scaffolds Update on Pest Management and Crop Development

FRUIT JOURNAL

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INSECTS

OILY BOIDS

TO OIL OR NOT TO OIL, THAT IS THE QUESTION?

(Jan Nyrop, Art Agnello, and John Minns)

❖❖ Spring now seems to have finally arrived. As much a part of this season as longer days, a rush of color, and baseball, are admonitions by pest control specialists to orchardists to apply oil for control of European red mite. Petroleum oils are particularly useful tools for managing early season mite populations as these oils can be applied anytime before bloom, they are relatively safe and environmentally benign, and pest mites are not likely to develop resistance to these products as has happened with other acaricides.

Many orchardists have established, or are now trying to establish, phytoseiid mite predators in their orchards to help keep European red mite numbers at low levels. These phytoseiid mites are about the same size as European red mite and feed on all stages of the pest mite except eggs. Phytoseiids can provide effective biological control of European red mite, and once established in an orchard, certain species of phytoseiids can totally eliminate the need for chemical miticides. Because phytoseiid mite predators overwinter in trees as adult females and become active and lay eggs even before European red mite eggs hatch, there has been concern that early season petroleum oil applications might be detrimental to these European red mite saboteurs.

During the past two years, we conducted research to determine the impact of petroleum oil applications on phytoseiid mite predators. We found that these oils, when applied directly to phytoseiid adults and eggs, caused extensive mortality. Residues of oil were far less toxic to these predaceous mites. Through field experiments, we found that applications of 2% oil at Half-Inch Green or 1% oil at Tight Cluster did not adversely affect phytoseiid numbers. In these experiments, no miticides were required after the oil applications, and mite predators were abundant. However, in plots where oil was not applied, European red mites often became very numerous and one or more miticide applications were required.

When applied under field conditions, petroleum oils certainly kill some phytoseiids. However, mortality of these predators from early season oil applications are minimal because of two factors. First, adult phytoseiids avoid oil residues when ovipositing and oil residues that are as little as 48 hr old cause much less mortality than oil sprayed directly on the predators. Second, the physical location of predators probably offers them considerable protection from the oil. Early in the growing season, adult phytoseiids can be found beneath developing buds, in bark crevices, and in flower buds. In these locations, predators are concealed and probably escape contact with the oil. Eggs are similarly protected, and even when placed on leaves they are most often found alongside the midrib, where oil would have difficulty reaching.

Failure to apply oil early in the growing season might lead to ineffective biological mite

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control later in the summer. In our experiments, this was very apparent when the mite predator *Amblyseius fallacis* was most common and probably occurred because mortality of overwintering *A. fallacis* is often high. This is certainly the case this year; very cold conditions have resulted in the near elimination of *A. fallacis* from trees we have sampled for overwintering predators. A similar phenomenon could occur with *Typhlodromus pyri*, the other common phytoseiid predator in New York orchards. If densities of this predator sufficient for effective biological control have not yet been achieved (this may take as many as three years) or if pesticides that are toxic to these predators have been used recently, omission of early season oil might lead to ineffective biological control during the summer.

In summary, orchardists usually should not forego an application of oil during the spring out of fear that it will have a detrimental effect on mite predators. Clearly, oil is not cost-free and making a good oil application can be time consuming. Therefore, it is desirable to identify blocks, if they exist, that do not require an oil application. We would recommend withholding an oil application only in blocks in which biological mite control has been effective for at least three years and phytoseiid mite predators can be found in trees even when European red mite numbers are very low. These conditions indicate the predator is most likely to be *T. pyri* and this predator is the hardiest and most persistent phytoseiid in commercial orchards.❖❖

THINK PINK

PINK INSECTICIDE STRATEGIES
(Art Agnello)

❖❖ Now that we've waited for so long to reach the point where apple bud development is finally getting under way, it's only fitting to begin thinking about *what comes next* because this stage doesn't last too long. The last of the prebloom sprays should be applied at pink for the most effective control of arthropod pests. In general, the three most important insects to be concerned with are tarnished plant bug, rosy apple aphid, and spotted tentiform leafminer. If all three are present in sufficient numbers to warrant a treatment at this time, the only materials with enough broad sprectrum activity and residual effectiveness to do a good job are the pyrethroids, Asana or Ambush/ Pounce. As a rule, the best control of plant bug is obtained with a pyrethroid, although Cygon and Thiodan are possible alternatives; Thiodan is easiest on mite predators, *but* probably least effective against TPB. If your fruit has been showing no more than 2–3% plant bug damage at harvest, a spray is of questionable value, because low-level damage is difficult to eliminate completely, and packout studies have shown that any increases in packout gained by spraying for TPB are usually offset by the cost of the spray. If TPB is not a problem, but rosy aphids and leafminers are, a recommended option would be Vydate; for rosy apple aphid control alone, use Lorsban 50WP at 12 oz, or Thiodan at 1 lb of the 50WP (2/3 qt of the 3EC) per 100 gallons.

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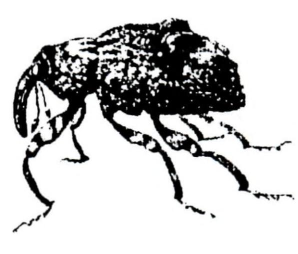
This newsletter available on CENET, on the Tree Fruit News bulletin board under FRUIT.

• Despite last year's late summer leafminer rampage, first brood STLM may well turn out to be low this year, because of the cold winter and slow spring, but if this insect is your sole pest at pink, you have some options. Vydate applied at pink will act as an ovicide against the eggs, 90% of which are present by bloom, and its long residual activity will also work against the larvae as they hatch. Lannate is also effective at pink, but has a shorter residual life, which may be a concern if egg-laying gets slowed down by cool weather. Also, there is little or no ovicidal action with this material, so you are aiming at the young larvae. These materials can also be used at petal fall, but Vydate thins the fruit, so if you don't want this thinning action, Lannate at petal fall is preferred. Be sure virtually all the blossoms have fallen. This allows enough time for all the eggs to be laid and begin hatching. The recommended threshold for this brood of STLM is 2 eggs per fruit cluster at pink. Examine leaves 2, 3, and 4 on three clusters from each tree sampled, and use the sequential sampling table (No. 16, p. 87 in the Recommends) or chart (Fig. 1, p. 92) to determine how many trees to sample. Rememer that a decision can also be made by sampling with a threshold of 1 sap-feeding mine per leaf at petal fall (same table, or chart on p. 94, Fig. 2). For rosy apple aphid, 1 infested cluster per 100 (check 10 on each of 10 trees) warrants treatment.

• Caterpillars: Growers may feel it is necessary to control green fruitworm and/or obliquebanded leafroller in their pink spray. A number of materials, most notably the pyrethroids, are suitable for this purpose; however, it generally turns out that even if some kill is obtained during pink, you usually need to come back again after bloom to finish the job, because not all of the population has emerged from their overwintering sites by this time. We consider petal fall to be the best time to control these worms.

• Mites: If oil was not used earlier for red mites, a contact miticide should be included now — Kelthane, Omite, and Carzol are possibilities; however, Morestan performs very well against mites at pink, and because no resistance to it has been seen (and it can't be used post-bloom), it remains our strongest recommendation for a pink miticide. (Its withdrawal from the pear label does not affect its availability for use on apples.) Be sure to use adequate water with any of these miticides. No contact miticide should be necessary at pink if oil was applied previously. Vydate or Lorsban may also provide some mite suppression if used at this time.

• Plum curculio: Some growers advocate a pyrethroid at pink to help take care of the first curcs immigrating into the block during bloom, because they don't feel they will get in soon enough with a petal fall spray to control every single one. This is an especially popular practice in mixed plantings, where some varieties are still in bloom while others have already reached petal fall. Although it may be possible to kill some curculios this way (and it may not be very many if the residue has to last through a very protracted pink stage), the majority of adults begin damaging the fruit clusters after the petals fall; in fact, Sieg Lienk found that it takes a couple of warm days after this point until any are actually working in the trees. Despite the philosophy that ANY curcs that can be killed justify a spray, it is our opinion that the long-term effects of excessive pyrethroid sprays constitute a strong argument against this practice. 1993 field trials conducted by Harvey Reissig showed again that the addition of a pink pyrethroid spray did not reduce fruit damage by curculio when compared with normal programs consisting of petal fall-plus-cover sprays. You would come out ahead by spot-treating the trees that reach petal fall earlier, or by making a quick border row spray to hold off the invasion for a few days while the straggling varieties catch up, after which a full cover petal fall spray would be applied.❖❖



FIELD NOTES

HUDSON VALLEY

(Dave Rosenberger)

APPLE SCAB ascospore maturity

Highland, NY(4/21):

Immature	Mature	Discharged	Tower shoot
64%	34%	2%	617 spores
Columbia Co. (4/18):			
75%	23%	2%	155 spores

APPLE SCAB UPDATE

❖❖ Note that apple scab ascospore maturity at our Highland Lab as determined by squash mounts was virtually unchanged between April 15 and April 21. However, the number of spores discharged in our shooting tower increased from 15 to 617 during that same period. Thus, while the number of colored spores (i.e., those rated mature in squash mounts) remained unchanged, the number that are actually ready to discharge increased dramatically.

The Hudson Valley has not had any important scab infection periods to date. We had one infection period at green tip, but none since that time.❖❖

GENEVA

APPLE SCAB
(Wayne Wilcox)

ASCOSPORE MATURITY (4/21)

	Maturity category (%)**					Discharge test
DD 32*	1	2	3	4	5	(Spores/LP field)
55	73	11	7	9	tr	0.6

*Accumulated degree days (base 32°F) between first date of green tip and date of assessment. Ability to discharge ascospores usually begins to increase rapidly at approx. 175–225 DD after green tip.

**Categories: 1–3 = immature; 4 = morphologically (apparently) mature; 5 = discharged. Growth stage on 4/21: McIntosh = Green tip

INFECTION PERIOD: Sun. 4/24–Mon. 4/25, 11 hr @ 58°F = Light infection (see below).

DISEASES

SCAB

ARE ASCOSPORES DISCHARGED AT NIGHT?
(Wayne Wilcox)

❖❖ For many years, it has been known that the discharge of scab ascospores is severely suppressed during darkness under most conditions. Some time ago, this knowledge led workers in other parts of the world (e.g., Australia, South Africa) to propose that when a rain begins at night, the hours of leaf wetness that occur between the start of the rain and daylight can be ignored when determining the potential for a primary infection period. In 1989, Bill MacHardy and Dave Gadoury published a paper based partly on data from New Hampshire, in which they also proposed adopting this practice.

The reasoning here is simple: leaf wetness doesn't matter if there are no ascospores around to cause an infection, so don't start the clock until the inoculum is present. Doing so has no effect on the ultimate calculation of many infection periods (e.g., those that start during the day, or rains that begin at night but continue for a long time into the next day), but it can have a major effect on the interpretation of rainy periods like we had last night (Sun. 4/24). For instance, in Geneva the rain started at 9 PM and leaves remained wet until 8 AM Monday morning, giving us 11 hr of leaf wetness at an average of 58°F. According to traditional interpretations, this constituted a light Mills infection period; however, if we wait until 7 AM to start the clock, we get an insignificant 1 hr wetting period.

So, which one's right? Unfortunately, biology is seldom as black-and-white as we'd like for making things easy, so it often comes down

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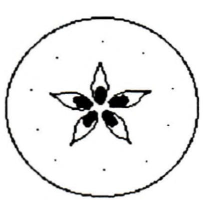
to playing the odds. Published studies and recent work by Dave Gadoury and Bob Seem in our Department provide some basis for assessing these odds:

a. Even though ascospore release is severely suppressed at night, it isn't eliminated. When four rainy periods during the month of May were analyzed in New Hampshire, 96–97% of the ascospores were released during the day and only 3–4% at night. Whether or not 3–4% is significant depends on how much you're starting with; that is, what's the seasonal overwintering inoculum potential from last year's scabby leaves. This is exactly the same dance we do with early season spore maturity every year: 3–4% of a lot is still a lot, 3–4% of a little is much less likely to be important.

b. There are occasional, sometimes anecdotal, accounts of unexplained large ascospore discharges at night. Gadoury and Seem's research suggests that such occurrences are most likely (i) when long dry periods have allowed a large fraction of the season's inoculum to mature since the previous discharge; and/or (ii) late in the spring, towards the end of primary infection season.

My own opinion is that we still don't know it all, but if you're going to disregard the hours of wetness between the start of a nighttime rain and the next morning, do so only in a low-inoculum orchard. Other factors in this equation are relative cultivar susceptibility (Macs or Goldens?), where we are in terms of general ascospore maturity, whether the "extenuating circumstances" given in the preceding paragraph apply, and the specific characteristics of your fungicide program (regular SI program that will suppress "surprises"? Enough contact fungicide residue to take care of a few spores that might slip through?)

Finally, remember that there are a lot of different programs for controlling apple scab, and this doesn't have to get any more complicated than you want it to be.❖❖



ON ICE

POWDERY MILDEW
(Wayne Wilcox)

❖❖ With current economic conditions, many apple growers are looking extra hard at cutting costs wherever they can, including the spray bill. With this in mind, recognize that one of the few bright spots of this winter's Deep Freeze should be its severe reduction in overwintering powdery mildew inoculum.

The powdery mildew fungi are considered "obligate parasites"; that is, they can only function in association with a living host. Furthermore, the apple powdery mildew doesn't overwinter as dormant resting spores, but as a parasite within live, infected apple buds. Now for the good part: infected buds are considerably less winter hardy than healthy buds, and survive poorly at temperatures below -11°F. Thus, when we get good shots of temperatures below this point, the mildew's life-support system goes out and so does the mildew. In fact, mildew is a rare and sporadic disease in regions where winter temperatures are regularly well below zero.

For a disease like powdery mildew, a significant reduction in overwintering inoculum means that the need for control programs can be delayed well beyond the "normal" time for starting them. In orchards that have had good mildew control the last couple of years (not much inoculum to begin with), this year's additional reduction may allow delaying mildew control programs well into the cover spray period and/or allow the use of generally inferior materials (sulfur, benzimidazoles). If you're trying to cut back on mildew sprays, keep a regular eye out in each individual orchard and be ready to start an effective program if and when the disease starts to appear. Remember that overwintering infections can be initiated up until terminal bud set; don't get complacent and let a late epidemic put you behind the 8-ball for next year.❖❖

INSECT TRAP CATCHES (Number/Trap/Day)

Geneva NY

	4/18	4/22	4/25
Green fruitworm	0.4	0	0.2
Pear psylla adults	0.05	0	0
Pear paylla eggs (per terminal bud)	1.5	1.9	4.3
Redbanded Leafroller	0	0	0
Spotted Tentiform Leafminer	0.1*	0	277.3

* = 1st catch

HVL, Highland NY

	4/18	4/21	4/25
Green fruitworm	0.1	0.8	0.4
Pear psylla adults	0.6	1.5	2.8
Pear psylla eggs (per terminal bud)	1.4	–	–
Redbanded Leafroller	0	0.5*	0.5
Spotted Tentiform Leafminer	0	0.3*	2.8

(Dick Straub, Peter Jentsch)

UPCOMING PEST EVENTS

	43°F	50°F
Current DD accumulations		
(Geneva 1/1 – 4/25):	170	75
(Highland 1/1 – 4/25):	285	137
Coming Events:	**Ranges:**	
Redbanded leafroller 1st adult catch	32–480	17–251
Spotted tentiform leafminer 1st oviposition	141–319	48–154
Spotted tentiform leafminer 1st flight peak	180–375	65–192
Green fruitworm flight subsiding	170–448	75–251
Rosy apple aphid nymphs present	91–291	45–148
Green apple aphid nymphs present	127–297	54–156
Pear psylla 1st egg hatch	111–278	55–92
Tarnished plant bug adults active	71–536	34–299
Lesser appleworm 1st catch	135–651	49–377
Pear thrips in pear buds	137–221	54–101
Obliquebanded leafroller larve active	149–369	54–196
European red mite egg hatch	157–358	74–208
Predator mites observed	218–396	92–212
McIntosh at tight cluster	209–279	87–138
Pear at green cluster	209–282	83–138
Peach at half-inch green	154–193	61–101
Plum at green cluster	170–282	75–138
Sweet cherry at white bud	152–267	75–112
Tart cherry at white bud	258–326	109–149

PHENOLOGIES

Geneva:
Apple(McIntosh) - **Half-inch green**
Pear, cherry, peach, plum - **Bud burst**
Highland:
Apple (All varieties): **Early tight cluster**

PEST FOCUS

Geneva:
Pear psylla adults active, laying eggs
Spotted tentiform leafminer adults flying
Highland:
Spotted tentiform leafminer and **Red-banded leafroller** adults flying
Aphid colonies observed
Tarnished plant bug active

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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