Painless and Efficient Apple Maturity Testing

Win Cowgill, Agricultural Agent and Jon Clements, Extension Tree Fruit Educator, University of Massachusetts

Our observation has been that few growers utilize the Starch Index (SI) method of determining harvest maturity. Perhaps SI testing is perceived as time consuming and difficult to properly judge. We contend, however, that SI testing is the best and easiest indicator of apple maturity that a grower can use to plan their harvest and storage regimes.

Why is it important to perform SI testing? First, as mentioned, the SI method is probably the best way to judge fruit maturity without expensive equipment. The SI technique, wherein the starch to sugar ratio is measured, is correlated with ethylene evolution. In fact, ethylene synthesis occurs as fruit ripens. Therefore, the SI index is an inexpensive way to assess the degree to which fruit has converted starch to sugar, and is indicative of the onset and progress of ethylene production.

Secondly, because SI is a reliable indicator of relative fruit maturity, SI testing can help you determine if harvested fruit should be placed in early CA, late CA, or regular cold storage. Remember that, as a rule, fruit with SI readings of 3-4 are suitable for late CA, apples measuring 4-6 on the SI scale are best for early CA, and any fruit reading 6 or above should be placed in regular cold storage or marketed immediately. Of course, reliability in using the SI method for determining apple maturity is predicated on good sampling techniques, i.e.; looking at fruit that has sufficient size and color. Or, in other words, sample apples that you expect are approaching harvest readiness. (Note: Apples going into late CA (available in April-June, etc.) should not average less than 15 lbs. flesh firmness.)

Dr. George Green, Pennsylvania State University, has more details on harvest maturity in the Pennsylvania Tree Fruit Production Guide at http://agsci.psu.edu/tfpg.

He also offers the following “Over the years charts have been developed for many varieties but some charts went from 1 to 5 while others went from 1 to 7. There was much confusion so the postharvest physiologists at Cornell University have developed a more universally accepted chart that is useful for all varieties.

It was used by researchers in over 20 states in the national apple cultivar-testing program http://www.ne183.org

See Apple Maturity Testing on page 2
Cornell has an excellent publication available to help you use the starch-iodine test and to develop an apple maturity program. The publication also contains a laminated starch iodine chart to aid in interpreting the tests. I strongly suggest that anyone seriously interested in harvesting high quality apples with good storage potential download a copy of this publication, ‘Predicting Harvest Date Windows for Apples (1992)’ Information Bulletin 221 at http://ecommons.library.cornell.edu/handle/1813/3299

Full-color plates show how to use and interpret the starch-iodine test for determining maturity and the best harvest dates for quality, especially important for apples going into storage. It covers McIntosh, Cortland, Empire, Delicious, Mutsu/Crispin, and Idared; dates for other varieties can be interpreted from the information presented. 20 pages. Cost $5.50. This publication can be ordered from Cornell University by calling 607-255-2080 and using a Master Card or VISA credit card to pay for the pub or ordered online at:
http://ecommons.library.cornell.edu/handle/1813/3299

Specific starch charts have also been developed for:
Gala http://www.umass.edu/fruitadvisor/clements/articles/gala.jpg
Liberty, http://www.umass.edu/fruitadvisor/clements/articles/gala.jpg
Cortland http://www.umass.edu/fruitadvisor/clements/articles/cortland.jpg
Mutsu http://www.umass.edu/fruitadvisor/clements/articles/mutsu.jpg

Having tested tens of thousands of apples over the years per numerous experimental protocols, we can now suggest a simple, quick and efficient method for evaluating orchard by orchard or block by block SI apple samples. Here is our quick and simple testing technique:

Equipment consists of a one quart hand-operated spray bottle filled with SI solution, a pocketknife, and a Starch Index chart. It's most important to just use the chart and begin sampling and testing the fruit two weeks before anticipated harvest to get a baseline on the maturity.

The procedure is simple -- pick a sample of apples that appear ready to harvest, based on size, color, days after full bloom, and taste. Spray the SI solution on longitudinally halved fruit, wait one to one and one-half minutes, and make your readings based on the SI chart. The whole process is portable, quick, simple, and saves SI solution compared to dipping individual apple in a solution filled pan.

It is important to keep good records on your maturity determinations by cultivar and block. You will start to build a good database of harvest maturity information for your orchard.

Although the SI is a reliable gauge of many cultivars, such as McIntosh, Empire, Jonathan, Red and Golden Delicious and Macoun, some cultivars do not respond as well to the SI test. Examples include Gala, Honeycrisp, and Fuji, which do not respond well to the SI rating, and should be gauged using background color, soluble solids content, and flesh firmness.

Background color is a very good maturity indicator on Gala and will provide the grower with an accurate maturity gauge. Red color, flesh firmness and soluble solids are not as reliable an indicator of maturity as is background color on this cultivar. Fruit should be harvested for optimum long-term storage quality when the background color of the fruit is changing from a green to yellow color. After that, the background color changes from yellow to cream. It is at this stage that the fruit is ready for immediate sales or short-term storage. Galas will require multiple pickings for optimum fruit quality. Background color is also one of the best indicators of maturity for Fuji cultivars.

Here are some additional resources on fruit maturity testing and for purchasing/making supplies for doing the SI test, including SI Test solution and charts. Also, contact Win Cowgill (cowgill@NJAES.rutgers.edu) or Jon Clements (clements@umext.umass.edu) if you have further questions or need more information.

From the Ontario Ministry of Agriculture, Food, and Rural Affairs, two publications on using the SI test, including directions for making the solution and charts for McIntosh, Delicious, Empire, Idared, and Spartan:
http://www.omafra.gov.on.ca/english/crops/facts/00-025.htm
http://www.omafra.gov.on.ca/english/crops/facts/00-027.htm

For purchasing SI Test solution and charts
Cascade Analytical, 800-545-4206, http://www.cascadeanalytical.com
Fruit IPM

Dean Polk, Fruit IPM Agent and David Schmitt, Eugene Rizio and Atanas Atanassov, Ph.D., Program Associates, Tree Fruit IPM

Peach

✔ Oriental Fruit Moth (OFM): Degree day timed treatments for the third brood have now past in all areas of the state. Fortunately, the population is also very low in most locations. For the remainder of the season, growers should treat this pest only if trap counts remain above 6 males per trap 7-10 days after an insecticide spray, depending on the weather, and the type of insecticide used. In southern counties, growers have about 14 days at the most to be concerned with insecticide use for OFM, since virtually all varieties will be harvested by the end of the month, and pre-harvest intervals must be observed.

✔ Brown Marmorated Stink Bug (BMSB): No significant increase in populations or activity has been since last week.

✔ Tufted Apple Budmoth (TABM): If TABM has been a problem, and trap counts were high during the first generation, then plan on treatments for the second generation. Timings for these sprays are as follows:

<table>
<thead>
<tr>
<th>County Area</th>
<th>Conventional, Diamides</th>
<th>Conventional, Diamides</th>
<th>Intrepid, Rimon</th>
<th>Bt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Southern</td>
<td>3rd 8/1-8/5; 4th 8/8-8/10</td>
<td>2nd 8/4-8/6</td>
<td>2nd 8/4-8/6</td>
<td>2nd 8/2-8/4; 3rd 8/9-8/12</td>
</tr>
<tr>
<td>Central</td>
<td>3rd 8/4-8/5; 4th 8/11-8/12</td>
<td>2nd 8/6-8/9</td>
<td>2nd 8/6-8/9</td>
<td>2nd 8/4-8/6; 3rd 8/11-8/14</td>
</tr>
<tr>
<td>Northern</td>
<td>1st 7/27-7/28; 2nd 8/2-8/4</td>
<td>1st 7/29-8/1</td>
<td>1st 8/1-8/4</td>
<td>1st 8/1-8/4</td>
</tr>
</tbody>
</table>

✔ Brown Rot: Brown Rot is appearing in mid to late season varieties in southern county orchards. Although it has been relatively dry, humidity has been high and many split or damaged pits are present. In addition some varieties may have had latent infections in the spring and symptoms are just now appearing. These blocks will provide inoculum that can move into ripening blocks. Growers should be on at least a two spray pre-harvest rot management program using the rotations that have been discussed in previous newsletters.

Apple

✔ Codling Moth (CM): All timings for CM sprays have past in all areas of the state. However sprays may not be over. Growers who have had a history of CM injury should maintain coverage with very effective materials. Most of the materials used for TABM control, except for BT should control CM. BE sure to adjust the rate since in some cases it is higher for CM control than TABM.

Grape

✔ Grape Berry Moth (GBM): The recommended treatment timing in southern counties has passed in southern counties. Evaluate control over the next week to 10 days.

✔ Grape Root Borer (GRB): Trap counts increased since last week, showing more significant populations in some vineyards. If you have a GRB population in your vineyard, then treatments should be made as soon as possible. Use 4E @ 4.5 pt/100 gal, or Lorsban Advanced @ 4.5 pt/100 gal, or Lorsban 75W @ 3lb/100 gal.

Scouting Calendar

The following table is intended as an aid for orchard scouting. It should not be used to time pesticide applications. Median dates for pest events and crop phenology are displayed. These dates are compiled from observations made over the past 5-10 years in Gloucester County. Events in northern New Jersey should occur 7-10 days later.

<table>
<thead>
<tr>
<th>Pest Event or Growth Stage</th>
<th>Approximate Date</th>
<th>2012 Observed Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pit Hardening Peach</td>
<td>June 16 +/- 8 Days</td>
<td>June 13</td>
</tr>
<tr>
<td>3rd Pear Psylla Hatch</td>
<td>June 28 +/- 1 Days</td>
<td>About July 2</td>
</tr>
<tr>
<td>San Jose Crawlers 2nd Generation</td>
<td>July 21 +/- 5 Days</td>
<td>July 18</td>
</tr>
</tbody>
</table>

Captures Southern Counties

<table>
<thead>
<tr>
<th>Date</th>
<th>GBM</th>
<th>GRB</th>
</tr>
</thead>
<tbody>
<tr>
<td>6/9</td>
<td>0.29</td>
<td>0</td>
</tr>
<tr>
<td>6/16</td>
<td>0.43</td>
<td>0</td>
</tr>
<tr>
<td>6/23</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>6/30</td>
<td>3.29</td>
<td>.8</td>
</tr>
<tr>
<td>7/7</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>7/14</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>7/21</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>7/28</td>
<td>1</td>
<td>14</td>
</tr>
</tbody>
</table>

See Trap Counts on page 4
In 2003, Cornell University released a red wine grape known as ‘GR 7’. The name stood for “Geneva Red” as it was one of a series of red wine grapes (GR 1 to GR 8) from the Geneva Experiment Station to be extensively tested during the 1960s and 1970s. Since it was targeted primarily for blending wine production at the time of its release, it was simply given the official name ‘GR 7’, as it had been known until that time.

Since its release, members of the grape and wine industry have asked for a more marketable name to be applied to ‘GR 7’ because the name ‘GR 7’ causes confusion among consumers not accustomed to abbreviated names, and since even with blends, wineries often list the names of varieties used on the back of the label. In response to the requests we’ve received, we have therefore decided to simply re-name ‘GR 7’ officially as ‘Geneva Red’. The United States Tax and Trade Bureau has already approved this name for use on wine labels.

If you have any questions about ‘Geneva Red’, please direct them to Bruce Reisch (viticultural aspects) bruce.reisch@cornell.edu, or to the Wine Analysis Lab (enology) NYSWAL@cornell.edu. If you would like to acquire a license to propagate and sell this Cornell variety, please contact Jessica Lyga JML73@cornell.edu at the Cornell Center for Technology Enterprise Commercialization.

Submitted by Jerome L. Frecon, Member and Agricultural Agent.
Preparing Your Farm Food Safety Plan
Part 10: Field Harvest and Field Packing Activities
Meredith Melendez, Mercer County Senior Program Coordinator and Wesley Kline, Ph.D., Cumberland County Agricultural Agent

Part 2 of your farm food safety plan addresses field harvest and field packing activities. Your plan should document your activities and your pre-harvest assessment log. Field harvest assessment should be made the day prior to starting to harvest to ensure everything is in place to reduce the chance for product contamination. We covered the specifics of the pre-harvest assessment log in article number 6 of this series. If a field is harvested over several days each morning the assessment is repeated.

✔ The following statements should be included in your Field Harvest and Field Packing Activities section:
✔ Pre-harvest assessments are made the day prior to harvest begins.
✔ Fields harvested for more than one day will be assessed each day.
✔ Employees take necessary precautions to avoid contamination of produce.
✔ The number, condition and placement of field sanitation units comply with OSHA and WPS safety requirements.*
✔ These field sanitation units are always located in a safe area that poses no potential risk for contamination.
✔ If there is a spill or leak from the field sanitation unit, a soil berm is constructed around the unit and the service company is immediately contacted.
✔ Indicate the method of harvest that is used on the farm.
✔ During harvest, all equipment and harvesting containers are kept clean and are sanitized before use in the spring.
✔ During the production season containers are checked and cleaned/sanitized as needed.
✔ If hand harvesting knives or clippers are used: Hand harvesting equipment is kept clean and sanitized daily with a chlorine solution.
✔ All equipment and harvesting machinery that comes in contact with the produce is kept in good repair.
✔ All light bulbs and glass on the harvesting equipment are protected to ensure that contamination of the fields does not occur if the glass breaks.

✔ If glass does break, the contaminated area will not be harvested and any product that had been harvested from the area will be placed in plastic bags and removed from the field.
✔ If other products such as chemicals, petroleum, or pesticides contaminate the produce, the affected area and a five-foot buffer is not harvested.
✔ Harvest baskets and totes are used only for picking.
✔ Any container that is broken is either discarded or painted another color and marked not for harvesting.
✔ When field packing produce only new cartons are used.
✔ No water is applied to harvested product in the field. Note: water can be used, but it must be microbiologically safe.
✔ Wagons and trailers used at the farm are kept clean from dirt and debris before the loading process.
✔ Products moved from the field are always covered.

*The number of field sanitation units and rest rooms depends on the number of employees that you have working on a daily basis at that location. One unit is required per 20 employees.

This is the tenth article in a series dedicated to preparing a farm food safety plan. For previous articles refer to earlier editions of the Plant and Pest Advisory, or visit the Rutgers Vegetable Crops blog at: http://jerseyveggcropsagupdates.blogspot.com. Remember you may not need a third party audit; it depends on who is purchasing your produce. However, everyone should have a food safety plan.

Next week: House Packing Facility.
**Calendar of Events**

August 7, 2012, 1:00 – 3:30 pm. **Orchard Pollinator Field Day.** At Penn State Fruit Research & Ext. Center, 290 University Dr., Biglerville, PA. Sponsored by Penn State Coop. Ext. Contact Katie Ellis at kag298@psu.edu for more information.

August 24, 2012, 8:30 am – All Day, **Summer Plant Symposium,** at Rutgers Gardens, Log Cabin Rd., New Brunswick, NJ 08901, Sponsored by New Jersey Nursery and Landscape Association. Website [www.summerplantsymposium.com](http://www.summerplantsymposium.com). Contact Dominick Mondi, 609-291-7070 or njnla.director@gmail.com

August 29, 2012, 3:00 – DUSK. **Tomato Tasting.** Rutgers Snyder Farm, 140 Locust Grove Rd, Pittstown, NJ. Contact Joanne Stevely, stevely@aesop.rutgers.edu. (908) 730-9419 RSVP website: [http://snyderfarm.rutgers.edu/tomatoes.html](http://snyderfarm.rutgers.edu/tomatoes.html). Event will be held Rain or Shine - Fee is $7.00.

December 4-6, 2012, no times as of yet, **Great Lakes Fruit, Vegetable & Farm Market EXPO,** DeVos Convention Center, Grand Rapids, Mich. For more info visit: [www.glexpo.com](http://www.glexpo.com)

January 10-13, 2013, no times as of yet, **Southeast Regional Fruit & Vegetable Conf.,** International Trade & Conv. Center, Savannah, GA. For more info call 877-994-3842 or visit: [www.gfvga.org](http://www.gfvga.org).

**Here’s What’s Happening at NJ IR-4**

*Cesar Rodriguez-Saona, Ph.D., Specialist in Blueberry/Cranberry Entomology*

The IR-4 Project is “a cooperative program of the USDA and the SAES, with the principle goal of developing data to support and to expedite regulatory clearances of newer, reduced risk pest control products for specialty crop growers.” More information on the IR-4 Project can be found at [http://ir4.rutgers.edu](http://ir4.rutgers.edu). As the IR-4 liaison for the state of New Jersey, my main responsibility is to represent the pesticide needs of minor crops in New Jersey at the IR-4 Food Use Workshop meeting.

This year, the IR-4 Food Use Workshop will take place on Tues.-Wed., Sept. 11-12, at the St. Louis Union Station Marriott, downtown St. Louis, MO. New projects must be submitted no later than August 15. These projects will be discussed at the workshop in September. If you would like to submit a project, visit the IR-4 website listed above and click on “Submit a Request”. Nominations for projects can be done August 17-30. I will represent New Jersey grower needs at this workshop. Please let me know if you are submitting a request, and whether you plan to attend the meeting. That way I will be aware of all the projects being submitted and attendees from New Jersey, and thus be better prepared to support your requests.

Please feel free to contact me if you have any questions at 609-726-1590 x 4412, or e-mail me at crodriguez@aesop.rutgers.edu.
Farmers Against Hunger Event and Garden Field Day

On Saturday, August 18, The EARTH Center, home to Rutgers Cooperative Extension of Middlesex County, New Jersey will host their Garden Field Day/Open House from 9 AM to 3 PM. The event will take place in Davidson’s Mill Pond Park, 42 Riva Ave. South Brunswick, NJ and is great day of fun for the family in a beautiful park setting.

The Extension Agriculture Department as well as Rutgers Master Gardeners will be on hand, offering sound advice on horticulture and environmental stewardship while guiding visitors through their various teaching gardens and learning projects. Examples of their work include the Children’s Garden with Green Roof playhouse, an enormous vegetable display garden, environmentally conscious rain garden and the popular Butterfly House.

New to the day for 2012, will be the Walk-A-Farm & Feast to Fight Hunger, an organized walk around the park to raise funds for the New Jersey Agricultural Society’s Farmers Against Hunger Program (a 501c3 non-profit organization).

The walk will take people around the trails of Davidson’s Mill Pond Park to points of interest occupied by local organizations including but not limited to the Middlesex County Board of Agriculture, The Lawrence Brook Watershed Partnership, Middlesex County’s Mosquito Commission, Farmers Against Hunger, Middlesex County Improvement Authority’s MC Blue, the Recycling Robot and the East Coast Greenways.

Available food at the event will be in the form of a Feast to Fight Hunger. Applebee's of Milltown will donate grilled items and a staff to cook and serve the food. Side dishes will be donated by local farms and prepared by Elijah's Promise culinary program.

The EARTH Center’s Garden Field Day attendance is free, however, prices to participate in the Walk A-Farm & Feast Against Hunger and receive its benefits are as follows:

**Walk-A-Farm:**
- Adult  $12 (T-Shirt included with Pre-Registration)
- Child  $12 (T-Shirt included with Pre-Registration)
- Child  $ 5 (T-Shirt not included)
- Family 2 adults + one/two children $25 (2 shirts included with Pre-Registration)

**Feast Against Hunger:**

Pre-Registration ends on Aug. 12. Attendees can register on the day of the event, however, T-Shirts will not be guaranteed. Register by contacting Kris Gutta-dora at 609-462-9691, e-mailing farmersagainsthunger@gmail.com or visiting the Farmers Against Hunger booth at the Middlesex County Fair. Registration fees will benefit Farmers Against Hunger program Society (a 501c3 non-profit organization).

Also part of the EARTH Center Garden Field Day, the Second Annual “Greatest of the Garden” competition will take place, so gardeners are encouraged to bring along their biggest or most outstanding home grown produce to win prizes and recognition. This will give residents a chance to show off their green thumbs to fellow gardeners… Attendees are encouraged to bring their homegrown entries for the following categories: Biggest Tomato, Biggest Cucumber, Biggest Zucchini; Biggest Pumpkin; Biggest Squash; Biggest Water Melon; Biggest Sunflower Head; Longest Gourd; Smallest Pumpkin; Smallest Cherry Tomato; Oddest Heirloom Tomato; All Vegetables..Best Likeness to Celebrity or Historical Figure and Hottest Pepper Variety Grown (judged by Scoville ratings)

Garden Field Day attendees can also enjoy samples of locally grown produce courtesy of Middlesex County farmers, while enjoying the sounds of acoustic musicians, “Off the Grid”. There will be “green” living displays including talks on Compost Tea and kids can meet MC Blue, the recycling robot.

For more information and participation contact David Smela at 732-398-5268 or at: david.smela@co.middlesex.nj.us www.co.middlesex.nj.us/extensionservices.
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