

## SEASON-LONG FIRE BLIGHT MANAGEMENT IN APPLES

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### Background

Fire blight is a reoccurring problem for apple production regions in western NY and an occasional problem for production regions in eastern NY. When fire blight outbreaks have occurred in eastern NY, they often catch the industry off guard and result in devastating shoot blight epidemics. Blossom blight is fairly manageable, but low or undetectable levels of blossom blight can lead to subsequent shoot blight outbreaks during favorable seasons. Streptomycin-resistant strains of the fire blight bacterium, *Erwinia amylovora*, (SmR Ea) were identified in western NY in 2002, and from 2011 to 2013. The occurrence of SmR Ea was localized to specific fields at specific operations and was not present region-wide. In subsequent surveys from 2014 and 2016, SmR Ea was not detected in western NY, even in orchards that had SmR Ea in previous years. There have been three years of state-wide surveying without the detection of single SmR Ea strain. Given the availability of kasugamycin, an effective antibiotic with a different mode of action than streptomycin, we are poised to ensure the longevity of both antibiotics by implementing simple resistance management practices. Given the absence of streptomycin resistance for three years and the availability of two bactericidal antibiotics, a standard set of guidelines for the management of fire blight can now be practiced throughout the state.

### General guidelines for season-long management of fire blight management in apples and pears.

1. All fire blight strikes and shoots with larger cankers should be removed during winter pruning. Remove any trees where the central leader or main trunk has become infected. Infected wood should be removed from the orchard and either burned or placed where it will dry out rapidly. The fire blight pathogen can withstand cold temperatures, but is intolerant to drying.
2. Copper sprays should be applied at green tip. Processing varieties can be protected with copper as late as ½ inch green depending on requirements of the label.
3. During bloom, follow a blossom blight forecasting modeling system such as the one offered in NEWA (<http://newa.cornell.edu/index.php?page=apple-diseases>), Maryblyt™ 7.1, or RIMpro. Time applications during high risk weather only. If the operation rarely or has never had fire blight, it may not be necessary to apply antibiotic each time a high

risk period is forecast. Regardless of model predictions, it is rarely necessary to make more than three applications for blossom blight.

4. Begin antibiotic applications for blossom blight with a single application of streptomycin at 24 oz./acre. Consider including the penetrating surfactant Regulaid (1 pt/100 gal of application volume) in the first streptomycin spray to enhance the effectiveness of streptomycin. Regulaid would be especially beneficial when applied under rapid drying conditions. Regulaid can be omitted from subsequent applications so as to minimize the leaf yellowing that is sometimes associated with repeated applications of streptomycin. If later antibiotic applications are needed, streptomycin or kasugamycin (Kasumin 2L 64 fl oz/A in 100 gallons of water) should be used. Consider making at least one application of Kasumin 2L for resistance management purposes. If there are concerns about the effectiveness of streptomycin or kasugamycin, contact the authors to discuss the product failure and determine if it would be necessary to submit a sample for antibiotic resistance testing. The presence of shoot blight later in the season isn't necessarily an indication that antibiotics applied during bloom failed due to resistance.
5. Preventative applications of prohexadione-calcium (Apogee or Kudos) for shoot blight should be seriously considered, especially on highly-susceptible apple varieties during shoot elongation beginning in late bloom.
  - a. For maximum effectiveness, prohexadione-calcium should be applied 6-12 oz/100 gal (3-6 oz/100 gal for trees <5 years) when trees have 1-2" of shoot growth. A second application should be made 14-21 days later.
  - b. A program where prohexadione-calcium is applied at low rates, slowly, over the period of active shoot growth is gaining popularity for reduced impacts on tree productivity. Specific programs may vary slightly, but generally consist of three applications at 1-2 oz/100 gal on a 14 day schedule beginning with early shoot growth in mid to late bloom. Take caution, as such programs have not been widely validated over many seasons and locations.
6. Preventative applications of copper can be used post-bloom and during the summer to protect against shoot blight infections. Copper must be applied before infection occurs as it will only reduce bacteria on the surface of tissues. Copper will have no effect on existing shoot blight infections. Copper may cause fruit russet in young developing fruit. Apply with adequate drying time and use hydrated lime to safen copper. An example would be Badge SC at rate of 0.75 to 1.75 pints /acre buffered with 1-3 lbs. of hydrated lime for every 2 pints of Badge to minimize fruit finish damage. Terminal shoots can outgrow protective residues of copper. Hence, a low rate fixed copper program consists of applications on a 7-10 day schedule during high risk weather until terminal bud set.
7. Fire blight strikes should be pruned out promptly and destroyed by burning or leaving them out to dry. It is best to prune well back into healthy wood, at least 12 inches behind the water soaking margin or into 2nd year wood. Take care as summer pruning may stimulate active shoot growth leading to new susceptible tissues that could later become infected. If fire blight reaches the central leader, the tree should be discarded. However, the spot may be safely replanted.
8. It may be possible to save plantings on resistant rootstocks that have a moderate amount of shoot blight. Discard trees where fire blight has reached the central leader, and apply prohexadione-calcium at 6-12 oz/100 gal. Allow the product to work for 5 days and then prune out existing and newly developing shoot blight every two weeks.

9. If you need to interplant apple trees in existing orchards where fire blight was observed, replant in late fall to better synchronize bloom with the established trees in the following season.

### **Additional guidelines for new plantings (1-2 years)**

1. If possible, plant varieties grafted on fire blight-resistant rootstocks.
2. Trees should be carefully examined for fire blight infections before planting. Infected trees should be submitted for strep-resistance testing and subsequently discarded. Contact CCE for SR Ea testing, listed under “Sample Submission” below.
3. Immediately after planting, and 14 days later, a copper application should be made using the lower copper rates that are labeled for use after green tip. Ensure that soil has settled to avoid phytotoxicity to roots.
4. Trees should be scouted at 7-day intervals for fire blight strikes until July 31st. Infected trees should be removed as described above. Plantings also need to be scouted 7-10 days after hail or severe summer storms. The NEWA disease forecasting model for fire blight can assist by providing an estimate of symptom emergence following a storm or other trauma event. Also scout the planting at the end of the season (mid-September).
5. If possible, remove flowers before they open. New plantings may have considerable numbers of flowers the first year, and blossom removal may not be practical. If practiced, the blossoms should be removed during dry weather and before a lot of heat units have been accumulated and there is a high risk of fire blight infection.
6. Trees should receive an application of copper at a stage equivalent to bloom. Observe the labeled REI before blossom removal.
7. To protect any remaining bloom, follow the chemical management program for your region of streptomycin resistance risk.
8. Samples of any infections observed after planting should be submitted for strep-resistance testing – see contact information below. Infected trees should be removed entirely in these high density orchards.

### **Guidelines for on-farm nursery production**

1. Collect budwood from orchards where fire blight is not established or from a neighboring farm without fire blight.
2. Limit streptomycin and kasugamycin applications to 2-3 per season. These should be timed according to a disease forecast model prediction or CCE alert.
3. When fire blight pressure is high and shoots are actively growing, apply copper at the lowest labeled rate to prevent shoot blight.
4. Before conducting tree management tasks in the nursery apply a copper product at the lowest labeled rate and observe the labeled REI.
5. Any pinching or leaf twisting should be done on dry sunny days with low relative humidity, after the REI of a copper application has expired.
6. When working in the nursery, field workers must wear clean clothing, and should wash hands and disinfect working tools often.
7. If fire blight is found in the nursery, completely remove the infected trees including the root system, and place them in trash bags between rows. Subsequently, remove the culled trees from between the rows and discard them. Under no circumstances should unbagged

infected trees be pulled between nursery rows when trees are wet, otherwise fire blight will be spread down the rows.

8. Manage potato leafhoppers in nursery using a registered product.
9. Maintain weed control through cultivation. Apply registered post-emergence herbicides using a shielded boom. There are some residual herbicides registered for use in nurseries.
10. When trees have reached the desired height, consider applying the lowest labeled rate of Apogee (1-2 oz/100 gal to slow growth and reduce susceptibility to shoot blight. Manage nitrogen levels to balance tree growth and fire blight susceptibility.

## **Sample submission instructions**

If fire blight infected trees and strikes are observed after proper streptomycin application, call or email one of the persons below to provide you with sample submission instructions, and possibly to come and collect samples and take data on the situation.

- Tess Grasswitz, Tel: 585-261-0125,  
email: [tg359@cornell.edu](mailto:tg359@cornell.edu)  
Lake Ontario region
  
- Dan Donahue, Tel: 518-322-7812  
email: [djd13@cornell.edu](mailto:djd13@cornell.edu)  
Hudson Valley region
  
- Anna Wallis, Tel: 518-410-6823  
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Statewide