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Update on Pest Management and Crop Development

FRUIT JOURNAL

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CHEM NEWS

SECTION 18 GRANTED

AGRI-MEK LABELLED
(Art Agnello)

❖❖ Today we received notification from the EPA that our apparently annual Section 18 Specific Exemption for use of Agri-Mek on pears for the control of pear psylla has been approved in N.Y. for 1994. This approval is subject to the following conditions and restrictions:

1 - The N.Y.S DEC is responsible for ensuring that all provisions of this specific exemption are met.

2 - The product Agri-Mek 0.15 EC, manufactured by Merck and Co., may be applied. All applicable directions, restrictions and precautions on the EPA-registered product label must be followed.

3 - A maximum of ONE application per season by ground applicator will be observed. A rate of 10–20 fl. oz. of product per acre will not be exceeded. A 21-day PHI will be observed.

4 - A maximum of 2,400 acres may be treated in N.Y.S.

5 - To reduce the risk to aquatic organisms, a 100-yard buffer zone must be maintained from ALL water bodies containing aquatic life.

6 - Livestock may not be grazed in treated orchards.

7 - This specific exemption expires September 30, 1994.

Just a reminder that the EPA conditions above (specifically, No. 3) explicitly state that a maximum of ONE application is permitted. This does not mean deciding how much you ultimately want to apply and then dividing it into two half applications 10–14 days apart. Psylla is a difficult pest to control, and rates lower than the maximum are often not effective. Also, the label requires that the Agri-Mek be mixed with a minimum of 1 gallon per acre of highly refined paraffinic oil, which in our region means Ultra Fine Oil. The purpose of including oil is to increase absorption of the active ingredient into the leaf tissue. I have been asked whether good ol' (i.e., cheaper) Sunspray 6E wouldn't achieve the same result, and I suppose it would; however, 1) it contains heavier petroleum fractions, which pose more of a threat of phytotoxicity, and 2) it's not labelled.

In accordance with our use patterns and observed effectiveness of this product the past 2 years, we are advising that the material be applied 10–14 days after petal fall, in order to contact the foliage when it is in the best condition to absorb the chemical. This may be a little before psylla numbers actually build up to the 1 nymph/leaf suggested threshold, but it will ensure maximum control of the "front end" of the summer population. Most growers should not be surprised if they end up needing to make 1–2 applications of another material, such as Mitac, towards the end of the summer, if it turns out to be another one of those true problem years, in order to attain season-long control. Incidentally, I've been informed that amitraz recently has been granted a

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tolerance in Canada, so Mitac is now a permitted alternative for pears headed north.

Reports from a few places, including the Hudson Valley, indicate that psylla egg and nymph numbers appear to be much lower so far than normally seen at this time, prompting speculation as to whether we can do without Agri-Mek this season. In response, I would say that there's probably no sense in making this spray if there are virtually NO psylla nymphs in the trees by the 10–14-d post-petal fall period. Past research in western N.Y. has shown that effective control can be attained even if the application is delayed for another 1–2 weeks (or more), PROVIDED that the leaves have not hardened off yet. If you get 30 or 40 days down the road after petal fall, and psylla still aren't appearing, then it may be time to re-assess the most pragmatic and economical approach to managing them for the rest of the summer.❖❖

INSECTS

BLOOM

PLANET OF THE APIS
Increasing Efficiency of Honey Bee Pollination
(Roger Morse)

❖❖ During the past twenty-five years, three new diseases of honey bees have been accidentally introduced to North America, two from Europe and one from Asia. Data from the New York State Department of Agriculture and Markets show that the number of human-managed colonies in the state has decreased from 120,000 to 70,000 in the past four years. These figures do not include the heavy losses from the winter 1992–1993. Many individual beekeepers have reported losses of 20 to 80 percent in a single year since 1988.

In many areas of the state, especially where migratory beekeeping is practiced or colonies are moved for pollination and the new diseases are more widespread as a result, all or nearly all of the feral colonies living in hollow trees, buildings, or field crates have died because of one or a combination of these diseases. At the same time, the diseases that have been present for many years continue to take a heavy toll.

The first of these new diseases is chalkbrood, which is caused by a fungus that attacks and kills honey bee larvae. Since it was first found in 1968, it has cost beekeepers as much as 5 percent of their honey crop. During the past four years the second of these diseases, caused by mites that infest the breathing tubes of adult bees, has been even more troublesome. However, Asian varroa mites that live externally on pupal and adult bees are rapidly becoming the most serious of the pests, causing many colony deaths in 1992.

Commercial beekeepers, especially those who migrate, have compensated for these disease losses by dividing colonies in Florida in February and March or by buying package bees and queens from a southern state. However, an estimated 40 percent of the hobby beekeepers, who own at least half of the bees in New York State, no longer have live bees. The colonies owned by these hobby beekeepers, as well as the feral colonies, have been important in the pollination of commercial crops, especially apples, but also fruits and vegetables grown both com-

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Dept. of Entomology
NYSAES, Barton Laboratory
Geneva, NY 14456-0462
Phone: 315-787-2341 FAX: 315-787-2326
E-mail: art_agnello@cornell.edu

Editors: A. Agnello, D. Kain

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mercially and in home gardens. In some areas *solitary ground-* and twig-nesting bees and bumble bees will be helpful in pollination, but on a year-to-year basis their populations fluctuate widely and cannot be depended upon.

Good chemical controls for the varroa mites are available and are being widely used. However, beekeepers report that the chemicals used for tracheal mite control are only marginally effective. It is agreed that the bees being kept today are more tolerant of tracheal mites and chalkbrood, merely because the most susceptible stock has died. Research is under way to develop bees resistant to these new diseases, but we have not reached the stage where specific strains of bees can be recommended.

MANAGING COLONIES FOR MAXIMUM FLIGHT

The existence of the new diseases increases the importance of care and timing in placing and managing colonies for pollination in orchards. The following guidelines are especially critical. Honey bees will visit plants with the greatest quantities of pollen and the highest sugar concentrations in the *nectar*. The nectar of dandelions and yellow rocket is as rich as that of apple. Orchardists should mow flowering weeds in orchards or apply weed killer. Weeds in fields adjacent to orchards may also attract bees away from the trees to be pollinated.

• Colonies of honey bees in orchards should be kept in full sunlight to warm the hives rapidly in the morning and entice the workers out of the hives. We suggest placing colonies in groups of three to five to take advantage of the best locations. Good locations should slope to the east or south with entrances facing in these directions and should be protected from the wind. Colonies should be placed on pallets, cinder blocks, old tires, or any objects that will keep the bottomboards six to eight inches above the ground. Hives with wet bottomboards will be cooler, which slows bees' flight. A hivestand will also keep colonies above grass, which may shade or block the entrance.

• Bees often collect large quantities of water to dilute the honey they feed their young. It is impractical to carry sufficient water into an orchard or to fill all wheel ruts and holes with dirt or sand and force the bees to forage outside of the orchard for water. But growers must understand that water contaminated with pesticides can kill bees that collect it. A problem exists if more than 10 dead bees are found in front of a hive in the morning. If too many bees die, it may be necessary to rent more bees. Beekeepers expect some losses and figure them into their rental fee.

• Pesticides are less of a problem to bees and beekeepers today than they were 10 and 20 years ago. Nevertheless, it is still important to read the label and to avoid using materials that are especially toxic to bees. Honey bees are most often killed by pesticides when they ingest contaminated pollen. Avoid spraying when flowers, including weeds, are open and attractive to bees.

• Red Delicious and a few other apple varieties have flower structures that are different from most other common varieties such as McIntosh. Their anthers are widespread, and bees learn to insert their mouthparts between the anthers to obtain nectar. In this way, the bees do not contact the flower's sexual

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parts and no pollination occurs. It takes time for bees to learn to obtain nectar in this way. To counteract this problem, the number of colonies in the orchard must be increased so there are more bees that have not learned this technique.

• New York growers currently use about one colony of bees per three acres for apple pollination. This number may be adequate in small orchards, which may be visited by feral honey bees and solitary and subsocial bees such as bumble bees from adjacent hedgerows and woods. Growers with larger blocks may wish to increase the number of colonies to one per two acres, especially considering the new diseases.

• Pollination of pears will probably always be a problem because pear nectar contains only about 15 percent sugar versus 40 percent for apples, dandelions, and yellow rocket. The answer is to move the bees into the center of the pear block when the pears are in full flower. It will take several hours for the bees to discover the 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 naive bees.

Bees will visit flowers and pollinate only if they can fly. Cool, rainy, and windy weather will delay, slow, or stop flight. In warm years bees may over-pollinate during bloom, and growers must thin the flowers. Unfortunately, we cannot predict the weather. For the above reasons, you should contract for bees for pollination well ahead of when the colonies will be needed.❖❖

HUDSON VALLEY

HUDSON VALLEY DISEASE UPDATE
(Dave Rosenberger)

Apple scab ascospore maturity counts, Highland, NY, May 4

Immature	Mature	Discharged	Tower shoot
37%	47%	16%	not done

APPLE SCAB

❖❖ Scattered showers occurred Friday May 6 and there were spotty reports of soft hail. We received neither rain nor hail at the Hudson Valley Lab. Our first really significant scab infection period occurred May 7–9 with 36 hrs of wetting, mean temperature of 52°F, and 0.95 inches of rain. (Previous wetting periods were marginal for scab infections either because of limited green tissue for the April 12 wetting period or because the wetting period on April 30 was a Mills' period only if night time hours of wetting were included.)

On May 6, a fieldman (Paul Minard) brought in an early cluster leaf with a sporulating scab lesion that he had found in a commercial orchard in Marlboro. Paul said it was the only lesion he had found. I suspect it may have resulted from the infection period on April 12 when trees were at green tip. As of May 9, we have not yet found any primary scab in unsprayed Jerseymacs here at the Hudson Valley Lab.❖❖

RUST DISEASES

❖❖ The May 7–9 infection period provided ideal conditions for severe rust infections, including infection on fruit. Rust diseases are frequently more severe following long wetting periods (36–60 hours) caused by light or intermittent rainfall. Furthermore, fruit infections are most likely to occur between tight cluster and petal fall with peak susceptibility occurring near

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pink. All of these conditions applied for the May 7–9 infection period. Romes and Golden Delicious were especially vulnerable because they were just at the king bloom stage when the wetting period started.

The SI fungicides Rubigan and Nova are very effective against cedar apple rust, but their activity against quince rust is questionable. I have seen some severe quince rust outbreaks (>40% fruit infections) in orchards where SI fungicides were used at 10-day intervals in combination with weak protectants like thiram. We are lacking good experimental data on quince rust, but I suspect that SI fungicides are effective against quince rust when applied immediately before or after the infection period. They may have limited eradicant activity when applied more than 72 hours after infection. When used in combination with mancozeb, the SI fungicides should provide adequate control of quince rust as long as the residual activity of mancozeb holds up through the infection period. With only one inch of rain May 7–9, the low rates of mancozeb applied with SI fungicides should have provided adequate protection.❖❖

FIRE BLIGHT

❖❖Because most of last week was quite cool, the epiphytic infection potential (EIP) for blossom blight infection (according to the MaryBlyt model) remained quite low. The EIP was less than 20 when hail occurred in some area orchards on May 6 and it remained low throughout the weekend wetting period. A high temperature of 71°F on May 6 followed by rain later that evening triggered a high-risk period according to MaryBlyt, but applications of streptomycin were not recommended because the EIP was so low. The only places strep sprays may have been justified were orchards with highly susceptible cultivars and a history of blight last year.❖❖

WINTER DAMAGE

❖❖ With apples now at full bloom, we are seeing less winter damage in the lower Hudson Valley than many had feared we might see. Limited damage is evident in some locations, and bloom on a few cultivars is light. However, apples and pears generally have a strong healthy bloom in the lower Hudson Valley.❖❖

GENEVA

APPLE SCAB
(Wayne Wilcox)

ASCOSPORE MATURITY (5/6)

DD 32*	Maturity category (%)** 1	2	3	4	5	Discharge test (Spores/LP field)
367	27	15	23	30	5	45

*Accumulated degree days (base 32°F) between first date of green tip and date of assessment. Ability to discharge ascospores usually begins to increase rapidly at approx. 175–225 DD after green tip.
**Categories: 1–3 = immature; 4 = morphologically (apparently) mature; 5 = discharged.
Growth stage on 5/6: McIntosh = Open cluster

FIRE BLIGHT

STREPTOMYCIN DURING BLOOM?

(Wayne Wilcox)

❖❖ Fire blight seems to occur in cycles in New York. A typical cycle goes something like this: (a) clobbered; followed by (b) 1 or more years of heightened concern; followed by (c) 1 or more years of reduced concern; followed by (d) clobbered. 1991 was an "a" year; '92 and '93 were "b" and, in some cases, "c" years; the question is, when do we get back around to "d"? Well-timed sprays of streptomycin are very effective for control of the blossom infections that start fire blight epidemics. However, the short residual activity of streptomycin means that poorly timed sprays will not be effective even when they are needed. Furthermore, unneeded strep sprays are not only a waste of time and money, but also contribute to a very real risk of resistance developing. (Note that fire blight resistance to strep has become an increasingly common and serious problem in Michigan in just the last couple of years. Also remember that

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DISEASES

there are no good alternatives to strep if resistance does develop). All of which is reminder that it's time to review basic fire blight biology and some of the criteria used to determine the need for and timing of streptomycin sprays.

Fire Blight Biology. Remember that the serious blighting of twigs, branches, trunks, and rootstocks are entirely the result of secondary infections, which only occur after primary infections (blossom blight, mostly) develop. As with apple scab, the best way to control secondary infections is to control the primary ones to begin with.

Although there are exceptions to every rule, it is generally accepted that four separate events must occur in the proper order before blossom blight infections develop (which is why we don't see the disease every year). These are:

(1) Blossoms must be open.

(2) Temperatures must remain warm enough to allow bacteria to build up to very high levels on the flower stigmas (pollen receptors), where they are harmless. Flowers initially are contaminated by insects that have been attracted to a sticky bacterial ooze that is exuded from overwintering fire blight cankers (NOTE: green-tip copper sprays are intended to kill at least some of this bacterial ooze). However, initial populations on flowers are far too low to cause disease until they build up.

(3) Once flower populations have built up, large numbers of bacteria must be moved from the stigmas down to natural openings at the base of the flowers, where they enter and cause infection. This requires a wetting event, usually rain, although a heavy fog or dew may occasionally be effective if bacterial populations are very high.

(4) Average daily temperatures "must" remain above 60°F (for how long?) after the wetting event. NOTE: Experience in Western New York suggests that warm weather after a rain certainly increases the severity of an infection period, but we've still gotten significant blight developing even when a cold front came in right after a "blight rain". Take this one with a grain of salt.

Once blossom blight develops, the bacteria present in infected tissue can be spread to shoots by the feeding of insects (aphids, leafhoppers) or by rainfall associated with "trauma" events (such as hail or severe wind-whipping) that create the wounds necessary for the bacteria to gain entry.

The MARYBLYT Model. A few years ago, Dr. Paul Steiner at the University of Maryland developed a model (termed MARYBLYT) for predicting fire blight infections, based heavily on points #2 and #3 above. Specifically, the model predicts that blossom infections will not occur until (i) bacterial populations reach a threshold level associated with a MINIMUM accumulation of 200 DEGREE HOURS (above a base of 65°F) after the first blossom in the orchard has opened; and (ii) a wetting event occurs after this threshold has been reached.

To determine degree hour accumulations, it is merely necessary to know the daily high and low temperatures in the orchard each day. Then, assume that the high and low each prevailed for 6 hr and that the average of the two prevailed for the remaining 12 hr of the day. [For example, on a day when the high and low temperatures were 77° and 57° (average 67°), the accumulated number of degree hours above 65° would be 12 x 6 = 72 for the 6 hr at 77°; 0 for the 6 hr at 57°; and 2 x 12 = 24 for the 12 hr at the average temperature of 67°. That is, there would be a total of (77 + 0 + 24) = 101 degree hours accumulated for that particular day, which would be added to those of all other days since first bloom, to give a running total].

There is also a "fine tuning" adjustment for cool days during bloom: the running total should be reduced by 33% after one day in which the daily high is less than 65°; reduced by 50% after two consecutive days below 65°; and reduced by 100% (start all over again) after three consecutive days below 65° or after any one day (or night) that goes below freezing. However, you reach a point of no return (no downward adjustments for cold weather) once the running total has gone above 400 degree hours.

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Using Weather Information to Schedule Strep Sprays. We have always recommended that decisions about streptomycin use be influenced by both an orchard risk factor—particularly varietal susceptibility, rootstock susceptibility, and previous fire blight history—and an environmental risk factor. Blocks with a low orchard risk factor can tolerate relatively more environmental risk, but even "low risk" blocks are in serious danger when a wetting event during bloom is preceeded by enough warm weather to produce very high inoculum levels. For instance, the fire blight epidemic of 1991 in western and central N.Y. was caused by two blossom infection periods, each of which occurred after more than 2,000 (!) degree hours had accumulated since first open blossom.

Therefore, the MARYBLYT criteria should be used as a guide to timing sprays. Carefully determine the date of the first open blossom in the orchard, and keep a running total of accumulated degree HOURS above 65°. Consider the weather risk to be high and rising once 200 degree hours have accumulated, especially if continued warm weather is forecast, and consider infection of susceptible varieties probable during the next wetting event. Ideally, strep should be applied before the rain occurs, but sprays applied within 24 hr after the start of the infection period will still be of significant benefit (remember that strep must be absorbed by the flowers, so wait for the rain to stop or it will be washed off). Whether to spray preventively, wait the forecast out and spray afterwards if the rain really does occur, or just ignore it depends on the usual factors: how far over the 200 hour threshold you are, value and characteristics of the block (e.g., danger to tree framework or rootstock on smaller trees), history of the block. Once a strep spray has been applied, wait 3–4 days and check the weather forecast, then reapply before the next wetting event if sufficient blossoms are still open.

New York Experience With MARYBLYT. In general, several people who have worked with the program find it useful but conservative in recommending strep sprays for our conditions. It hasn't missed any infection periods, but seems to call for "high risk" conditions more often than experience has shown to be necessary. Nevertheless, the concepts are very useful, and whether the appropriate threshold value is 200 degree hours or somewhat higher (probably depends heavily on the orchard), recognize that risk increases directly above this level.

In cooperation with Debbie Breth, we've tested the program in three Orleans Co. orchards in 1992 and '93. In one 'Rome' block south of Rt. 31, a single strep spray provided good control in both years when applied immediately following predicted infection periods, i.e., rains that occurred after 342 degree hours (base 65) in 1992 and after 330 degree hours in '93; the unsprayed trees in this orchard got blight. In another 'Rome' orchard near the Lake, the time of bloom was different and infection periods were marginal each year (>500 degree hours had accumulated before rains, but temperatures afterwards were only in the 40's to low 50's). In this orchard, there was no blight in either the sprayed or unsprayed treatments. In a third 'Ida Red' block, a single spray applied according to the model gave good control in 1993 (480 degree hours accumulated prior to the rain, spray applied the rain), but no blight developed in either the sprayed or unsprayed orchards in '92.

We'll be testing the program again this year.❖❖

PHENOLOGIES

Geneva:
Apple(McIntosh) - **Pink** ; Pear - **White bud** ; Tart cherry(Montmorency) - **Bloom**; Sweet cherry(Windsor) - **Early petal fall** Peach - **Petal fall** ; Plum(Darrow) - **Plum**

Highland:
Apple (McIntosh): **40% Petal fall** ; Apple (Rome): **Full bloom** ; Pear (Bartlett): **90% Petal fall** ; Plum (Stanley): **Petal fall (5/5)**

INSECT TRAP CATCHES (Number/Trap/Day)

Geneva NY

	5/2	5/5	5/9
Green fruitworm	0	0	0.1
Pear psylla adults	0.05	0	0
Pear psylla eggs	1.9	2.9	1.6
Pear psylla nymphs	0.1*	0.07	0.3
Redbanded Leafroller	0**	0**	0**
Spotted Tentiform Leafminer	274	371	386
San Jose scale	0	0.2*	0
Lesser appleworm	0	0	0.4*

** We are not catching any RBLR in designated traps, but have seen them in other traps at the Station, and in Wayne County.

HVL, Highland NY

	5/2	5/5	5/9
Green fruitworm	0	0	0
Redbanded Leafroller	1.7	1.0	0.9
Spotted Tentiform Leafminer	19.2	28.0	12.9
Oriental Fruit Moth	6.5	7.5	16.1
Fruitree Leafroller	0	0.3	0.1
Lesser appleworm	–	0	0.1*
Codling moth	–	0	0
American plum borer	–	0.2*	0
Sparganothis fruitworm	–	0	0

* = 1st catch

(Dick Straub, Peter Jentsch)

UPCOMING PEST EVENTS

Current DD accumulations	43°F	50°F
(Geneva 1/1 – 5/9):	310	152
(Highland 1/1 – 5/9):	480	248

Coming Events:	**Ranges:**	
Comstock mealybug 1st crawlers	220–425	82–242
Lesser peachtree borer 1st catch	224–946	110–553
Oriental fruit moth 1st catch	208–587	79–338
Redbanded leafroller 1st flight peak	180–455	65–221
Spotted tentiform leafminer 1st flight peak	180–375	65–192
Tarnished plant bug adults active	71–536	34–299
Lesser appleworm 1st flight peak	455–851	255–471
Codling moth 1st catch	273–805	141–491
Pear thrips in pear buds	137–221	54–101
European red mite egg hatch complete	361–484	183–298
White apple leafhopper nymphs present	236–708	123–404
McIntosh at bloom	310–425	152–255
Pear at bloom	242–402	117–225
Peach at shuck split	362–518	174–287
Plum at petal fall	277–448	113–251
Sweet cherry at fruit set	409–518	209–287
Tart cherry at petal fall	394–518	201–287

PEST FOCUS

Geneva:
Pear psylla eggs hatching
Spotted tentiform leafminer adults flying
Red-banded leafroller adults flying (5/3)
European red mite eggs hatching (5/2)
Predator mites (*Typhlodromus pyri*) active, feeding on ERM
Obliquebanded leafroller larvae active (Wayne Co.)

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Dept. of Entomology
NYS Agricultural Exp. Sta.
Barton Laboratory
Geneva, NY 14456-0462

ARTHUR AGNELLO
ENTOMOLOGY
BARTON LAB
NYSAES