scaffolds

Update on Pest Management and Crop Development

FRUIT JOURNAL

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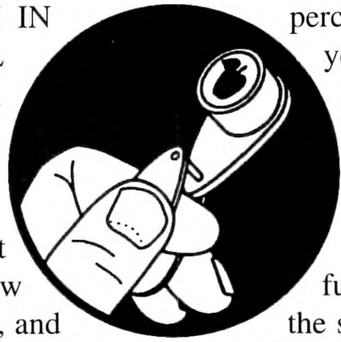
INSECTS

OILY SEASON

YOUR TURN IN THE BARREL
(Art Agnello, Entomology, Geneva)



❖❖ Ignore for now the fact that we've just had enough rain to allow canoe access in most NY orchards, and the leftover water in the weather front is half-way between snow and slush. The sun is still up there somewhere, things will eventually dry out, psylla adults are biding their time, and respiration in mite eggs is almost audible as they approach maturity. As in the past 100 years or so, this would be an appropriate time to consider the uses of horticultural mineral oil, a traditional option that continues to be a wise tactic, despite the fact that a number of newer and capable contact pesticides are available for early season use today. For as many of the blocks as you can find the time and application window to devote to a thorough treatment, oil retains a justifiably preferred position because of its effectiveness, affordability, and relative safety from a biological and pesticide resistance perspective. Exploiting the most acceptable spraying conditions to maximize tree and block coverage can be a challenge in our area, but few pest management efforts have such potentially high returns when everything *falls* properly into place.

Pear Psylla

After a few teaser days of sunny and warm weather, I know that psylla eggs are already present, as it's nearly impossible to be sure your pear trees are all protected by the time the very first psylla adults start flying and (presumably) ovipositing. However, even a few nice warm days in a row don't awaken more than a small percentage of the total population, so you'll be more than adequately psylla-ready if you prepare a little ahead of time, once the waters recede, of course.

Early oil applications can be useful against pear psylla all throughout the swollen bud stage; although it's capable of killing adults and nymphs that are contacted directly, oil is recommended mainly because the residue has a repellent effect on adult females looking to deposit their eggs, and this lasts for an extended period after treatment. The strategy behind the use of oil is to delay the timing of any needed insecticide spray until as late as possible before (or after) bloom. Oil rates depend on when you start: If your buds are at the dormant stage, one spray of 3% oil, or two of 2% through green cluster are recommended; if you start at swollen bud, one spray at 2% or two at 1% up to white bud should be adequate for this purpose, especially if applied as soon as the psylla become active (50°F or above). This will also give some red mite control at the same time.

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IN THIS ISSUE...

European Red Mite and the Book of Chapman

The following advice is pretty much unchanged from what I print every spring, but last year a grower posed some practical questions of interpretation after this piece ran, so I thought I'd follow up by printing those, along with my response, in the hopes that I'm not making this more confusing than it already is:

A delayed-dormant spray of petroleum oil from green tip through tight cluster can be a favored approach for early season mite control, both to conserve the efficacy of and to help slow the development of resistance to our contact miticides. Our standard advice has been to try for control of overwintered eggs using 2 gal/100 at the green tip through half-inch green stage, or 1 gal/100 at tight cluster; this assumes ideal spraying conditions and thorough coverage. Naturally, real life doesn't always measure up, mainly because of weather and coverage challenges, coupled with the difficulty of getting to a number of blocks during this transient window. It is possible for mites to start hatching when the trees are at solid tight cluster, so the suffocating mode of action tends to be compromised if the nymphs are able to wade through or avoid the droplets. Let practicality determine how best to use the following guidelines.

First, to be sure that mites are in the egg stage, start on your blocks as soon as the weather and ground conditions permit, even if this means using a higher rate. Snowfalls have been generally heavy in many locations, so local conditions will be a prime determinant of how easily you can get through the rows early on. Also, tend toward the high end of the dosage range, especially if there's been no frost during the 48–hour period before your intended spray, and no danger of one for 24–48 hours afterwards. For example, use 1.5 gal/100 if the buds linger somewhere between half-inch green and full tight cluster during your chosen spray period.

Naturally, good coverage of the trees is critical if you're to take advantage of oil's potential efficiency; this in turn requires adequate spray volume delivered at an appropriate speed. Experience and research have shown that a 1X concentration (300 gal/A) in larger trees is clearly preferable; however, if all other conditions are optimal (weather, speed, calibration), then 3X, or 100 gal/A, is the highest concentration that should be expected to give acceptable control at any given time. Growers like to concentrate more than this to save time and the hauling of extra water, but reducing coverage too much can wipe out your efforts if you end up getting only a small fraction of the egg population under the residue.

Don't limit this mite-control tactic just to apples and pears. Talks with stone fruit growers recently have reminded us that many cherry, peach and plum plantings can suffer equally serious European red mite infestations that weren't given the early season attention they might have needed. We don't have hard and fast threshold guidelines for these crops, but stone fruit plantings with a history of past ERM problems should be examined for presence of the red overwintered eggs, and if they're numerous enough to see without a hand lens, then a prebloom application of 2% oil would be a prudent measure to help stave off this damage.

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scaffolds
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The grower's questions about this article are paraphrased below:

'Your Scaffolds article said, if I read it correctly, 2 gal/100 at green tip and 1 gal/100 at tight cluster. Now, I will admit I may be sucked into red mite thinking of old, but 10 gallons of oil in a 500 gal tank seems a bit thin. (It's difficult) to comprehend percentage solution; I need to know "How much oil do I spray per acre", or just tell me "how much oil per 100 gallons in the tank and how much water to throw per acre." Naturally, I would like to spray 50 gallons per acre on my small and medium stuff and 100 on the large ones. We have mostly M106/MM111 and M26 with some seedling spacing (30 x 35) on the fringes. Out here, there are folks who think we need 6–8 gallons per acre for good coverage. It has just been the way we did things.'

My response follows:

I have to confess that this seemingly standard recommendation (which we have been giving for many more years than I've been here) appears not to be as straightforward to some as we thought. Our recommendations for ERM control using oil are given in terms of gallons per 100 gal of spray solution, so the 2 gal/100 at green tip would mean a 2% solution, and 1 gal/100 at TC means 1%. These rates come directly from the efficacy studies conducted on ERM eggs by Paul Chapman and Sieg Lienk as far back as 1948, and published in the proceedings of many Hort Society meetings since then.

The studies showed that good coverage of ERM eggs using *2% oil when the trees were* at the green tip stage caused 98% mortality of all the eggs present, which in most cases was enough to prevent mites from building up to damaging levels for the rest of the season. Naturally, because these were **research** trials, and Chapman was a very meticulous researcher, an important aspect of the work needs to be clarified — "good coverage" means that the eggs were completely covered with a film of the spray solution, so the actual amount (of water **and** oil) needed per acre had to do with how big the trees were.

In Chappie's time, most of the trees were standards on seedling rootstocks, so he applied 300 gallons of spray solution per acre to ensure that all surfaces of the tree's canopy, including the eggs deposited on them, were thoroughly wetted. This would result in 6 gal of oil per acre being applied. In spraying smaller trees, which might need only 100–200 gal of spray solution per acre to thoroughly cover all the surfaces, Chapman never recommended concentrating the oil — mixing more than the 2 gallons per 100 gallons in the tank — to maintain that per-acre rate of 6 gal of oil. If 200 gallons of spray solution were applied per acre, that would equate to 4 gal of oil per acre; if only 100 gallons, that would result in 2 gal oil per acre. If the trees are sufficiently wetted to cover the eggs, then this amount (i.e., 2%, or 2 gal of oil per 100 gallons in the tank) is enough to suffocate the eggs and achieve control. Concentrating the oil so that the effective strength of the spray solution is 4% (4 gal per 100) or 6% (6 gal per 100) was never recommended, firstly because such a high "dose" wasn't needed to smother the eggs, and secondly, using those high rates would increase the chances of phytotoxicity — oil is an effective penetrant, which means too much of it could carry unwanted external materials (like the a.i.'s of fungicides) into the internal tissues, or, in combination with low temperatures it can cause cell damage. This is a case where, because of its **physical** mode of action, the use of oil differs a bit from what growers are accustomed to doing when they concentrate insecticides and fungicides.

You will also have noted the passage that refers to being able to get acceptable control using a 3X, or 100 gal/A, application. This is a concession that Chappie made as a compromise to balance the need for optimal coverage of the tree canopy and the time efficiency needed to justify the time and effort involved in making an oil application instead of using a chemical miticide. So in large, standard trees that otherwise should be getting 6 gal of oil in 300

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gallons of spray per acre, he conceded that adequate control **might** be possible by putting those 6 gal of oil in 100 gallons of spray per acre — naturally, he always said it wouldn't be good enough to carry you through the whole season, which is why rescue miticide treatments are so often needed later on in the summer.

So far, I've only addressed the 2% rate recommended during green tip. The recommended rate needed for effective control decreases as the bud stage develops. ERM egg development is closely tied to tree phenology, and in our part of the world, Chapman found that when the buds were at tight cluster, the eggs were so much closer to hatching (i.e., respiring more actively) that it took a less strong oil solution to kill them—just 1%, or 1 gal per 100 gallons in the tank.

This long-winded preamble was necessary in order to be clear in my response to your questions:
"How much oil per 100 gallon in the tank?"
As stated above, use 2 gal per 100 if the trees are at green tip (to half-inch green), and reduce it to 1 gal per 100 if they've reached tight cluster (the exception being as discussed in the "3X compromise", above).

"How much water to throw per acre?"
This is the critical determining (and sometimes limiting) factor. None of these recommendations make any sense if you don't apply enough to get **good** coverage. This is why, for growers with big trees, oil is not a popular option (too much water to haul, too much time, etc.) If you cut the water actually needed to cover all the tree surfaces, this means that some of the tree won't be thoroughly wetted by the spray, so any ERM eggs on those surfaces won't be contacted. Concentrating the oil back up to 3X only increases the strength of the droplets that actually land on and cover a mite egg; those not contacted will hatch as normal; in contrast to a chemical miticide, the mites aren't susceptible to the oil's effects once they start walking around.

"How much oil do I spray per acre?"
This question now takes care of itself, once you've determined a) the rate of oil per 100 gallons (in other words, the % solution) to use based on the tree phenology stage, and b) the amount of finish spray solution to apply per acre in order to get that good coverage.❖❖

DISEASES

STONE COLD

EARLY SPRING DISEASE CONTROLS FOR STONE FRUITS
(Dave Rosenberger, Plant Pathology, Highland)

❖❖ Control of the following stone fruit diseases is enhanced if control measures are initiated at or before bud break in spring:

- Black knot of plums and tart cherries
- Bacterial canker of sweet cherries and apricots
- Bacterial spot of peaches and nectarines
- Peach leaf curl of peaches and nectarines

If the early season controls outlined below are omitted, disease control later in the season may be compromised.

Black knot is caused by the fungus *Apiosporina morbosa* (=*Dibotryon morbosum*). The disease is common in both plums and tart cherries. The knots appear as black, gnarly growths on twigs and branches and release ascospores in spring, beginning at about the time trees reach white bud and continuing until about shuck split.

The critical action required before bud-break is to remove all visible knots from orchard trees and from wild *Prunus* species growing within several hundred feet of plum or tart cherry orchards. Knots should be pruned out by cutting at least 6–8 inches below the visible knots, and the knots should be removed from the orchard and burned or otherwise destroyed. Knots pruned

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and left on the ground at this time of year will still release ascospores. Black knot cannot be spread on pruning tools, so there is no need to disinfect pruning tools between cuts.

Black knot commonly infects wild chokecherry (*Prunus virginianae*) and wild black cherry (*Prunus serotina*). Chokecherry is usually a bush or short tree, and knots on chokecherry are often found from 1–10 feet above ground level. Wild black cherry trees can be 80 ft tall. Binoculars may be needed to scan the tops of these trees for evidence of black knot. Severely affected trees should be removed if they are situated close to susceptible crops. Black knot spores released from the tops of tall trees can be blown considerable distances into orchards.

Fungicides applied to plums and tart cherries during the period of ascospore release provide some protection against black knot infections, but fungicides rarely provide 100% control where black knots were not removed during winter pruning. Finding black knots in hedgerows and border areas is virtually impossible after bud-break, so this job must be completed before growth begins in spring.

Bacterial canker of sweet cherries and apricots is caused by two species of bacteria, *Pseudomonas syringae* and *P. morsprunorum*. The bacteria can enter leaf scars in autumn or injuries and pruning wounds in spring. The bacteria are favored by cool wet conditions, by frost injury (which provides entry sites), and by other spring stress factors such as waterlogged soils or drought conditions that make trees less able to ward off infection. In sweet cherries, bacterial canker usually appears as gummy cankers on twigs and branches. In New York apricot plantings, however, *Pseudomonas* seems to become systemic and probably contributes to the tree decline and mortality of young trees (< 5-yr old) that is common in many apricot plantings.

Virtually no research has been done on the epidemiology of bacterial canker in apricot in northeastern US, but casual observations suggest that *Pseudomonas* species may be a limiting factor in tree survival. To minimize risks of *Pseudomonas* infection, no pruning should be done in young apricot plantings between bud swell and petal fall, the time when bacterial populations are high and trees are very susceptible to infection. If pruning can be delayed until after petal fall (or perhaps until after harvest), pruning wounds are less likely to become infected with *Pseudomonas* because these bacteria do not survive well in hot temperatures. Removing wild *Prunus* species adjacent to apricot plantings may also help to reduce infection because I suspect that wild *Prunus* sometimes harbor large populations of the pathogen that are then blown into orchards during windy spring rains.

Apricots should be protected with a copper spray at bud swell. Copper residues from a spray at bud swell slowly release copper ions during subsequent rains, thereby suppressing bacterial populations within the tree canopy. Copper sprays can be phytotoxic to leaves of most stone fruits, so copper applications after bud break are not usually recommended in New York.

A dormant copper application will also help to control bacterial canker on sweet cherries, but some Hudson Valley growers feel that copper applied in spring may reduce fruit set on sweet cherries. It seems possible that in dry years copper residues that

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persist on sprayed trees might be released during rains at bloom, thereby reducing viability of the pollen. This is unlikely to occur if more than an inch or two of rain occurs after the copper spray is applied and before trees begin to bloom, but growers concerned about this risk should either apply their copper sprays in autumn and omit the spring copper spray, or they might try lower rates of copper on sweet cherries in spring. Effects of spring copper sprays on pollination in apricots is not a concern because apricots tend to over-set and any reduction in pollination would hardly be noticed.

Bacterial spot of peaches and nectarines, caused by *Xanthomonas arboricola* pv *pruni,* has been a sporadic problem in NY, but it is gaining importance as more acres are planted to disease-susceptible nectarine and cling-stone peach varieties. Over the past few years, several growers in the Hudson Valley have lost their entire nectarine crop to early fruit infections (Fig. 1). This disease is best controlled by applying oxytetracline (Mycoshield)

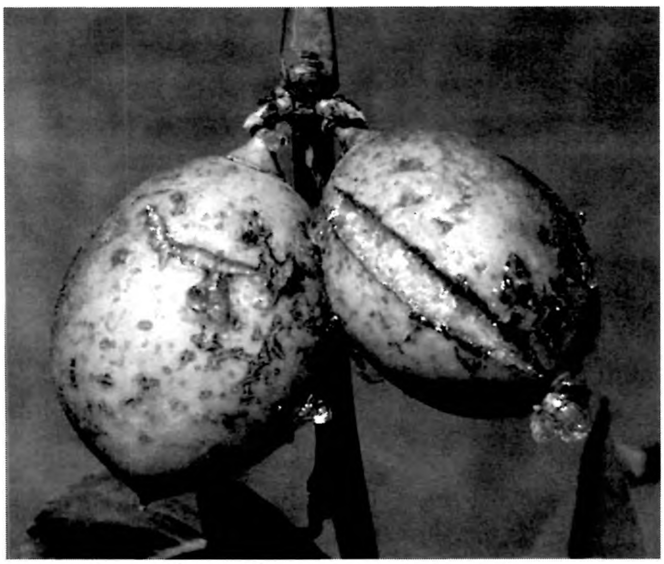


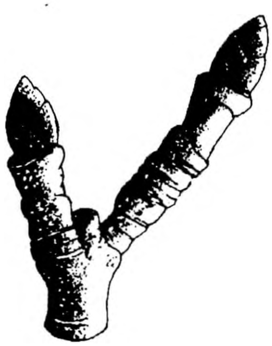
Fig. 1 Effects of bacterial spot on nectarine fruit.

in at least three applications beginning at shuck split. However, highly susceptible varieties should be sprayed with copper at bud swell to reduce the amount of overwintering inoculum in trees, especially in orchards where the disease was prevalent the previous year.

Bacterial spot can also become a problem on apricots, but Mycoshield is not labeled for apricots. Therefore, bacterial spot on apricots can only be controlled by planting resistant cultivars or by using copper sprays.

Peach leaf curl, caused by the fungus *Taphrina deformans*, can be controlled with fungicide applications either at leaf drop in the fall or at bud-swell in the spring. Although Bravo, Ziram, and Ferbam are all effective for controlling peach leaf curl, a copper spray may be preferred in spring because copper will also provide some protection against bacterial spot, whereas the fungicides will not. If green tissue appears before the leaf curl spray can be applied, then a fungicide should be used instead of copper so as to avoid the potential for phytotoxicity (unless the variety being sprayed is highly susceptible to bacterial spot, in which case the risk of phytotoxicity from a slightly late copper spray may be dwarfed by the risk of crop loss to bacterial spot).

Peach leaf curl can be especially severe in orchards where last year's crop was lost to frost and no brown rot fungicides were applied last year. Delaying leaf curl sprays past bud swell may result in less than complete control, but sprays applied after green tissue appears will still control the majority of infections.❖❖



PEST FOCUS

Highland:
San Jose scale DD_{50} since March 1 = 11.1

PHENOLOGIES

Geneva: All dormant
Highland: McIntosh at silver tip

UPCOMING PEST EVENTS

	43°F	50°F
Current DD accumulations (Geneva 1/1–4/4):	41.3	10.4
(Geneva 1/1–4/4/2004):	88.3	32.8
(Geneva "Normal"):	93	40
(Geneva 4/11 Predicted):	81.5	27.2
(Highland 1/1–4/4):	46.7	11.4

Coming Events:	**Ranges(Normal± StDev):**	
Green fruitworm 1st catch	50–122	12–54
Pear psylla adults active	29–99	7–33
Pear psylla 1st oviposition	40–126	11–53
McIntosh at silver tip	54–106	16–42

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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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