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Update on Pest Management and Crop Development

June 10, 2013

COMING EVENTS

	43°F	50°F
Current DD accumulations		
(Geneva 1/1-6/10):	883	539
(Geneva 1/1-6/10/2012):	1186	728
(Geneva "Normal" for this date):	913	533
(Geneva 1/1-6/17 predicted):	1039	646
(Highland 1/1-6/10/2013):	1068	645

Upcoming Pest Events – Ranges (Normal +/- Std Dev):

	43°F	50°F
American plum borer		
1st flight peak.........................	625-973	340-592
Black cherry fruit fly 1st catch	702-934	380-576
Codling moth 1st flight peak.......	571-999	311-591
European red mite		
summer eggs hatch..................	737-923	424-572
Obliquebanded leafroller		
1st flight peak.........................	826-1208	479-755
Oriental fruit moth		
1st flight subsides.....................	837-1123	489-697
Peachtree borer 1st catch...........	789-1341	453-827

Pear psylla 1st summer gen adults present	737-885	428-526
Pear psylla 2nd brood hatch	967-1185	584-750
Redbanded leafroller 1st flight subsides	589-899	329-561
Rose leafhopper adults on multiflora rose	689-893	366-498
San Jose scale 1st flight subsides	851-1233	506-764
Spotted tentiform leafminer 1st flight subsides	674-956	372-580
Spotted tentiform leafminer 2nd flight begins	990-1162	588-724

Pest Focus

Highland: 17-year Cicada emerging and causing damage.

TRAP CATCHES (Number/trap/day)

Geneva

	5/28	5/30	6/3	6/10
Redbanded Leafroller	0.1	0.3	0.0	0.0
Spotted Tentiform Leafminer	0.4	0.0	0.0	0.0
Oriental Fruit Moth	0.4	1.0	0.1	0.0
Lesser Appleworm	0.0	0.0	0.0	0.0
San Jose Scale	0.6	1.3	0.3	0.1

Codling Moth	1.1	2.0	2.0	0.3
American Plum Borer	0.0	1.0	0.5	0.0
Lesser Peachtree Borer	0.5	0.0	0.8	0.6
Pandemis Leafroller	-	-	0.3*	0.3
Obliquebanded Leafroller	-	-	0.1*	0.2
Dogwood Borer	-	-	1.6	1.0

Highland (Peter Jentsch)

	5/20	5/28	6/3	6/10
Redbanded Leafroller	1.8	1.1	0.0	0.1
Spotted Tentiform Leafminer	8.0	2.0	0.3	6.2
Oriental Fruit Moth	1.4	3.8	1.2	0.4
Lesser Appleworm	0.9	-	0.1	0.7
Codling Moth	1.7*	2.1	1.6	0.2
Obliquebanded Leafroller	-	0.0	0.6*	0.9

* = 1st catch

ORCHARD RADAR DIGEST

[Box Text: TODAY'S TARGETS]

Geneva Predictions:

Roundheaded Appletree Borer

Peak egglaying period roughly: June 26 to July 11.

First RAB eggs hatch roughly: June 17.

Dogwood Borer

First DWB egg hatch roughly: June 25.

Codling Moth

Codling moth development as of June 10: 1st generation adult emergence at 67% and 1st generation egg hatch at 12%.

1st generation 20% CM egg hatch: June 13, = target date where one spray needed to control 1st generation CM.

Obliquebanded Leafroller

1st generation OBLR flight, first trap catch expected: June 7.

San Jose Scale

1st generation SJS crawlers appear: June 18.

Spotted Tentiform Leafminer

2nd STLM flight begins around: June 16.

[Section: INSECTS]

WHEN STORM CLOUDS GATHER

(Art Agnello, Entomology, Geneva; ama4@cornell.edu)

[Box Text: THE HOPPA!]

Potato leafhopper (PLH) does not overwinter in the northeast but instead migrates on thermals (warm air masses) from the south. It is generally a more serious problem in the Hudson Valley than in western N.Y. or the Champlain Valley; however, weather fronts such as those resulting from the recent unrest occurring in the middle states and subsequently in our region provide ample opportunity for most of the region to share the wealth, so it doesn't hurt to tour observantly through a few orchards now. Because PLH comes in constantly during the season, there are no distinct broods or generations and the pest may be present continuously in orchards from June through harvest.

PLH feeds on tender young terminal leaves. Initially, injured leaves turn yellow around the edges, then become chlorotic and deformed (cupping upward) and later turn brown or scorched. Damage is caused by a toxin injected by PLH while feeding. PLH also occasionally causes symptoms similar to the effects of growth regulators, such as excessive branching preceding or beyond the point of extensive feeding. PLH damage is often mistaken for injury caused by herbicides, nutrient deficiency, or over-fertilization. PLH injury may not be serious on mature trees but can severely stunt the growth of young trees.

Nymphs and adults should be counted on 50–100 randomly selected terminal leaves in an orchard. Older trees should be sampled approximately every three weeks during the summer. Young trees should be sampled weekly through July. PLH nymphs are often described as moving sideways like crabs, whereas WALH generally move forward and back. No formal studies have been conducted in N.Y. to determine the economic injury level for PLH on apples, so we suggest a tentative threshold of an average of one PLH (nymph or adult) per leaf. Little is known about the natural enemies of PLH, but it is assumed that they cannot effectively prevent damage by this pest in commercial New York orchards.

Damage by this migratory pest is usually worse when it shows up early. PLH can cause significant damage to newly planted trees that are not yet established. When

PLH, white apple leafhopper (WALH), rose leafhopper (RLH) and aphids are present, control measures are often warranted.

Field trials were conducted some years ago in the Hudson Valley to evaluate reduced rates of Provado against all three species of leafhoppers. Provado was applied in combinations at a full rate (2 oz/100 gal) and a quarter rate (0.5 oz/100 gal), at varying intervals (3rd–5th cover). Nymphs of PLH, WALH, and RLH were sampled and leaf damage by PLH was monitored.

Because of Provado's translaminar activity, all rates and schedules produced excellent control of WALH/RLH nymphs (however, reduced rates will not control leafminer). Against PLH nymphs, the number of applications was shown to be more important than rate; i.e., better protection of new foliage. Considering the percentage of leaves with PLH damage, the number of applications again appeared to be more important than application rate.

Admire Pro, the currently available imidacloprid formulation from Bayer, is also an excellent aphicide, and the same principle would hold as for PLH — maintaining coverage of new growth is more important than the rate. Moreover, reduced rates are likely to increase the survival of cecidomyiid and syrphid predators that are common and effective biological control agents. Other management options for this complex of leaf feeding bugs can be found in the "Additional Summer Sprays" section starting on p. 143 in the Recommends. Check Table 7.1.2 (p. 64) for impacts of any of these products on beneficials.

"HE'S ONLY MOSTLY DEAD" - MANAGING BROOD II OF THE 17-YEAR CICADA IN THE HUDSON VALLEY

(Peter Jentsch, Entomology, Highland;
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[Box text: UNKIND CUTS]

The past two weeks have been quite a challenge for fruit growers experiencing Brood II of the 17-year cicada, *Magicicada septendecim*. Populations are variable throughout the Hudson Valley with a very strong edge effect in blocks bordering woodlands and concentrated emergence within apple blocks heavily infested in 1996. The first appearance of adults was observed on the 27th of May this year, with the onset of mate calling or "singing" on the 2nd of June, while egg-laying slits in pencil size branches occurred the following day. Winds from this weekend's storm front began to break limbs that once bore fruit due to cicada oviposition.

Tree fruit producers with high-pressure cicada blocks have made at least one application of an insecticide to reduce egg-laying damage to branches this past week, yet growers have had a difficult time discerning how effective these treatments really are. In most 1st and 2nd cover treatments used against PC and codling moth, the cicada can still be found in trees shortly after applications are made. Some treatments induce a knockdown effect lasting only a few hours before the insect is back on its feet, climbing up the trunk and limbs to cause trouble. This "mostly dead" effect, or moribund state, has been observed in larger insects, including the brown marmorated stink bug. The moribund effect can last for a few days before the insects either succumb to the toxic effect of the insecticide or revive and go back to "business as usual". During this "down time", they are vulnerable to predation by mammals and other insects such as foraging ants.

However, designated materials in the carbamate class such as Lannate (methomyl) and the pyethroid class including Asana (esfenvalarate), Danitol (fenpropathrin) or Warrior (lambda-cyhalothrin), have proven to be quite effective against the cicada, often providing high mortality on contact. Given the body mass of the insect, these materials appear to have very short residual toxicity against the migrating adults and emerging nymphs. With short residual toxicity, repellency becomes an important mode of action, one found to be an effective component of the pyrethroid chemistry.

Of these insecticides, it appears that two of the pyrethroids are capable of maintaining low oviposition damage to trees to reduce limb breakage and fruit loss. In studies conducted by Chris Bergh at Virginia Tech in Winchester, VA, three dilute applications were made at 6–8-day intervals to young trees beginning on 28 May. Near the end of the egg-laying season, Asana applied at the high labeled rate of 14.5 oz/A and Danitol applied at 21.0 oz/A provided significantly better ovipositional deterrence to the 17-year cicada than did the highest labeled rates of the neonicotinoids Actara and Calypso, or Avaunt 30WG and Aza-Direct 1.20%. Lannate, Warrior and Assail, although numerically higher, were not significantly different than the best treatments in reducing egg-laying slits, while Danitol provided complete control of limb breakage (Table 1 & 2).

In plots to which we applied the organic control measures of Surround WP at 50 lbs/A and the highest labeled rate of Pyganic to control plum curculio, we continue to see the presence of the cicada with oviposition into treated wood. In conventional treated plots employing Imidan and Lannate at the full labeled rates, we have seen re-infestation 3 days post-application, also with continued egg-laying on the treated wood.

Although pyrethroids have a tainted history of mite flare-up from disruption of predatory arthropods and significant loss of efficacy at higher temperatures, they are relatively "user-friendly", with low mammalian toxicity and broad-spectrum activity to help combat the tree fruit pest complex, and so maintain an important place in the toolbox during these days of plague-like emergences of the 17-year cicada, and the looming presence of the invasive brown marmorated stink bug.

Table 1.

Treatment	Rate	Mean # of cicada oviposition slits/branch

	amt form/A	May 27	June 3	June 10	June 17
Actara 25WG	5.5 oz	9.9a	21.1a	26.7a	30.2abc
Asana XL	14.5 fl oz	1.3b	2.6b	3.4c	3.5e
Assail 70WP	3.4 oz	2.1b	15.6ab	21.9ab	19.3bcde
Avaunt 30WG	6.0 oz	9.7a	21.1a	31.1a	38.4a
AzaDirect 1.20%	1.0 qt	4.6ab	16.4ab	27.4a	34.3ab
Calypso 480SC	8.0 fl oz	5.1ab	15.1ab	21.1ab	27.1abcd
Danitol 2.4EC	21.0 fl oz	1.2b	1.8b	2.1c	2.1e
Lannate LV	3.0 pt	1.4b	4.9b	9.3bc	11.1de
Warrior 1CS	5.1 fl oz	1.2b	7.6ab	11.1bc	13.3cde
Untreated check	–	7.9ab	21.3a	28.4a	32.6ab

Means within a column followed by the same letter(s) are not significantly different (Fisher's Protected LSD, $P > 0.05$).

Table 2.

Treatment	Rate amt form/A	Mean # flagged shoots/tree (June 24)	Mean # fallen shoots/tree (June 24)
Actara 25WG	5.5 oz	8.3ab	1.75a
Asana XL	14.5 fl oz	0.3e	0.50ab
Assail 70WP	3.4 oz	3.0cde	0.25ab
Avaunt 30WG	6.0 oz	9.0a	1.75a
AzaDirect 1.20%	1.0 qt	4.8abcd	0.75ab
Calypso 480SC	8.0 fl oz	4.5bcde	0.75ab
Danitol 2.4EC	21.0 fl oz	1.0de	0.0b
Lannate LV	3.0 pt	5.0abcd	0.75ab
Warrior 1CS	5.1 fl oz	4.5bcde	0.50ab

Untreated check	–	7.3abc	1.25ab

Means within a column followed by the same letter(s) are not significantly different (Fisher's Protected LSD, $P > 0.05$).

[Section: DISEASES]

THE CAPTAN CONUNDRUM: SCAB CONTROL VS. PHYTOTOXICITY

(Dave Rosenberger, Plant Pathology, Highland; dar22@cornell.edu)

[Box text: JEKYLL & HYDE]

Captan is a cornerstone fungicide for apples because it is very effective against apple scab and also controls summer fruit rots. Captan has long been noted for its ability to prevent scab on fruit even when scab control on leaves is less than perfect. In fungicide tests in replicated plots where we purposely used lower than recommended rates, Captan 50W at 3 lb/A has usually provided better control of apple scab than mancozeb fungicides applied at the same rate.

Fungi do not become resistant to captan because it blocks multiple biochemical pathways (i.e., it is a multi-site inhibitor). Resistance to captan can occur only if fungi develop simultaneous mutations for all of the blocked pathways, something that has not happened in the 60 years since captan was introduced.

Captan kills spores that it contacts, whereas many of our newer fungicides kill fungi or arrest fungal growth only after germ tubes emerge from the spores. As a result, when captan is applied in combinations with other fungicides in protectant sprays, captan usually does 90 to 99% of the work by killing spores on contact, thereby reducing selection pressure for fungicide resistance to the other product in the tank mix. We use tank mixes with other fungicides (dodine, benzimidazoles, DMIs, strobilurins, SDHIs) to expand the spectrum of disease control and/or to control/suppress the small amount of scab that may have escaped control from the last spray. Captan does not control powdery mildew or rust diseases, so tank mixes are needed to control those diseases even when captan alone might suffice for controlling apple scab.

Unfortunately, captan also has a dark side: it is toxic to plant cells if it penetrates into leaf or fruit tissue. Spray oil and other spray adjuvants that act as penetrants allow captan to move through the protective wax cuticle on leaf surfaces. When that occurs, we see captan-induced leaf spotting, usually on the two or three leaves on each terminal that were just unfolding at the time trees were sprayed. It takes time for cuticular waxes to develop on new leaves, so young unfolding leaves are the most susceptible to spray injury. The leaf cells directly killed or injured by captan provide entry sites for other leaf spotting fungi such as *Phomopsis, Alternaria,* and *Botryosphaeria* than can enlarge the spots. It may take five or 10 days for the injury to become visible, and by that time the injured leaves may be 5 or 6 nodes below the growing point on terminal shoots.

Captan injury on apples usually appears during the three weeks after petal fall because during that time period terminal shoots are growing very rapidly (i.e., producing lots of new leaves), and spray mixtures used at petal fall and in first and second cover sprays commonly include insecticides, growth regulators, foliar nutrients, and spray adjuvants. Captan applied alone almost never causes leaf spotting on apples. Rather, it is the other products in the tank that sometimes enhance captan uptake and trigger the resultant phytotoxicity. Increasing the number of products that are included in a tank mixture increases the probabilities that the mixture will enhance captan absorption and result in injury to leaves.

Early last week, we became aware that, under some conditions, spray mixtures that included Fontelis and captan were triggering unacceptable levels of leaf spotting or leaf edge burn. Because orchards showing injury were always treated with spray mixtures that included more than just Fontelis and captan, we lack definitive proof that Fontelis was the key contributing factor. However, the other products in these spray mixtures had previously been combined with captan without causing noticeable injury. In Quebec, Vincent Philion noted severe damage on Spartan apple trees sprayed with a tank mix of Fontelis-captan-urea under slow drying conditions. Urea in that mix may have exacerbated the captan damage, although urea-captan combinations have been used without incident in the past.

Following is a summary of our observations on injury associated with Fontelis-captan mixtures based on contributions from Vincent Philion in Quebec and crop consultants Jeff Alicandro and Jim Eve in Wayne County, New York:

1. Thousands of acres of apples have been treated with Fontelis-plus-captan combinations, and damage has been noted on only a very, very small percentage of the treated acreage.

2. Factors that seemed to increase the probability of injury were applications made under slow drying conditions (e.g., spraying at night) and applications that were made with low volumes of water (i.e., <100 gal/A).

3. Damage is primarily on leaves and is usually limited to a few leaves per terminal. In some cases, only occasional terminals show damage and the injury is very minor.

4. Cultivars vary in their susceptibility to damage, with the greatest damage being reported on Braeburn, Spartan (Acey Mac), Red Delicious, Empire, Gala, and Mutsu.

5. The unusually hot weather that prevailed throughout much of the northeast during the last few days of May might have contributed to the problem by favoring rapid terminal growth and/or by making trees more susceptible to damage via some other mechanism.

Although DuPont, the manufacturer of Fontelis, had run extensive trials to test the safety of Fontelis-captan mixtures, it is impossible to duplicate all of the tank mixtures that apple growers will ultimately use. Nor can test conditions ever duplicate all of the environmental factors that prevail during applications after products are commercialized. Thus, the discovery of occasional problems with Fontelis-captan mixtures is one of those unfortunate but perhaps unpredictable events that can occur in process of commercializing a new product. Fontelis will remain an important apple fungicide for controlling scab and rust, especially during the time period when it can be combined with mancozeb.

It is important to note that some pathogens cause leaf spotting that is very similar to leaf spotting caused by captan injury. Rust-induced leaf spotting occurs when cedar apple rust spores germinate on apple cultivars that are resistant to rust. The invading rust fungus soon dies due to the host incompatibility reaction, but the cells killed or damaged by the germinating rust spores provide entry points for leaf spotting fungi. Rust-induced leaf spotting can be differentiated from leaf spotting due to phytotoxicity by the fact that rust-affected leaves usually show some bright yellow-orange pinpoint spots either at the center of lesions or at other locations on the leaves where the rust spots were not followed by secondary pathogens. Frog-eye leaf spot caused by *Botryosphaeria obtusa* can also cause severe leaf spotting, but distribution of this disease is very uneven within trees, with most infections occurring below over-wintering fruitlet mummies that supplied the inoculum.

Finally, pesticides other than captan can also cause leaf spotting and/or leaf burn. Sulfur and liquid-lime sulfur can cause damage when applied ahead of hot weather and/or if mixed with or applied close to oil sprays. Last year, Topguard fungicide caused a leaf-edge burn when applied to Cortland trees in my test plots that had recently been treated with streptomycin plus Regulaid. Topguard injury has reportedly been observed on Braeburn when sprays were applied with enough water to allow droplets to accumulate on leaf edges.

Defining the exact cause of phytotoxicity on apple leaves is often difficult. However, we know that special cautions are required when applying captan because it has a demonstrated record of causing phytotoxicity to leaves if oils, adjuvants, or carriers in other pesticides enable captan to penetrate into leaves.

[Section: GENERAL INFO]

EVENT ANNOUNCEMENTS

[Box text: HOP TO IT]

CORNELL FRUIT FIELD DAY

Cornell University will host the 2013 Fruit Field Day at the New York State Agricultural Experiment Station in Geneva, NY, on Thursday, August 1, from 8:00 a.m. to 5:00 p.m. The field day will be composed of two concurrent day-long tours, one of tree fruit presentations and another tour of grapes, hops and small fruit presentations. Fruit growers, consultants, and industry personnel are invited to tour field plots and learn about the latest research and extension efforts being carried out by Cornell researchers in Geneva and Ithaca and on commercial farms around the state. The event will focus on all commodities of key importance to New York's $350 million fruit industry: apples, grapes, cherries, raspberries, strawberries, blueberries and other berry crops, plus hops. During lunch, equipment dealers and representatives from various companies will showcase their latest products and technologies to improve fruit crop production and protection.

The list of presentations will include the following topics:

Tree Fruit Tour

Apple breeding at Cornell and new varieties in the pipeline; Precision apple thinning; Apple mechanization; Tall Spindle management in years 1-6; Spray volume for Tall Spindles; Precision spraying in the orchard; Fruit russet control on NY1; CG rootstocks; Nutrient removal by fruit harvest and maintenance application of fertilizers; Impacts of glyphosate on apple tree health; Evaluation of bactericide programs for fire blight management; Persistent NY nematodes for plum curculio biocontrol; Peach rootstocks; Rain protection in cherries; Pear systems and rootstocks; Organic apple production trials; Apple scab management in a fungicide-resistant orchard

Berries/Grapes/Hops Tour

Soil and root factors in improved blueberry productivity; Mass trapping and exclusion tactics to control Spotted Wing Drosophila in organic blueberries; Limiting bird damage to small fruit crops; SWD trap network in NY; Day-neutral strawberries and low tunnel production; SWD, a new threat to strawberries and raspberries in NY; Enhancing pollination and biological conrol in strawberries; Training systems for Arandell; New hops variety trial and pest management trials; Biology and control of sour rot in grapes; Precision spraying in the vineyard; High tunnel raspberry and blackberry production; A fixed-spray system for SWD control in high tunnel raspberries

The event will be held on the Experiment Station's Fruit and Vegetable Research Farm South, 1097 County Road No. 4, one mile west of Pre-emption Road in Geneva, NY. Signs will be posted. Attendees will travel by bus to the research plots to hear presentations by researchers on the work being conducted. The cost of registration is $30 per person ($40 for walk-ins) for all-day attendance. Lunch will be provided.

Pre-registration is required for the $30 rate, register on-line at: http://is.gd/ffd2013
For sponsorship and exhibitor information, contact Debbie Breth at 585-798-4265 or dib1@cornell.edu.

CORNELL UNIVERSITY STORAGE WORKSHOP

This year's workshop, slated for August 6 in Ithaca, will feature an international, national and statewide cast. Our guest speakers include Dr. Angelo Zanella, who heads the post-harvest research group at Laimburg Agriculture Research Centre in Italy, and who will be presenting their work on DCA and ILOS, as well as their experiences with DPA. Other presentations will include Honeycrisp, and Empire and Gala browning by Jim Mattheis (USDA, Washington), Jennifer DeEll (Ontario Ministry of Agriculture and Food, Canada), as well as the Cornell team of Chris Watkins and David Rosenberger. Industry presentations include DECCO, PACE and Storage Control Systems. Registration materials will be available shortly.

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