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Update on Pest Management and Crop Development

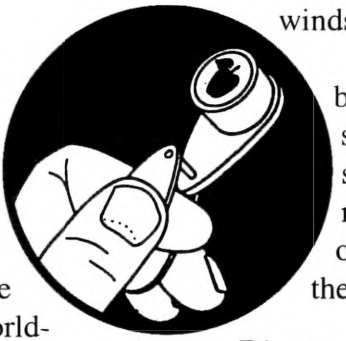
F R U I T J O U R N A L

April 30, 2001 VOLUME 10, No. 7 Geneva, NY

DISEASES

SOUND THE ALARM!

FIRE BLIGHT
(Bill Turechek, Plant Pathology, Geneva)



❖❖ Fire blight is perhaps the most devastating disease of apple worldwide. Last year, extensive losses occurred across much of the Midwest and Northeast because weather conditions during bloom, coupled with bouts of severe weather later in the season, created conditions that were extremely favorable for disease development. Add to this that our new varieties, rootstocks, and planting systems have evolved in such a way that newer plantings are more susceptible to fire blight than ever before, and we now have a situation that makes it increasingly difficult to manage this disease. The bottom line is that fire blight is on almost every apple grower's mind. The following article provides an overview of the fire blight disease cycle and discusses management options through the blossoming and post-bloom periods.

Definitions

- *Blossom blight* starts in spring when flowers become infected. The blossom blight phase of fire blight includes shoot death that develops as a result of bacterial invasion from the flower clusters.
- *Shoot blight* develops from secondary infections that originate on young terminal shoots. Shoot blight usually develops in late spring or early summer.
- *Trauma blight* is a term used to describe infections that occur when blight is initiated at leaf or bark injuries resulting from hail or severe windstorms.
- *Rootstock blight* occurs when bacteria from infected blossoms or shoots moves internally through symptomless trunks and infects roots. Trees on M.26 and M.9 are often, but not always, killed when the roots become infected.

Disease cycle

Fire blight is caused by the bacterium *Erwinia amylovora. E. amylovora* overwinters in cankers on infected limbs. Cankers become active in early spring as temperatures warm and buds begin to develop. Active cankers produce a yellowish to white bacterial ooze that can appear several weeks prior to bloom. During this period, insects (mainly flies) disseminate the bacteria

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throughout the orchard. During bloom, pollinating insects rapidly move the pathogen from flower to flower initiating the blossom blight phase of the disease. Flowers can become infected within minutes after a rain or heavy dew when the average daily temperatures are equal to 60°F or greater. Flower receptacles and young fruits are resistant after petal fall. Early symptoms of blossom blight can be expected 5–30 days after infection depending upon daily temperatures.

Inoculum produced from infected blossoms is further spread by wind, rain, and insects. Shoot tip infections are likely to occur when shoots are actively growing and daily temperatures average 60°F (16°C) or more. In years when blossom infections do not occur, the primary sources of inoculum for the shoot blight phase are the overwintering cankers. Particularly, young water sprouts near these cankers become infected as the bacteria move into them systemically from the canker margins. In the absence of blossom infections, the development of shoot blight infections is often localized around areas with overwintering cankers.

Rootstock blight is associated primarily with the highly susceptible rootstocks such as M.26 and M.9. On these trees, just a few blossom or shoot infections on the scion cultivar can supply bacteria that move systemically into the rootstock where a canker may develop and girdle the tree. Trees affected by rootstock blight generally show symptoms of decline and early death by mid- to late season. Sometimes symptoms may not be apparent until the following spring.

Although mature shoot and limb tissues are generally resistant to infection by *E. amylovora*, injuries caused by hail, late frosts of 28°F (-2°C) or lower, and high winds that damage the foliage breach the normal defense mechanisms in mature tissues. Instances of fire blight that originate with infections at sites of injury are called trauma blight and may affect even normally resistant cultivars like 'Delicious'.

Disease Management During Bloom

Managing blossom blight is achieved through well-timed chemical sprays. The level of control is critically dependent upon which product you choose to use and the timing of your sprays. The number of applications is typically far less important, *per se*, than when sprays are applied.

Streptomycin: Streptomycin applications during bloom are highly effective against the blossom blight phase of the disease. These sprays are critical because effective early season control often prevents the disease from becoming established in an orchard. Predictive models, particularly *MARYBLYT* and Cougar Blight, help to identify potential infection periods and improve the timing of streptomycin, as well as to avoid unnecessary treatments, particularly during the blossom blight phase of the epidemic.

Streptomycin applications are best used in a preventive mode, just prior to an infection event. Using predictive models (e.g., *MARYBLYT*), it is possible to use local weather forecasts to predict (i.e., guess) whether an infection event is likely to occur in the next day or two. This can be extremely helpful in identifying unusually high-risk situations. In younger orchards, removing

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blossoms by hand will reduce the risk of blossom infection. This practice can be especially effective in minimizing losses due to rootstock blight as well, particularly when highly susceptible varieties such as 'Gala' or 'Gingergold' are grafted on to M.9 or M.26. Although somewhat time consuming, blossom removal is a much less expensive alternative than replanting an entire block.

***Messenger* (Harpin)** is a unique pesticide that may prove useful for managing both the blossom and shoot blight phases of fire blight. Messenger was recently labeled for use in New York (see related article in this issue). The active ingredient in Messenger is a protein derived from the bacterium *Erwinia amylovora* (the causal agent of fire blight). The protein is called harpin. Messenger has no direct effect on the viability of the pathogen. Instead, Messenger activates natural defenses within plants to make them more resistant to diseases and physiological stresses. Plants require 5–7 days for full induction of resistance, so Messenger must be applied several days prior to fire blight infection periods. This is a problem with using this compound because it means that the product must be applied before anyone can tell whether or not weather conditions during bloom will actually allow blight infections to occur. The blight suppression provided by Messenger will last for approximately 14 days. In experimental orchards, Messenger applied 10 days before pink and at pink significantly reduced blossom blight, but it was less effective than streptomycin.

Properly timed applications of streptomycin during bloom should still be used as the primary defense against fire blight. Messenger may prove useful as a supplement to streptomycin for situations where blight is expected to be unusually severe either because of high carry-over inoculum in young highly susceptible orchards or when severe blossom blight conditions can be expected based on long-term weather forecasts. We do not yet have enough information to justify recommending routine use of Messenger except in locations where streptomycin-resistant strains of the fire blight bacterium are present. Streptomycin resistance, however, has not been documented in New York. Messenger applied after bloom at 14-day intervals has so far shown variable results in controlling shoot blight. When mixing Messenger, do not use chlorinated water, or water below pH 5.0 or above pH 10.0. Follow label instructions regarding tank mixing. Research on the use of this new material is continuing.

Blight Ban: BlightBan A506 is a biological control agent that is used primarily on the west coast for the management of blossom blight. BlightBan contains beneficial bacteria that, when applied to the blossoms, colonize the blossoms quickly to produce a protective barrier that inhibits infection from the fire blight bacterium. It has given significant control of blossom blight in research trials, but is usually not as effective as streptomycin. Unfortunately, BlightBan <u>is not</u> registered for use in New York.

How do these chemicals fit in to a blossom blight management program?

Effectively managing fire blight requires a combination of disease management practices. Chemical control will be less effective in orchards where fire blight cankers have not been pruned out. Dormant and seasonal pruning (i.e., removing infected limbs as soon as symptoms are detected and before extensive damage develops) play an integral role in reducing the amount of disease pressure in an orchard. Copper applied at 1/4-inch green will reduce the amount of inoculum on the surface of infected trees.

Assuming that appropriate prebloom controls have been employed (removal of cankers, copper at green tip), how does one incorporate Messenger and streptomycin into a blossom blight spray schedule? At bloom, streptomycin sprays are still the most effective defense against blossom blight. These sprays are critical because effective early season disease control often prevents the disease from becoming established in an orchard. Predictive models, particularly *MARYBLYT*, help to identify potential infection periods and improve the timing of antibiotic treatments.

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Messenger can be applied 5–7 days prior to an infection event to activate a plant's natural defenses to fire blight. Accurately predicting an infection event a week in advance is impossible. Therefore, it is recommended that Messenger be applied at the pink bud stage in orchards that have historically high disease pressure. These orchards should then receive the normal streptomycin sprays in addition to the Messenger spray at pink. Thus, until we have more experience with Messenger, it should be used only as a means of adding extra protection to existing streptomycin programs. Messenger should not be used as a substitute for streptomycin.

Managing fire blight after bloom

Management focuses on minimizing shoot blight (especially if blossom blight was severe) and the development of cankers that can overwinter and serve as next year's inoculum source. Minimizing shoot blight damage begins by pruning out infected limbs as soon as symptoms are detected and before extensive necrosis develops. When pruning out active cankers, cuts should be made at least 12 inches below symptoms. The effectiveness of sterilizing pruning-shears between cuts is debatable, and is often not done due to the impracticality.

Growers should use management systems that promote early cessation of tree growth without adversely affecting tree vigor. Excessive vigor is an important component of orchard risk for fire blight. When tree growth continues past mid summer, the likelihood that late season or trauma blight infections will overwinter increases. Nitrogen fertilizer should be applied based on foliar analysis. In young blocks, it is possible to use Apogee as a means to terminate growth and possibly minimize the damage due to fire blight. The thoughts behind this approach will be featured in an article next week.

Trauma events (hail, high winds) can put any orchard block at risk because varieties that are considered relatively resistant to blossom blight and shoot blight can suffer severe blight under trauma conditions. If a trauma event occurs when trees are actively growing, application of streptomycin within 12–24 hours after the trauma event may limit the severity of the resultant trauma blight. After midsummer, when trees have hardened off for the season, streptomycin protection following trauma events may be unnecessary because trees are thought to be fairly resistant to fire blight after tree growth stops for the season. Applications of streptomycin may be not be possible after mid-summer anyway because of the days-to-harvest limitations on the label.

Managing fire blight requires season-long attention. Unfortunately, even the most prudent grower can suffer extensive losses because fire blight can strike very rapidly and unexpectedly. Next week's article will discuss the use of Apogee for managing fire blight. ❖❖

GET IN ON THE GROUND FLOOR

APOGEE: TIMING IS EVERYTHING
(Jim Schupp, Horticultural Sciences, Highland)

❖❖ The timing of the first Apogee application is critical to getting optimal growth control in orchards in northern states. This is because most of the annual shoot growth occurs in a relatively short, rapid burst in orchards north of the Mason-Dixon Line. Shoot growth begins about full bloom, quickly enters the phase of the most rapid growth, then gradually slows and usually ends by mid- to late July. To get the best growth control from Apogee, it must be applied before the start of the rapid growth phase.

It takes 10–14 days for Apogee to fully take effect, and a lot of the season's growth will have already occurred if the spray is late. Also, once shoots are rapidly growing, it seems to take a higher concentration of Apogee to get them under control. Observations suggest this last point is especially true with McIntosh.

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HORTICULTURE

The first Apogee application should be made when the new terminal growth is 1–3 inches long. This amount of growth often coincides with late bloom to petal fall, and we suggest that growers use petal fall to time Apogee applications. Growers do not have time to measure shoots, and are usually not attuned to how rapidly shoots are growing at this time of season. In short, if a grower waits until 3-inch long shoots are present to schedule an Apogee spray, then waits 2 or 3 days so that he can apply Apogee along with a scheduled pesticide spray, then waits a little longer to get good spray conditions, the results will be sub-optimal. Timing is everything. Apogee is non-toxic to bees; go knock off some petals with Apogee sprays!

The duration of growth control depends upon the dose and tree vigor. The Apogee label permits a wide range of dose options, from 3–16 ounces per 100 gallons, dilute basis. We suggest that growers select the dilute rate, then use the TRV calculations as outlined in Cornell Recommends to determine rate per acre. For New York conditions, 6–12 ounces of Apogee per 100 gallons dilute basis will provide growth control for trees of good-to-high vigor, respectively. The growth control at these rates will usually last 4–6 weeks. Lower doses may also be effective, but the response may last only 2–4 weeks.

Two well-timed sprays should provide season-long growth control in most orchards in the northeast. Excessively vigorous trees may require a third application to achieve season-long control.

One strategy for timing the second spray is the calendar method. Apply the second spray 2 weeks after the first. This is an effective strategy that involves the least time investment. For operations that are stretched thin on management, this may be the best strategy.

The other option is monitoring. Three weeks after the first spray, start scouting the orchard twice weekly. Monitor the longest shoots in the top of the canopy for new growth, and **apply the second spray as soon as the first shoots resume growth.**

Monitoring may provide the most growth control for the least cost. If growth control from the first spray persists, growers may be able to reduce the rate of the second Apogee spray and still achieve season-long control. It is important to leave a few untreated check trees in the block to compare the effect of Apogee and to gauge the need for the second spray.

Poor monitoring that fails to detect the first regrowth, or a slow response that fails to re-apply Apogee before shoot growth resumes will result in poor growth control. Continue to monitor shoot growth in excessively vigorous blocks to determine if a third spray is necessary, keeping the 45 day pre-harvest interval in mind.

How about spray volume? Apogee has performed well with a wide range of volumes. Use enough water to get thorough coverage for the size and density of the canopy being treated.

The suggested retail price of Apogee is $90 per pound, equal to $5.63 per ounce. If a grower has a block of trees with tree row volume of 200 gallons per acre and decides to apply 6 ounces per 100 gallons dilute basis, then each spray will apply 12 ounces per acre. The estimated cost of the material is 12 ounces/acre x $5.63/ounce = $67.56 per acre per spray. Two sprays to obtain season-long growth control will require a total of 24 ounces for an estimated $135.12 per acre. This will lead some growers to ask how thin Apogee can be stretched before it breaks.

My suggestion for 2001 is to treat the majority of the block exactly as described in the previous paragraph. The most expensive spray is the one that fails, and it is important to see what Apogee can do before experimenting with lower rates. That said, there are some legitimate ways to try to achieve savings.

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The first opportunity for savings may come about by using the monitoring strategy. If the first Apogee application of 6 ounces per 100 gallons dilute controls growth for 6 weeks or more and the untreated check trees are slowing down at the time that a second spray is needed, then 3 ounces per 100 dilute may be all that is needed in that second spray to achieve control for the rest of the season. This would use only 18 ounces of Apogee for the season. The estimated cost of the Apogee would be $101.34 per acre, saving $33.78 per acre.

A similar idea would be to plan on making 3 sprays at 3 ounces per 100 gallons, dilute rate. In the example of a 200 gallon tree row volume block, this plan also aims to control growth with a total of 18 ounces of Apogee per acre, by monitoring growth to get the maximum duration out of each spray.

Another opportunity to get results and savings comes about when the need to control vigor in the trees is confined to the top of the canopy. Shutting off the bottom 2 nozzles will direct the Apogee to where it is needed, while reducing the spray output per acre. This will extend the amount of acreage covered by each tank of spray, and reduce the cost per acre.❖❖

COUNT YOUR BLOSSOMS

FLOWER POWER
(Jim Schupp,
Horticultural Sciences,
Highland)

❖❖ Evaluating spur quality and bloom density is always a good idea, and especially so this year. Healthy spurs with numerous, large leaves have the highest potential for setting fruit and for supporting fruit during the early stages of growth. Since most of the early growth in developing fruits is due to cell division, this early growth also largely determines the fruit growth potential for the rest of the season.

Once development reaches the pink stage, growers can begin to evaluate return bloom and make some preliminary notations about bloom density this season. This spur and blossom information can then be combined with notes on pollination, initial fruit set, early fruit growth, seed number and other observations that you will find valuable for decision-making at thinning time.

Many orchards in N.Y. have produced large crops for two years in a row. This may have depleted nutrient reserves and such blocks may have lighter bloom and be predisposed to set a lighter crop in 2001. Other blocks carried big crops in 1999 and came back a little light in 2000. These trees will be predisposed to have heavier bloom and set in 2001, as will those blocks that had light crops last year due to blossom damage from a freeze last April.

Some growers thinned hail-damaged blocks very aggressively last year to remove as much of the damaged fruit as possible. This practice should result in heavier bloom and set in 2001. Strong thinning materials, such as ethephon and naphthalene-acetic acid (NAA) stimulate return bloom through direct hormonal action as well as by removal of competing crop. Even in blocks where these late thinning treatments weren't very effective for removing last year's crop the tendency of these materials to increase flower formation may be noticeable.

Some hail-damaged blocks received minimal care in 2000. Pesticides, herbicides and mowing were curtailed to cut expenses. In some cases the crop was not harvested or was harvested late for juice. Bloom will probably be lighter and weaker in such "low maintenance" blocks.

Many regard chemical thinning to be the most important single spray decision a grower makes in any given year. Little wonder then that this spray also causes a lot of worry. It is too early to make thinning decisions, but not too early to jot down some notes to include in your decision-making process on chemical thinning. Recording this information now can help you to remember all the relevant

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information about thinning decisions and will result in less stressful decision making when the time comes. Take the time to jot down your observations for each block in a small notebook that fits in your shirt pocket. While not as trendy as a palm pilot, the batteries don't run down and you can sharpen a pencil with a pocketknife.

What can be done to increase set, if bloom appears light and the flowers weak? Foliar sprays of urea tank-mixed with boron at pink, petal fall and first cover have been beneficial. See the new Nutrient Management section of Cornell Recommends for details on rates, timing, and compatibility. A new and less proven method for increasing set in apple is Apogee. The label recommends 10–12 ounces Apogee per 100 gallons, dilute basis, at 1–3 inches of shoot growth for increasing fruit set.❖❖

CHEM NEWS

MESSAGE PROVIDED

CHEM NEWS
(Art Agnello, Entomology, Geneva)

Messenger Labeled

❖❖ Messenger 3WDG, containing 3.0% harpin protein, is now labeled in N.Y. as a biochemical pesticide for plant disease management, insect suppression, and plant growth enhancement. (For guidelines on use of this product in apples, see Bill Turechek's fire blight article in this issue.) This product is applied as a foliar spray at approximately 14-day intervals.

Provado Section 18 on Stone Fruits

The EPA has granted a specific exemption under the provision of FIFRA Section 18 for the use of imidacloprid (Provado) to control aphids on stone fruit (peaches, nectarines, plums and apricots) in N.Y. Under this specific exemption, Provado 1.6F, manufactured by Bayer, may be applied in a maximum of 4 applications at a rate of 5–6 fluid ounces of product/acre. No more than 24 ounces (0.32 lb a.i.) may be applied per acre per year. However, in consideration of resistance management objectives, we do not recommend more than 2 applications in a given block per season. Applications may be made up to and including the day of harvest. Provado cannot be applied within 7 days of the previous Provado application. The label must be in the possession of the user at the time of application.❖❖

FIELD NOTES

HUDSON VALLEY

HUDSON VALLEY APPLE SCAB

Apple Scab Ascospore Maturity Counts:

Date	% ascospores that were Imm.	Mature	Empty	No. spores in tower shoot
Saratoga Co.				
April 25	86	14	0	39
Peru				
April 25	83	17	0	7
Sodus Center				
April 23	51	45	4	667
Williamson				
April 23	57	41	2	876

❖❖ Scab ascospore maturity in the Saratoga/Champlain Valley areas is still lagging other areas of the state, now approaching or just passing our action threshold of 15% mature spores. However, the low counts in the shooting tower suggest that it will take a few more days of warm weather or perhaps some rain to allow maturation to proceed before any major discharges will occur. The slower maturation of ascospores in the Saratoga/Champlain region compared to the Hudson Valley/Western NY regions has been quite striking this year. The last several weeks of dry weather apparently arrested spore development in northeastern NY before spores were at threshold levels whereas the southeastern and western parts of the state had already passed threshold levels before the dry weather began.❖❖

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PEST FOCUS

Geneva:
1st **oriental fruit moth** caught in Niagara Co 4/28.

UPCOMING PEST EVENTS

	43°F	50°F
Current DD accumulations (Geneva 1/1–4/30):	203	101
(Geneva 1/1-4/30/2000):	261	102
(Geneva 1/1–4/30 "Normal"):	240	105
Coming Events:	**Ranges:**	
Green fruitworm flight peak	64–255	19–108
Spotted tentiform leafminer 1st oviposition	141–319	48–154
Redbanded leafroller 1st flight peak	180–455	65–221
European red mite overwintered eggs hatch	157–358	74–208
Obliquebanded leafroller larvae active	149–388	54–201
Pear psylla 1st egg hatch	111–402	55–208
McIntosh at pink	258–356	96–182

PHENOLOGIES

Geneva:
Apple (McIntosh): tight cluster
Apple (Red Delicious): tight cluster
Peach: pink
Pear: green cluster
Sweet cherry: white bud
Tart cherry: early white bud
Plum: white bud

Highland:
Apple (McIntosh): early pink
Apricot: petal fall
Pear (Bartlett): white bud
Peach: full bloom
Plum (Stanley): 10% bloom

INSECT TRAP CATCHES (Number/Trap/Day)

Geneva, NY

	4/23	4/26	4/30
Green fruitworm	0.4	0.3	0.4
Redbanded leafroller	0.4*	9.3	9.3
Spotted tentiform leafminer	0.9*	257	312

* first catch

Highland, NY

	4/23	4/30
Green fruitworm	0.8	0.4
Redbanded leafroller	7.1	19.7
Spotted tentiform leafminer	2.2	44.6
Pear psylla eggs (per 100 buds)	350	–

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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