



Vermont Apple IPM News

Lorraine P. Berkett, IPM Specialist

June 23, 2005

Disease Update

Apple Scab - So far, things are looking good in terms of scab management in a number of orchards. Although most of Vermont's orchards were out of the primary scab period during the very wet conditions last week, it would be wise to continue to check the youngest 7-10 leaves on terminals during the next week just to confirm that infections did not occur.

Flyspeck - As discussed in previous years, flyspeck is more difficult to manage than sooty blotch. In a recent article in *Scaffolds* (June 20, 2005), Dave Rosenberger reviewed a technique which can help in timing summer fungicide sprays for flyspeck which involves tracking the hours of leaf wetness from Petal Fall. The following information is from the article "Timing Sprays for Flyspeck and Sooty Blotch" written by Dave Rosenberger.

"Flyspeck and sooty blotch infect apple fruit during summer and cause blemishes that can make fruit unmarketable. These diseases are caused by unrelated fungi, but both diseases are favored by extended periods of wet weather during mid- to late summer. Sooty blotch is easily suppressed by fungicides, but flyspeck is more difficult to control in northeastern United States. In abandoned or unsprayed trees, sooty blotch may appear on fruit before flyspeck does. However, flyspeck usually appears first in commercial orchards and causes more commercial losses than sooty blotch.

Most of the inoculum for sooty blotch and flyspeck comes from wild hosts in orchard perimeters. Ascospores of the flyspeck fungus mature in wild hosts shortly after apples begin bloom. Release of ascospores peaks about 10 days after petal fall. However, only a few ascospores land on apple fruit, and most of these are killed by fungicides used to control apple scab. Although ascospores do not play much of a role in commercial orchards, they are important because they initiate secondary infections in the border areas.

Brown and Sutton in North Carolina showed that flyspeck becomes visible on apple fruit only after fruit have been wet for a cumulative total of approximately 270 hr following infection. If we assume that flyspeck has a similar incubation period on wild hosts, then the primary infections initiated by ascospores will begin producing conidia on non-orchard hosts after approximately 270 hr of Accumulated Wetting counting from Petal Fall (hr-awpf).

The conidia produced on non-orchard hosts are continuously blown into apple orchards beginning at 270 hr-awpf, and these conidia cause the majority of infections that appear on apple fruit during late summer. However, another 270 hr of accumulated wetting are required before flyspeck becomes visible on apple fruit. Thus, most infections on fruit will become visible only after 540 hr-awpf.

Because flyspeck spores do not enter orchards in significant numbers until 270 hr-awpf, summer fungicides for controlling flyspeck are not needed during early summer. Furthermore, Topsin M, Flint, and Sovran (and probably Pristine) all provide post-infection activity that will eradicate flyspeck infections that have accumulated less than 100 hr of wetting after infection. Given that conidia begin blowing into orchards at 270 hr-awpf and that fungicides can provide post-infection activity through another 100 hr of wetting, summer fungicides should not be needed between the end of scab season and the time that the orchard reaches 370 hr-awpf. However, summer sprays probably should not be delayed beyond about 320 hr-awpf to allow for errors in measuring wetting periods and to ensure that a lengthy wetting period will not suddenly cause the 370 hr threshold to be exceeded.

In dry years, 320 hr-awpf may not occur until mid-August, but summer sprays should not be delayed beyond July 20-25 in New York State for two reasons. First, summer fungicides may be needed in late July to protect fruit against black rot and white rot, especially on cultivars that mature in late August or early September. Second, complete spray coverage becomes increasingly difficult as apples increase in size, especially on cultivars such as Redcort that tend to produce two short-stemmed fruit on a single cluster. Complete spray coverage also becomes more difficult as limbs bend downward under heavy crop loads.

In dry years, a single fungicide application in late July can sometimes provide adequate control of flyspeck for the whole season. Depending on a single application is risky, however, because effectiveness of a single spray depends on achieving perfect spray coverage. A safer approach in dry years is to use a minimum of two summer fungicide applications with one timed for mid- to late July and the second about three weeks later in early to mid-August. A slightly earlier timing may be advisable in orchards where poor pruning or an exceptionally heavy crop load make effective spray coverage impossible after mid-August. More than two applications will be needed in wet years when 320 hr-awpf is reached by late June.

Commercial losses to flyspeck usually occur when late summer rains remove fungicide protection from the "last spray" and then another 270 hr of accumulated wetting occurs prior to harvest. Under those conditions, flyspeck can suddenly appear on a high proportion of fruit within a few days. This scenario was illustrated in 2004 in a field trial at the Hudson Valley Lab that was conducted in a small orchard surrounded by woodlots. The last fungicide sprays in test plots were applied on 17 Aug. Fungicide residues were removed by 2.15 inches of rain that occurred 20-22 Aug. Development of flyspeck on Golden Delicious fruit was monitored in each of four replicated plots per treatment by observing 25 fruit per plot. On 22 Sept., less than 10% of fruit had any flyspeck and most of the lesions observed were inconspicuous infections in stem-cups or calyx ends of fruit. Five days later, and after exactly 270 hr of accumulated wetting counting from the fungicide wash-off date of 22 Aug., incidence of flyspeck

jumped to 27-64% in all except the Pristine plots. Data from this trial suggests that none of our fungicides (with the possible exception of Pristine) will provide fruit protection through more than 2 inches of rain, and the results verify the accuracy of the 270-hr incubation period for flyspeck.

As was seen in the 2004 trial, the critical decision for controlling flyspeck was deciding when to re-spray orchards after heavy rains in August and September. September of 2003 was one of the wettest Septembers on record at the Hudson Valley Lab, and we accumulated 270 hr wetting in just 25 days. Thus, one might assume that a "worst-case" rule of thumb would be to recover apples following heavy rains in late August or early September if fruit will remain on the tree for another 25 days, especially if the fruit are adjacent to a good inoculum source.

However, fungicides need not be re-applied immediately after a wash-off event in late August or early September because Topsin M, Sovran, and Flint will all provide post-infection activity covering up to 100 hr of accumulated wetting after the wash-off event. Given the scenario in 2004, that means that if trees had been resprayed any time before 7 Sept. (when hours of accumulated wetting reached 100), then flyspeck should have been controlled through September. If another storm had delivered 3 inches of rain on 30 Aug., then a grower who re-applied fungicides on 25 Aug might have needed yet another application in September to protect fruit through September whereas an application on 4 Sept. would have sufficed to eradicate infections from both the 20-22 Aug. and 25 Aug. rain events while at the same time providing protection on through September.

Conclusions: Fungicides for flyspeck are not needed between the end of scab season and 320 hr-awpf, so fungicide schedules can often be stretched during June if orchards are scab-free at second cover. Control failures with flyspeck usually occur either because of poor spray coverage during the latter part of the growing season or because trees were left unprotected through more than 270 hr of wetting during the preharvest interval. Fungicide protection on fruit is exhausted after 2 inches of rain, so fungicide sprays may be needed in September if heavy rains occur with more than 25 days remaining before fruit will be harvested."

Note: If you are not planning to use a fungicide with post-infection activity, such as Captan, you should not wait until 320 hr-awpf but protect the fruit at 270 hr-awpf. As of June 23, 237 hrs of leaf wetness have accumulated from PF at the UVM HRC which occurred on May 31.

Arthropod Update

Apple Maggot Fly - Review of Basics - The following information appeared in the article "On the Fly", written by Harvey Reissig and Art Agnello, which was in the June 20, 2005 issue of *Scaffolds*. It offers a good review.

"Once again, it is nearly time to expect the first appearance of apple maggot (AM) flies in volunteer apple stands and abandoned orchards, particularly in eastern N.Y.; western N.Y. could be about a week later, or not, depending on what kind of temperatures we get over the next week or so. Crop scouts and consultants have been using traps to monitor AM populations for a long time, but this tactic, useful as it is, nevertheless is not recommended in all cases. Some orchards have such high or such low AM populations that monitoring for them is a waste of time. That is, sprays are needed predictably every season in some blocks, and on a calendar basis; conversely, they are rarely needed at all in other blocks. However, most commercial N. Y. orchards have moderate or variable pressure from this pest, so monitoring to determine when damaging numbers of them are present can reduce the number of sprays used in the summer with no decrease in fruit quality.

Sticky yellow panels have been in use for over 30 years, and can be very helpful in determining when AM flies are present. These insects emerge from their hibernation sites in the soil from mid-June to early July in New York, and spend the first 7-10 days of their adult life feeding on substances such as aphid honeydew until they are sexually mature. Because honeydew is most likely to be found on foliage, and because the flies see the yellow panel as a "super leaf", they are naturally attracted to it during this early adult stage. A few of these panels hung in an orchard can serve as an early warning device for growers if there is a likely AM emergence site nearby.

Many flies pass this period outside of the orchard, however, and then begin searching for fruit only when they are ready to mate and lay eggs. That means that this advance warning doesn't always have a chance to take place -- the catch of a single (sexually mature) fly then indicates a spray is necessary immediately to adequately protect the fruit. This can translate into an undesirable risk if the traps are not being checked daily, something that is not always possible during a busy summer.

To regain this time advantage, researchers developed newer traps that have the form of a "super apple" -- large, round, deep red, and sometimes with the smell of a ripe apple -- in an attempt to catch that first AM fly in the orchard. Because this kind of trap is so much more efficient at detecting AM flies when they are still at relatively low levels in the orchard, the traps can usually be checked twice a week to allow a one- or two-day response period (before spraying) after a catch is recorded, without incurring any risk to the fruit. In fact, research done in Geneva over a number of years indicates that some of these traps work so well, it is possible to use a higher threshold than the old "one fly and spray" guidelines recommended for the panel traps. Specifically, it has been found that sphere-type traps baited with a lure that emits

apple volatiles attract AM flies so efficiently that an insecticide cover spray is not required until a threshold of 5 flies per trap is reached.

The recommended practice is to hang three volatile-baited sphere traps in a 10- to 15-acre orchard, on the outside row facing the most probable direction of AM migration (towards woods or abandoned apple trees, or else south). Then, periodically check the traps to get a total number of flies caught; divide this by 3 to get the average catch per trap, and spray when the result is 5 or more. Be sure you know how to distinguish AM flies from others that will be collected by the inviting-looking sphere. There are good photos for identifying the adults on the Apple Maggot IPM Fact Sheet (No. 102GFSTF-18); see p. 226 of the Recommendations for details on obtaining any that may still be in print, or else check the web version at: <http://www.nysipm.cornell.edu/factsheets/treefruit/pests/am/applemaggot.html>. In home apple plantings, these traps can be used to "trap out" local populations of AM flies by attracting any adult female in the tree's vicinity to the sticky surface of the red sphere before it can lay eggs in the fruit. Research done in Massachusetts suggests that this strategy will protect the fruit if one trap is used for every 100-150 apples normally produced by the tree (i.e., a maximum of three to four traps per tree in most cases), a density that makes this strategy fairly impractical on the commercial level.

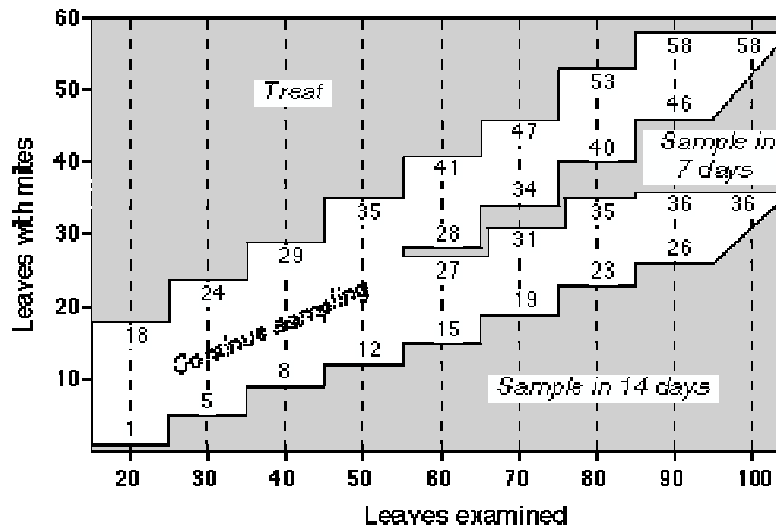
A variety of traps and lures are currently available from commercial suppliers; among them: permanent sphere traps made of wood or stiff plastic, disposable sphere traps made of flexible plastic, and sphere-plus-panel ("Ladd") traps. The disposable traps are cheaper than the others, of course, but only last one season. Ladd traps are very effective at catching flies, but are harder to keep clean, and performed no better than any other sphere trap in our field tests. Brush-on stickum is available to facilitate trap setup in the orchard. Apple volatile lures are available for use in combination with any of these traps. These tools are available from a number of orchard pest monitoring suppliers, among them:

- o Gempler's Inc., 100 Countryside Dr., PO Box 328, Belleville, WI 53508; 608-424-1544, Fax, 608-424-1555
- o Great Lakes IPM, 10220 Church Rd. NE, Vestaburg, MI 48891; 800-235-0285, Fax 989-268-5311
- o Harmony Farm Supply, 3244 Gravenstein Hwy, No. B, Sebastopol, CA 95472; 707-823-9125, Fax 707-823-1734
- o Ladd Research Industries Inc., 83 Holly Court, Williston, VT 05495; 800-451-3406, Fax 802-660-8859
- o Olson Products Inc., PO Box 1043, Medina, OH 44258; 330-723-3210, Fax 330-723-9977
- o Scenturion Inc., P.O. Box 585, Clinton, WA 98236; 360-341-3989, Fax 360-341-3242

By preparing now for the apple maggot season, you can simplify the decisions required to get your apples through the summer in good shape for harvest."

European Red Mites: Monitoring of this pest is important. There are different ways to monitor populations. You can look at 100 leaves and count all the moving ERM on those leaves and get an average per leaf. In June, the threshold is an average of 2.5 motile mites/leaf. Or, you can count the number of leaves with any motile ERM. If 55% of the leaves have ERM, you should consider a miticide application. Another method is the “sequential sampling” technique which is described in the Cornell University Coop. Ext. “2005 Pest Management Guidelines for Commercial Tree-Fruit Production.” The following is Cornell’s sequential sampling guidelines for June and July:

**MITE SAMPLING CHART - Threshold = 2.5 mites/leaf
(June 1 - 30)**

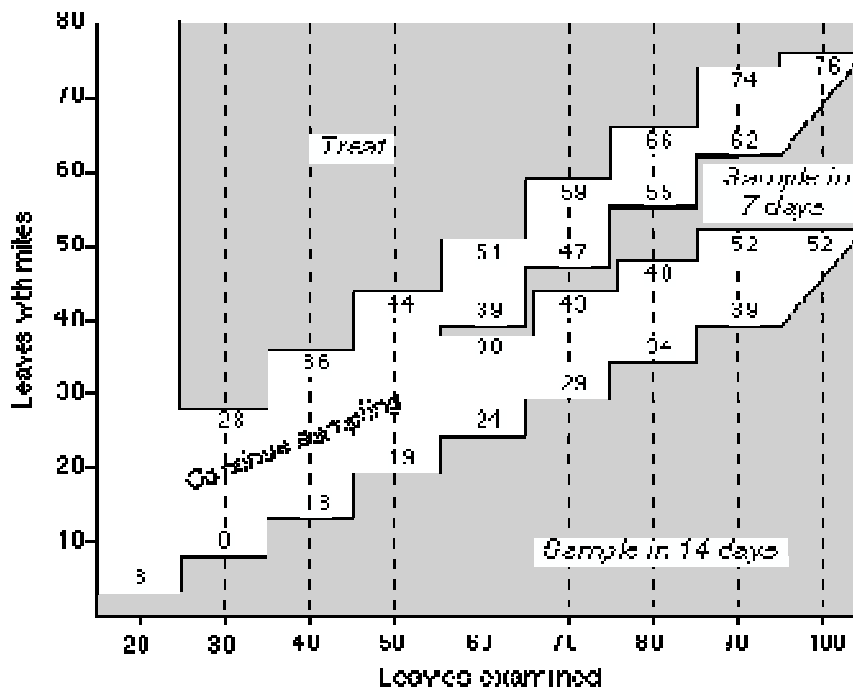


- ◆ This procedure involves examining middle aged leaves for motile mites (any stage except eggs). Use this chart, which corresponds to a mite density of 2.5 mites per leaf, from June 1 until June 30. You will not be counting mites, but will only determine whether they are present or absent on each leaf sampled.
- ◆ Starting with a random tree and sampling every other tree, collect 4 leaves in a plastic bag from each of 5 trees, choosing from each quadrant of the canopy. To make sure the leaves are of an intermediate age, pick them from the middle of the fruit cluster.
- ◆ Using a magnifier, examine the top and bottom surface of each leaf for motile mites, and keep track of the number of leaves containing motile mites. When all 20 leaves have been examined, compare this number with the numbers on the above decision guide. If the number of leaves with mites is equal to the values on the staircase lines, the decision is the one shown in the area immediately below the value (example: For "29" after sampling

40 leaves, the decision is "Continue sampling"; for "8" the decision is to "Sample in 14 days").

- ◆ When the counts fall into any of the shaded regions, sampling is stopped and a decision is made to either treat, or else re-sample in 7 or 14 days. If the counts fall in the "Continue sampling" zone, take and examine more leaf samples in batches of 10 (5 per tree) until the counts fall into one of the shaded regions. If you reach one of the resample zones, the population is below threshold, and should remain so for at least the number of days stated. Return at the designated time and conduct another sample. If the "7 day" resample date falls during the 5.0 mites/leaf Threshold period, you can wait for a total of 14 days before resampling.

**MITE SAMPLING CHART - Threshold = 5.0 mites/leaf
(July 1 - 31)**



- ◆ This procedure involves examining middle aged leaves for motile mites (any stage except eggs). Use this chart, which corresponds to a mite density of 5.0 mites per leaf, from July 1 until July 31. You will not be counting mites, but will only determine whether they are present or absent on each leaf sampled.
- ◆ Starting with a random tree and sampling every other tree, collect 4 leaves in a plastic bag from each of 5 trees, choosing from each quadrant of the canopy. To make sure the leaves are of an intermediate age, pick them from the middle of the fruit cluster or foliar terminal.
- ◆ Using a magnifier, examine the top and bottom surface of each leaf for motile mites, and

keep track of the number of leaves containing motile mites. When all 20 leaves have been examined, compare this number with the numbers on the above decision guide. If the number of leaves with mites is equal to the values on the staircase lines, the decision is the one shown in the area immediately below the value (example: For "36" after sampling 40 leaves, the decision is "Continue sampling"; for "13" the decision is to "Sample in 14 days"). When the counts fall into any of the shaded regions, sampling is stopped and a decision is made to either treat, or else re-sample in 7 or 14 days. If the counts fall in the "Continue sampling" zone, take and examine more leaf samples in batches of 10 (5 per tree) until the counts fall into one of the shaded regions. If you reach one of the resample zones, the population is below threshold, and should remain so for at least the number of days stated. Return at the designated time and conduct another sample. If the "7 day" resample date falls during the 7.5 mites/leaf Threshold period, you can wait for a total of 14 days before resampling.

Looking Ahead - Predicted Insect Activity based on Estimated DD Accumulation - The following tables contain (1) the estimated DD accumulation for 4 locations around Vermont and (2) the arthropod "events" associated with DD.

2005 <u>Estimated</u> Degree-Day Accumulation (Base 50F, from Jan. 1) for Selected Vermont Sites ¹				
Date	So.Burlington	Shoreham	South Hero	Dummerston
6/21	616	631	612	629

¹Degree Days received from Skybit E-Weather Service: <http://www.skybit.com/>

Arthropod 'Events' Based on Degree-Day Accumulation ¹	
Pest/Phenology Event	Estimated DD Base 50 F for Event (from Jan 1)
STLM - 2nd gen. 1st adult catch	557-739
SJS - 1st crawlers observed	619-757
OBLR - peak catch	564-830
AMF - 1st capture	747-1029

¹ Source of Estimated DD (Base 50F) for arthropod pest events: Pest Management Guidelines for Commercial Tree-Fruit Production 2005. A Cornell Cooperative Extension Publication, Table 14: "Degree-day accumulations (from January 1) corresponding to selected fruit phenology and arthropod pest events."

Contact Information

A Commitment to Excellence and Service:

Lorraine P. Berkett
Plant Pathologist and IPM Specialist
Dept. of Plant & Soil Science
105 Carrigan Drive
University of Vermont
Burlington, VT 05405
Phone: 802/656-0972
Fax: 802/656-4656
E-mail: lorraine.berkett@uvm.edu

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