Ohio
Fruit ICM News

Editor: Ted W. Gastier, Extension Educator, Agriculture
Ohio State University Extension, Huron County
180 Milan Avenue, Norwalk, OH 44857 419-668-8219
FAX: (419) 663-4233 E-mail: gastier.1@osu.edu

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In This Issue

Calendar
Phosphorous Acid Fungicides
Testing Scab Resistance to Fungicides
Current Fire Blight Assessment
Handguns Blazing (Oriental Fruit Moth Control)
New Miticide for Strawberry
Deploying Blueberry Fruitworm Traps
Fruit Observations and Trap Reports
Degree Day Accumulations for Ohio Sites
Pest Phenology

Calendar

June 28: Ohio Fruit Growers Society Board Meeting, Burnham Orchards, Berlin Heights, OH, 6:30 to 8:00 p.m. Contact Tom Sachs at 614-246-8290 or e-mail Tsachs@ofbf.org or Kathy Lutz at 614-246-8292 or e-mail growohio@ofbf.org.

June 28: Ohio Apple Marketing Program Board Meeting, Burnham Orchards, Berlin Heights, OH, 8:00 to 9:30 p.m. Contact Tom Sachs at 614-246-8290 or e-mail Tsachs@ofbf.org or Kathy Lutz at 614-246-8292 or e-mail growohio@ofbf.org.

June 29: Ohio Fruit Growers Society Summer Tour, Burnham Orchards, Berlin Heights, OH, 8:00 a.m. to 3:00 p.m. Check out <http://www.ohiofruit.org/ofgs/> (click on 2005 Summer Tour). Burnham's website is <http://www.burnhamorchards.com>.

Phosphorous Acid Fungicides

Source: Annemiek Schilder, Michigan State University Plant Pathology, Fruit Crop Advisory Team Alert, Vol. 20, No. 5, May 10, 2005

Recently, a number of new fungicides that have phosphorous acid as the active ingredient have come on the market. Other names that you might hear for this group are "phosphonates" or "phosphates." Examples are ProPhyt, Phostrol and Agri-Fos. Aliette (fosetyl-Al), an older fungicide, is the prototype for this group of fungicides. However, the long-standing patent on Aliette had prevented similar fungicides from being developed up until recently. In Australia, where the patent did not apply, growers have been using these types of fungicides for over a decade.

The term "phosphorous acid" should not be confused with phosphoric acid or phosphorus (P), a fertilizer component. In fertilizers, P is normally found in the form of phosphoric acid (H_3PO_4), which readily disassociates to release hydrogen phosphate (HPO_42) and dihydrogen phosphate (H_2PO_4-). Both of these ions may be taken up by the plant and are mobile once inside the plant. Phosphorous acid is H_3PO_3.

A single letter difference in the name of a chemical compound can make a make major difference in its properties. Phosphorous acid releases the phosphonate ion (HPO_32-; also called phosphite) upon disassociation. Phosphonate is easily taken up and translocated inside the plant. Phosphorous acid does **not** get converted into phosphate, which is the primary source of P for plants.

Because phosphorous acid and its derivatives do not get metabolized in plants, they are fairly stable and probably contribute little or nothing to P nutritional needs of the plants.

Some researchers have investigated the ability of phosphorous acid to act as a nutrient source for plant growth and found that P-deficiency symptoms developed with phosphorous acid as the sole source of P. This means that although phosphorous acid can control diseases, it is not a substitute for P fertilization. The inverse is also true: phosphate is an excellent source of P for plant growth, but is unable to control diseases other than improving the general health of the crop. So applying high amounts of P fertilizer will not work as a disease control measure.

Researchers have found that phosphorous acid fungicides are especially effective against Oomycete pathogens, such as *Phytophthora, Pythium*, and downy mildews in a number of crops. Phosphorous acid has both a direct and an indirect effect on these pathogens. It inhibits a particular process (oxidative phosphorylation). In addition, some evidence suggests that phosphorous acid has an indirect effect by stimulating the plant's natural defense response against pathogen attack. This probably explains the much broader spectrum of activity observed in fungicide efficacy trials in small fruit crops in Michigan. We've found, for instance, that ProPhyt had efficacy against downy mildew, *Phomopsis*, and black rot (but not much against powdery mildew) in grapes. We also have evidence of activity of these compounds against anthracnose in blueberries.

The phosponate ion is highly systemic and fairly stable in plants. The systemic activity allows them to be applied as foliar fungicides for prevention of *Phytophthora and Pythium* root rots. They also display curative activity. In general, applications every 14 days seem to be effective in grapes, but follow label directions. These fungicides are sold as solutions of potassium and/or sodium salts of phosphorous acid. To compare them, one should look at the "phosphorous acid equivalent," which should be listed on the label.

Prices range from about $25 to $35 per gallon, and the application rate ranges from 2 to 5 pt/acre ($6.25 to $22 per acre, depending on the product and rate). Under high disease pressure, higher rates may need to be used and spray intervals tightened. Since these fungicides are actually in salt form, care must be taken not to exceed a certain concentration, as crop injury may result.

In addition, if the concentration is too high, the pH may become so low that in tank mixes with copper products (particularly copper hydroxide such as Kocide), too much copper will become available and result in crop injury.

Testing Scab Resistance to Fungicides: SMOR as a Service

Source: Wolfram Koeller & Diana Parker, Plant Pathology, Geneva, Scaffolds Fruit Journal, Volume 14, No. 8, May 9, 2005

Nine fungicides (Syllit; Topsin M or Methyl-T; Nova, Procure and Rubigan; Flint and Sovran; Vangard and Scala) belonging to four classes of chemistries are labeled for the post-infection control of apple scab. Unfortunately, many of these materials have lost their activity because the scab fungus developed resistance. In response, we have worked on the site-specific management of resistance (SMOR). The SMOR concept is simple: Test the sensitivities of individual orchards and only use the post-infection materials that are still active. Who would do the sensitivity tests to find out where individual orchards stand? We are prepared to provide this test service for the 2005 season for a cost-covering fee of $800.

We must have 50 apple leaves with scab lesions to do these sensitivity tests. There are two modes of testing, a 'forward mode' and a 'rescue mode'. In the 'forward mode', a scab control failure has not been a problem in previous seasons, but a grower wants to know for how much longer the post-infection fungicides used will last until resistance sets in.

Naturally, leaves with at least one visible scab lesion will not be found easily. In this case, six trees at the opposite corners of a typical orchard block must be left unsprayed until scab lesions develop on cluster leaves. The 50 leaves with scab lesions are then collected and submitted to our test facility. After that, the corner trees are included in all subsequent treatments. Alternatives to such corner trees are unsprayed trees close (no more than 1,000 feet) to the orchard block, or a recently abandoned (no more than two seasons) orchard where scab had been managed with the same fungicide program.

In the 'rescue mode', leaf scab develops unexpectedly after post-infection fungicides have been applied. In this case, finding leaves with scab lesions will not be a problem. However, the leaves submitted for testing must be collected before a 'rescue' spray is applied. Otherwise, the scab spores already sprayed will not germinate and, therefore, cannot be tested.

The collection and shipment of leaves to our test facility are crucial steps in the procedure:

1. The 50 leaves with visible scab lesions must be collected from as many trees as possible to reflect the sensitivity of the entire orchard.

2. The leaves must be stored in paper bags (e.g., an open mail envelop). Plastic bags must be avoided, because the moisture building up in plastic bags will cause prohibitive problems.

3. Once the leaves are collected and stored in an open paper bag, they must be kept at a relatively cool place (lower than 75°F). Spores of the scab fungus are very sensitive to heat and will be "dead on arrival", if they are heated up; for example, if left inside a car or a truck cab on a sunny day.

4. The open paper bag with leaves must be shipped to our test facility by overnight mail. Surface mail takes too long to keep the spores of the scab fungus viable. Prior to overnight shipment, the leaves can be kept in a regular refrigerator, but never longer than for two days.

Leaves are sent to (no weekend delivery): Diana Parker
Cornell University, Department of Plant Pathology 630 West North Street, Barton Laboratory
New York State Agricultural Experiment Station
Geneva, NY 14456
(Telephone 315-787-2400)

The minimum requirement included with the shipment of leaves will be the name, address and telephone/e-mail number of the submitter. Much appreciated would be a "warning" to Diana Parker, either by phone (315-787-2400) or by e-mail (dmp2@nysaes.cornell.edu) prior to the shipment.

What happens next ? The submitter will be contacted before sensitivity tests are initiated. A brief form with simple questions will be sent (mail, fax, e-mail). This form will include the assurance that a fee of $800 will be charged after a sensitivity diagnosis has been provided for the orchard sampled. The test submission form and instructions can also be obtained from Cornell's regional extension tree-fruit specialists.

Current Fire Blight Risk Assessment

Source: George Sundin, Michigan State University Plant Pathology, Fruit Crop Advisory Team Alert, Vol. 20, No. 5, May 10, 2005

We have experienced relatively warm temperatures during apple bloom throughout the state — warmer temperatures than we've had during bloom for a few years. A quick rule of thumb for fire blight risk is that days with high temperatures between 70°F and 80°F present a moderate blossom blight infection risk if the rainfall is less than 0.1 inch and a high blossom blight infection risk if the rainfall is greater than 0.1 inch. Days with high temperatures greater than 80°F present a high blossom blight infection risk regardless of rainfall.

High temperatures for the last five days have been conducive to growth of the fire blight pathogen in several areas with trees in various stages of apple bloom (see table).

Location	May 5	May 6	May 7	May 8
Sparta	66°	67°	72°	81°
Hart	65°	68°	66°	79°
NWMHRS	68°	64°	63°	81°

Although temperatures are predicted to be cooler over the next few days, the risk is present now. Low amounts of rainfall have kept the fire blight infection risk as determined by the MaryBlyt model from climbing off the charts. However, we must remember the extended period of warm temperatures from earlier in the season (April 4-20). These temperatures would have activated growth of the fire blight pathogen in cankers on trees to likely high internal populations.

The long cold period that followed probably shut down growth, but the internal populations would remain at higher levels than normal.

Thus, I believe that fire blight risk may be even greater than predicted by the MaryBlyt model because of the prolonged early season activation of the pathogen. Orchard blocks with fire blight symptoms from prior years would be particularly at risk. Growers should keep trees protected during bloom (see articles in the April 26, 2005 *Fruit CAT Alert* http://www.ipm.msu.edu/CAT05_frt/F04-26-05.htm) and also use Apogee (prohexadione calcium) for shoot blight control where possible, applied at petal fall of the king bloom.

Handguns Blazing

Source: Harvey Reissig & Dave Combs, Entomology, Geneva, Scaffolds Fruit Journal, Volume 14, No. 8, May 9, 2005

Before the internal worm management decision process gets started in earnest this season, here is a synopsis of a small-plot efficacy trial conducted against oriental fruit moth in Wayne County, NY last year.

The effectiveness of different schedules of Imidan were compared against oriental fruit moth in commercial WNY apple orchards in 2004. Tests were set up in two small plots (approx. 1/3 A), in two commercial orchards in Wayne County. Both of these small plots had been used in the past for OFM studies and were heavily infested during the 2003 growing season. Many of the unsprayed trees in 2003 had a 40-60% infestation level of OFM at harvest.

In order to time sprays, a network of 24 OFM traps was maintained throughout western NY, and checked weekly throughout the season. The first egg hatch for each generation was estimated to occur at 175-200 DD (Base 45 F) after the biofix (first sustained catch of moths). Four treatments were compared in each orchard:

- **Protective Schedule:** Imidan was applied at pink (May 6), petal fall (May 21) and as cover sprays on June 3, 16, and 30; July 20; and August 2, 17, and 31.
- **Optimum Timing:** Imidan was applied at the estimated first hatch of eggs against each generation. The first generation spray was applied at pink (May 6) based on pre-season estimates of OFM phenology. The second generation spray was applied based on a pheromone trap biofix and DD calculations on July 20. The third generation of OFM was delayed until after the third flight had started during the last week in August, and applied on August 31. A fourth spray in this treatment was never applied because the flight continued throughout September and growers were reluctant to spray after Labor Day.
- **Late Season Control:** The first spray was applied on July 20 at the estimated first hatch of eggs of the second generation using methods described for the Optimum Timing schedule, followed by another cover spray on August 2. A final spray was applied on August 31, and a fourth spray was not applied after September because of concerns outlined above.
- **Untreated Check:** No insecticide sprays were applied to a small block of 12-16 trees along the outside edge of the research plot.

The same rate of Imidan 70W (3 lbs/A) was applied in all applications in all treatments with a high-pressure handgun sprayer to ensure adequate coverage. Damage from the first generation was estimated on July 23 by inspecting 100 fruits on each of 5 trees in each treatment. Apples were sampled again on September 10 (100 fruits on 3 trees/trt) to estimate cumulative damage from the first and second generations of OFM. Fruit was picked on October 8, which is a normal harvest date for late maturing apple cultivars in NY, and 100 fruits on 4 trees/trt were examined to estimate seasonal damage from all three generations of OFM. Data from the two combined orchards was subjected to an AOV with SuperAnova. Means were separated with Fisher's Protected LSD Test ($P<0.05$). Data was transformed Arcsin (Sqrt X) prior to analysis.

OFM damage was considerably lower in the Untreated Check plots throughout the season than in 2003, probably because of the unseasonably cool and rainy weather throughout the summer (Table 1).

After the first generation, 13.4% and 5.0% of the fruit was infested in the checks in the two orchards, and damage in the combined orchards averaged 9.2%. When data from the combined orchards was analyzed, only the Protective schedule significantly reduced damage from the first generation below that in the Untreated Checks. Since no OFM sprays had yet been applied in the Late Season treatment, damage in this plot should have been similar to that in the check. However, the lack of control in the Optimum Treatment suggests that the single spray at pink was ineffective against the first generation, probably because flight of the first generation of OFM was later than normal and did not even begin until bloom in 2004.

Average fruit injury in the combined Check plots increased to 15.7% after the second generation, and only the Protective treatment significantly reduced fruit damage, although damage was lower than that in the Check plot in the Late Season combined treatments.

At harvest (October 8), damage in the combined orchards Checks (17.4%) was only slightly higher than the average damage resulting from the first and second generations, which suggests that damage from the third generation of OFM was relatively insignificant during 2004. The results from this study show that Imidan can still adequately control OFM in problem apple orchards in NY if it is applied frequently at high rates with thorough coverage. In these heavily infested orchards, neither of the 3-spray programs, the Optimum Timing, or Late Season Schedule were as effective as the Protective Schedule, although damage in both of these treatments at harvest was lower than that in the Check. Even though the effectiveness of both of these reduced-spray schedules was similar during 2004, it is possible that results from these strategies could vary from year to year, depending upon seasonal weather patterns that may affect OFM phenology.

Table 1. Comparison of different spray schedules for control of oriental fruit moth in apples, 2004

	Percent Damaged Fruit								
Evaluation Dates	1st Generation July 23			2nd Generation Sept. 10			3rd Generation Oct. 8		
Treatment	#1	#2	Both	#1	#2	Both	#1	#2	Both
Protective Schedule Pink, petal fall, 1-7 cover	1.4	0.6	1.0a	2.7	0.3	1.5	1.8	0.5	1.13a
Optimum OFM - 1 spray at 1st hatch/brood	12.2	1.4	6.8b	26.7	8.7	17.7b	12.5	5.8	9.0b
Late Season - 2 sprays for each of summer broods	9.2	2.4	5.8b	14.0	5.0	9.5b	5.3	10.3	7.8b
Control - Untreated	13.4	5.0	9.2b	24.3	7.0	15.7b	20.8	14.0	17.4c

Means within a column followed by the same letter are not significantly different (Fisher's Protected LSD Test, $P < 0.05$). Data transformed arcsin (sqrt[x]) prior to analysis.

New Miticide for Strawberry

Source: Dr. Celeste Welty, Extension Entomologist, OSU

Oberon 2 SC is a new insecticide/miticide from Bayer CropScience. On strawberry, Oberon controls two-spotted spider mite and whiteflies, used at a rate of 12 to 16 fl oz per acre, with a pre-harvest restriction of three days and a re-entry interval of 12 hours. It is classified as general use, not restricted use.

Oberon contains spiromesifen as the active ingredient, which is part of a new family called tetronic acids. Oberon kills all stages of mites from egg to nymph to adult, with best activity against nymphs. It acts by inhibiting lipid biosynthesis. Oberon is also registered for use on field corn, cotton, cucurbit vegetables, tomato and related fruiting vegetables, leafy greens, Brassica greens, and potato. In addition to spider mites and whiteflies, target pests include broad mite and psyllids.

Blueberry Fruitworms: Deploy Monitoring Traps Now

Source: Rufus Isaacs, Michigan State University Entomology, Fruit Crop Advisory Team Alert, Vol. 20, No. 5, May 10, 2005

There are two species of fruitworms that can infest blueberries in Michigan: the cherry fruitworm and the cranberry fruitworm (see images at <http://www.ipm.msu.edu/CAT05_frt/F05-10-05fruitworm.htm>). The larvae can be found inside young blueberry fruit during and after bloom, but their presence is often not evident until the premature ripening of infested berries, or the webbing of berries together by cranberry fruitworm are noticed. However, an Integrated Pest Management approach using monitoring for moths, scouting, and appropriate application of effective controls can prevent fruit contamination by these pests.

Regular weekly scouting in blueberry fields across west Michigan as part of our RAMP Project indicates that the flight of cherry fruitworm moths has just started. All our monitoring traps were empty one week ago, and yesterday male cherry fruitworm moths were trapped at a farm in Grand Junction.

So, if not already deployed, monitoring traps for cherry fruitworm and cranberry fruitworm should be placed in fields this week.

In recent years, some fields have experienced high pressure from cherry fruitworm, and it is worth monitoring for both moth species if this has been your experience. Cherry fruitworm emergence usually precedes cranberry fruitworm by up to a week.

To monitor for these pests, hang traps baited with a pheromone lure in the top third of the bush. Deploy one trap for each species per five acres of field with traps placed on bushes along wooded borders or areas where fruitworms were a problem last year. Traps should be checked weekly and the moths counted and removed. Writing the number trapped on the bottom of the trap is one way to keep track of the developing population.

Pheromone traps are very specific, but it is important to know what the species you are monitoring looks like. See the image link above in this article for the correct species to identify. Contaminant moths have been caught in cherry fruitworm traps at most of the farms we are scouting in Van Buren County, but these should not be confused with cherry fruitworm. These contaminants are *Pseudexentra vaccinii*, which are longer and lighter-colored than cherry fruitworm with a distinctive pattern.

The monitoring traps catch male moths, but because females lay the eggs, controls should be delayed until egg laying starts. This is usually soon after petal fall begins, so in high-pressure fields an insecticide may be warranted during bloom, limiting grower's choices of what to apply. If pressure is lighter or if bush development is faster than the moths, growers may be able to wait until the immediate post-bloom timing to control fruitworms.

Fruit Observations and Trap Reports

Site: Waterman Lab, Columbus
Dr. Celeste Welty, OSU Extension Entomologist

Apple: 5/4 to 5/11/05 still late bloom on 5/4	
Redbanded leafroller	1 up from 0
Spotted tentiform leafminer	9 up from 6
San José scale	0 same as last wk.
Codling moth (3 trap mean)	2.7 up from 0.0
Lesser appleworm	19 up from 0
Tufted apple budmoth	0 same as last wk.
Variegated leafroller	0 first report
Obliquebanded leafroller	0 first report

Note: Biofix for codling moth on 5/10/05

Site: Holmes, Medina, and Wayne Counties
Ron Becker, IPM Program Assistant

In apples, leafminer numbers are remaining low in the traps, with an average around 315. Codling moth traps are still at 0. There has been very little other than very light scab found as we examine the trees. In training my scouts this year, what most of them have brought to me for identification is "bee poop" that they are finding on the leaves (LOTS of bee activity). We have not found any apple blossoms damaged by the cold temperatures. Trees are mostly at full bloom with some of the earlier blooming cultivars starting to drop their petals.

In peaches, the LPTB traps are still at 0 for all locations. The OFM trap at Moreland had 20 in it (first catch of the season) while the two in Rittman still were at 0. Though we did not find any sign of insect activity in the peaches, there were new infection sites for bacterial canker. I suspect it may have been in the spots damaged by hail last year. One block of peaches in Holmes County had the blossoms/fruit frozen off with the colder temperatures while the rest of the area seemed to come through ok.

Early strawberries are at about 10% bloom with very light aphid infestations. Very few blossoms show any cold damage. Orange rust is now being found in blackberries and black raspberries. It looks like the pustule burst is at least a week away. Growers are starting to dig out the infested plants and will probably put on protectant fungicides the first of next week.

Site: East District; Erie and Lorain Counties
Jim Mutchler, IPM Scout/Technician

Apple: 5/3 to 5/10	
Oriental fruit moth	17.6 first report
Redbanded leafroller	5.3 up from 4.0
San Jose scale	0.0 same as last week
Spotted tentiform leafminer	913 first report

Beneficials found: brown lacewings
Note: Biofix for Oriental fruit moth on 5/8/05

Peach: 5/3 to 5/10	
Oriental fruit moth	1.8 first report
Redbanded leafroller	13.3 first report

Site: West District: Huron, Ottawa, Richland, and Sandusky Counties
Lowell Kreager, IPM Scout/Technician

Apple: 5/2 to 5/9	
Codling moth	0.0 same as last week
Oriental fruit moth	5.3 up from 0
Redbanded leafroller	9.0 first report
San Jose scale	0.0 same as last week
Spotted tentiform leafminer	215 up from 187

Note: Biofix for codling moth on 5/10/05

Peach: 5/2 to 5/9	
Lesser peachtree borer	0.0 same as last week
Oriental fruit moth	3.3 up from 0.0
Redbanded leafroller	54.0 first report

Degree Day Accumulations for Ohio Sites

May 11, 2005

Ohio Location	Degree Day Accumulations Base 50°	
	Actual	Normal
Akron-Canton	177	223
Cincinnati	368	389
Cleveland	146	209
Columbus	298	286
Dayton	262	294
Kingsville	113	171
Mansfield	156	216
Norwalk	134	199
Piketon	323	407
Toledo	165	193
Wooster	181	197
Youngstown	143	192

Pest Phenology

Coming Events	Degree Day Accum. Base 50°F
Redbanded leafroller 1st flight peak	103 - 193
Lesser appleworm 1st catch	104 - 286
Lesser peachtree borer 1st catch	110 - 553
White apple leafhopper nymphs present	123 - 404
Spotted tentiform leafminer sap-feeders present	130 - 325
First codling moth catch	141 - 491
Lesser appleworm 1st flight peak	181 - 483
European red mite egg hatch complete	183 - 298
Plum curculio oviposition scars	232 - 348

Revised thanks to *Scaffolds Fruit Journal*
(Art Agnello)