UMass Extension
Healthy Fruit
Prepared by the University of Massachusetts Fruit Program

Healthy Fruit, Volume 20, Number 11. June 12, 2012

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Current (through June 11) degree day (DD) accumulations

Location: UMass Cold Spring Orchard, Belchertown, MA

Base 43: 1225 Base 50: 824

Upcoming pest events

based on current DD accumulations: Base 43 at 1225 on 11-June

Cherry fruit fly 1st catch	775-1289
Lesser appleworm 1st flight subsides	990-14666
Oriental fruit moth 2nd flight begins	1286-1507
Obliquebanded leafroller summer larvae hatch	1038-1460
Apple maggot 1st catch	1235-1653
Codling moth 1st flight subsides	1280-1858

Orchard Radar key dates

Below are key dates for insects and mites from Glen Koehler's (U. of Maine) Orchard Radar output from Belchertown, MA. You can look at Orchard Radar for Belchertown here: http://pronewengland.org/AllModels/MAmodel/RADARMA-Belchertown.htm

Codling moth (CM): Codling moth development as of JUNE 12: 1st generation adult emergence at 90% and 1st generation egg hatch at 49%. In most orchards, insecticide targeting plum curculio and apple maggot prevent codling moth damage. If targeted codling moth control needed, key management dates are: 1st generation 3% CM egg

hatch: MAY 26, Saturday = target date for first spray where MULTIPLE sprays needed to control 1st generation CM. 1st generation 20% CM egg hatch: MAY 31, Thursday = target date where ONE spray needed to control 1st generation CM.

Obliquebanded leafroller (OBLR): 1st generation OBLR flight begins around MAY 26, Saturday. Where waiting to sample late instar OBLR larvae is NOT an option (= where OBLR is known to be a problem, and will be managed with insecticide against young larvae): Early egg hatch and optimum date for initial application of B.t., Delegate, Altacor, Proclaim, Intrepid, Rimon, Belt, pyrethroid or other insecticide against OBLR (with follow-up applications as needed): JUNE 13, Wednesday.

Oriental fruit moth (OFM): 1st generation 55% egg hatch and first treatment date, if needed: MAY 16, Wednesday. 2nd generation OFM flight begins around: JUNE 18, Monday. 2nd generation - first treatment date, if needed: JUNE 26, Tuesday. 2nd generation - second treatment date, if needed: JULY 9, Nondday.

Spotted tentiform leafminer (STLM): 2nd STLM flight beings around: JUNE 1, Friday. Rough guess of when 2nd generation sap-feeding mines begin showing: JUNE 24, Sunday. Optimum first sample date for 2nd generation STLM sap-feeding mines is JULY 2, Monday.

Apple maggot fly (AMF): Rough guess of date of first AMF are caught on traps is: TUESDAY, June 19.

Upcoming meetings

June 18: Twilight Meeting: Perishable Retailing. South Kingston Land Trust Barn, 17 Matunuck Beach Rd., South Kingston, RI. 5:30 - 8:30 PM. Contact Heather Faubert for more information (hhf@uri.edu, 401-874-2967) or see Upcoming Events on the UMass Fruit Advisor (http://umassfruit.com)

July 16: Massachusetts Fruit Growers' Association Summer Meeting, UMass Cold Spring Orchard, Belchertown, MA

July 26-27: International Fruit Tree Association 2012 Quebec Study Tour, Montreal PQ, Canada. More information: http://www.ifruittree.org/?page=2012StudyTour

The way I see it (J. Clements)

I found **potato leafhopper (PLH)** on young apple trees yesterday, so begin looking for this pest, particularly on young plantings. See Scaffolds re-cap for treatment options. Also, caught **lesser peachtree borer** in pheromone traps this week -- mating disruption (MD), which is the best option for controlling this significant peach pest, should be in place now. No **greater peachtree borer** yet, however, the MD will take care of this too when they start flying. No dogwood borer caught in traps yet, it is a little early. Consider using the new MD for this pest too. Finally, insect-wise, beginning anytime now is a good time to apple sprays for **obliquebanded leafroller (OBLR)** as the larvae are

hatching. Delegate, Proclaim, Altacor, Belt, and Voliam Xpress are all excellent OBLR insecticides at this timing.

You should be including NAA and calcium in the next 3-4 summer sprays (depending on variety). NAA to enhance return bloom (2-3 oz./acre) and calcium to reduce the incidence of bitter pit and other fruit breakdown-related disorders. See the Fact Sheets on the UMass Fruit Advisor (umassfruit.com) for more information.

Scaffolds re-cap

Summarized from Scaffolds Fruit Journal, June 11, 2012. http://www.scaffolds.entomology.cornell.edu/index.html

Potato leafhopper (PLH) a migrant pest that arrives now from the south and continues to show up throughout the summer. PLH feeds on young leaves and they inject a toxin which causes the leaves to yellow, curl, and look 'stunted.' Damage is more serious on young trees vs. old trees because it stops shoot growth. Young trees should be sampled weekly by examining 50-100 leaves on terminal shoots. PLH's are green and move sideways. There is no economic injury level established, however, the pest cannot be tolerated in 1st- and 2nd-leaf young plantings. Otherwise, one adult per leaf is considered to be the action threshold. Provado/Admire Pro at moderate rates (app. 1 oz. per 100 gallons) is the gold standard for control, however, relatively frequent applications (2-week intervals?) are necessary. Other excellent control options include Assail, Actara, Calypso, and Belay.

Powdery mildew (PM) of apple is turning into a significant pest this year. The mild winter, dry spring, reduced use of SI fungicides for scab, and favorable conditions for further development of PM are likely contributing to the high incidence of PM this year. If SI's were used during the pre-bloom scab sprays and PM is still evident, resistance to the SI's may be an issue too. If PM is still infecting shoots, then sulfur sprays at 10-14 day intervals until shoot growth stops are indicated. (Ed. note: in Massachusetts, Luna Sensation also provides very effective mildew control.) Consider also the roles of: susceptible cultivars (Gingergold, Honeycrisp); failure to apply proper fungicide(s) such as SI's before petal fall; failure to maintain fungicide coverage after petal fall; and, generally poor spray coverage, which is particularly important for controlling PM.

Guest article: Sunburn on Apples

Dr. Jozsef Rackso, Tree Fruit Coordinator & Outreach Specialist, Ohio State University
Reprinted from Ohio Fruit ICM News, Vol. 16, Issue 5. June 11, 2012
http://go.osu.edu/OhioFruitNews

From the 1990's, as apple growers adopted high-density plantings on size-controlling rootstocks, which considerably enhanced direct sun exposure of the fruit, the incidence of sunburn in apples increased markedly.

Currently, 6 to 10% crop loss can be calculated in Ohio in unprotected orchards on dwarfing rootstocks. Besides the primary external damage caused by pre-harvest

exposure of the fruit to elevated solar radiation, sunburn may predispose affected fruit to other physiological disorders such as watercore, bitter pit, 'Fuji' stain, lenticel marking, sunburn scald in 'Granny Smith', internal browning, or to various pathogens that may gain entrance into the fruit through the affected area.

Types of damage

Sunburn is a physiological disorder of apple fruit, which is produced by over-exposure to solar radiation. Based on the symptoms and the components of solar radiation by which they are induced, three distinctly different types of sunburn exist:

Sunburn browning is the most prevalent type occurring on sun-exposed fruit, and is caused by the concomitant action of radiant heating and UV-B exposure. It occurs when fruit surface temperature reaches 113° to 120° F (depending on varieties), the ambient air temperature is generally 86° F or higher. The symptoms are yellowish, brownish patches on the sun-exposed side of the fruit. The discoloration associated with sunburn browning has been correlated to alterations in the pigmentation of the peel, i.e. decreases in chlorophyll and anthocyanin concentrations and increases in carotenoid and flavonol concentrations in the peel. Damage occurs on the surface of the fruit but do not penetrate into the core tissues.

Sunburn necrosis is a pure thermal death of the skin and underlying flesh tissues of the fruit caused by excessive radiant heat. It occurs when the fruit surface temperature reaches 126° F. for as short as 10 minutes. No light exposure is necessary for the formation of this type of sunburn. Symptoms are generally dark brown necrotic spots on the exposed fruit surface.

Photooxidative sunburn is the third type, which develops on previously shade-grown fruit upon sudden exposure to the direct sun. These apples are not acclimated to high sunlight; they have been covered by leaves or other fruits within a cluster or even located inside the canopy. Exposure can occur after hand thinning or selective picking, after shifting of a branch as fruit load increases, after summer pruning or even after leaving harvested apples uncovered in the bins after harvest or during transit to the packing shed

Photobleaching of the suddenly exposed fruit surface causes white discoloration, which can easily turn to necrotic spots .

Factors affecting damage incidence

From the above sunburn types, sunburn browning has the greatest economic importance, while sunburn necrosis and photo-oxidative sunburn generally do not cause significant crop loss in apple orchards. Damage incidence depends on cultivar susceptibility and various cultural management practices. While 'Honeycrisp', 'Granny Smith' and 'Jonagold' seem to be susceptible to sunburn, 'Gala' and 'Jonathan' damage less. 'Red Delicious', 'Fuji' and 'Golden Delicious' are somewhere in between, regarding susceptibility. Sunburn injury appears to be more prevalent on dwarfing rootstocks (e.g. on B.9 or M.9) in high-density plantings because of the greater degree of fruit exposure than in conventional (lower density) planting systems. Also, trees in NS row orientation seem to produce more fruit with sunburn damage than trees planted in E-W orientation. In N-S row direction, fruit located on the western side of the row are in

shade of the canopy in the morning while eastern fruit are exposed in this period. At this time, i.e. in the morning, air temperatures and thus fruit surface temperatures usually do not exceed the threshold temperatures at which fruits are damaged.

Suppressing sunburn
As sunburn symptoms do not disappear once formed, their protection methods involve prevention only. Sunburn formation can be prevented three different ways;

1. *Climate ameliorating techniques* reduce fruit surface temperature, and therefore the possibility of the formation of heatdependent types of sunburn (sunburn browning and sunburn necrosis). These techniques involve evaporative cooling, the use of shading nets and fruit bagging. Evaporative cooling (EC) involves applying water to trees, preferably through overhead sprinklers in order to reduce heat stress. Besides its apparent benefits in many cultivars for sunburn control and fruit color improvement, other factors should be considered before investing and starting to operate an EC system; such as high cost of installation and high water requirement, an EC system must also be subjected to regular check-ups.

Shading or hail nets are primarily installed for preventing hail and bird damage, but it has great efficacy in preventing sunburn damage by reducing the intensity of direct solar radiation. The color of the net seems to be key aspect in the effectiveness of the shading net. Due to optical properties of the nets and specific needs of apple cultivars for light quality for color development, it was found that black nets are suitable for singlecolored green or bi-colored apple cultivars with good coloration or those otherwise susceptible to sunburn. Red nets are generally recommended for red cultivars.

Bagging of individual apple fruits was initially used to prevent fruit injury by insects and diseases, and to obtain a smooth finish of the apples, along with uniform skin color. As a positive “sideeffect,” bagging also protects apples from sunburn. This protection method has a high labor demand and it more common in Asia than in the US where labor costs are very high.

2. *Sunburn suppressants* are sprayable materials and have physical mode of action; they cover the fruit surface and change the optical properties of the cuticle by increased reflection or absorption, or by reduced transmission of the infrared, visible or ultraviolet radiation. There are two major types of suppressants are currently on the market: particle films and carnauba wax emulsion. Particle film technology was developed in the late 1990s for the application of aqueous formulations of chemically inert mineral particles to crop plants, including apples, to become a physical barrier to repel insects, reduce disease, infection, and provide protection from sunburn. Currently, there are various types of particle films available for sunburn control in apples based on their inorganic mineral content; it can be kaolin (Surround® WP, Cocoon™), talc (Invelop®) or calcium carbonate (PurShade, Eclipse™, Diffusion®). They have common specific characteristics that are: non-lipophilic and generally water-insoluble materials; and providing a white, highly reflective cover on the fruit surface resulting in an increased reflection of ultraviolet and infrared radiation, which are key aspects of reducing sunburn

incidence in apples. As the binding of these products on the cuticle is weak, reapplication is necessary after rainfall or wind-rubbing to maintain consistent coverage on the fruit surface. Besides their great efficacy for sunburn control, the major drawback of using particle films on apples is the difficulty of completely removing the white residues from the stem-end and calyx areas of the fruit at harvest.

Carnauba wax emulsion was invented at Washington State University, it contains emulsified carnauba wax, a natural plant wax, as a principal component, which decreases transmission of ultraviolet radiation, and addition of emulsified, organically modified clay to the wax emulsion enhances reflectivity. In contrast with particle film technology, this formulation provides a clean, rain-fast film on apples that is not washed off by rain or overhead irrigation, and does not require specific washing/brushing technology on the packing line to remove residue. It can be effectively combined with evaporative cooling (EC) for better sunburn control due to the combination of different modes of action; the wax emulsion protects the fruit from the harmful UV-B radiation while EC reduces fruit surface temperature.

3. *Chemical protectants* (vitamin C, vitamin E, anti-transpirants, etc.) have also been used to protect against sunburn with success. Recently, extensive research has been initiated at the Ohio State University to elucidate the physiology of sunburn control by abscisic acid under the direction of Valent BioSciences Corp. Results are promising, but the details of application (timing and concentration) have yet to be tested rigorously.

Sprayer calibration

Proper sprayer calibration means accurate pesticide application. If you would like to go over your sprayers calibration and spray pattern, let me -- Jon Clements -- know. I have the tools and expertise (at least I think I do!) to help you out. clements@umext.umass.edu, 413-478-7219.

Useful links

- UMass Fruit Advisor: http://umassfruit.com
- Scaffolds Fruit Journal: http://www.nysaes.cornell.edu/ent/scafolds/
- Network for Environment and Weather Applications (NEWA): http://newa.cornell.edu
- Follow me on Twitter (http://twitter.com/jmcextman) and Facebook (http://www.facebook.com/jmcextman)
- UMass Vegetable & Fruit IPM Network (on Facebook, https://www.facebook.com/umassipmteam)

The next Healthy Fruit will be published Tuesday, June 19 or thereabout, 2012. As always feel free to get in touch with any member of the UMass Fruit Team (http://extension.umass.edu/fruitadvisor/about/members) if you have questions or comments.