and senescence (aging). Testing involves removing gas samples from the cores of fruit with a syringe and analyzing them with an expensive gas chromatogram. Most growers do not have access to such equipment, but labs in WNY and the lower Hudson Valley enable CCE staff to give ethylene updates as part of their localized maturity evaluation reports.

Starch-iodine staining: Treating a cut apple with iodine solution provides an easily evaluated visual queue of starch to sugar conversion within the fruit. Fruit quality after storage is best when fruit are picked within specific "starch index" ranges. Fruit that have reached the appropriate index are said to be in the "harvest window", a duration of no more than 5-7 days. Plant growth regulators like "Retain" can expand the harvest window for a given cultivar, thereby increasing the picking time of optimal condition. Cornell has developed a "generic starch chart" suited to many but not all cultivars; for instance, starch readings appear to be irrelevant with Honeycrisp (and Honeycrisp crosses?).

Flesh firmness: Fruit gradually soften as they ripen. Firmness (incorrectly but frequently called "pressure" as opposed to "resistance to pressure" which connotes firmness) does not indicate maturity as much as it shows fruit condition and storage potential. Firmness is measured with a penetrometer ("pressure tester"). Markets, particularly export markets, generally have minimal firmness standards that growers must meet.

Soluble solids: Fruit sugar concentration affects taste and sweetness and is measured in "brix units" using a refractometer. Markets generally request certain "brix" levels (12 or above) for fruit before they will accept them for sale, and these levels vary by cultivar.

Other criteria: Red color (blush) development, skin background color, flesh color, seed color and flavor are all used to make decision on when to harvest. Fruit size and blush development are not reliable indicators of fruit maturity, but are the most important marketing considerations.

Finding maturity testing supplies: Numerous vendors sell pressure testers (penetrometers) and refractometers (brix)

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Suggested "Maturity Indices" for some NY Apple Cultivars for Long-term Storage.

Cultivar	Cornell Starch Index	Firmness (Min lbs.	Other Indices
Jonamac	5.0-5.8	>14.5	None
Honeycrisp*	--	>14.0	Bright appearance and varietal flavor develop
Gala*	--	--	Change in background color & varietal flavor develop
McIntosh	5.0-6.0	>15.0	None
Cortland	2.5-3.5	>15.0	None
Aceymac	2.5-3.5	> 15.5	None
Spartan	2.5-3.5	>15.5	None
Empire*	4.2-4.6	>17.0	None
Jonagold*	7.0-7.5	>16.0	None
Red Delicious	2.8-3.5	>17.0	None
Gol. Delicious	--	--	Color shift from dark to pale green
Ida Red	3.5-4.5	>15.0	None
Law Rome	4.0-5.0	>17.0	None
Mutsu/Crispin	4.0-5.0	>17.0	None
Fuji **	5-6	>15.0	First sign watercore or starch clears ½ way thru cortex
Stayman	>2.0	>17.0	None
Cameo*	--	--	40-50% red color & background shift toward creamy
Braeburn	3-6	>17.5	None

*Multiple pickings are required.

** No NY starch index recommendation; based on interpretation of information from other states.

Harvest Maturity Evaluations, continued from page 2

testers, including Gemplers www.gemplers.com/, Wagner Instruments http://www.fruittest.com/, Frostproof: http://frostproof.com/fruit-testing/, or Atago USA: http://www.atago.net/USA/products.html.

Drug stores generally carry tincture of iodine (also called decolored iodine) at 50% ethanol, which is unsuitable; it must not contain ethanol (sometimes called Lugol's solution) and be a 1.8 or 2.0% solution to approximate the Cornell formula. Iodine can be stored for up to two years if kept in an opaque container, out of sunlight and in a cool dry place. Do not use any improperly stored holdover supplies; instead buy new. Purchase Iodine solution pre-made (http://www.wilsonirr.com, http://www.fishersci.com, http://www.grainger.com) or go to http://dspace.library.cornell.edu/bitstream/1813/3299/2/Predicting%20Harvest%20Date%20Window%20for%20Apples.pdf if buying raw ingredients for use with the Cornell formula. Iodine is a hazardous material. Read and understand the MSDS precautions and use appropriate chemically resistant gloves when handling iodine solution.

Maturity Recommendations: Maturity indices are available for some but not all apple cultivars (see below). Follow recommended maturity indices for each variety in addition to consulting with your marketer. Make sure there is adequate varietal flavor prior to harvest. Variation between individual blocks and orchards always occur. Because of this inherent variation, the average maturity index readings of several grower blocks (as developed by a regional testing program) has often proved a better guide to harvest than readings from individual orchards. Crop load effects maturity. Trees with lighter crop loads, along with stressed trees and very young trees usually mature earlier. Maturity is usually delayed in trees carrying a larger crop. Consult with your marketer before harvesting each new cultivar.

Will You Be Using a DA Meter for Future Harvests?

By Kevin Iungerman, ENYCH

The DA-Meter is an innovative, non-destructive, handheld, lightweight instrument for determining fruit maturity by measuring chlorophyll content in the fruit skin. The meter was recently showcased at *Fruit Logistica* in Europe, where it received a 3rd place in the prestigious new innovation award (FLIA) category. Developed and patented by Professor Costa's team from the University of Bologna, Italy, the DA-Meter is a portable spectrometer, which reputedly can monitor on-tree fruit ripening to accurately establish optimal harvest maturity. The meter can also be used during the cold chain to establish maturity changes over time. ExperiCo (Fruit Technology Solutions) reports extensively testing the instrument for two seasons across several pome, stonefruit and grape cultivars as a means of determining fruit maturity and storage potential.

Here in New York, Dr. Terence Robinson is similarly evaluating the use of this device at a number of locations across the State in conjunction with field research aimed at facilitating and predicting "Precision Harvest" windows.

In our region, we have a cooperative evaluation utilizing this device in multiple Honeycrisp blocks with Forrence Orchards in Peru.

In each region, fruit samples are being taken from these trial blocks over several pickings, and each sample is being progressively evaluated for dry matter content, and also assayed for mineral analysis by A&L Labs. Within days, based on these data, Terence then ranks each of the blocks by dry matter content, fruit Nitrogen (N) content, fruit Calcium (Ca) content, fruit N/Ca ratio, to formulate recommendations for optimal picking dates and storage options for the blocks in question. Cooperators are bearing

Figure 1. Costa's DA-Meter, University of Bologna, and Fruit Technology Solutions, Italy.

the cost of this fruit sampling, as well as the coordinated sampling and harvesting.

On the date of harvest of each block, the grower cooperator then also collects a 100 apple sample from each, labels it as to place and time, and place the harvest samples into pre-treatment storage (50° F). Once per week during the Honeycrisp harvest season, these samples are then collected and transported to Geneva where each is split, with half treated with MCP and the other half left untreated. Following this, they are to be placed into regular storage until late winter (date TBD – a time in February or March, 2014). At that point, the fruit will be evaluated on the basis of taste, fruit firmness, soluble solids and storage disorders by the grower cooperators, Cornell Extension, Terence's lab group, and (if my suggestion gains legs), as many regional growers as might be interested in being a part of this evaluation. All of these then - actual results after emergence from storage -

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Using a DA Meter, continued from p. 3

will be analyzed by Robinson for any correlation with front-end storage predictions/recommendations and then summarized in a final written report for the growers and the industry by the end of April.

The ripening stage of fruit is normally determined on the basis of destructive parameters (note the prior article) such as flesh firmness, starch breakdown, levels of acidity and soluble solid content, and carried out on a small sample of fruit that may not fully represent the variability within fruit batches. Non-destructive instruments on the other hand, are able to carry out measurements on much larger sample sizes, with the added advantage of repeat analysis in time over the same samples to follow their physiological evolution. Visible (VIS) and Near Infrared (NIR) Spectroscopy, are two such non-destructive technologies, which are currently utilized on packing lines, but which are expensive, relatively slow, and which require complex statistical elaboration of data to be useful.

In contrast, the DA-Meter (Figure 1), which has been developed from VIS/NIR spectroscopy, is reported to be a simple, cost effective and reliable technology that can rapidly assess fruit ripeness. Vis/NIR spectroscopy has been used to develop a new maturity index calculated as the difference in absorbance (DA) between two wavelengths (670 and 720 nm) close to the absorbance peak of chlorophyll-a. Simply stated, the DA-Meter, by means of its absorbency properties, measures the chlorophyll content in a fruit and, as a consequence, its state of ripeness. The index of absorbance difference (IAD) decreases in value during ripening of the fruit, until it reaches very low values (0.00), when fruit are yellow and ripening is complete.

I watched the meter in use last week. In mere fractions of a minute, when placed against a fruit (exposed and then unexposed sides), readings are generated and recorded, and this is repeated across multiple samples in a block. The device stores the data until it can be downloaded into a spreadsheet.

Each fruit kind, and cultivar too, has specific DA values according to the different phases of maturation, and so for this instrument to be practical, a full set of reference indices would be required for each cultivar – and thus its role in the current precision orchard harvest field research work.

Consider the potential value for a multiple variety such as Honeycrisp, which largely relies upon color picking: despite experienced workers, there is the nuance of lighting, canopy shadowing, time of day, and frankly, fatigue and "color-drift" over time. Now compound these factors across multiple men! Now visualize again, how the DA meter might lend more precision to the process, generate a more homogeneous quality fruit at each picking, and possibly even reduce the number of overall picks?

These DA units cost in the neighborhood of $3000 – but if their potential is as great as it seems, that cost would rapidly be eclipsed by fruit value enhancement. Stay tuned – and watch for the opportunity to evaluate the results next year.

Source: "The Da Meter as a New Option for Determining Optimal Harvest Maturity and Ripening Stages of Fruit", Ian Crouch ExperiCo (Fruit Technology Solutions), P O Box 1231, Stellenbosch, 7599, South Africa. See http://www.experico.co.za/wp-content/uploads/2012/10/DA-Meter-article-Crouch-ExperiCo.pdf. Also, Terence Robinson, "Exp. 14 2013 Honeycrisp Precision Harvest Trial Proposal, by T. Robinson, K. Iungerman, August 7, 2013.

Clean Up After Harvest Can Include Dogwood Borer Control

By Art Agnello and Dave Cain. Cornell Dept. Entomology. Edited by K. Iungerman, ENYCH

Over recent years, there has been recurrent concern in the Northeast about damage to apple trees by various borers. The species of primary concern is dogwood borer, but American plum borer can be prevalent in western New York apple orchards that are close to tart cherry and peach orchards. It stands to reason that the effects of these borers on dwarf trees – which have substantially less structure - can be extensive, and minimally, infestations can reduce vigor, and in time, may completely girdle and kill trees.

Tests in NY have shown that borers can be controlled season-long by applying Lorsban at various times. While a postbloom application of Lorsban is still allowed, enabling growers to spray at the peak of the dogwood borer flight, applying this material prebloom as early as half-inch green works well, too. And established research at Geneva has demonstrated Fall to also be a good time for control dogwood borer.

We tested a number of insecticides against these borers over a number of growing seasons. Lorsban is very effective for this use and we have urged growers to take advantage of it where needed. In 2001–2003 we compared some other materials, including white latex paint, endosulfan, Avaunt, Surround, Intrepid, Danitol, Imidan, spinosad and Esteem against Lorsban, with varying results. To make a long story short, only Avaunt, Danitol and, possibly Esteem, applied two or three times in midsummer, provided control comparable to one application of Lorsban. Assail and Altacor were effective when applied only once in midsummer but, obviously, will control only the summer generation.

Results from 2002 indicated that Lorsban applied postharvest the previous year (sprays went on in October 2001) controlled both the overwintering and the summer generations of dogwood borer. An October 2002 application of Lorsban similarly provided season-long control of dogwood borer in 2003.

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Clean Up After Harvest - Dogwood Borer Control, continued from p. 4

Lorsban works when applied in the spring or fall because it infiltrates burrknot tissue and kills larvae concealed within. It is also very persistent in wood so it continues to work for a considerable time after it is applied (apparently 9-12 months in our trials). Because of field conditions and chore duties, Fall application may offer growers a more convenient alternative for applying borer control sprays.

Recall that current Lorsban label restrictions allow only ONE application of any chlorpyrifos product in apples, whether as a foliar or trunk spray, so these Fall application recommendations pertain only if no earlier applications have been made. Bear in mind that we now also have a mating disruption option available, Isomate-DWB, which we have found to be very effective in interfering with these insects' pheromone communication process. Use of this product would be recommended as a tactic next June, before the first adult catch of the season.

Conventional wisdom has held that borer problems are worse where mouseguards are in place. Are findings have been to the contrary. We did observe some relationships between borer infestation and various orchard parameters in the mid-1990s, such as the proportion of trees with burrknots, proximity to stone fruit orchards and the presence of mouseguards. Mouseguards can contribute to increased expression of the burrknots that borers invade, and may shield borers from predators and insecticide sprays.

Some growers were known to remove mouseguards thinking that mice were easier to control than borers. However, results of our surveys indicate that dogwood borer larvae may be found as readily in trees with or without mouseguards. (American plum borer may be a different story in orchards near tart cherry or peach trees.) A number of orchards in which we have conducted borer control trials have never had mouseguards and there is no shortage of dogwood borers in them.

If mouseguards have deteriorated and are no longer protecting the tree, there may be small advantage, in terms of borers, to removing the guards. But, in orchards where mouseguards still provide rodent protection, removing them for the sake of borer control is probably not worth the risk, and trunk sprays are the preferred option. Even with mouseguards on, insecticides will give adequate control if they are applied carefully (i.e., a coarse, low-pressure, soaking spray with a handgun).

So, the bottom line is this: as we go into fall, consider using Lorsban after harvest to control borers, and consider leaving mouseguards on trees where they still afford protection.

This has been a seasonal reminder adapted from "Borer Wars", Dave Kain & Art Agnello, Scaffolds, V22, N21, August 12, 2013. Dept. Entomology, Geneva.

A Tale Of Two Seasons and Wondering About 2014

By Art Agnello and Dave Kane. Cornell Dept. Entomology. Kevin Iungerman, ENYCH.

Coming into 2013, most people in the fruit business were a little apprehensive about what to expect. We all recalled the incredibly early start to tree and insect development in 2012, with degree-day accumulations up to a month ahead of "normal" early in the season and still 2–3 weeks ahead, in terms of degree-days at the end. And of course, there was the horrid frost damage.

Looking back, insect development in 2012 was not only ahead of schedule in some cases, but also exhibited unusual patterns. *Plum curculio* probably came and went fairly early without much notice or fruit damage. July-August came on hot and dry, dissimilar to 2013, but much like 2011. European red mites threatened to take off in a few orchards and woolly apple aphids were evident here and there. Japanese beetles made their appearance but left little damage in their wake. Apple maggot was almost nowhere to be found most of the summer until a few August rains briefly produced a small bump in numbers. Potato leafhoppers however did come through in a couple of waves, making the case for control sprays in some younger plantings.

Internal leps *seemed least disadvantaged with the strange season*, producing some of the earliest first flights ever seen (OFM as early as April 14 in Western NY, and May 4 for CM). And the prolonged warm temperatures promoted a 4th generation OFM flight in more advanced sites like Long Island (especially in peaches), and a 3rd CM generation flight statewide. Obliquebanded leafroller, though, seemed to fare less well, and was basically confined to one very early, heavy, long flight in Geneva, and 2nd flight never materialized beyond marginal straggling numbers. Redbanded leafroller numbers looked similar.

That being the year that was, it was no wonder there was a sense that anything was possible for 2013: perhaps something more resembling the southeastern states rather than our good "old fashioned" (if non-standard) New York summers of yore. We had all heard the worries over 'light' control programs last year, pests that had had extra flights, and we saw a cold-but-not-epic winter as regards temperatures - all of which might have presaged a monumental insect resurgence this year. Even as the spring proceeded in its slow, gradual, and even boring sequence of non-dramatic crop & pest development stages, there remained a tendency to glance over one's shoulder to be sure nothing was sneaking up on us. As fortunate had it, that did not occur

The prebloom period in 2013 was cool and not too rainy, and though pollination weather flirted with frosts, bloom was abundant, and the results greatly acceptable. As to pests, the Early ones seemed to have slept in and we somehow reverted to pest business as usual, just another "normal" NY season. There were though several twists: June into early July produced too-much-rain, complicating disease control and

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A Tale of Two Seasons, continued from p. 5

thinning; real summer temperatures didn't occur the end of June and into the first half of July – and it was pretty extreme with both high heat and humidity, and sunburn; then the heat retreated for the next 6 weeks, more suggestive of early September than mid-summer. In sum, not quite the old normal, but considering season launch and early patterns, it couldn't have been more dissimilar to 2012!

And fortunately, the insect pests did not explode, although they weren't actually absent. In fact, the insect scene was more predictable (or unpredictable in its relatively normal way). Our spring was nice and gradual, almost excessively, so the early season pests were not particularly challenging then nor similarly through bloom and fruit set. We hardly saw any **mites,** or **pear psylla**, or **curculios**; however, **San Jose scale** infestations were a common sight, as well as **potato leafhoppers, woolly apple aphid**. Summer pest populations fell into the "typical" category; **Codling moths** and **oriental fruit moths** did not overrun the countryside, but they were out there in all the usual spots, the same as **leafrollers**. **Apple maggot** took its time in emerging and seems to yet have additional curtain calls before it will be finished.

The invasive pest species took up much more of our attention and apart from very limited areas haven't quite registered at the crisis level just yet, but the steady progression northward of **Brown Marmorated Stink Bug** should probably be taken as a sign of things to come. It finally began showing up in traps in western NY this year, albeit in low, sporadic numbers. (And perhaps now "visible" because of the true pheromone lures which were new this year). More eastern NY sites are experiencing fruit damage this year, including further north into Columbia Co., so we expect this trend to continue. **Spotted wing drosophila** has become a more universal, and urgent, concern, although mostly for berry growers; our cherry and peach plantings seem to have escaped any notable damage this time, but next season could be different if the fly's first occurrence date continues to advance each year. Overall, something old and something new... once the harvest is in, we take a breather, and start wondering what 2014 will bring!

Article adapted from Scaffolds, Fruit Journal, "Roll Call" Dave Kain & Art Agnello, V22, N24, September 3, 2013; "2013 Fruit Arthropod Pest Review", Art Agnello, V22, N23, August 26; and "The Long, Hot Summer," Dave Kain & Art Agnello, V21, N25, August 27, 2012. Cornell Dept. Entomology, Geneva, NY.

A Tale of Two Season: Orchard Pests in 2013 and 2012

Geneva Pest Events	2013 Date & Degree Days (Base 43 F)		2012 Date & Degree Days (Base 43 F)	
Apple Maggot				
1st catch	12-Jul	1732	29-Jun	1697
Peak	15-Aug	2611	23-Jul	2449
American Plum Borer				
1st catch	16-May	399	7-May	491
1st flight peak	16-May	399	14-May	598
1st flight subsides	8-Jul	1610	21-Jun	1489
2nd flight start	25-Jul	2126	9-Jul	2019
2nd flight subsides	na	na	20-Aug	3251
Codling Moth				
1st catch	16-May	399	4-May	455
1st flight peak	3-Jun	770	17-May	656
1st flight subsides	11-Jul	1707	25-Jun	1601
2nd flight start	22-Jul	2057	16-Jul	2238
Green Fruitworm				
1st catch	4-Apr	39	9-Apr	282
Peak	15-Apr	82	12-Apr	291
Flight subsides	20-May	465	23-Apr	396
Lesser Peachtree Borer				
1st catch	20-May	465	15-May	618
Obliquebanded Leafroller				
1st catch	10-Jun	883	28-May	924
1st flight peak	17-Jun	1021	25-Jun	1601
1st flight subsides	22-Jul	2057	23-Jul	2449
2nd flight begins	12-Aug	2549	na	na
Oriental Fruit Moth				
1st catch	6-May	267	16-Apr	330
1st flight peak	6-May	267	16-Apr	330
1st flight subsides	10-Jun	883	4-Jun	1072
2nd flight begins	1-Jul	1391	21-Jun	1489
2nd flight peak	8-Jul	1610	29-Jun	1697
3rd flight begins	12-Aug	2549	26-Jul	2547
Redbanded Leafroller				
1st catch	25-Apr	157	20-Mar	159
1st flight peak	2-May	195	16-Apr	330
1st flight subsides	28-May	603	28-May	924
2nd flight begins	na	na	25-June	841
San Jose Scale - adult males				
1st catch	23-May	554	4-May	455
1st flight subsides	17-Jun	1021	25-May	841
2nd flight begins	22-Jul	2057	5-Jul	1895
2nd flight peak	5-Aug	2376	23-Jul	2449
Spotted Tentiform Leafminer				
1st catch	29-Apr	194	16-Apr	330
1st flight peak	6-May	267	26-Apr	399
1st flight subsides	30-May	648	31-May	1012
2nd flight begins	24-Jun	1192	7-Jun	1115
2nd flight peak	15-Jul	1824	25-Jun	1601
3rd flight begins	12-Aug	2549	23-Jul	2449
3rd flight peak	22-Aug	2782	9-Aug	2970

This table summarizes comparative listings of some of the pest events (for the "usual" species) that occurred this season (in Geneva) in comparison with the timing of last year, along with degree-day accumulations with these events, at Base 43 F.

Table prepared by K. Iungerman, CCE NENYCH, September 9, 2013. Information derived from Scaffolds, Fruit Journal, Geneva, NY. V22, N24, September 3, 2013, and V. 21, N25, August 27, 2012.