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Update on Pest Management and Crop Development

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INSECTS

STOCK UP

POLLINATION AND POLLINATORS

(Nicholas Calderone, Entomology, Ithaca)

❖❖ *The honey bee–Apis mellifera* - Solitary bees and the bumblebees are often the best pollinators for many crops. However, many modern agricultural practices, such as the use of large monocultures and an increasing variety and quantity of herbicides and pesticides, have reduced or eliminated many wild pollinator populations. High-density plantings also bring about a demand for large numbers of pollinators, and native bees often cannot reach the interiors of large fields or orchards. Consequently, growers often find that natural populations of pollinating insects are insufficient to ensure adequate pollination. The honey bee is widely used to supplement inadequate populations of native pollinators.

How many colonies do I need? - This depends, in part, on what else is available within the bees' foraging range, which extends about 2.5 miles from the colony and covers an area of about 12,500 acres. Your crop must compete with *everything* else within that area. For that reason, a general recommendation of one strong colony per acre for most crops makes a good starting point from which you can make adjustments based on personal experience. Below, I outline a few cases where more detailed information is available.

New York apple growers have traditionally used about one colony per three acres. This number may have been adequate in small orchards visited by feral honey bees and by solitary bees and bumble bees from adjacent hedgerows and woods. However, feral honey-bee populations have been greatly reduced in recent years, and modern agricultural practices have eliminated many natural nesting sites for solitary bees and bumble bees. In addition, the flight range of solitary bees is not generally sufficient to ensure coverage of the center portions of large plantings. Growers with large blocks of apples and other tree fruits may wish to increase the number of colonies to one per acre. If your fruit set has been lower than expected, or your fruits are misshapen, you probably need to use more bees. Remember! If your fruit set is too high, you can always thin, but if it is too low, you are just out of luck. Apples are self-incompatible and require

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the presence of a pollinizer cultivar for fertilization. Honey bees should be moved into apple orchards when 5–10% of the king blossoms are open.

Some crops have special requirements. Red Delicious apples have flower structures that are different from most other varieties. The anthers are widespread, and bees learn to insert their mouthparts between the anthers to obtain nectar. This results in less contact with the sexual organs and, consequently, less pollination. It takes time for bees to learn to obtain nectar this way. To counter this problem, the number of colonies in the orchard can be increased so there are more naive bees present. Two colonies per acre may be needed in large stands of red delicious apples.

Pollination of pears will probably always be a problem because pear nectar contains only about 15% sugar compared to 40% for apples, dandelions, and yellow rocket. The answer is to move the bees into the center of the pear block when the pears are at 30%–50% bloom. It will take some time for the bees to discover better sources farther away, and in that time, the pears may be adequately pollinated. An alternative is to use more colonies per acre, which will increase the number of bees foraging within the orchard. Pears can be completely or partially self-sterile, depending on the conditions under which they are grown. Where pears do not set a parthenocarpic crop, you can interplant cross-compatible cultivars.

Cherry blossoms should be pollinated as soon after they open as possible. Move bees into sweet cherries the day before bloom. A considerable reduction in yield can result from being late with bees on sweet cherries. Sweet cherry cultivars will not set fruit with their own pollen and require a compatible pollinizer cultivar for good crops. Additionally, many cultivars of sweet cherries are inter-incompatible with each other. Move honey bees into sour cherries the day after the blossoms begin to open because they have less attractive nectar than that of sweet cherries. Moving the bees in right after bloom begins provides the bees with a greater incentive for working close to the colony for a longer time. Sour cherry cultivars range from self-fertile to self-incompatible. In general, sour cherries set a good crop if there are sufficient numbers of pollinators present. Two colonies per acre may be required because cherries require a high fruit set for a commercially viable crop and because they bloom early in the season when the weather is often unfavorable for foraging.

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Getting the most from the bees - There are a number of things you can do to maximize the benefits from honey bee colonies. There are also a number of steps you can take to guard against damaging the bees while on location. Remember! If the colonies are damaged while on location, not only do you receive less pollination, but the beekeeper will eventually have to increase rental fees to make up for the loss.

Moving bees - It is generally best to move bees onto location after the flowers on your crop have begun to open. A rule of thumb is at 10–20% bloom. However, some crops, as mentioned above, have special requirements. Some growers rotate bees between distant fields every few days in an effort to keep the bees close to their hive. While this may seem to make sense in view of the bees foraging behavior, it does not take into account the loss of foragers that occurs with each move. Therefore, the net gain associated with this practice is unclear.

Pesticides and bees - Pesticides can kill the bees you have rented, causing serious financial problems for the beekeeper who ends up with damaged or dead colonies. Pesticides may also result in liability problems for the grower. Remember! The less pesticide used the better. If a pest emergency arises, contact your beekeeper, discuss the situation, and arrive at an agreement on fair compensation in the event that there is damage to the bees. Large numbers of dead bees accumulating rapidly in front of one or more colonies usually indicates pesticide damage. If you notice this symptom at anytime, contact the beekeeper immediately.

There are a number of steps you can take to reduce the potential for damage from pesticides. Never apply pesticides to crops in bloom. Remove flowering weeds from orchard cover crops and field edges. Follow an IPM program to reduce the number of sprays and use low-hazard materials whenever there is an option. Select low-hazard application methods. Systemic pesticides are better than sprays, and fine sprays are better than course ones. Use low-hazard formulations. In order of greatest to least danger to bees are dusts, wettable powders and emulsifiable concentrates. Do not spray when the wind is greater than 5 mph and use spray adjuvants to reduce drift. The best time to apply a pesticide is at dusk, when there are few bees in the field and when the pesticide will have time to break down before the next day. Lastly, dispose of pesticide containers properly.

Water - Provide a source of fresh water nearby for the bees. Without water, the bees will be unable to regulate the temperature inside the hive and may die. Bees will abandon pollen foraging to search for water if they are overheated and, consequently, they will be of less value for pollination. This recommendation is especially important in areas where the weather is hot, the air is dry, and the sun is shining. A large, galvanized tub makes a good watering station, but it must be equipped with lathe strips or a floating screen on which the bees can land while they are collecting water, otherwise, they will drown.

Placement of colonies - Pay attention to the placement of colonies. When possible, place colonies out of sight of the public and away from roads to minimize liability problems and vandalism. News reports of so-called "killer bees" have made many people perceive all bees as a threat, even at a distance. The old adage, "out of sight out of mind", works well when it comes to bees. Posting your orchards or fields with warning signs may reduce claims of negligence in the event of a stinging incident.

The placement of colonies in a field or orchard can affect their efficiency as pollinators. Distribute colonies in groups of 4–6 in orchards. Many commercial beekeepers have 'palletized' their bees into groups of 4–6. Do not attempt to separate these colonies. You can place colonies in groups of 10–20 to take advantage of a limited number of sites with good sun. Be sure to place colonies near the pollinizer variety if one is present. In large fields, place colonies in groups spaced 500 feet apart. The number of colonies per group is determined by the

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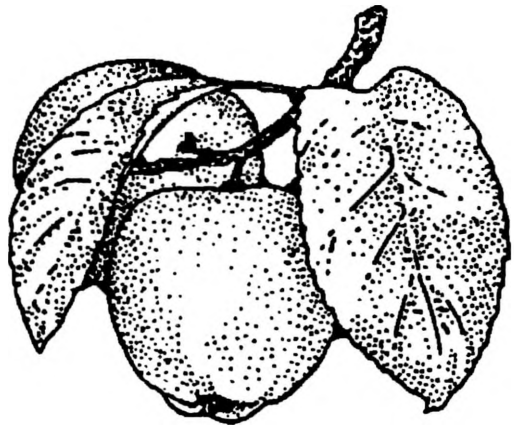
number of colonies per acre desired. Hive entrances should face south and be in full sun whenever possible. In addition, colonies should be elevated at least 4 inches off the ground, preferably more. This will help warm the colonies in the morning and get the bees flying earlier.

Bear fences - Spring is one of the peak times for bear damage to bees. If you are in an area with known bear activity, erect a temporary electric bear fence to protect the bees, or inform the beekeeper of potential bear problems so he can take preventive action.

Other factors affecting fruit set - Pollination is only one factor that affects fruit set. Some crops may fail to set fruit if the temperature is too high during bloom. Inclement weather may prevent pollinators from visiting your crops. Nutritional factors such as boron levels also affect fruit set. Be sure to explore all aspects of your crop system to ensure that you have done everything possible to encourage a good fruit set.❖❖



WAIT 'TIL ALL THE CARDS ARE DEALT

WHITHER GUTHION?

(Art Agnello, Entomology, Geneva; and Dick Straub, Entomology, Highland)

❖❖ There have been a lot of rumors bouncing around lately concerning the status of Guthion, partly as a result of some recent label changes, and partly as an anticipated reaction to possible FQPA-generated changes in use that have yet to be made. Apparently, a New England produce broker has suggested that Guthion not be used for fear of another Alar phenomenon — negative customer reaction to a perceived risk. Growers who want to use Guthion, or other formulations of anizphos-methyl, are understandably concerned that their fruit will again be subjected to the same unfortunate circumstance. It's safe to say that not too much is clear on this latter issue (still), but some information can be provided on the label changes.

It is true that the federal label for Guthion has recently been revised, and passed (by the EPA**) to modify the Personal Protective Equipment and extend the Re-Entry Interval (REI) on tree fruits to 14 DAYS instead of the former 48 hours, for CERTAIN ACTIVITIES: propping, hand-thinning, and hand-harvesting. For all other activities — according to the label "mowing, irrigating, scouting, other activities" — the REI remains at 48 hours. However, note the following:

** This label change is not yet in effect for NY, according to the latest information we have. Until the NYS DEC signs off on these changes (they are currently reviewing the label change, and approval is expected soon), the old label remains in effect.

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CHEM NEWS

** This action by EPA probably signals that other changes regarding uses on apples will not occur this season. In our opinion, EPA would not OK a revised label if it anticipated sweeping changes in the near future. Moreover, we feel it's unlikely that they will issue any edict that would affect this season's crop.

** These changes are not in effect until the new label has been printed and affixed to product yet to be shipped. In other words, if growers presently have product on hand, the old label applies to that material. "Old label" material is perfectly legal to use, but it might be circumspect to apply in conformance to the revised label, thereby showing a good faith effort to provide increased protection for workers.❖❖

PHENOLOGIES

Geneva:
Apple (McIntosh): Tight cluster
Apple(Red Delicious): Early tight cluster
Pear (Bartlett): Green cluster
Tart Cherry: White bud
Sweet cherry (Windsor): Bloom
Peach: Early bloom

Highland:
Apple (McIntosh): Full bloom
Apple (Red Delicious): King bloom
Pear (Bartlett): Early petal fall
Peach: Petal fall
Apricot: Petal fall

FIRE 'N RAIN

DISEASE UPDATE
(Dave Rosenberger, Plant Pathology, Highland)

DISEASES

Fire Blight

❖❖ The first open flowers on Bartlett pears at the Hudson Valley Lab were noted on Tuesday, April 27, and most pear varieties were in Full Bloom by May 3. The epiphytic infection potential for fire blight (as determined from degree hours >65°F) increased rapidly over the weekend and is expected to reach the minimum required for infection by Tuesday afternoon or Wednesday. Thereafter, a wetting event on any day with an average temperature ≥ 60°F (max plus min divided by 2) will be sufficient to trigger a fire blight infection period.

The first apple blossoms appeared in the lower Hudson Valley only a day or two after the first pear blossoms, so apples will also be at risk for fire blight infection later this week. Highly susceptible apple cultivars such as Ginger Gold, Gala, Fuji, Mutsu, Idared, Jonathan, Monroe, Paulared, and Greening should be protected with streptomycin if there is any history of fire blight in the vicinity of the orchard.

Streptomycin should be applied as a protectant just ahead of predicted wetting periods that might trigger infections. Streptomycin only protects open flowers. If streptomycin is applied too far in advance of infection periods, additional flowers will open after the streptomycin application and will be unprotected at when infections occur.

If susceptible orchards are not protected prior to an infection period, a post-infection spray of streptomycin can reduce potential losses

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even though post-infection sprays are generally less effective than protectant sprays. When necessary, a post-infection spray of streptomycin should be applied as soon as possible after the infection event. Effectiveness of post-infection sprays varies depending on the severity of the infection event, temperatures during the period immediately following infection, and the duration of the post-infection delay. A post-infection spray applied within 24 hours after the infection period may provide reasonable control of fire blight under moderate conditions, and a spray within 48 hours after infection is probably still better than nothing.

Remember that if warm wet weather persists, follow-up sprays of streptomycin may be needed at 3–5 day intervals to protect blossoms that open after the first application.

Drought Stress and Phytophthora Crown Rot

In eastern NY, April of 1999 was one of the driest Aprils on record. In the Albany region, this was the driest April of this century and the second driest since record keeping was initiated around 1825. Our weather this year is eerily similar to that of 1982 when apple trees were stressed by dry conditions during Bloom. The drought in 1982 was broken by more than 5 inches of rain during the first week of June. Hudson Valley apple growers experienced an unusually severe epidemic of crown rot during August and September of that same year.

Three factors may have contributed to the crown rot epidemic of 1982. First, drought stress during bloom added to the natural "stresses" associated with flowering and fruit set. Stressed trees presumably are less able to resist infection by *Phytophthora*. Second, the drought conditions were alleviated by a deluge that provided ideal conditions for infection by *Phytophthora*. And finally, there were large numbers of young orchards where *Phytophthora* infections resulted in rapid girdling of the trees. On larger-diameter trees, an infection on one side of the tree may be arrested before the tree can be girdled by *Phytophthora* whereas small trees can be girdled fairly quickly following an infection.

It is impossible to predict whether the spring drought of 1999 will contribute to an epidemic of crown rot. However, if the current drought is followed by excessive rainfall, young trees should be considered at risk and treatment may be warranted to prevent crown rot. Ridomil Gold is labeled for controlling crown rot, but its label restricts application to early spring and after harvest. Therefore, Ridomil Gold is useless for situations where a mid-season application is needed. That leaves a foliar spray of Aliette as the only viable option for controlling crown rot when unusual conditions develop during the growing season.

Effectiveness of Aliette for preventing crown rot on apples has not been very well researched, and sprays of Aliette are rather expensive. However, tree losses to *Phytophthora* can also prove expensive. Given what we know, it would seem prudent to apply Aliette to orchards considered at risk for crown rot if and only if the current drought is followed by rainfall that results in flooded soil conditions. Aliette applied after the rain event should help trees wall off infections before they can cause extensive damage. Follow instructions on the label for applying Aliette. If copper was applied to trees at Green Tip for fire blight, be aware that Aliette can solubilize copper deposits and cause phytotoxicity to fruit. (See the warning on the Aliette label.) Trees sprayed with copper at Green Tip should be exposed to at least 3 inches of rain before they are sprayed with Aliette.

In determining which orchards might be at risk, both tree age and rootstock should be considered. As noted earlier, small trees can be girdled quickly, whereas older trees with a larger trunk diameter can sustain some damage from *Phytophthora* and still recover. The M.26 rootstock seems to be the most sensitive rootstock in commercial orchards today. MM.106 rootstock is technically more sensitive to crown rot than M.26, but most trees on MM.106 trees either died from crown rot long ago or they are

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now mature and therefore will be less susceptible to girdling. M.9 and MM.111 rootstocks are relatively resistant to crown rot. M.7 rootstock is more susceptible than M.9 and MM.111, but less susceptible than M.26. Although M.9 and MM.111 rootstocks are relatively resistant, they are not immune to infection. During the epidemic of 1982, young orchards on both of these stocks suffered occasional tree losses to crown rot.

Not all "natural" disasters can be ascribed to "acts of God". In young orchards with trickle irrigation, the events that contributed to the 1982 epidemic of crown rot can be re-created by delaying the start of trickle irrigation until trees are well stressed and then compensating for that error by over-watering. Several years ago, I was called to an orchard where a number of three-year-old trickle-irrigated trees were lost to crown rot. The trickle irrigation had been delayed because of equipment problems, and the trickle line delivered water directly to the tree crowns. Possible solutions in trickle irrigated blocks are to begin irrigation before trees are stressed, avoid over-watering of stressed trees, keep trickle lines at least several inches away from tree crowns, or treat trees with Aliette to prevent invasion by *Phytophthora.*❖❖

UPCOMING PEST EVENTS

	43°F	50°F
Current DD accumulations (Geneva 1/1–5/3):	248	104
(Geneva 1998 1/1–5/3):	388	203
(Geneva "Normal" 1/1–5/3):	272	126
(Highland 1/1–5/3):	400	185
Coming Events:	**Ranges:**	
Obliquebanded leafroller larvae active	149-388	54-201
Pear psylla 1st hatch	111-402	55-208
Rosy apple aphid nymphs present	91-291	45-148
Green apple aphid present	127–297	54–156
Spotted tentiform leafminer 1st oviposition	141-319	48-154
Spotted tentiform leafminer 1st flight peak	180-544	65-275
Tarnished plant bug adults active	71–536	34–299
European red mite egg hatch begins	157–358	74–208
Redbanded leafroller 1st flight peak	180–455	65–221
Codling moth 1st catch	273–805	141–491
Oriental fruit moth 1st flight peak	259–606	96–298
Plum curculio adults active	135–394	49–225
Rose leafhopper nymphs on multiflora rose	188–402	68–208
San Jose scale 1st catch	189–704	69–385
McIntosh at pink	258-356	96-182
Peach at bloom	229–446	95–199
Pear at white bud	217–423	96–217
Plum at bloom	241-394	95-225
Sweet cherry at petal fall	257–448	131–251
Tart cherry at bloom	257-448	131-251

PEST FOCUS

Geneva:
Oriental fruit moth and **spotted tentiform leafminer** numbers increasing. 1st catch of **lesser appleworm**. **Rosy apple aphid** nymphs found in fruit clusters. **Obliquebanded leafroller** larvae active 4/28.

Highland: **Pear psylla** nymphs present/increasing . **Spotted tentiform leafminer** and **redbanded leafroller** increasing. First catch of **lesser appleworm** and **codling moth**.

INSECT TRAP CATCHES
(Number/Trap/Day)

Geneva, NY

	4/26	4/29	5/3
Green fruitworm	0	0	0
Spotted tentiform leafminer	1.8	333	349
Redbanded leafroller	1.3	2.2	11.5
Oriental fruit moth	0.3	0.5	72
Lesser appleworm	0	0	14.6*
San Jose scale	-	-	0

* first catch

Highland, NY

	4/26	5/3
Green fruitworm	0	0
Spotted tentiform leafminer	13.2	19.9
Redbanded leafroller	220.2	18.4
Oriental fruit moth	0.2*	3.4
Codling moth	0	0.1*
Lesser appleworm	-	0.1*
European red mite(#/leaf)	0.2*	10.0

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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