

Fire Blight Control Strategies

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Fire blight is caused by the bacterium *Erwinia amylovora* and continues to be one of the most unpredictable and devastating diseases of apples and pears. Our ability to control the blossom blight phase of fire blight has been greatly enhanced by the MaryBlyt and Cougar Blight predictive models that can be used to optimize the timing of streptomycin (strep) sprays applied during bloom. However, despite availability of these predictive models, few growers or researchers feel confident about their abilities to consistently control fire blight in pears and susceptible apple cultivars.

Effective control of fire blight requires season-long vigilance and an integrated approach to disease control because no single action or spray program will provide complete and consistent control of fire blight. Following are key considerations and checkpoints for managing fire blight. All of these should be integrated into a seasonal program for fire blight management.

1. New plantings: Regularly examine trees for fire blight during spring and summer after new trees are planted. The fire blight pathogen can be present in symptomless trees that are shipped from reputable nurseries. This is a rare event, but it is of great concern because strep-resistant strains of *E. amylovora* are present in geographic regions around most tree fruit nurseries. If strep-resistant fire blight becomes established in an orchard or region, costs for managing fire blight will double or triple because alternative products are either more costly, less effective, or both. Strep-resistance is stable, so introduction of strep-resistance is probably an irreversible event if the strep resistant bacteria become established in a region after their introduction.

- Newly planted trees that develop symptoms of fire blight should be pulled out immediately to minimize potential spread of disease from these trees.
- Copper (any of the labeled copper products) should be applied at 4 oz/100 gal after newly planted trees begin to grow so as to kill any epiphytic (surface-dwelling) strep-resistant *E. amylovora* that may have come from the nursery. Higher rates of copper products or copper sprays that are applied before the soil settles around newly planted trees may stunt tree growth and therefore are not advised.
- If newly planted trees develop flowers, either remove the flowers by hand at the pink-bud stage or spray the trees with a combination of strep and the low rate of copper (4 oz/100 gal). More than one spray of strep plus copper may be needed during bloom. Use MaryBlyt or Cougar Blight to time these sprays, realizing that they will usually occur several weeks after established plantings have reached petal fall. Hand removal of flowers on young trees should only be done during dry weather because there is a slight possibility that blight could be transmitted on fingers or tools that are used for deblossoming, especially if this work is done while plants are wet.

2. Apply a copper spray at silver tip in orchards that have had active fire blight in either of the past two years. Copper residues on trees sometimes help to suppress levels of *E. amylovora* present during bloom, but the benefit of the copper spray may be minimal if there is more than 3 or 4 inches of rain between the application date and king bloom. Because no one can predict

which years will have heavy rains between silver tip and bloom, the copper spray is always recommended even though it may prove worthless in some years. Applying copper at green tip or quarter-inch green rather than at silver tip may increase the probability that copper residues will still be present on trees at king bloom, but it also increases the risks that the copper spray will cause fruit russetting. Both McIntosh and Empire are highly susceptible to the copper-induced fruit russetting that occurs if there is too much copper residue still present on trees at bloom. Finally, there is no reason to apply copper in orchards with no history of fire blight because these orchards will not have cankers that release bacteria during bloom.

3. Apply streptomycin during bloom using timings suggested by either the MaryBlyt or Cougar Blight models. Strep sprays are the most critical component for effective control of fire blight. Omitting critical strep sprays almost ensures disaster if *E. amylovora* is present in the orchard. Following are additional pointers for effective control of blossom blight:

- Use strep at 8 oz/100 gal of dilute spray or at 1.5 lb/A for mature trees that have a tree-row volume requirement of 300 gal/A. Lower rates of strep may prove ineffective, especially if spray coverage is less than perfect.
- In the first blossom spray, use a good adjuvant such Regulaid (1 pt/100 gal of spray solution) to enhance penetration of streptomycin into the plant tissue. If additional sprays are required during bloom, omit the adjuvant so as to reduce the severity of foliar phytotoxicity (yellowing of leaf margins) that may occur with repeated sprays. However, avoid mixing captan (for scab control) with sprays that include a penetrating adjuvant such as Regulaid because captan applied with a penetrating adjuvant can be phytotoxic.
- Streptomycin does not redistribute after it dries, so sprays will only protect those flowers that are contacted by the spray solution. Thus, good spray coverage is essential.
- Flowers that are not yet open generally will not be fully protected by the strep sprays. Thus, there is an advantage to waiting as long as possible before making the first strep application during the early part of bloom (so as to maximize the number of open flowers), but the application must be completed before a wetting period triggers a blossom blight infection period.
- New high-density plantings often have some late flowers that persist through the time when petal fall insecticides are applied. It may be advantageous to include streptomycin plus Regulaid in the petal fall spray IF no strep was applied during the five days prior to petal fall and IF the orchard has any of the following risk factors:
 - ⇒ The orchard is a pear orchard.
 - ⇒ Trees are less than 7 years old (because young trees are especially susceptible).
 - ⇒ Fire blight was present in the orchard in either of the previous two growing seasons.
 - ⇒ Fire blight was present in nearby blocks (within one-half mile) last year.This suggested petal fall application is NOT a substitute for well-timed sprays during bloom as indicated by one of the blossom blight models, but it should help to prevent infections on late flowers.
- Streptomycin is by far the most effective material for preventing blossom blight, and there is absolutely no evidence that repeated sprays during bloom will stimulate development of strep-resistant *E. amylovora*. Therefore, do NOT use alternative products for controlling blossom blight so long as streptomycin is effective.

- Strep sprays may be needed even in relatively blight-resistant cultivars such as McIntosh, Empire, and Red Delicious if high temperatures occur during bloom. Severe blossom blight can occur on these cultivars when the Epiphytic Infection Potential (EIP) in the MaryBlyt model exceeds 300.

4. Apply Apogee where it is horticulturally acceptable and/or when the risk of blossom blight is exceptionally high. Two or three sequential applications of Apogee, with the first application during late bloom, can significantly reduce losses to fire blight in orchards where blossom blight sprays fail to eliminate all blossom blight infections. However, applying Apogee to young trees may reduce their productivity during the early years of orchard establishment. Apogee applications that are delayed until fire blight strikes become evident after bloom will have little or no benefit for controlling fire blight.

5. Monitor orchards for fire blight during June and remove infected shoots ASAP. Quick removal of fire blight strikes can limit secondary spread and is essential for minimizing loss of young trees and of pear trees, but orchards may need to be surveyed two or three times per week if shoot removals are intended to reduce secondary spread.

6. DO NOT APPLY STREPTOMYCIN DURING SUMMER except for cases where hailstorms damage orchards with active fire blight (i.e., visible infections). When hail occurs in orchards with active blight, streptomycin plus Regulaid should be applied as soon as possible and no later than 24 hr after the hail event if an application is allowable within the constraints for preharvest intervals as listed on the streptomycin label. Hailstorms during late summer do not pose a blight risk because trees are not susceptible to fire blight after terminal growth ceases.

Repeated use of streptomycin sprays after petal fall almost guarantees selection that *E. amylovora* will become streptomycin-resistant. This has occurred in Missouri, California, Washington, Oregon and Michigan. There is no reason to believe that it will not occur in New York and New England if we abuse streptomycin by applying it repeatedly during summer.

7. Control potato leafhoppers (PLH) in young plantings. Potato leafhoppers continue to be implicated in spread of fire blight during summer. However, the best evidence suggests that most shoot blight infections that occur during summer are attributable to *E. amylovora* that was disseminated by wind-blown rain and are not attributable to transmission by PLH. Nevertheless, high populations of PLH can stunt young trees, and young trees are also more susceptible to secondary spread of fire blight. Therefore, PLH should be controlled on young trees.

8. Prune out fire blight infections during winter. Removal of blighted shoots is best accomplished during November and December when these shoots can still be identified by the presence of dead leaves that may disappear if removals are delayed until the normal pruning time in February or March. Heavy pruning during late fall or early winter can reduce winter hardiness, especially on young trees, so the pruning required to removed blight shoots may need to be done separately from the normal winter pruning.

Failure to remove blighted wood during winter ensures that abundant inoculum will be available the following year. In the Hudson Valley, we have repeatedly noted that fire blight inoculum can travel at least a half-mile from an inoculum source to previously blight-free orchards. Therefore, a blighted orchard that is not cleaned up during winter can endanger all of the other orchards located within a half-mile radius. Fire blight is a community disease!