



## NH Integrated Pest Management Newsletter

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### **Plum Curculio Should Be Done!**

Plum curculio activity in apples (and other fruit) should be done for the year. In Durham we passed our degree day target on June 20th. Although you might still find them in a few spots (unsprayed orchards for example), immigration into sprayed orchards should be over for the year.

### **San Jose Scale**

By the time you read this, SJS crawlers should have started, even in the North. The crawlers are the just-hatched stage, and they are very small (1 millimeter?), oval, and yellow. They crawl around for a day or so, looking for a site to settle down. As crawlers, they are very vulnerable to pesticides. Crawlers of SJS emerge over several weeks. For people who have problems with this pest, two insecticide applications are often required, one as they first appear, and the other about 12 days later. Imidan and Guthion were standard materials for this for many years. Provado is newer, and is effective. Esteem and Assail are pesticides that are insect growth regulators. Both are listed for SJS crawlers (Assail label says "suppression", which suggests to me that it is less effective), and both labels say adding oil to the mix improves control of crawlers.

As the season progresses, any crawlers that survive your spraying and settle on fruit will produce a small halo of red around them. These tiny red marks are obvious on green or yellow fruit, and make an easy marker for next year's SJS treatment. I mark infested trees with flagging, so I'll remember.

### **Are You Ready for Apple Maggot?**



Apple maggot flies start to fly about the first of July, and peak numbers are usually in August. In unsprayed orchards the flies can be found through the end of September. With such a long flight period, growers used to just blanket the summer with insecticides, to be sure to control this insect. Today we recommend monitoring with traps, and applying sprays only when the numbers are high enough. Traps to monitor apple maggot should go up about July 1<sup>st</sup>. I prefer the unbaited (i.e. no scent) red sphere traps, but you can also get yellow rectangle traps. Yellow rectangle traps last about 2 weeks before you have to replace them. It is easy to identify apple maggot flies on them,

because the black wing bands (see below) contrast well with the yellow color. One disadvantage is that they blow very easily in the wind, and slap their sticky stuff on whatever is in reach.

Red sphere traps last all season (you often have to scrape off the thick layer of insects and re-apply sticking agent halfway through the season). They don't blow around much in the wind, and are very effective **if hung properly**. For that matter, the same statement applies to the yellow traps.

### How to Hang AM Traps

Hang them under a branch that is firm enough to take the weight. Have them fairly close to the branch, but not obscured by vegetation, and not deep in the interior of the tree. If you can have some fruit within 18 inches to the side or below, that greatly improves effectiveness. I place them around head height. Placing them higher sometimes results in higher catch, but makes it difficult to check. To me, the three most important factors are: 1) traps must be highly visible. 2) traps must be highly visible and 3) the traps must be highly visible.

I always mark the trees with traps by tying bright plastic flagging nearby. I have learned to keep it far enough away that it can't reach the trap!

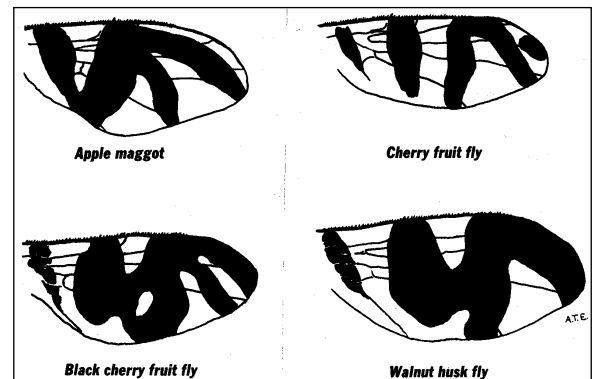
If you controlled AM fairly well last year, I'd keep most traps along the periphery of the orchard, since your AM flies will be coming from outside the orchard. If you had AM problems last year, you may need to place several traps in the orchard interior. I place traps by variety as well. A trap or two in your earliest variety(ies) is a good idea, since it will attract flies earlier than others, and be susceptible earlier, too. Varieties that I know are very attractive and/or very commonly damaged here in NH include Red Astrachan, Lodi, Cortland and Delicious. The latter two might be more heavily infested than many varieties because some growers stop spraying too soon.

### How Many is Too Many?

The threshold for unbaited red sphere traps is a cumulative average catch of 1 or more flies per trap. For baited spheres, results are much more variable (that's why I don't prefer them for monitoring), but I usually recommend a threshold of 5 to 7 per trap. There's more to consider. If your catch goes over threshold during July, usually I don't consider varieties that ripen with or after McIntosh to be vulnerable then. I think of July as when early varieties are vulnerable. If you have LOTS of flies, then you might need to revise the "not vulnerable now" idea. I suggest you check traps at least once a week, and write down the results. That way, they'll help you in future seasons, as well as this one.

### Apple Maggots Have Distinctive Wing Bands

You can confirm identification of apple maggot from two characters. One is that it has a white spot on the back, between the bases of the wings (see photo on the previous page). The second character is that it has characteristically shaped wing bands. All flies in the genus *Rhagoletis* have wing bands, and you can easily tell most species apart. An exception is telling blueberry maggot from apple maggot. The band patterns for these two are identical. If you are trapping in blueberry bushes, assume you're catching BM. If you're trapping in apple, crabapple or hawthorn, assume they are AM. Blueberry maggots are slightly smaller than apple maggots, but there is some size overlap. You can tell males from females by looking at the abdomen. Females have pointy abdomens, with 4 narrow white bands. Males have broad, blunt abdomens, with 3 white bands. Yes, that's a female on the previous page.



## The “Curveball”



Pest Management Innovations has a red sphere that is intended to **control** apple maggots. This was Ron Prokopy’s idea, and the company was formed and product refined by one of Ron’s former graduate students, Starker Wright. I understood that the trap was to be available for sale this year, but can’t tell if it is ready yet. Anyway, the concept is neat. The red sphere is topped by a “cap” that contains sugar and an insecticide. Every time it rains (or there’s a heavy dew, I suppose) some of the sugar and insecticide washes down and coats the sphere. The flies are lured

by the scent capsule and the color and shape of the sphere. When they land on it, the taste receptors in their feet detect sugar, and they feed for a bit, thereby picking up enough insecticide to stop them from attacking your fruit. Neat, huh? The spheres protect for the entire growing season, and the challenge is to find the best way to deploy them (where, how many). That work continues, and eventually may spill over into blueberries, to control blueberry maggot.

## White Apple Leafhopper and Potato Leafhopper

Nymphs of WALH are still visible on the undersides of cluster leaves. They are elongated and yellow. Soon they will transform into adults. Adults have wings, and are whitish. I’ve seen some adults already.

Potato leafhoppers look a lot like white apple leafhoppers. Both hit apple, but the damage is quite different. WALH feeding produces a white stippling that is visible on the upper side of the leaves. They also make brown shiny droppings that decorate whatever is below their feeding point. Unlike WALH, potato leafhoppers don’t overwinter in NH. They re-invade from the southern states around this time. Adults are yellow-green, with whitish marks on and just behind the head. Nymphs look very similar to WALH nymphs, except for their behavior. PLH nymphs tend to crab-walk sideways, in a “nervous” looking manner. WALH nymphs are less “jumpy” and tend to move front or backwards, not sideways.

PLH damage is different. They feed on suckers and shoots, causing the young leaves to be cupped, then get yellowish, then have edges burn. Affected shoots get stunted, too. This injury isn’t much of a problem on older trees, but it can be serious on very young trees. Besides apple, PLH hits many other crops. A few examples: potato, basil, beans, alfalfa, eggplant, raspberry, cantaloupe.

## Flyspeck and Sooty Blotch on Apple

Last year I found that NH apples had the highest incidence of injury from these two fungal diseases, since I started annual evaluations in 1980. Flyspeck was by far the more serious. Undoubtedly, the damp weather we had last summer helped. Research in NC proved that flyspeck infections on the fruit become visible after 270 Hours of Accumulated Wetting After Petal Fall (HAWAPF). Most infections apparently start from fungal conidia on other hosts in or near the orchard, not the apple trees (they’re usually well treated with fungicides for apple scab).

There are LOTS of hosts, including dozens of species of trees and shrubs. Raspberry and blackberry may be major hosts. So since the non-apple hosts need 270 hours to produce lesions (and

spores), and then 270 more hours of wetting are needed for infections from those spores to become visible on apples, that means most apple infections don't become visible until 540 HAWAPF. Dave Rosenberger showed us that in 2004 at the Hudson Valley Lab, 270 HAWAPF was July 15<sup>th</sup>, and 540 HAWAPF occurred by August 18<sup>th</sup>.

Keep the 270hr figure in mind this summer when considering whether or not to apply fungicides. We don't need any flyspeck fungicides until 270 HAWAPF, which might be roughly July 6 -15. Dave says two inches of rain will remove most fungicide protection, requiring re-treatment if you want to maintain protection. Dew periods in late summer may enhance the growth of flyspeck on your fruit. Poor spray coverage and dense canopy can also be problems. What fungicides work well? Check table 12 in the New England Apple Pest Management Guide (pg 85). Those with good or excellent ratings include protectants like Captan and Ziram ("good"). Topsin-M has protectant and some eradicant activity ("excellent"). The strobilurins Flint, Pristine and Sovran are effective eradicants ("excellent").

## Aphid Predators on Apples

Once we stop spraying insecticides for plum curculio, aphid predator numbers really start to rise. Check aphid colonies on shoots and suckers. I'm sure you'll be seeing the following insects. In recent years, **ladybugs** have become quite abundant in orchards. Multicolored Asian ladybug is the most common species. The larvae are shaped somewhat like little alligators, and are black, with orange and pale yellow pointed fleshy projections. Both adults and larvae prey on aphids.

Fly larvae are very common aphid predators. The all-orange maggots are **Cecidomyids**. The species is *Aphidoletes aphidimyza*. They are voracious aphid predators (as larvae, not as adults). The adults are delicate small flies that detect aphid colonies by smell, and lay their eggs there. The eggs are tiny, elongated, and orange.

**Syrphid fly larvae** come in several colors, but most are variegated with tan and some yellow. The adults are called hover flies. They also detect aphid colonies by smell, as to the Chamaemyiids below.

**Chamaemyiids** (cam-eh-my-ee-ids) are called silver flies. Their maggots are yellowish, with two pointed projections at the rear end.

There are a few others. **Aphid parasites** are out there, but they don't have too much effect in apple orchards. Aphids that are killed by parasites become rigid, with a tan, opaque skin. They are called aphid mummies. If you see a round hole in one, that's where the parasite emerged. Occasionally we see **green lacewings** now, but they are much more common in late August and September.

## Mites on Apples

Hot, dry weather is ideal for two spotted spider mite and European red mite. Now that we've had some of that, we are into the period when it pays to periodically check apple foliage for mite problems. Delicious is one variety that is especially prone to mite problems. Any variety that is heavily fertilized with nitrogen is another strong bet to find problems. At the end of this newsletter is the mite counting procedure for this next part of the summer.

I saw two orchards last week that had sections with very heavy mite numbers. Gala, Gingergold, Delicious, and Honeycrisp were more heavily hit in these two sites than McIntosh or Cortland.

There are LOTS of miticide choices now. I'll try to list as many as I can: Acramite, Apollo, Kanemite, Kelthane (?), Nexter, Pyramite, Savey, "Summer" oil, Zeal. **Acramite** is relatively new. It kills both eggs and moving stages of European red mite (ERM) and two spotted spider mite (TSSM). It gives quick knockdown, but for good coverage (i.e. good control) it should be mixed with an

organosilicate wetting agent like Silwet L-77, Silgard309, or Kinetic. It is relatively safe to most beneficial arthropods in the orchard. There is a maximum of 1 application per season. **Apollo** isn't effective against adult mites, so if populations are high already, it isn't my first choice. It works on ERM, not TSSM. **Kanemite** is new to me. It is for both ERM and TSSM. Avoiding development of resistance is a concern, so it should not be used more than once a year. Nexter and Fujimite have the same mode of action, so you wouldn't rotate with them. **Kelthane** is an old reliable product, but I'm uncertain if it is still available. It works on both species. **Nexter** is a very slightly modified version of **Pyramite**. Both work on ERM, but are less effective (need high rate) for TSSM. The immature stages are most vulnerable, so it may not be the best choice if there is a very high population already. Pyramite probably isn't available any more, but you can still use existing stocks. I checked the NH pesticide registration database (link is on the NH Dept of Ag, Mkts & Food website, under pesticide regulatory division) for Fujimite (mentioned above). It doesn't seem to be registered in NH, so I won't recommend it! **Savey** is another product that controls the immature stages, not adults. It gives contact and residual control for both species. It wouldn't be my choice to knock down a high population. **Summer oils** can reduce mite numbers, but don't give residual control. You can also risk fruit finish problems and phytotoxicity if you use summer oils. Moisture stress or temperatures above 80F are risky conditions for phytotoxicity. **Zeal** is new to me. It works on eggs and immature stages of both species, so wouldn't be my choice for a fast knockdown product if high mite numbers were present. Wow! Do you remember a few years back, when we had only 1 or two miticide options?

## Leafminers on Apple

As I write this in late June, spotted tentiform leafminers and apple blotch leafminers are in the tissue-feeding stage. That's when they chew on the spongy mesophyll and palisade layers of the leaf, making white "spots" visible on the upper side of the leaf. They are NOT vulnerable to pesticides in this stage. Pupation comes next, and then the next generation of moths will fly and lay eggs in July.

## Cyclamen Mites on Strawberry

Shortly after renovation is the easiest time to see cyclamen mite injury, and the most effective time for control. Cyclamen mites are deep down in the crowns, feeding on the just-forming and opening leaf tissues. New leaves emerge as twisted, distorted, stunted, often purplish. When I see this, I ask myself if it could be herbicide injury. It is easy to confuse the two. The pattern in the field provides a good clue to distinguish the two. If injury is spotty; a plant here then there, then a skip... that suggests cyclamen mite. If damage is along entire rows (or the entire bed), that suggests herbicide injury to me.

One way to confirm cyclamen mites is to examine the crown under a microscope. For someone trained, with really good eyes and good light, 20X magnification **might** be enough. For me, I need a microscope. The mites are very tiny, oval shaped things, straw-colored. Yes, I mean tiny. An adult two-spotted spider mite is about ½ millimeter long. An adult cyclamen mite is about ¼ millimeter long. Since there are 25.4 millimeters to the inch, that's tiny.

I'll include control information now, lest I forget in the July issue. The reason post-renovation is the easiest time to control these is that you have to get the pesticide to run deep into the crowns, where the mites live. That means high gallonage, a wetting agent, and enough pressure to get good foliar agitation are required. Labels usually list 400 gallons per acre as the recommended rate of water. Both Kelthane and Thionex are registered. One properly done application should do it.

## Sap Beetles on Strawberry (& Other Crops)

I was disappointed to see the first sap beetles of the year brought to a twilight meeting June 6<sup>th</sup>. That is a bit early. They are very strongly attracted to the scent of ripe or over-ripe fruit. Anything you can do to keep fruit well picked, and avoid squashing fruit will help. The New England Small Fruit Pest Management Guide lists several pesticides that are registered for control. They vary in effectiveness. Some have up to 3 days pre-harvest interval, making them poor choices for application during harvest. Brigade can be applied with only 12 hours waiting before harvest. It works somewhat well but... often creates serious mite problems later. Malathion and Cythion are registered too (“fair to poor” said one grower) and have an objectionable “pesticide” odor. Pre-harvest interval is 3 days for them. Danitol: 2 days to harvest. Pyganic: less than 1 day, but not really effective.

So there you have it. Pesticides aren't very good alternatives for this critter. One option that sometimes is successful is to place bait buckets with overripe fruit or balls of bread (!) around the edges of fields, to intercept the beetles when they arrive. I can't speak to the effectiveness of this method, but it is listed in the guide. In addition to strawberries, they can be pests in raspberry plantings.

## Raspberry Cane Borers Due Soon

This one is easy --- no spraying required. The new canes of raspberry (occasionally blackberry) suddenly have the tip wilt. Upon closer examination, you find a double girdle near the tip. This is work of raspberry cane borer. Control? Prune out the affected cane or prune the tip, just below the girdle. Also, eliminate nearby unmanaged brambles, especially raspberries. The beetle that does this is long and slender, black, with long antennae. It should start appearing around now.

## Blueberry Growers: Ready For Maggot?

Raise your hand if you think your customers would like to have maggots emerge from the quart of blueberries they just bought. No, it isn't far-fetched. Last year this happened to me at three of the places where I bought blueberries. Most customers aren't as forgiving as me, and they often call a local health officer, who then calls me. Most who call are so disgusted that they say they won't buy there ever again. Many also will not contact the grower.

How do you avoid this? Monitor for blueberry maggot adults, and treat your plantings if the traps show significant numbers of BM flies are present. We use the same traps as for apple maggot, but hung in a different manner. Also, we don't add the commercial scent capsules. These attract apple maggots, which might confuse things. If using the yellow rectangle traps, hang them as shown, in a “V” position. I usually loop a piece of string (hard to see in this photo) around the fold in the trap, and secure it to a branch or stake below, to keep it from blowing around. I place the **trap within the canopy**, in a protected spot or “hole”. Placing traps above the canopy may be convenient, but catches very few flies, this giving you a false sense of security. For red sphere traps, the same area is chosen, except that you need some sturdy support for the sphere, which is usually heavy.



We monitor starting when the fruit turn blue. The flies can attack all through July and August, even into September. I suggest checking at least once a week. Clean off the red spheres if they get too heavily coated with bugs or debris. Replace the yellow cardboard traps about every 2 weeks. A major problem with these traps is that customers are often in the fields at the same time. The sticking agent can mess up hair (or expensive clothing) of those who are unaware or curious.

### **More Blueberry Bugs: European Fruit Lecanium Scale**

You can read more about this insect in previous issues (#7 & #8, 2005 and #6 in 2004). The crawlers of this scale are expected to appear in early July. Most bushes have none, but I've seen some with very serious infestations. An application of Esteem 35WP when crawlers show up should be effective at controlling it. The better time has passed (early spring). If you have a heavily infested bush or two, some sticky tape wrapped snugly around an infested branch (sticky side out) is helpful to see crawlers. A hand lens is helpful, too. They are straw-colored, oval, about 1 mm long (1/25 inch).

### **High Tunnel Workshop at UNH**

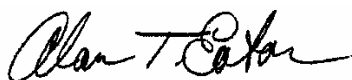
Becky Grube has been working on a 9:30 to 4:00 workshop at UNH on high tunnels (temporary "greenhouses" with plastic covering, no furnace, no electricity) at UNH on June 30<sup>th</sup>. There might still be time to register. Details are at 862-3200. Cost is \$40 per participant, and Becky has put together a great group of experts. Attendees get a couple of nice publications as part if the price.

### **Tree Fruit Meeting for Commercial Growers**

July 12<sup>th</sup> is the date of the meeting, which features Dr. Tracey Leskey (plum curculio expert from USDA). Windy Ridge Orchard in North Haverhill, NH is the location.

### **Next Issue Will Be Mid-July**

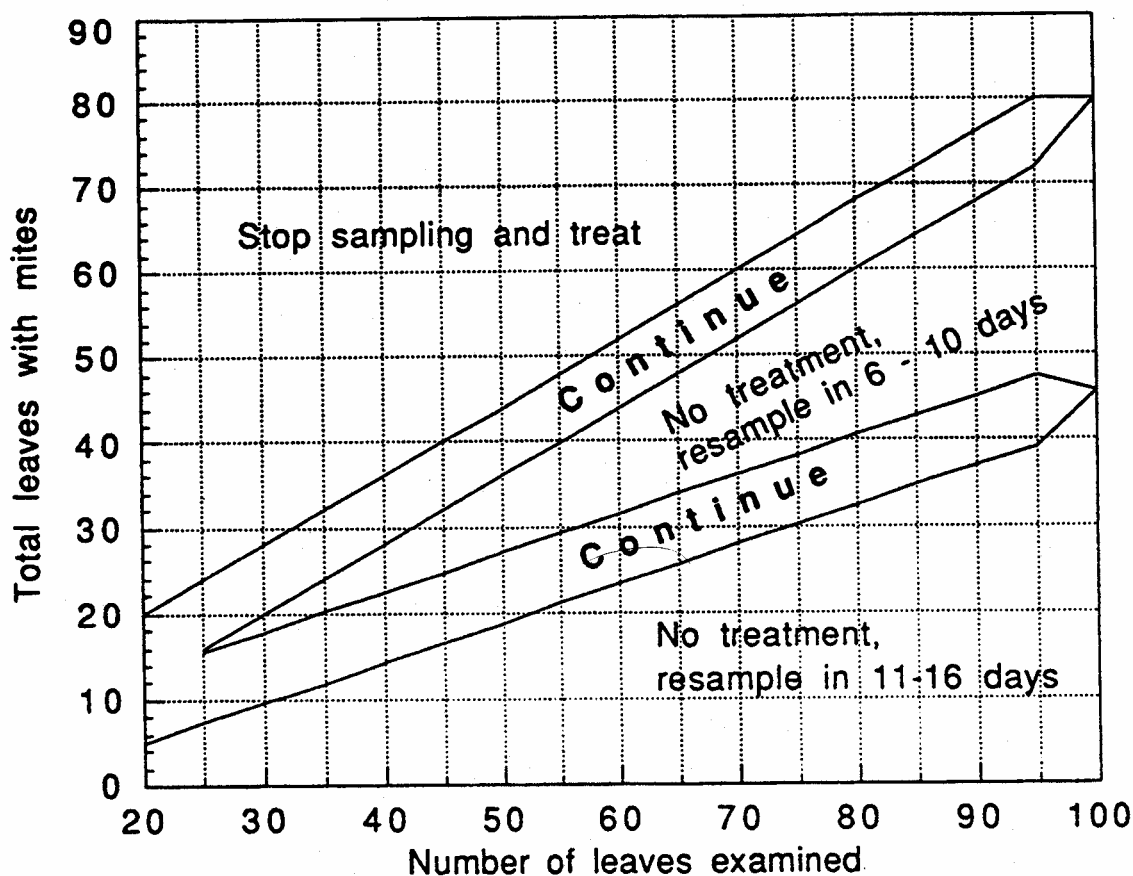
That's right. As I've done for the last several years, I'll write only 1 newsletter for July and one for August. The fruit pest update telephone (862-3763) will continue on a weekly schedule.



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## Mite Sampling Chart - Threshold = 5.0 mites/leaf (July 15 - August 15)



\* 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 15 until August 15. 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 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 decision lines on the above chart. If you are in either of the "Continue" zones, take more leaf samples in batches of 10 (5 per tree, for simplicity), adding the number with mites present to your original value while checking the chart again. Continue until you have passed out of the "continue" zone to arrive at a decision. If you reach "Stop sampling and treat", the population is above the threshold and a miticide application is recommended. 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 "6-10 day" resample date falls during 7.5 mites/leaf Threshold period, you can wait for a total of 11-16 days before resampling.

Modified from: Apple IPM; A Guide for Sampling and Managing Major Apple Pests in New York State. Agnello, A., J. Kovach, J. Nyrop, H. Reissig, W. Wilcox.