

# Fire Blight Management in Nova Scotia

## Introduction to Fire Blight Management in Nova Scotia

Fire blight is a bacterial disease of apple and pear caused by *Erwinia amylovora*. The disease is well established in most commercial production areas of Nova Scotia including Annapolis, Kings, and Lunenburg Counties. Producers in Hants and other counties of Nova Scotia are also at risk of fire blight infections and should be aware of its management. Fire blight is not a new disease in Nova Scotia and observations date back to before the 1980's. This factsheet will discuss applied management of fire blight in Nova Scotia, focusing on 7 important steps:

1. Understand Fire Blight and Recognize the Symptoms
2. Prune Out Overwintering Cankers
3. Use Copper at Green Tip
4. Scout for and Remove Bacterial Ooze
5. Apply Antibiotics in Bloom During High Risk Periods
6. Apply Apogee for Best Shoot Blight Control
7. Scout for Active Infections Based on Maryblyt Forecasting

### 1. Understand Fire Blight and Recognize the Symptoms

There are many excellent resources on the life cycle and pathogenic nature of fire blight and it is not intended that this be replicated here. The life cycle involves three basic stages: overwintering cankers (Figure 1), blossom blight (Figure 4), and shoot blight (Figure 6). Shoot blight and subsequent infections of the rootstock causes the majority of economic losses due to fire blight.

Apple cultivars vary in their susceptibility to fire blight: Cortland, Gala, Ginger Gold, Golden Russet, Gravenstein, Paula Red, Idared, and Jonagold are highly susceptible; Ambrosia, Golden Delicious, Honeycrisp, McIntosh, and Northern Spy are moderately susceptible; Red Delicious is least susceptible.

Just like scion cultivars, rootstocks vary in susceptibility to fire blight: M.9 and M.26 rootstocks are highly susceptible; M.106 and M.111 are moderately susceptible; M.7, B.9, and Cornell series



Figure 1

“Fire blight is a challenging and complex disease to manage – fortunately, there are a number of excellent tools available”



Figure 6

rootstocks are considered least susceptible or resistant.

For detailed explanations of fire blight disease see the following resources:

American Phytopathological Society: Fire Blight of Apple and Pear <http://www.apsnet.org/edcenter/intropp/lessons/prokaryotes/Pages/FireBlight.aspx>

Agriculture and Agrifood Canada: Integrated Management of Fire Blight on Apple and Pear in Canada <http://www.agr.gc.ca/eng/about-us/offices-and-locations/pest-management-centre/publications-and-newsletter/sustainable-crop-protection-factsheet-series/integrated-management-of-fire-blight-on-apple-and-pear-in-canada/?id=1185385723877>

## 2. Prune Out Overwintering Cankers

Fire blight bacteria overwinter in cankers in the tree. It is from these cankers that bacteria ooze in the spring – typically around Pink – to be a source of inoculum for the current season's infections. Remove these cankers during dormant pruning to remove the potential inoculum source. Cankers should be removed by cutting 12" below the last sign of symptoms (Figure 1). Unfortunately the young tree in Figure 1 should be headed about 12" below the overwintering canker to minimize potential for fire blight inoculum in the current season. Sterilization of pruning equipment is not necessary during dormant pruning.

## 3. Use Copper at Green Tip

Copper application can be effective for reducing overwintering fire blight bacteria in the ooze present around cankers. The goal of copper application is to apply 2.2 kg/ha of elemental copper to the orchard by the time bacterial ooze is active – typically around Pink – and can be transported to the open flowers. The challenge is that copper residues can cause problems with phytotoxicity and fruit russetting if residues persist too long after bloom. To avoid fruit russetting, copper applications are typically targeted at Green Tip. Copper residues need to remain until Pink to Bloom to control fire blight bacteria in the ooze at that time. Retired Cornell plant pathologist Dr. David Rosenberger (Scaffolds, Vol. 22, No. 1) explains the basic strategy of copper applications below:

*For the best suppressive activity on fire blight, copper residues need to persist until at least pink. Fixed copper products (e.g. copper oxychloride, basic copper sulphate) are the least soluble in water, most resistant to washing off, and should provide the longest residual activity. Copper sprays should be*

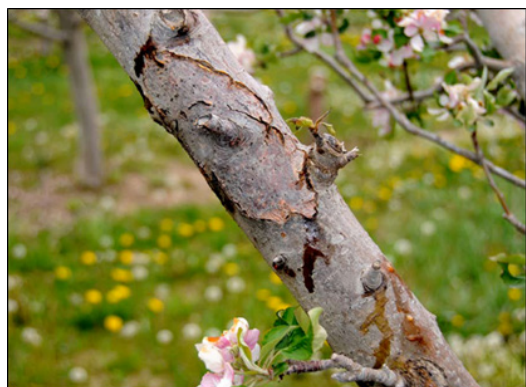
*used cautiously at lower rates after green tip to avoid problems with phytotoxicity and fruit russetting. A fixed copper application at green tip to suppress fire blight will also give protectant activity against apple scab equivalent to a half rate of an EBDC fungicide. Note copper does not have any post-infection activity.*

## Notes on Copper Applications in Nova Scotia

- Apply dilute to cover canker surfaces
- Can be applied with dormant oil EXCEPT if making Bordeaux mixture
- Product options (select 1 of):
  - Copper Spray Fungicide – copper oxychloride – (50% elemental copper)
    - o Label rate: 3.2 kg/ha = 1.6 kg/ha of elemental copper
    - o Maximum of 2 applications per year
  - Copper 53 W – basic copper sulphate – (53% elemental copper)
    - o Label rate: 1.0 kg/ha = 0.5 kg/ha of elemental copper
    - o Maximum of 10 applications per year
    - o Compatible with dormant oil application EXCEPT if mixed with hydrated lime to make Bordeaux mixture.

## 4. Scout for and Remove Bacterial Ooze

Despite the best efforts in pruning to remove dormant cankers, not all cankers will be removed by pruning. Therefore, it is important that orchards be scouted on a weekly basis beginning around the Pink stage to look for oozing overwintering cankers (Figure 2) that might have been missed and remove them to eliminate a source of inoculum for blossom blight.



**Figure 2: An overwintering fire blight canker that is oozing around early bloom.**

This is also a good time to look for signs of rootstock blight where susceptible rootstocks and scions were showing signs of early leaf drop and discoloration of the graft union in the previous fall.



Figure 3: A young 'Ambrosia'/M.26 tree that is showing signs of discoloration of the graft union. This may be an indication of rootstock blight.

**5. Apply Antibiotics in Bloom During High Risk Periods**

Antibiotics offer a very effective option for blossom blight control during the bloom period. Studies have repeatedly shown that very effective control of blossom blight (Figure 4) can be obtained from the proper use of antibiotics even in very aggressive disease conditions. Timing of application is the most critical aspect for antibiotics. Unlike fungicides where the protective abilities are measured in days, antibiotics are generally only effective if applied within 24-48 hours of an infection period and from 12-24 hours post-infection.

Models have been developed to track the potential risk of blossom blight infections and can be used to properly time application of antibiotic products. One widely used model is Maryblyt (Figure 5). Maryblyt uses temperature data and phenological stages to predict the risk of fire blight infection and to predict disease symptom development. Be familiar with the use and interpretation of these models to best time antibiotic applications. It can be downloaded free at <http://www.caf.wvu.edu/kearneysville/Maryblyt/>.



Figure 4: Blossom blight of apple. Note ooze droplet on pedicel.

**Notes on Antibiotic Application in Nova Scotia**

- Apply when models are indicating high risk of infection prior to a wetting event
- Can be applied with Apogee
- Product options: Streptomycin 17 – streptomycin sulphate – (17% streptomycin activity)
  - o Rate: Make 100 ppm (parts per million solution) (Table 1)
  - o Equivalent to 600 g/1,000 L spray volume
  - o Including a surfactant such as Agral 90 at 500 mL/1,000 L may improve efficacy
  - o Maximum of 3 applications per year and observe a 50-day pre-harvest interval
- Kasumin – kasugamycin – (2%)
  - o Rate: Make 100 ppm (parts per million solution) (Table 1)
  - o Equivalent to 5 L/1,000 L spray volume
  - o Maximum of 4 applications per year
  - o Do not use after petal fall

Inputs											
Date	Phenology	Max Temp (C)	Min Temp (C)	Wetness (mm)	Trauma	Spray	Notes	Avg Temp (C)	EIP	BHWTR	
5/29/14	B	20.6	-0.7	0.00				9.9	-	+++L	
5/30/14	B	20.2	4.1	0.00				12.2	13	+++L	
5/31/14	B	22.2	2.9	0.00				12.6	30	+++L	
6/01/14	B	22.3	2.6	0.00				12.4	46	+++L	
6/02/14	B	24.0	6.5	0.00				15.2	77	+++L	
6/03/14	B	25.0	7.1	0.00			spray	16.1	116	+++H	
6/04/14	B	23.1	12.6	0.00				17.9	135	+++H	
6/05/14	B	23.1	13.6	8.89				18.3	152	+++H	
6/06/14	B	17.5	12.1	1.78				14.8	69	++-M	
6/07/14	B	16.0	7.6	0.25				11.8	22	++-M	
6/08/14	B	22.8	6.7	0.25				14.8	33	++-M	
6/09/14	B	26.6	8.3	0.00				17.4	88	+++M	

Figure 5: Maryblyt 7.1 output for forecasting blossom blight.

**Table 1: Mixing recommendations for antibiotics to control fire blight on apple and pear.**

Product	Antibiotic Mixing Recommendations		
	L	Gal (US)	Streptomycin Required (g)
<b>Streptomycin 17</b> (25.2 % streptomycin sulphate) (17% streptomycin activity) 100 ppm - desired concentration Add 0.6 g per L of water	500	132	300
	750	198	450
	1000	264	600
	1250	330	750
	1500	396	900
	1750	462	1050
	2000	528	1200
	L	Gal (US)	Kasumin Required (L)
<b>Kasumin</b> (2 % kasugamycin) 100 ppm - desired concentration Add 5.0 mL per L of water	500	132	2.5
	750	198	3.8
	1000	264	5.0
	1250	330	6.3
	1500	396	7.5
	1750	462	8.8
	2000	528	10.0

## 6. Apply Apogee for Best Shoot Blight Control

The suppressive effect of Apogee on shoot blight is well documented and has been observed in Nova Scotia. Experimental results have given efficacy on shoot blight control greater than 90% in some trials. This effect results from a physical change in shoot cell thickness as a result of Apogee application and takes about 10-14 days to come into effect. To be effective, Apogee needs to be applied early, around 2.5 to 5.0 cm of new shoot growth – typically between king bloom petal fall and petal fall.

### Notes on Apogee Application in Nova Scotia

- Apply dilute to adequately cover new shoot tips – Apogee is only locally systemic
- Can be applied with antibiotics if blossom blight risk necessitates this
- Apogee – prohexadione-calcium – (27.5%)
  - o Label rate (fire blight suppression): 450 g/1,000 L of water
  - o Make 1st application at king bloom petal fall to petal fall
  - o Make 2nd application 14 days later
  - o Subsequent applications may be required to control shoot growth on vigorous cultivars/root-stock combinations
  - o Include Agral 90 at 500 mL/1,000 L of water
  - o Include ammonium sulphate at a 1:1 ratio

with Apogee if hard water used for spraying

- o Do not mix with calcium products
- o Maximum of 4 applications per year

## 7. Scout for Active Infections Based on Maryblyt Forecasting

Maryblyt 7.1 will also give indications of disease symptom development – most important for blossom blight and shoot blight (Figure 6 (on cover) early shoot blight symptoms and Figure 7). This indicates that fire blight symptoms should be found in the orchard at approximately this time which alerts producers when scouting activities need to be occurring. Scouting for blossom blight (later half of June) can give an indication of the potential risk for shoot blight. Shoot blight should be scouted for beginning approximately July 1st on a weekly basis until terminal bud set. Infected shoots should be removed if possible according to the guidelines below.



**Figure 7: Later shoot blight symptoms of apple (see also Figure 6 on cover for early symptoms)**

#### Notes on Dealing With Active Infections

- Active infections should be removed by pruning if feasible based on severity of infection and age of trees
- Pruning should be done **ONLY** in dry weather to prevent spreading bacteria
- Infected shoots should always be pruned to 12” below the last signs of symptoms or to two-year-old and older wood **ONLY** if 12” of clean wood is not available
- After pruning, infected shoots should be left to dry in the alleys before mowing
- The priority for blighted shoot removal should always be given to the youngest trees with the fewest strikes to avoid further spreading to the rootstock and bearing surfaces
- Trees 8 years old and younger are at the greatest risk of rootstock blight
- Sterilization of pruning equipment should be

done if feasible during the growing season – but at a minimum once per hour during fire blight removal operations with a 10 parts water to 1 part Lysol or bleach solution

- If there are a severe number of strikes (5+ per tree), removal during the season can be impractical – in this case, leave fire blight until the dormant season and avoid any summer pruning
- If fire blight is limited to a few trees in a block or a certain area, consider removing these trees entirely

Fire blight is a challenging and complex disease to manage – fortunately, there are a number of excellent tools available. When an integrated approach using pruning, copper, antibiotics, and Apogee is used in combination with diligent scouting and the use of resistant rootstocks, very effective control of fire blight can be obtained even in areas where fire blight has been severe in the past.

#### **Photo Credits:**

**Figure 2** <http://www.justanswer.com/general/685m0-need-advice-identify-fire-blight-apple-tree.html>

**Figure 4** <http://www.agr.gc.ca/eng/about-us/offices-and-locations/pest-management-centre/publications-and-newsletter/sustainable-crop-protection-factsheet-series/integrated-management-of-fire-blight-on-apple-and-pear-in-canada/?id=1185385723877>

#### **For more information, contact:**

Chris Duyvelshoff, Horticulturist  
Extension and Advisory Services Team  
Perennia

Tel: (902)678-7722

Email: [cduyvelshoff@perennia.ca](mailto:cduyvelshoff@perennia.ca)