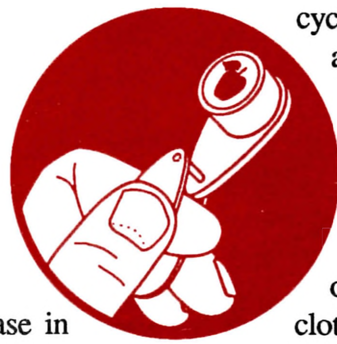
scaffolds
Update on Pest Management and Crop Development

F R U I T J O U R N A L

May 24, 1993 VOLUME 2 Geneva, NY

INSECT BITES

(Art Agnello & Dave Kain)



❖❖ ROUNDHEADED APPLETREE BORER

There has been a recent increase in complaints about damage traceable to this once-serious pest, so a brief review of the information we have about it might be in order here. The roundheaded appletree borer, *Saperda candida* F., is a cerambycid beetle that attacks young, healthy trees (unlike many other longhorn beetles). Warren Johnson, in his "Insects That Feed on Trees and Shrubs", writes of its having been a very serious problem for apple producers in the northeastern U.S. during the mid-1880s. Next to the codling moth, it was the worst enemy of the apple tree. However, current pest management programs have generally relegated it to a rather minor status among most apple growers, except for homeowners and newer or smaller operations. This insect is also a pest of hawthorn, mountain ash, quince, shadbush, cotoneaster, and flowering crabapple.

The adult is an attractive light brown beetle, approximately 5/8-inch long, and olive brown with longitudinal white stripes. It emerges in N.Y. in June, and is active at night, normally hiding by day. The larva is a pale yellow grub, 1 inch long, and deeply divided between segments, with a dark brown head and blackish mandibles. Eggs are laid mainly from late June through July in the bark near soil level. Two weeks are required to hatch, after which the larvae bore into the sapwood, and create tunnels throughout the lower trunk area. This insect takes 2–3 years to develop, and is closest to the surface during first and last few months of its life.

Because of its concealed habit and long life cycle, control of this borer is problematic and can be rather labor-intensive. The following protocol should be followed to ensure the best success in eliminating this pest:

May: Ring the bottom 12–24" of trunks with oviposition barriers made of a) wire mosquito netting or hardware cloth, or b) several layers of newspapers. Barriers should be loose except at the bottom (cover with earth) and top (tie with a cord). You can mound the earth up 12" around the base of the barriers. Remove barriers at the end of the season (October).

Late May through July: Apply a deterrent wash above the barriers on uninfested trunk using a paintbrush, consisting of an alkaline mixture of soap (e.g., M-Pede insecticidal soap @ 2.5 oz/gallon water) plus caustic potash (lye) mixed to the consistency of thick paint. Apply every 2–4 weeks, depending on rainfall, to deter egg-laying on the trunk.

June 15 and July 1 (1st & 2nd cover sprays, 802–1029 degree days [from March 1, base 50°F]): Spray foliage with multi-purpose orchard spray containing endosulfan (Thiodan) or chlorpyrifos (Lorsban), methoxychlor, or diazinon to reduce the adult population. Repeat sprays the last 10 days of July (1514–1798 degree days) to kill newly hatched borers.

Mid- to late Sept: Check trunks above barriers for evidence of small larvae working just beneath the surface. Paint on kerosene or PDB (para-dichlorobenzene moth flakes) in cottonseed oil (saturated solution) wherever castings are found protruding from the bark.

Late summer to mid-Sept: Check bark for small pinholes with sawdust exuding from them. Kill larvae with an awl or wire or knife (use caution so as not to damage tree) OR inject a mixture with a grease gun of: a) PDB + cottonseed oil (saturated solution), or b) 1.5% rotenone extract in ethyl alcohol.

If trees are girdled, you might try applying bridge grafts (1–2 per tree) to help them overcome the injury. Keep the bases of trees weed-free to encourage birds (mainly downy woodpeckers) and other natural enemies to control the beetles. If possible, destroy wild hosts within 300 yards (wild apple seedlings, hawthorn, shadbush, mountain ash). If a tree is injured beyond recovery, it should be taken out and burned before the following spring to prevent borers inside from completing their life cycle.

SAN JOSE SCALE

The San Jose scale (SJS) is a pest of tree fruit that attacks not only apple, but also pear, peach, plum, and sweet cherry. The minute SJS adult males emerge in the spring from beneath scale covers on the trees, usually during bloom, and mate. The first of this year's adults should be showing up any day now. The females produce live crawlers within 4–6 weeks of mating; these are bright yellow, very tiny insects resembling larval spider mites. About 24 hours after birth, the crawlers have walked or drifted to new sites and settled in by inserting their mouthparts into the tree and secreting a white waxy covering that eventually darkens to black.

SJS infestations on the bark contribute to an overall decline in tree vigor, growth, and productivity. Fruit feeding causes distinct red-purple spots that decrease the cosmetic appeal of the fruit. Control measures for SJS are recommended when the scale or their feeding blemishes have been found on fruit at harvest during the previous season. Insecticidal sprays are most effective when directed against the first generation crawlers, specifically timed for the first and peak crawler activity, which are usually 7–10 days apart.

The most reliable method of determining first appearance of the crawlers in your specific area is by putting sticky-tape traps on the tree limb near encrusted areas and checking them at least twice a week, starting next week. Alternatively, a degree-day accumulation of 310 (50°F base) from the date of first adult catch has also been shown to be reliable if the degree-days are known with some accuracy.

Effective materials for SJS control include Lorsban 50WP, Guthion, Imidan and Penncap-M. These sprays may also help in the control of OBLR, apple maggot, and codling moth. Coverage and control are generally better if the pesticide is applied dilute and in every row. SJS is frequently a problem in larger, poorly pruned standard size trees that do not receive adequate spray coverage. Dormant or delayed-dormant sprays of oil, oil plus Ethion, or 1/2-inch green applications of Lorsban 4EC or Supracide will help prevent populations from getting established. Early season pruning is important for removing infested branches and suckers, as well as for opening up the canopy to allow better coverage in the tree tops where SJS are often concentrated.

STONE FRUITS

Green peach aphids: Although apparently not as serious a problem as they can be some years, these greenish, smooth-looking aphids are occurring in some blocks around the state. They cause curled leaves that may turn yellow or red in severe cases. The young aphids begin to hatch about the time of peach bloom and remain on the trees for 2–3 generations, until early summer, when they seek other hosts (mainly vegetable truck crops). Green peach aphids suck the sap from the new fruits and twigs, and are also found on plum, apricot, cherry, and many ornamental shrubs. These insects are

scaffolds
is published weekly from March to September by Cornell University—NYS Agricultural Experiment Station (Geneva) and Ithaca—with the assistance of Cornell Cooperative Extension. New York field reports welcomed. Send submissions by 3 pm Monday to:

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

difficult to control; Lannate is recommended before excessive leaf curling occurs, in order to maximize the spray's effectiveness. Also, keep an eye out for black cherry aphid in your cherry trees. If colonies are building up on the foliage, recommended materials include Imidan (tart cherries only), malathion, Sevin, and Penncap-M.

Lesser Peachtree Borers: Remember to get your trunk and scaffold sprays on peaches and cherries during the first week of June if borers are a problem in your blocks. This pest increases the severity of *Cytospora* canker infections in peaches and is often found within the canker; by feeding in the callous tissues, it interferes with the tree's natural defenses against the disease. Infestations can be determined by the presence of the insect's frass, which resembles sawdust, in the gum exuded from the wound. In peaches, you can use Lorsban, Thiodan, Asana, Ambush, Pounce, or Penncap-M for this application. In cherries, use Lorsban 4E, Thiodan 50WP, Asana, or Ambush 25WP as a trunk spray ONLY; do not spray the fruit.

American plum borers: With the aid of a newly developed pheromone, we've recently been catching males of a moth called the American plum borer (APB) in traps at Geneva. APB is a pyralid, like European corn borer, rather than a clearwing moth that we usually think of when we think of borers. It is of interest because it has only recently come to be considered a major pest of cherry and plum in Michigan, and has rapidly gained in importance as a pest in that state. (It has been found in about 85% of all cherry and plum plantings in western Michigan.) It has even become more important than lesser peachtree borer there. Its emergence as a major pest has been associated with wounding caused by mechanical harvesting of cherries. In fact, the larvae can't bore into the cambium unless a wound of some sort is present. The APB adult is a tan-colored moth with darker (reddish brown to black) jagged markings running across the forewing about 2/3 of the distance from its base. Its wingspan is approximately 25 mm. Eggs are deposited in cracks under loose bark and hatch in a few days. Larval tunnels are shallow with frequent openings to the outer bark, where red frass accumulates.❖❖

DISEASES

RESIST-ANCE

APPLE SCAB RESISTANCE TO SI FUNGICIDES?

(Wayne Wilcox)

❖❖ Sterol-inhibitor (SI) fungicides have become integral parts of many apple growers' disease control programs. As with many of our newer crop protectants, there is the potential for these materials to lose their effectiveness if target organisms become resistant to them.

Since 1986, Dr. Wolfram Koeller in the Dept. of Plant Pathology at Geneva has been leading an on-going study examining just how threatening this potential is with respect to the apple scab fungus. Specifically, he has focused on the nature of resistance to the SI's, how rapidly it develops, and methods for preventing or delaying resistance development. We have spoken about the results obtained so far at winter fruit schools, but a summary may be appropriate as we get into the heart of scab control season. A few of the most important points are outlined below.

I. There are two basic and fundamentally different patterns of resistance to scab fungicides:

A. "All or nothing" (a.k.a. 'displacement shift')
   1. At least two distinct subpopulations of the pathogen exist in the wild
      a. Sensitive to field rates of the fungicide (most isolates before use)
      b. Immune to field rates, require approx. 1,000X concentration as sensitive strains to kill or inhibit (a few isolates before use)
   2. Immune population displaces sensitive population quickly after use begins; results in a sudden control failure, and is not affected by the normal range of usage rates
   3. Example: Benlate, Topsin-M

B. "Shades-of-gray" (a.k.a. 'directional shift')
   1. Single pathogen population with a continuous range of sensitivities ("normal" or bell-shaped distribution, i.e., most individuals show "average" sensitivity, progressively

continued...

lower percentage of individuals the farther you move away from the average)
- a. Vast majority of isolates are sensitive to labeled field rates
- b. What about isolates that are sensitive to field rates, but show reduced sensitivity compared with the population average?
  - i. These represent 10–15% of the population, require approx. 3X rate needed for the most common or "average" strains
  - ii. Because label rates have been determined by trial-and-error, they are usually sufficient to control such isolates; however, there is very little "cushion" in rate for some SI's, including Nova and Rubigan (i.e., significant percentage of reduced-sensitive isolates not controlled by sub-label rates; minimum label rates may also be "iffy")
- c. Very few isolates with high resistance to SI's
  - i. Controlled by approx.10X concentration as "average" sensitive strains; percentage of population is not known, but is <0.3%

2. Isolates with lower sensitivities selected gradually after repeated use of fungicide
   - a. Selection speeded up by low use rates and/or poor coverage (low exposure rates)
     - i. Reduced-sensitive isolates more likely to "sneak " through" weak programs, average population sensitivity starts to shift
3. Loss of control gradual, begins as need for higher rates/shorter intervals
   - a. Example: Dodine, SI's

II. History of SI/Apple Scab Resistance

A. First confirmed report of control failure at Kentville Experiment Station, Nova Scotia (1987)
1. After 12 yr of seasonal SI use, population shifted significantly; Baycor (old SI) no longer works
   - a. Rate-dependent resistance: highest rate that failed was below recommended label rates
   - b. More active SI's (e.g., Nustar) still provided control, esp. at higher rates; see below

B. Recent European experience
1. Significant number of recent confirmed control failures in commercial orchards after 10–15 yr

C. Common trends between Nova Scotia and European orchards
1. Seasonal use (10+/- sprays per year)
   - a. Numerous selection events
   - b. Extensive data now shows that scab fungus more resistant in July & August than earlier in season (don't know why)
2. Heavy secondary disease pressure (frequent summer rains)
   - a. Rapidly increases population of resistant isolates (i.e., those that survived initial scab sprays)
3. Often involve Baycor or other weak SI's with label rates "near the edge"
   - a. No room for error or "cheating" on rates/timing; control declines as soon as population begins to shift

III. New York Scab Resistance Data

A. Geneva Experiment Station orchards
1. Orchard A—12 yr SI use (same as Nova Scotia), no population shift towards resistance
2. Orchard B—22 yr SI use, limited population shift towards resistance, but:
   - a. Still obtain control with full label rates
   - b. Sub-label rates (e.g., 1.5 fl oz Rubigan = 0.75 oz Nova/100 gal dilute) completely ineffective

B. Commercial orchards
1. In 1991, surveyed approx. 15 commercial orchards in western NY &Hudson Valley with 2-4 yr of SI use
   - a. No shift towards resistance in WNY, very slight shift in Hudson Valley

IV. Anti-Resistance Strategy

A. Four basic "rules" for any system, and their applicability to SI/scab resistance:
1. Reduce selection PRESSURE by reducing disease pressure
   - a. Start with low primary inoculum (get good control year to year)
   - b. Get thorough spray coverage
   - c. Use adequate rates and spray intervals to maintain control
   - d. Improve control by mixing with a protectant

B. Reduce selection TIME by limiting use of SI's to primary scab season

1. Maximum 4-5 sprays/yr

C. Reduce PERCENTAGE of resistant (thus, selectable) isolates

1. Don't cheat on the rate!!

a. Know your material: the "full" label rates of Rubigan (3–4 oz/100 gal) and Nova (1.5–2 oz/100 gal) are near the edge. They work, but anything much lower lets an increasing percentage of reduced-sensitive isolates slip through the cracks, cause disease, and reduce the overall average population sensitivity.

2. Get thorough spray coverage—the fungus doesn't react to the rate in the tank, only to the rate on the tree!

It is our current belief that by following these rules, we can continue to use SI's effectively in NY for many years to come. Conversely, if you want to burn these materials out, try the following recipe: (1) allow some scab to develop in the orchard every year; (2) cut your rates; (3) get lousy coverage (spray in the wind, use an airplane); and (4) spray into the middle of the summer. Don't laugh, this recipe worked for dodine; no reason it shouldn't work for the SI's too.

TAKE-HOME MESSAGE:

It is critical to think about SI resistance in terms of a pathogen POPULATION and fungicide RATES. That is, for any given rate, most of the population will react in an "average" manner, a small percentage of individual isolates will be considerably more sensitive than average, and another small percentage will be considerably more resistant. Similarly, more and more individuals in the population become sensitive to a material as its rate is increased, whereas more and more become resistant as the rate is decreased.

In terms of disease control, it is fundamentally inaccurate to think and speak about "SI resistance" without recognizing that we are speaking in relative rather than absolute terms. What we really mean is resistant (lack of disease control) TO A PARTICULAR MATERIAL AT A PARTICULAR RATE. This concept is vividly illustrated by the "case history" of the orchard in Nova Scotia in which "SI resistance" was first documented, as given below. It has been proven conclusively that selection pressure has caused reduced-sensitive and highly resistant isolates to predominate in this orchard. However, it is important to note a few basic observations that tell a more complete story:

(1) The degree of control provided by Baycor was directly related to its rate. As early as 1981, control was poor at the sub-recommended rate of 250 g/ha, but was good at 500 g/ha. Essentially, the fungus was resistant to the lower rate but sensitive to the higher. Would the pathogen population have shifted if the higher rate had been used throughout?

(2) Rubigan was originally tested at 12–13 fl oz of product/A (110–120 g active/ha) and provided good control at this rate. Too bad this wasn't considered the base rate from the beginning; history tells us what happened with the 4–6 fl oz/A rate originally labeled in the U.S. Ditto for Nova, which originally was tested and developed at rates near that used in the Nova Scotia orchard (i.e., 8.9 oz product/A = 250 g active/ha), although the product is now marketed and used at about 50–60% of that rate in most commercial orchards.

(3) In 1985 and '86, when the scab population in this orchard was already considered "resistant" to Baycor, Nustar provided good control at recommended or near-recommended rates (35–50 g active/ha). However, Nustar provided poor control at 15 g/ha. So was the population resistant or susceptible to Nustar? To reiterate one last time: if you define resistance as a lack of control under field conditions, this population was resistant to Baycor at a sub-recommended rate; it was resistant to Nustar at a sub-recommended rate; but it was sensitive to Nustar at a recommended rate.

(4) In 1987, Baycor failed completely at 250 g/ha, but it worked well the following year at half that rate in combination with captan. Either (a) the captan miraculously reactivated the Baycor; or (b) captan did the job all by itself and the Baycor was wasted.❖❖

CASE HISTORY: DEVELOPMENT OF SI RESISTANCE IN NOVA SCOTIA ORCHARD

	% Fruit scab		SI	Application rate (grams a.i./ha)	
Year	Standard*	SI	tested	Tested	Recommended
1976	6	2	Rubigan	120	73-110**
1977	4	4	Rubigan	120	73-110**
1978	10	3	Baycor	750	300-400
		2	Rubigan	110	73-110**
1979	10	10	Baycor	500	300-400
		9		750	
		17	Vanguard	60	60
		6		85	
1981	39	26	Baycor	250	300-400
		4		500	
1982	7	16	Baycor	250	300-400
1983	67	58	Baycor	250	300-400
		28	Rondo	110	75-225
		12		220	
		28	Nustar	35	42-56**
	7	90			
1984	11	59	Baycor	250	300-400
		14	Rondo	220	75-225
		27	Nustar	25	42-56**
		17	Nova	250	112-225**
1985	23	82	Baycor	250	300-400
		10	Nustar	50	42-56**
		33	Nova	250	112-225**
1986	10	63	Baycor	250	300-400
		13	Rondo	550	75-225
		65	Nustar	15	42-56**
		12	Nustar	35	
1987	1	99	Baycor	250	300-400
1988	1	3	Anvil	30	30-60
		5	Baycor +	125	300-400
			captan	1700	1680-3360

*% fruit scab obtained using standard protectant program, generally captan and/or mancozeb. Useful for comparing relative disease pressure among individual years.

**Conversion of rates from grams active ingredient/ha to ounces of product/A:

Rubigan @ 73-110 g/ha = Rubigan 1E @ 8-12 fl oz/A
Nova @ 112-225 g/ha = Nova 40W @ 4-8 oz/A
Nustar @ 42-56 g/ha = Nustar 20DF @ 3-4 oz/A

AGAIN ?

PHYTOPHTHORA ROOT ROT (AGAIN)

(Wayne Wilcox)

❖❖ Although many people refer to apple tree diseases caused by *Phytophthora* fungi as "collar rot", these pathogens actually cause three different diseases: (1) COLLAR rot, which technically refers to infection of the scion portion of the trunk (rare in North America, but a serious problem on the variety 'Cox's Orange Pippin' where it is grown, e.g., England and New Zealand); (2) CROWN rot, which refers to infection of the underground rootstock portion of the trunk and transition zone to the primary roots (the most common and serious form in New York and most of North America); and (3) ROOT rot, referring to infection of the root system away from the crown region (also common throughout North America).

Even though root and crown rots often occur together, it is important to remember that they are two separate diseases for purposes of diagnosis and control recommendations. This point was vividly illustrated last week during a visit to an orchard in Wayne Co. where numerous trees on M.26 rootstock were pooping out during bloom but showed practically no typical crown rot symptoms. However, when the roots away from the trunk (particularly those more than a few inches beneath the surface) were dug up and cut into with a knife, the interiors of some were healthy and white, those of others were blue/purple in color (typical of roots that have merely "drowned" after long periods under water), whereas those of still others showed the dark orange to red-brown discoloration typical of tissues attacked by *Phytophthora* fungi. Laboratory cultures from these latter roots have confirmed the presence of the root rot pathogens.

Diagnosis: Trees are suffering from severely reduced root systems caused by long periods of very wet soils from last July until just a couple of weeks ago. Some roots asphyxiated, others were attacked by opportunistic *Phytophthora* species (e.g., *P. megasperma*) that are sort of "low grade" pathogens most likely to attack trees that are already under severe stress from long periods of extremely wet soils. (Note that there are a number of different *Phytophthora* species capable of attacking apples; some are weak and cause mostly root rot, some are very aggressive and cause mostly crown rot, some cause both). Although M.26 does not appear to be genetically more susceptible to *Phytophthora* root and crown rots than are many other apple rootstocks, it is probably one of the more sensitive rootstocks to root asphyxiation caused by waterlogging. For instance, in a greenhouse trial in which potted rootstocks growing in "clean" soil were subjected to 72-hr flooding periods once a week for 4 months, shoot weights were reduced by 61% on M.26 plants (compared with unflooded controls) but by only 19% on MM.111 plants. (For a more complete report on the effects of flooding periods on different rootstocks with and without *Phytophthora* spp. present, see a recent article in J. Amer. Soc. Hort. Sci. 118: 63-67).

Prognosis: If these trees had crown rot they'd have no hope. However, with functional crowns and some roots, they have a chance so long as the new roots currently being generated remain healthy. Chemical treatment of trees diagnosed with root rot is generally much more successful than of those with crown rot, since in both cases the best you can hope to do is stop the progress of the disease. On a root rot tree, this means a chance for recovery if something else doesn't do in the new roots that are constantly being formed; on a crown rot tree, it means you've still got a girdled tree. When trying to control ROOT rot with Ridomil, use the banded application option, treating beneath the drip line of individual trees; note, however, that the label does not allow application to bearing apples between the start of growth and harvest (bearing stone fruits can be treated during the growing season). Aliette is labeled only for nonbearing pome fruits.❖❖

FIELD NOTES

❖❖ **Apple Scab:** As predicted, significant amounts of apple scab are now showing up in some commercial orchards. In most cases, the infections that are now appearing have resulted from a two-step process. Step #1: A few primary infections slipped through in April, either because no fungicide was applied to control infections occurring at quarter-inch green or because the fungicides were applied at low rates or under conditions that resulted in poor coverage. Incidence of these these primary scab infections was often so low that they escaped notice. Step #2: Secondary infections occurred during rains in early May. These secondary infections are more numerous and are therefore attracting attention from those who previously assumed they had a "clean orchard". Options for limiting damages from secondary spread of apple scab were outlined in the last two issues of "Scaffolds".

Fire Blight: The MARYBLYT model for fire blight predicted that blossom blight symptoms should appear May 17 from infections occurring during ideal blossom blight weather on May 6–7. This morning I heard that blight symptoms had appeared in at least one pear orchard.

Winter damage: During a visit in the Champlain Valley with Dr. Warren Stiles last week, we could see the effects of the severe winter. Temperatures in the Champlain Valley fruit district reached -35 to -40°F last winter. Winter damage in spurs, evidenced as browning of the internal woody tissue when the spurs are sectioned longitudinally, was evident in many orchards. In most cases, flower buds survived and will still set a crop.❖❖

HUDSON VALLEY

APPLE SCAB
(Dave Rosenberger)

Apple scab ascospore maturity as of May 17, Highland, NY

Immature	Mature	Discharged	Tower shoot
6%	25%	69%	803 spores

GENEVA

APPLE SCAB
(Wayne Wilcox)

ASCOSPORE MATURITY DETERMINATIONS

	Maturity category (%)*					Discharge test
Date	1	2	3	4	5	(Spores/LP field)
5/20	1	4	13	40	42	156

*Categories: 1–3 = immature; 4 = morphologically (apparently) mature; 5 = discharged

Growth stage on 5/20: McIntosh = Petal fall

INSECT TRAP CATCHES (Number/Trap/Day)

Geneva NY

	5/13	5/17	5/20	5/24
Redbanded Leafroller	8.3	7.3	2.0	0.9
Spotted Tentiform Leafminer	341	138.3	26.3	45.3
Oriental fruit moth (apple)	14.2	16.3	3.0	4.8
Oriental fruit moth (peach)	0	0.1*	0	0.4
Lesser appleworm	8.8	19.5	9.8	8.0
Codling moth	0	0.1*	0.2	4.8
Lesser peachtree borer (cherry)	0	0	0	0.3*
American plum borer (plum)	0	0	0.2*	0.6
American plum borer (cherry)	0	0	0.2*	0.4

HVL, Highland NY

	5/9	5/17	5/24
Redbanded Leafroller	2.1	0.3	0.1
Spotted Tentiform Leafminer	20.5	12.5	1.9
Sparganothis Fruitworm	0	0.4*	0
Oriental fruit moth	11.1	6.2	0.6
Fruittree leafroller	0.1	0.2	0
Lesser appleworm	0	0.4*	0.6
Codling moth	0	1.9*	0.7

* 1st catch

(Dick Straub, Peter Jentsch)

PHENOLOGIES

Geneva: Apple(McIntosh) – **100 % Petal fall**
Pear – **Fruit set**
Sweet cherry (Windsor) – **Fruit 20 mm**
Tart cherry (Montmorency) –**Fruit set**
Peach – **100% Petal fall**
Plum – **Fruit 10 mm**
Highland: Apple (McIntosh): **Fruit 13 mm**

UPCOMING PEST EVENTS

	43°F	50°F
Current DD accumulations (Geneva 1/1 - 5/24):	538	292
(Highland 1/1 - 5/23):	738	423

Coming Events:	**Ranges:**	
San Jose scale 1st adult catch	189-704	69-385
Spotted tentiform leafminer 1st flight subsides	489-839	270-523
Redbanded leafroller 1st flight subsides	518-876	255-523
Codling moth 1st flight peak	547-1326	307-824
San Jose scale 1st flight peak	612-761	331-449
Obliquebanded leafroller pupae present	612-860	330-509
Lesser appleworm 1st flight peak	612-851	351-471
McIntosh at fruit set	467-734	242-353
Sweet cherry fruit coloring	663-898	360-515

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