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Update on Pest Management and Crop Development

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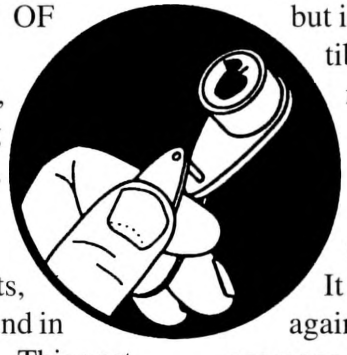
INSECTS

SCALE BACK

A QUESTION OF SCALE

(Dick Straub, Harvey Reissig & Peter Jentsch, Entomology, Highland & Geneva)



❖❖ According to grower reports, San Jose scale is again gaining ground in many orchards throughout the state. This pest can seriously affect fruit quality and, if unmanaged for a number of seasons, can result in poor tree health, or even death. We are fortunate to have a list of efficacious treatments that can be employed at various windows during the season (see Figure 1, page 3). In the universal language of spraying apples, however, good coverage is necessary for control of scale.

Treatment periods 1 and 2 (green tip and half-inch green). Oil, Lorsban and Supracide directed against overwintered 'black caps' are long-time standards, and each still has a place in control programs. Treatment during one or both of these time periods represents a first line of defense against scale. Oil+Lorsban tank-mixed is, of course, a traditional treatment. Historical evidence and recent results by Harvey Reissig suggest that there is not much synergism in the combination; i.e., either oil alone or Lorsban alone perform just as well. Many growers favor the combination, however, believing that it increases the efficacy against overwintered OBLR larvae — this is probably true.

Treatment periods 3 and 4 (crawlers of the 1st and 2nd generations).

Relatively new on the scene are Provado, Esteem and Assail. Quite frankly, we have very little experience with Provado against this pest, but it may be worth a try if other susceptible insect species are present during recommended treatment periods. Esteem is an insect growth regulator that functions as a juvenile hormone mimic and thereby inhibits metamorphosis from one stage to another. It is most effective when directed against crawlers, preferably at first appearance. Esteem has no contact toxicity and tends to act very slowly. Assail is a new-generation broad-spectrum neonicotinoid that, somewhat similar to Esteem, is most effective when directed against crawlers at first appearance. Esteem and Assail are also effective when applied at half-inch green, but such usage is 'off-label' and less economical than other options during this treatment period. Although the efficacy of both materials is improved by the addition of oil, these tank-mixes may be phytotoxic and result in fruit finish problems (Reissig & Combs 2003).

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Table 1. Historical record of calendar dates and corresponding degree-day accumulations to the treatment period (500 DD) for 1st generation summer brood crawlers of San Jose scale. Cornell's Hudson Valley Lab, Highland, NY.

Year	Date	DD_{50}	Petal Fall of McIntosh	Days post & cover period	
2004	23 May	495.4	13 May	10	1C
2003	6 June	508.6	19 May	19	1C-2C
2002	31 May	508.0	7 May	24	2C
2001	29 May	499.3	10 May	19	1C-2C
2000	31 May	498.8	8 May	23	2C
1999	1 June	513.2	13 May	19	1C-2C
1998	21 May	505.1	4 May	17	1C-2C
1997	12 June	508.0	14 May	31	2C-3C
1994	1 June	495.5	12 May	20	1C-2C
	Avg. =	503.5	11 May	20.2	+/- 5.5 days

Treatments to be applied at the first appearance of summer brood crawlers are best timed by the use of a degree-day model: 1st generation, 500 DD (base 50°F) from 1 March; 2nd generation, 1450 DD from 1 March. Real-time degree-day accumulations for specific sites throughout New York are available from the NEWA website (http://newa.nysaes.cornell.edu/base4504.htm), or perhaps from other local sources. Correct timing of treatments is critical with Esteem and Assail, and calendar dates are generally too imprecise to be of benefit. For example, Table 1 shows that on average, 1st appearance of crawlers occurs approximately 21 days after petal fall. Also evident, however, is the extreme variation; e.g., the 500 DD event at the Hudson Valley Lab during the last decade has occurred at intervals between 4 May and 19 May.

Reference cited: Reissig, W. H. and D. Combs. 2003. A why, what and when approach to San Jose scale. Proceedings 79th Cumberland-Shenandoah Fruit Workers Conf., Winchester, VA.

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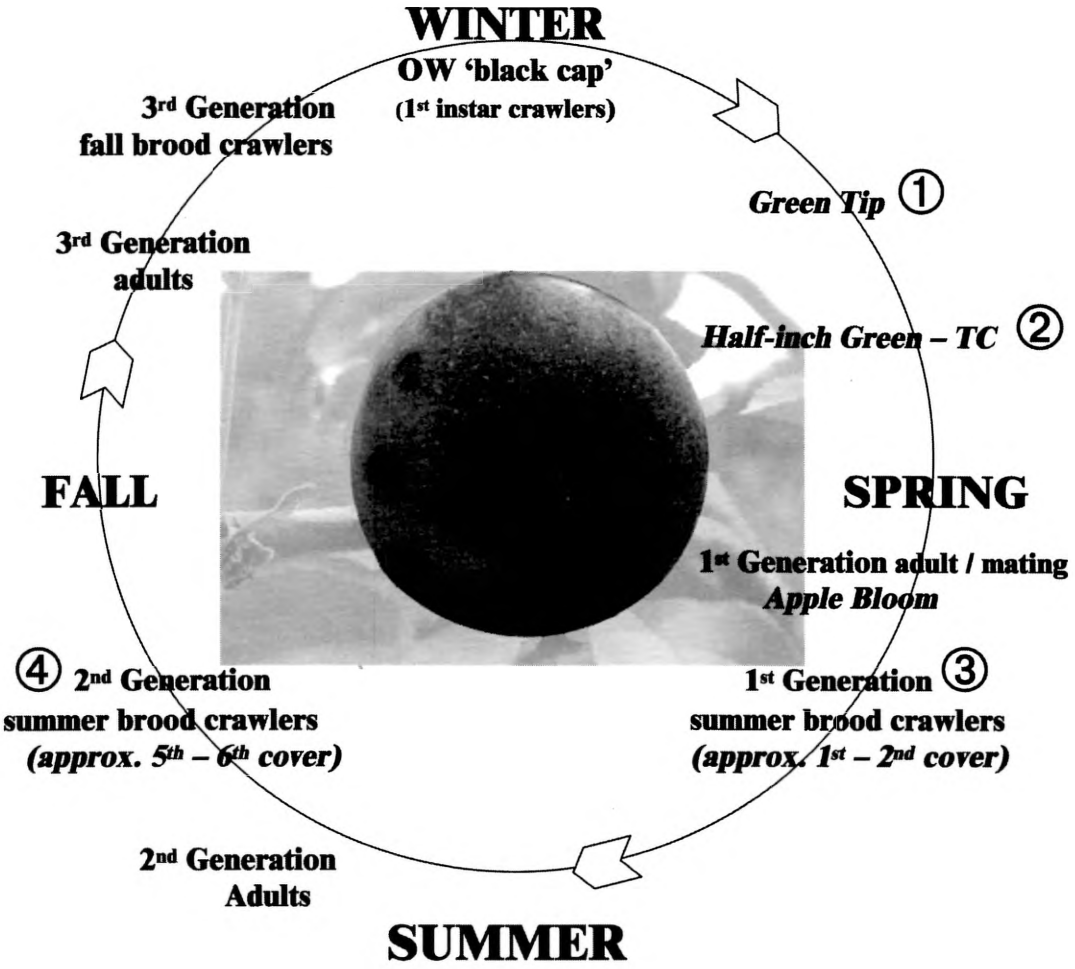
Figure 1. Treatment periods and insecticide choices for management of San Jose scale. Rates are listed as amount of material/100 gallon.



① a	② b	③ c	④ d
GREEN – TIP	HALF-INCH-GREEN	1st SUMMER BROOD (crawlers)	2nd SUMMER BROOD (crawlers)
		Apply @ 500 DD from 1 March + same 14d later	*Apply @ 1451 DD from 1 March + same 14d later*
	Use either:	Use either:	Use either:
3% oil	2% oil Lorsban 4E (16 oz) Lorsban + oil Supracide 2E (32 oz) Supracide 2E + oil	Esteem (1 oz) + oil (2%) Assail (1 oz) + oil (2%) Provado 1.6F (2 oz) + oil (2%)	Esteem (1 oz) + oil (2%) Assail (1 oz) + oil (2%) Provado 1.6F (2 oz) + oil (2%)

a. In low risk orchards, this treatment alone may be sufficient.

b. Treatment during this period is recommended if harvest damage was noted the previous season.

c. Treatment during this period may be necessary if bark infestations and/or fruit damage was noted the previous season.

d. Examine fruit (mid-July) to determine need for late-season treatments.

AN OUNCE OF PREVENTION

PLANNING BORED
(Dave Kain, Entomology & Terence Robinson, Horticultural Sciences, Geneva)

❖❖ Borers, including American plum borer and dogwood borer, are becoming routine inhabitants of some dwarf apple orchards in New York and other parts of the northeast. Dogwood borer is prevalent in NY and may be found throughout the state. American plum borer is generally only a problem in Wayne County and western NY, near infested stone fruit orchards. Certain factors, especially the presence of burrknots (aggregations of root initials) that can develop on dwarfing rootstocks, lead to borer infestation. With a little planning, the extent to which an orchard is infested and the severity of the damage done by borers can be reduced or even eliminated.

Planning begins with site selection, preparation and planting. While wild woodland populations of dogwood borer tend to be generally low, problems in orchards appear to be worse near woods where wild hosts grow. Nearby infested orchards may be a bigger source of potential immigrants. Plum borer infestation is greatest in apple orchards near infested stone fruit orchards. The apple orchard that initially led us to do a recent survey of the borer situation in NY had been infested by plum borer moths that emerged from the trunks of tart cherry trees that had been removed and bulldozed into an adjacent hedgerow the year before. If possible, siting new orchards away from sources of infestation may help to reduce the potential for a problem. Removal or destruction of sources such as the tart cherry trunks mentioned previously might also help. Controlling borers with insecticides in nearby infested orchards would reduce their contribution to problems in a new orchard.

If burrknots do not develop in the first place, there will be no problem with borers. In addition to borer problems, burrknots can lead to impaired tree growth, trunk twisting, woolly apple aphid colonization, rodent feeding, fireblight infection and winter injury (Rom 1986). Planting depth can have an influence on the development of burrknots. Burrknots develop to a greater extent when trees are planted so that the graft union is high above the soil surface. Trees that are planted with the graft union at or within a couple of inches of the soil surface may not develop above-ground burrknots but may develop scion rooting. In addition, tree vigor is decreased with increasing distance of graft union height above the soil line. With moderate or low density plantings we suggest that the trees be planted with the graft union 2" above the soil line. Since tree planting depth is difficult to control, this often results in a few trees being planted too deeply with subsequent scion rooting followed by excessive vigor. With low density plantings this is of no great concern, since the trees can fill a large space. However, with high density plantings this can be catastrophic. Thus, we recommend that with high denisty plantings the trees be planted with the graft union 4–6 inches above the soil line to ensure no scion rooting despite the increased risk for burrknots and borer infestation. Scion cultivar may have an effect on rooting from the buried shank. Rom (1986) found that rooting from buried rootstock shanks grafted to spur type cultivars was insufficient to anchor trees well. Therefore, deep planting of spur-bearing varieties, while it may inhibit burrknot development, is probably not advisable.

Burrknots can develop on any size-controlling rootstock, but many newer rootstocks from Geneva were selected for low susceptibility to burrknots. To the extent that a choice is possible, rootstock and scion selection may be factors to consider. M.26 is known to produce many burrknots. Leskey and Bergh (2005) found that burrknot development was greater on M.26 than on M.7. However,they also found that 'Ida Red' on M.26 had more burrknots than 'Buckeye Gala' on the same rootstock in the same site. Other rootstocks that have been shown to be more susceptible to burrknot development are:

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MM.111, MM.106, Mark, B.9, M.9, and M.7. Rootstocks with low susceptibility to burrknot development are M.27, G.11, G.16, G.41, G.935 and G.30

Conditions of low light and high humidity increase the development of burrknots. Shade from lower limbs can contribute to burrknot development. Weedy conditions around the trunk exacerbate the problem. Mouseguards (especially the spiral wrap type) have been implicated in increased problems with borers. In survey work we conducted in New York, trees without mouseguards were as likely to be infested by dogwood borer as those with mouseguards, indicating that this insect neither requires nor prefers the environment behind the guards. However, Rom, and Leskey and Bergh, have determined that the low-light, high-humidity environment created around the trunk by various wraps and guards leads to greater burrknot development. While the guards don't necessarily favor the insect, higher numbers of burrknots may attract higher numbers of borers. And, as previously stated, the burrknots themselves may inhibit tree growth and yield. American plum borer does appear to favor being behind a mouseguard, so thought should especially be given to the use of mouseguards on dwarf apple trees planted near plum borer-infested stone fruit orchards.

In plots at the NYSAES, established 4 years ago, burrknots were visible by the season after planting. Borer infestation occurred the following season. It appears that burrknots alone have had a greater impact on tree growth and yield than the borers, to this point (although the borer infestation has been at a low level). Borers so far have fed only on burrknot tissue. It is yet unclear what effect borer feeding on burrknot tissue may have on the tree. However, as burrknots are consumed and larvae begin to feed on the surrounding inner bark, if not sooner, it may be advisable to apply a trunk spray of Lorsban (1.5 qt Lorsban 4EC or 3 lbs 50WP per 100 gallons). One application of Lorsban will suffice, and it can be applied anytime from prebloom (half-inch green) through midsummer, and into the fall. A spring application will control overwintered larvae and protect the trunk throughout the rest of the season. Waiting until midsummer to apply Lorsban will allow spring feeding but will control the pest for the remainder of the season. Applying Lorsban after harvest will control larvae that are already in the trunk and give protection for at least part of the following season. Other insecticides will also provide some measure of control, but need to be applied multiple times beginning in mid-July (when the dogwood borer flight is at its peak). Materials tested with some success include: Avaunt, Danitol and Esteem. Endosulfan is also recommended for midsummer use. (See Cornell Pest Management Guidelines for Tree Fruit Production.)

Keeping borers in mind when planning a new orchard can go a long way in helping to prevent problems in the first place, or in keeping them in check before they become bigger problems later on.

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Rom, R.C. 1986. Burrknots on clonal apple rootstocks and their development as affected by scion cultivar. Compact Fruit Tree. East Lansing, Mich. International Dwarf Fruit Tree Association. 19: 183-188.

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DISEASES

HARD TO RESIST

SCAB CONTROL PRECAUTIONS
(David A. Rosenberger, Plant Pathology, Highland)

Information and concerns about fungicide resistance were reviewed in a previous issue of *Scaffolds*. This article provides some specific precautions and suggestions for scab control in orchards where growers suspect that SI fungicides (Nova, Rubigan, Procure) may be losing effectiveness.

With resistance to SI fungicides prevalent or emerging in many orchards, we have lost the safety net that the SI fungicides provided. When SI fungicides were effective, we could afford "limited-risk" fungicide programs that included omitting sprays at green tip, spraying at 10–12 day intervals, and alternate row spraying. Where SI resistance is documented or expected (based on poor scab control last year), those limited-risk strategies can lead to major crop loss to scab in a wet year!

Unfortunately, SI-resistance often becomes evident only in the wake of disastrous control failures. As a result of control failures, orchards with SI resistant scab often have exceptionally high levels of overwintering inoculum. The one-two punch of high inoculum and SI resistance creates tremendous potential for continued scab problems.

In orchards with high inoculum and suspected SI resistance, the following strategies are essential. For orchards where SIs are still working, implementing items 1 and 7 from the following list will help to preserve the effectiveness of the SI fungicides.

1. Start protectant fungicide sprays at green tip. Allowing just a few infections to occur before the first fungicide spray is applied can torpedo effective scab control for the entire season.

2. Use full rates of protectant fungicides. Remember that 1 lb of mancozeb fungicide or 1 lb of Captan 50W per 100 gal of dilute spray is actually a half rate of fungicide that was initially recommended as a complement for Benlate, Topsin M, or SI fungicides. Using mancozeb fungicides at only 1 lb/100 gal on a 7-day spray interval can result in a control failure in a high-inoculum orchard. In high-inoculum orchards, a combination of 1 lb/100 gal of a mancozeb fungicide plus 1 lb/100 gal of captan 50W (or the equivalent amount of another captan formulation) may be the best option, especially during the period from tight cluster through bloom when rapid leaf expansion can dilute fungicide effectiveness. Or switch to Sovran or Flint at pink and bloom as outlined in #7 below.

3. Use shorter spray intervals. Where SI fungicides are no longer working, plan on a 5 to 7 day spray interval with protectant fungicides. Protection might need to be renewed after 5 days following heavy rains or to ensure coverage ahead of slow-moving weather fronts that might impede spraying for several days. If mancozeb fungicides or Captan 50W or a combination thereof are applied at 2 lb/100 gal (6 lb/A for medium-sized trees), then residual activity should hold up through 1.5 to 2 inches of rain. (Other captan formulations would be equally effective when applied at similar rates of active ingredient.) If mancozeb fungicides or Captan 50W are applied at only 1 lb/100 gal, then fungicide protection will often be exhausted after only an inch of rainfall.

4. Use Scala or Vangard to work around prebloom oil sprays or when 48-hr post-infection activity is essential. Both of these fungicides work best in cool weather. They have the advantage of providing 48-hr of post-infection activity, but as protectants they are no more effective than 1 lb/100 gal of mancozeb used alone. Where captan-mancozeb mixtures are used in high-inoculum orchards, Scala or Vangard can be substituted for the captan in the mixture when oil is applied.

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5. Spray in the rain if necessary to protect new foliage during infection periods that last more than 2 or 3 days. If fungicide protection is removed by heavy rains at the beginning of a wetting period and rains are predicted to continue for several more days, then protectant fungicides should be reapplied during the rain to protect against ascospores that will mature as the wetting period continues. Sulfur, captan, and mancozeb fungicides that are applied in the rain will provide several days of protection against scab infection, but don't count on sprays applied in the rain to provide more than 3 or 4 days of protection. Sovran, Flint, Vangard, Scala, Topsin M, and SI fungicides should never be applied in the rain because all of these fungicides must dry on the leaf to be fully effective.

6. Be wary of alternate row spraying on an extended interval. Alternate row spraying often leaves a "shadow" of unprotected foliage on the back sides of tree trunks. Where SIs are no longer working, it is imperative that all leaves be protected every 7 days. If in doubt about spray coverage, use water-sensitive paper to evaluate coverage on the back sides of trees. Attempting to judge spray coverage based on visual analysis of the spray plume can be misleading because the spray mist that refracts the most light carries a relatively small proportion of the fungicide load.

7. Consider Flint or Sovran at tight cluster and pink or at pink and bloom, but keep the spray interval at 7 days. These fungicides often give slightly better control of scab than can be achieved with mancozeb or captan sprays. Sovran and Flint can be applied alone or in combinations with captan or mancozeb, but tank mixes have not improved control in our field trials. Using Sovran or Flint at pink and bloom provides two benefits: They will provide protection against early powdery mildew infections and they will suppress sporulation of any primary scab infections that slipped through the prebloom spray program. Note, however, that Sovran and Flint do not have post-infection activity equivalent to that of the SI fungicides, so using Sovran or Flint at pink and bloom is not an acceptable substitute for a green tip spray.

8. Where SI resistance is suspected, do not use any SI sprays before petal fall. Application of SI + protectant sprays in an orchard with SI-resistant scab may actually stimulate growth of scab lesions and might result in less scab control than would occur if a low rate of protectant fungicide were used alone. However, SIs may still be needed in petal fall and early cover sprays to control powdery mildew and rust diseases. Delaying SI sprays until petal fall will minimize risks of stimulating scab problems because most ascospore release will be completed by petal fall, and there should be no secondary scab inoculum if appropriate prebloom sprays were applied.❖❖

PEST FOCUS

Highland: 1st **redbanded leafroller** caught 4/4.1st **spotted tentiform leafminer** and **oriental fruit moth** caught 4/11.1st t**arnished plant bug** observed. **San Jose scale** DD_{50} since March 1 = 55

PHENOLOGIES

Geneva:
Apple (McIntosh): Early green tip
Apple (Red Delicious): Silver tip
Apple (Empire): Silver tip
Sweet cherry: Swollen bud
Tart cherry (Mont.): Swollen bud
Pear: Swollen bud
Plum: Swollen bud
Peach: green tip

Highland:
Apple (McIntosh, Ginger Gold): 1/2 inch green
Apple (Red/Golden Delicious): Green tip
Sweet cherry: Swollen bud
Pear (Bartlett): Swollen bud
Pear (Bosc): Dormant
Plum: Swollen bud
Apricot: Swollen bud
Peach: 1/4 inch green

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UPCOMING PEST EVENTS

	43°F	50°F
Current DD accumulations (Geneva 1/1–4/11):	92	34.7
(Geneva 1/1–4/11/2004):	95.2	33.3
(Geneva "Normal"):	113	47
(Geneva 4/18 Predicted):	120.5	44.2
(Highland 1/1–4/11):	122.9	55.3

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
Redbanded leafroller 1st catch	98–258	32–124
Spotted tentiform leafminer 1st catch	112–236	39–113
McIntosh at green tip	95–147	37–63
Red Delicious at green tip	111–167	40–82
Peach at bud burst	113–167	44–82
Pear at bud burst	121–207	51–93
Plum at bud burst	118–220	49–97
Sweet cherry at bud burst	143–193	58–90
Tart cherry at bud burst	163–243	68–116

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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