scaffolds
FRUIT JOURNAL

Update on Pest Management and Crop Development

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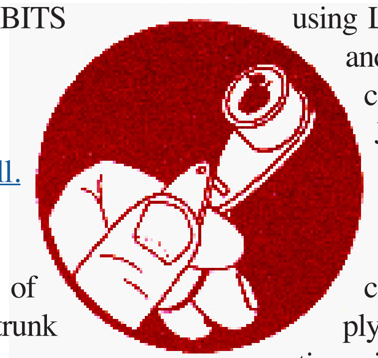
INSECTS

ONCE AROUND THE BARK

BORING HABITS

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



Following is an updated version of our annual pre-season article on trunk boring insects.]

Dogwood Borer

❖❖ In recent years, there has been increased concern around the Northeast about damage being caused to apple trees by borers. The species of primary concern is dogwood borer, but American plum borer can also be prevalent in western New York apple orchards, particularly those that are close to tart cherry and peach orchards. From our observations, DWB is very widespread throughout many of the Eastern as well as Western NY orchards with young plantings. While we do not have a complete picture of the effects of these borers on dwarf trees, we do know that they reduce vigor and can, in time, completely girdle and kill trees.

We have 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 the past, we have compared some other materials, including white latex paint and a series of alternative insecticides against Lorsban, with varying results. To make a long story short, none have really provided control comparable to one application of Lorsban. Assail is labeled for this use, but should be considered a fall-back option in the event that using Lorsban is not an acceptable option, and would probably require two applications – one between pink and mid-June, and the second before early August.

Our tests have shown that borers can be controlled season-long by applying Lorsban at one of a variety of times in the spring and summer. While a postbloom application (to the trunk only) 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 may be more convenient. Fall also may be a good time to control dogwood borer. 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. Lorsban works when applied in the

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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). Fall application could offer growers a more convenient alternative for applying borer control sprays. Recall that Lorsban label restrictions allow only ONE application of any chlorpyrifos product in apples, whether as a foliar or trunk spray, so these recommendations pertain only if no earlier applications have been made during the season. Bear in mind that we now additionally 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 at mid-May to early June, before the first adult catch of the season, and in plantings with annual DWB pressure, should be considered as a valuable complement to a trunk spray program.

In a survey we conducted in the mid-1990s, we observed some relationships between borer infestation and various orchard parameters such as the proportion of trees with burrknots, proximity to stone fruit orchards and presence of mouseguards. Conventional wisdom has held that borer problems are worse where mouseguards are in place. Mouseguards can contribute to increased expression of the burrknots that borers invade, and may shield borers from predators and insecticide sprays. This has led some growers to contemplate removing mouseguards under the premise that mice are easier to control than the borers. However, results of our survey indicate that dogwood borer larvae may be found as readily in trees without mouseguards as in those with them. (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 are deteriorated and no longer protect the tree, there may be some small advantage, in terms of borer control, to removing them. But, in orchards where mouseguards still provide protection against rodents, removing them for the sake of borer control is probably not worth the risk. Instead, we would recommend the use of trunk sprays to control borers. 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).

Black Stem Borer

The recent emergence of the black stem borer (BSB, *Xylosandrus germanus*) ambrosia beetle as a cryptic but devastating pest of apple trees in our region has focused more attention on early spring insect activity that could have serious consequences for tree health as the season progresses.

In 2017, we again assessed BSB adult occurrence and distribution in several New York apple growing regions, using ethanol-baited bottle traps hung on metal garden hangers at a 1-m height, placed along the edges of orchards bordered by hedgerows and woods likely to be a source of immigrating beetles. Additional traps were located inside the orchards, adjacent to previously attacked trees, to verify their attractiveness. Traps

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were checked weekly starting at the end of April, before maximum temperatures of 68°F began to occur, and continuing until the first week of September. Traps were placed on 8 farms in Wayne Co., 5 farms in Orleans Co., 8 farms in the Hudson Valley, and 8 farms in the Champlain Valley/Capital District.

BSB adults were captured at nearly all of the sites, and were again most numerous in the western NY locations, particularly Wayne Co. First activity was noted statewide on May 3–4, with higher counts along the orchard edges than in the interiors. May 17–24 was the peak of beetle emergence from the overwintering sites, and 1st generation adults emerged starting at the end of June, with catch continuing into September.

We continued to evaluate the efficacy of trunk sprays against infestations of ambrosia beetles by setting out trials of insecticide and repellents, located on three commercial farms having documented infestations (Sodus, Huron, and Lyons). All treatments were replicated in randomized complete plots at each of the individual test sites. Potted 2-yr old trees from the nursery were placed in turn into larger pots, which were then flooded to induce stress and promote ethanol production. These potted trees were placed inside wooded areas directly adjacent to the orchard plantings, and the trunks of the potted trees plus the orchard trees were sprayed using a handgun sprayer on May 11, before the start of major BSB flight. The treatments focused on different formulations of a commercially available repellent, verbenone, applied alone or in combination with a trunk spray of Lorsban Advanced (chlorpyrifos).

Verbenone, a natural terpene compound found in many plants such as pine trees, is used in the control of bark beetles such as mountain pine beetle and Southern pine bark beetle. It is produced, probably as a defensive mechanism, when the number of insects in an infested tree approaches the maximum that the tree can support, and acts as repellent to other beetles. Because it has demonstrated efficacy in related groups of bark boring beetles, as well as this species, we proposed that it might offer a higher degree of prevention than using insecticide sprays alone.

Unfortunately, we saw abnormally low infestations in most cases, possibly due to the extremely rainy weather that occurred during the primary infestation period (May-June). However, at the Sodus site, results gave an indication of some potential treatment effects: neither the Lorsban nor the verbenone, alone or in combination, had a measurable effect on preventing BSB infestations in the test trees, but some experimental verbenone-based formulations, which contained a second repellent, completely prevented borer attacks. These formulations will be tested more thoroughly this season, in anticipation of the eventual development of a new commercial product that can be used to repel BSB adults from apple trees.

In the interim, although recommendations for controlling this pest are still provisional, it appears that tree health – avoiding stress to the trees – is an important factor in BSB management. Our current advice is for growers to remove and destroy any infested trees detected in a planting, to prevent new infestations in surrounding trees. Trapping and monitoring adults using ethanol lures is a useful and informative tactic, but the fact remains that ambrosia beetles are difficult to control with insecticides. Sprays must be closely timed with beetle attacks, and multiple applications may be necessary. We would advise that growers consider multiple applications against this insect - Lorsban prebloom, and following up in June with one (or two) applications of one of the labeled pyrethroid products, Warrior or Danitol.

We anticipate that growers considering the use of Lorsban trunk sprays against San Jose scale and/or dogwood borer at this time may also see some benefit against ambrosia beetles, particularly in trees that might be under stress from flooding or cold injury. ❖❖

DISEASES

SPORE-CASTING

APPLE SCAB PREDICTIONS ON NEWA

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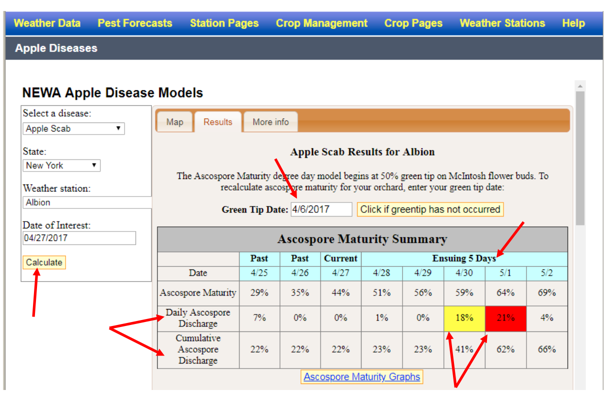
❖❖ The apple scab fungus overwinters in infected leaves that have fallen to the ground. In these leaves, from autumn to early spring, the fungus mates, resulting in the development of what are termed ascospores, which cause primary infections. Ascospores mature as spring progresses, with a few ascospores usually maturing by bud break (green tip). The proportion of ascospores maturing progresses slowly until about the tight cluster stage of blossom development. Apple trees are typically at peak susceptibility to infection from tight cluster through petal fall.

Season-long control is difficult if primary infections develop. Even moderate numbers of primary lesions can produce an extremely large population of secondary spores, conidia, requiring an intensive fungicide program to protect fruit throughout the summer. Conversely, good control



Ascospore Maturity Summary

	Past	Past	Current	Ensuing 5 Days				
Date	4/25	4/26	4/27	4/28	4/29	4/30	5/1	5/2
Ascospore Maturity	29%	35%	44%	51%	56%	59%	64%	69%
Daily Ascospore Discharge	7%	0%	0%	1%	0%	18%	21%	4%
Cumulative Ascospore Discharge	22%	22%	22%	23%	23%	41%	62%	66%

Figure 1. Ascospore Maturity Summary showing percent maturity in the top row and daily and cumulative discharge in the middle and bottom rows. Extreme discharge events are colored yellow or red. Last year's results will use actual data for the "Ensuing 5 Days" this year's results, in real time, show a 5-day forecast.

of primary infections allows use of fungicides to be reduced or omitted during the summer, once ascospores have been depleted and fruit become less susceptible. Control of primary infections has traditionally begun at or shortly after green tip, when the first ascospores become mature. The NEWA apple scab model (Figure 1) at http://newa.cornell.edu/index.php?page=apple-diseases now estimates percent ascospore maturity, as well as daily and cumulative ascospore discharge (double arrow points out the rows).

Ascospore risk is calculated for each weather station, based on the biofix date of 50% green tip (arrow) on McIntosh flower buds, specific to what you enter for your orchard. Access the model: select Apple Diseases from under Pest Forecasts. Select a disease: Apple Scab. Select your State, Weather Station (shown on the Map tab), the Date (defaults to current day) and hit Calculate (arrow) to get results.

Significant rain events that will lead to high levels of ascospore discharge are highlighted yellow or red (double arrow). Figure 1 shows results for Albion, last year, as "Ensuing 5 Days" (arrow). When accessed in real time, like today, these days will show the 5-day forecast, so you can plan accordingly.

Want to know if there is a scab infection event? The table below the ascospore maturity Summary shows the Infection Events Summary, for Albion, last year, in Figure 2.

Effective fungicide programs should be timed around infection events. Also keep in mind ascospore availability, cultivar susceptibility, and specific characteristics of the available fungicides. Apple scab fungicides control disease in different ways. Protectants must be applied before infection occurs. Those with post-infection activity must be applied within a narrow time after the beginning of an infection event. Some fungicides can suppress production of conidia from recent infections or established lesions. Understanding these activities

Infection Events Summary								
	Past	Past	Current	Ensuing 5 Days				
Date	4/25	4/26	4/27	4/28	4/29	4/30	5/1	5/2
Infection Events	Yes	No	No	No	No	Combined	Combined	Combined
Average Temp (F) for wet hours	52	-	63	58	55	40	52	51
Leaf Wetness (hours)	13	0	4	1	1	6	22	6
Hours ≥90% RH	23	21	13	9	8	20	24	24
Rain Amount	0.33	0.00	0.24	0.08	0.00	0.49	1.64	0.03

Download Time: 5/3/2017 23:00

Infection events, shown in red above, are based on the Revised Mills Table and are calculated beginning with 0.01 inch of rain. The word "Combined" means the wetting event on this day is being combined with another wetting event using the following rule: two successive wetting periods, the first started by rain, should be considered a single, uninterrupted wet period if the intervening dry period is less than 24 hours. **When an infection event is in the 5-day forecast, the actual weather data logged may or may not translate into an actual infection event. Therefore, the table output may change once actual weather data are logged.**

Figure 2. The Infection Events Summary table will show the apple scab risk and the weather conditions that contributed to the infection event, tabulated each day.

and knowing which fungicides exhibit them is important for maximizing the efficiency of a fungicide program.

Good control of primary infections allows use of fungicides to be reduced or omitted during the summer, once ascospores have been depleted and fruit become less susceptible. Control of primary infections has traditionally begun at or shortly after green tip, when the first ascospores become mature. Both ascospores and conidia infect at similar rates when tested at equivalent temperatures and inoculum doses. Therefore, the infection events tabulated by NEWA can be used for both primary and secondary infections.

Wondering what the leaf wetness events were like last year or in recent days? The Apple Leaf Wetness Events Log (Figure 3), http://newa.cornell.edu/index.php?page=apple-lw will give you the information from any weather station you want, so you can review the current wet and dry events or prior year's, depending on how long the weather station has been in service.

As the weather warms (if it ever will?), green tip will burst forth and the scab season will be under way. NEWA's apple scab model can help you effectively time your scab sprays and protect your crop. ❖❖

Albion — **Apple Wet and Dry Log 2018** — Download Time: 4/16/2018 14:00

When calculating the length of a wetting period use the following rule: two successive wetting periods, the first started by rain, should be considered a single, uninterrupted wet period if the intervening dry period is less than 24 hours, regardless of weather. Refer to Mills Chart for additional information.

Wet Starting Date Time	Wet Ending Date Time	Hours LW	Avg Temp F	Total Rain	Dry Starting Date Time	Dry Ending Date Time	Hours Dry
4/15/2018 9:01 PM	in progress	17	36	1.14	4/15/2018 5:01 PM	4/15/2018 9:00 PM	4
4/15/2018 10:01 AM	4/15/2018 5:00 PM	7	32	0.25	4/14/2018 12:01 PM	4/15/2018 10:00 AM	22
4/14/2018 10:01 AM	4/14/2018 12:00 PM	2	33	0.01	4/14/2018 9:01 AM	4/14/2018 10:00 AM	1
4/14/2018 4:01 AM	4/14/2018 9:00 AM	5	35	0.05	4/12/2018 5:01 PM	4/14/2018 4:00 AM	35
4/12/2018 4:01 PM	4/12/2018 5:00 PM	1	54	0.02	4/12/2018 10:01 AM	4/12/2018 4:00 PM	6
4/11/2018 5:01 PM	4/12/2018 10:00 AM	17	34	0.01	4/6/2018 11:01 PM	4/11/2018 5:00 PM	114
4/6/2018 10:01 AM	4/6/2018 11:00 PM	13	35	0.14	4/4/2018 8:01 AM	4/6/2018 10:00 AM	50
4/3/2018 4:01 PM	4/4/2018 8:00 AM	16	45	0.48	4/1/2018 3:01 AM	4/3/2018 4:00 PM	61
3/31/2018 10:01 PM	4/1/2018 3:00 AM	5	43	0.15	3/30/2018 8:01 AM	3/31/2018 10:00 PM	38
3/29/2018 1:01 PM	3/30/2018 8:00 AM	19	40	0.65	3/28/2018 3:01 PM	3/29/2018 1:00 PM	22
3/28/2018 2:01 AM	3/28/2018 3:00 PM	13	41	0.03	3/27/2018 3:01 PM	3/28/2018 2:00 AM	11
3/27/2018 1:01 PM	3/27/2018 3:00 PM	2	37	0.02	3/14/2018 2:01 PM	3/27/2018 1:00 PM	311
3/14/2018 1:01 PM	3/14/2018 2:00 PM	1	31	0.02	3/9/2018 7:01 PM	3/14/2018 1:00 PM	113
3/9/2018 2:01 PM	3/9/2018 7:00 PM	5	32	0.03	3/8/2018 12:01 AM	3/9/2018 2:00 PM	38
3/7/2018 3:01 PM	3/8/2018 12:00 AM	9	34	0.03	3/2/2018 1:01 PM	3/7/2018 3:00 PM	122
3/2/2018 10:01 AM	3/2/2018 1:00 PM	3	33	0.02	3/1/2018 12:01 AM	3/2/2018 10:00 AM	34

NEWA — Powered by ACIS Northeast Regional Climate Center

Figure 3. The Apple Wet and Dry Log will show the actual wet and dry events as logged by the weather station for the apple scab model.

UPCOMING PEST EVENTS

	43°F	50°F
Current DD* accumulations (Geneva 1/1–4/16):	73.8	24.1
(Geneva 1/1–4/16/2017):	202.8	91.0
(Geneva "Normal"):	148.6	64.4
(Geneva 1/1-4/23, predicted):	97.7	28.5
(Highland 1/1–4/16):	145.8	52.4

Coming Events:	Ranges (Normal ±StDev):	
Green fruitworm 1st catch	50-148	12-68
Green fruitworm peak catch	96-231	37-109
Green apple aphids present	111-265	38-134
Pear psylla 1st oviposition	40-126	11-53
Pear thrips in pear buds	118+214	50-98
Redbanded leafroller 1st catch	114-177	42-82
Spotted tentiform leafminer 1st catch	118-218	45-102
McIntosh green tip	99-145	38-63

*all DDs Baskerville-Emin, B.E.

INSECT TRAP CATCHES
(Number/Trap/Day)

Geneva, NY

	4/2	4/9	4/13
Green fruitworm	0.0	0.0	0.0
Redbanded leafroller	0.0	0.0	0.0
Spotted tentiform leafminer	0.0	0.0	0.0

Highland, NY

	4/2	4/9	4/16
Green fruitworm	1.0	0.0	0.0
Redbanded leafroller	2.0*	0.0	28.0
Spotted tentiform leafminer	0.0	0.0	0.0

* first catch

PHENOLOGIES

Geneva:	Current	4/23, Predicted
Apple (McIntosh, Empire, Idared):	silver tip	green tip
Apple (Red Delicious):	silver tip	green tip
Pear (Bartlett, Bosc):	early swollen bud	swollen bud
Cherry (Sweet, Tart):	dormant	swollen bud
Peach:	swollen bud	swollen bud/bud burst
Plum:	swollen bud	swollen bud/bud burst
Apricot:	swollen bud	swollen bud/bud burst

Highland:

Apple	
(McIntosh):	33% green tip
(Golden Del.):	15% green tip
(Ginger Gold):	55% green tip
(Red Delicious):	47% green tip
Pear	
(Bartlett):	58% swollen bud
(Bosc):	10% bud burst

NOTE: Every effort has been made to provide correct, complete and up-to-date pesticide recommendations. Nevertheless, changes in pesticide regulations occur constantly, and human errors are possible. These recommendations are not a substitute for pesticide labelling. Please read the label before applying any pesticide.

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