scaffolds

Update on Pest Management and Crop Development

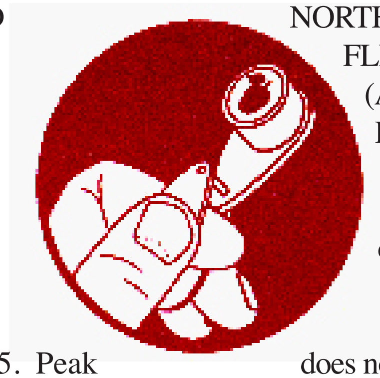
F R U I T J O U R N A L

June 11, 2012 VOLUME 21, No. 14 Geneva, NY

INSECTS

JUNE BUGS

ORCHARD RADAR DIGEST



NORTHBOUND FLIGHT

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

HOP THE JET (STREAM)

Roundheaded Appletree Borer
RAB egglaying begins: May 25. Peak egglaying period roughly: June 14 to June 30.

Dogwood Borer
First DWB egg hatch roughly: June 12.

Codling Moth
Codling moth development as of June 9: 1st generation adult emergence at 85% and 1st generation egg hatch at 40%.

Obliquebanded Leafroller
Early egg hatch and optimum date for initial application of insecticides effective against OBLR (with follow-up applications as needed): June 14.

Oriental Fruit Moth
2nd generation OFM flight begins around: June 17.

Redbanded Leafroller
2nd RBLR flight begins around: June 18.

San Jose Scale
First adult SJS crawlers appear: June 7.

❖❖ 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.

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IN THIS ISSUE...

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.

Provado, together with Admire, its currently available version, is also an excellent aphicide, and the same principle would hold as for PLH — maintaining coverage of new growth is more important than 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 on pp. 141-147 in the Recommends. Check Table 7.1.2 (p. 64) in the Recommends for impacts of any of these products on beneficials.

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scaffolds
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Other Pests of Concern

A note from Jim Eve reminds us to keep alert for increasing pear psylla populations; numbers could build fairly rapidly given the high temperatures we're currently seeing. Even trees with no fruit this season should receive some protection in order to guard against damaging the next batch of fruiting spurs. Also, keep an eye out for shoot flagging in peaches caused by oriental fruit moth terminal infestations; protection of the actively growing terminals can be achieved with a reduced spray schedule, but should not be disregarded, even in cases of a reduced (or no) crop. ❖❖

PEST FOCUS

Geneva: **Spotted tentiform leafminer** 2nd flight began Thursday, 6/7.
Obliquebanded Leafroller DD43 developmental model @ 294 (May 28 biofix); first egg hatch predicted at 360 DD.

Highland: 1st **brown marmorated stinkbugs** (adults and egg clusters) observed.
San Jose scale 2nd flight began today, 6/11.
Obliquebanded Leafroller DD43 developmental model @ 340 (May 27 biofix); first egg hatch predicted at 360 DD.

TAKE A POWDER

CONTROLLING APPLE POWDERY MILDEW AFTER THE DISEASE IS EVIDENT

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

❖❖ Apple powdery mildew has catapulted into the category of major apple diseases in many New York orchards this year. Factors favoring mildew include some or all of the following:

1. A mild winter throughout the state allowed mildew to survive through winter in most infected buds, thereby providing large amounts of inoculum in orchards where mildew was poorly controlled last year.
2. Dry intervals during spring (at least in some regions) allowed us to extend prebloom spray intervals for apple scab, but those extended spray intervals may have allowed mildew to become established on new leaves.
3. Weather patterns since bloom have favored secondary spread of mildew to developing leaves.
4. Trees that lost all or some of their crop during spring freezes may be more vigorous than trees carrying a full crop. Vegetative trees may "outgrow" their fungicide coverage more quickly than trees carrying a normal crop.
5. The variety mixes in many orchards may be shifting toward more susceptible cultivars.
6. Fungicide resistance to both the DMI and stroby chemistries may be reducing the effectiveness of our most widely used mildewcides.

The biology and general principles for controlling powdery mildew were reviewed in a Scaffolds article earlier this year (Rosenberger, 2012) and an IPM fact sheet (Turechek, 2004). The fact sheet outlines conditions that favor development of mildew as follows:

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"*Powdery mildew infections occur when the relative humidity (RH) is greater than 70%. Even on days when RH is low, infections may occur during night or early morning hours when RH usually rises. Infections can occur when the temperature lies between 50 to 77°F (10 to 25°C). The optimum temperature range for infection is between 66 to 72°F (19 to 22°C). Unlike other foliar diseases, leaf wetting is NOT a requirement for powdery mildew infection. …. Under optimum conditions, powdery mildew will be visible 48 hours after infections are initiated; new infections produce spores in about 5 days*."

What can be done in orchards that are now showing extensive mildew infections? If DMI (e.g., Rally, Topguard) and/or QoI (i.e., Flint, Sovran, Pristine) fungicides were applied as full cover sprays at petal fall, first cover, and second cover, and mildew is still apparent on new leaves, then it is quite possible that the mildew present in the orchards has shifted toward resistance to these fungicides. (No fungicides will fully eradicate overwintering mildew, so ignore the "flag shoots" that represent carry-over from last year when assessing the success of fungicides this year.) The other explanation for severe mildew at this time of year would be errors in fungicide timing and coverage, which are discussed later in this article.

Dr. Keith Yoder at Virginia Tech's Winchester Experiment Station has documented the performance of DMI and QoI fungicides, in his trials with Stayman and Idared apples, between 1994 and 2010. From 1994 to 1997, Rally applied at 4 oz/A provided 90 to 97% control of mildew in his test plots. Performance of Rally was more variable from 1998 to 2006, ranging from a low of only 40% control with 4 oz/A in 2005 to about 90% control with 5 oz/A in 2001 and 2003, and with intermediate levels of control in other years during that interval. Mildew control with Rally dropped below 35% in 2007 and 2008, and was only about 12% in 2009 and 2010. Raising the rate of Rally to 7.5 oz/A in a separate plot in 2009 had little impact on disease control, with control only slightly better that the 12% control achieved with 5 oz/A of Rally. Furthermore, comparisons between Rally and Topguard in some of Dr. Yoder's tests showed that, although Topguard may be slightly more effective than Rally, it still failed miserably in his test orchard where DMI-resistant mildew apparently predominated.

In 12 of the 17 years when Dr. Yoder tested DMI fungicides for mildew control, he also evaluated one of the strobilurin fungicides (usually Flint or Sovran) in other plots within those same trials. The strobilurins provided 70 to 80% control of mildew in all five years between 1995 and 2001, when these products were tested, but the activity of the QoIs was more erratic in recent years, ranging from 40 to 70% between 2002 and 2008, but then dropping to slightly less than 30% control in 2010. Dr. Yoder's data suggests that, at least in his test orchard, both the DMIs and QoIs have lost most of their effectiveness against mildew. Note that we can only "guess" that fungicide resistance is the issue because powdery mildew is an obligate parasite that cannot be grown and evaluated for resistance in Petri plate tests that are commonly used for other pathogens.

In New York orchards where high levels of mildew persist despite timely applications of DMI and/or QoI fungicides, the best alternative at this point will be to apply sulfur at 10–14 day intervals until terminal shoots stop growing. Mildew only infects young leaves as they unfold, so spread of mildew will cease when trees stop growing. Unfortunately, it will be difficult to regain control of mildew at this point in the season in orchards that are already showing severe infection, especially if experience suggests that the DMIs and QoIs are no longer working. None of the fungicides will completely eradicate mildew in orchards that are heavily infected, and one can only hope to protect new leaves from this point forward.

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We currently lack other options. Topsin M was effective as a mildewcide when it was introduced, but mildew became resistant to this chemistry in the 1980s and it is unlikely that Topsin M will do much for mildew populations in orchards today. Low rates of copper, for example with a product like Cueva, might be an option for non-bearing orchards, but I'm not certain that copper will be any more effective than sulfur. We may be able to manage mildew better next year when several of the new SDHI chemistries will hopefully be available in New York, but we can anticipate that mildew will also develop resistance to the SDHI chemistry within a few years, especially if we no longer have any chemistries other than sulfur to alternate with the SDHI group. In short, we probably need to begin integrating sulfur back into our regular apple spray programs.

Although I suspect that the combination of weather conditions and fungicide resistance are responsible for mildew problems this year, other "fungicide deployment errors" may also be involved. All of the following can contribute to poor mildew control:

1. Failure to apply a mildewcide before petal fall: When they were first introduced, DMIs would control mildew even if no mildewcides were applied before petal fall. However, QoI fungicides lack the post-infection activity of the DMIs and control programs with QoIs and sulfur must be initiated at tight cluster or pink. Waiting until petal fall to control mildew in the absence of DMIs is somewhat similar to waiting until petal fall to begin a scab control program.

2. Failure to maintain coverage until terminal buds are set: Again, we were spoiled by the effectiveness of the DMI chemistry because two or three applications (e.g., petal fall, 1st and 2nd cover) frequently provided nearly perfect mildew control. As mildew populations become resistant to the DMIs, one can no longer expect complete control from these products. As a result, some inoculum will persist throughout summer and, given the right weather, will explode into a major mildew problem between mid-June and early July. Failure to maintain coverage through June and July is especially critical for newly planted trees that may continue growing into August. Young non-bearing trees will need regular sulfur sprays throughout most of the summer.

3. Poor spray coverage: Poor coverage may be due to miscalibration, spraying under windy conditions, alternate row spraying, or using low volumes of water with nozzles that deliver large droplet sizes. Because mildew can spread and infect new leaves without rain, one cannot depend on rainfall to redistribute fungicides during infection periods like it does for scab control. Mildew control depends on getting excellent coverage of the entire crop canopy. Low-volume sprays can be effective when the volume is delivered with fine droplets, but low volume sprays with conventional nozzles that tend to deliver larger droplets will provide sub-optimal mildew control because there will not be enough droplets to fully cover leaf surfaces. Spray adjuvants that increase the surface tension of spray solutions can be helpful for reducing spray drift, but these adjuvants will also minimize the number of fine particles that can help to distribute fungicide to more of the leaf canopy, especially if spray volumes drop below 75 gal/A.

Finally, the role of cultivar shifts in our industry should not be ignored. Empire, Red Delicious, Golden Delicious, and McIntosh are all relatively resistant to mildew, especially if they are not grown adjacent to susceptible cultivars that inundate them with inoculum. Many of our newer cultivars are much more susceptible to mildew. Ginger Gold is a delightful cultivar for running mildew trials because it is so susceptible that only the very best mildewcides will provide complete control. However, trying to establish a new orchard of mildew susceptible cultivars next to an old orchard of Ginger Gold, Idared, Rome, or Paulared is a recipe for major headaches, especially if the DMI fungicides are no longer working on those older orchards.

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Even under the best conditions, regaining control of mildew is usually a two-year process. The SDHI fungicides may provide some relief next year, but I anticipate that mildew control with sulfur will increasingly be the new "normal" until new mildewcide chemistries (after the SDHIs) are approved. If my hunch is correct, controlling mildew will add complications to our apple pest control programs for the next few years. (Hint: remember that sulfur and oil are not compatible, so insecticides and acaricides that require oil to enhance uptake will not mesh well with a sulfur-based mildew control program.) ❖❖

References:

Rosenberger, D. 2012. Controlling apple mildew. Scaffolds 21(4), 2 April 2012. On-line at http://www.scaffolds.entomology.cornell.edu/2012/SCAFFOLDS%204-2-12.pdf.

Turechek, W.W., et al. 2004. Powdery mildew of apple. NY State IPM Program Publ. no. 102GFSTF-D4. On-line at http://www.nysipm.cornell.edu/factsheets/treefruit/diseases/pm/apple_pm.pdf.

INSECT TRAP CATCHES
(Number/Trap/Day)

Geneva, NY

	6/4	6/7	6/11
Redbanded leafroller	0.0	0.0	0.0
Spotted tentiform leafminer	0.0	1.3*	10.6
Oriental fruit moth	0.0	0.0	0.0
American plum borer	0.0	0.0	0.3
Lesser appleworm	0.0	0.0	0.1
San Jose scale	0.0	0.0	0.0
Codling moth	0.4	0.0	0.0
Lesser peachtree borer	0.1	0.0	0.6
Peachtree borer	0.0	0.1	0.0
Pandemis leafroller	0.1	1.5	0.3
Obliquebanded leafroller	0.0	1.0	1.0

Highland, NY

	6/4	6/11
Redbanded leafroller	0.0	0.5
Spotted tentiform leafminer	50.7	70.2
Oriental fruit moth	0.4	0.5
Codling moth	1.7	0.6
Lesser appleworm	0.5	1.9
Tufted apple budmoth	4.6	0.0
Fruittree leafroller	0.3	0.9
Variegated leafroller	1.1	0.9
Obliquebanded leafroller	2.3	0.9
San Jose scale	1.0	23.6*

* first catch

UPCOMING PEST EVENTS

	43°F	50°F
Current DD accumulations (Geneva 1/1–6/11/12):	1219	754
(Geneva 1/1–6/11/2011):	1020	634
(Geneva "Normal"):	919	536
(Geneva 1/1–6/18 predicted):	1399	885
(Highland 1/1–6/11/12):	1377	830
(Highland 1/1–6/11/11):	1153	713

Coming Events:	Ranges (Normal ±StDev):	
Cherry fruit fly 1st catch	755–1289	424–806
Lesser appleworm 1st flight subsides	990–1466	604–932
Oriental fruit moth 2nd flight begins	1283–1507	789–981
Obliquebanded leafroller summer larvae hatch	1038–1460	625–957
Apple maggot 1st catch	1235–1653	786–1058
American plum borer 1st flight subsides	1194–1422	741–915
Codling moth 1st flight subsides	1280–1858	811–1225
Comstock mealybug 1st adult catch	1308–1554	809–1015
Redbanded leafroller 2nd flight begins	1235–1627	758–1068
Spotted tentiform leafminer 2nd flight peak	1373–1795	856–1194

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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