

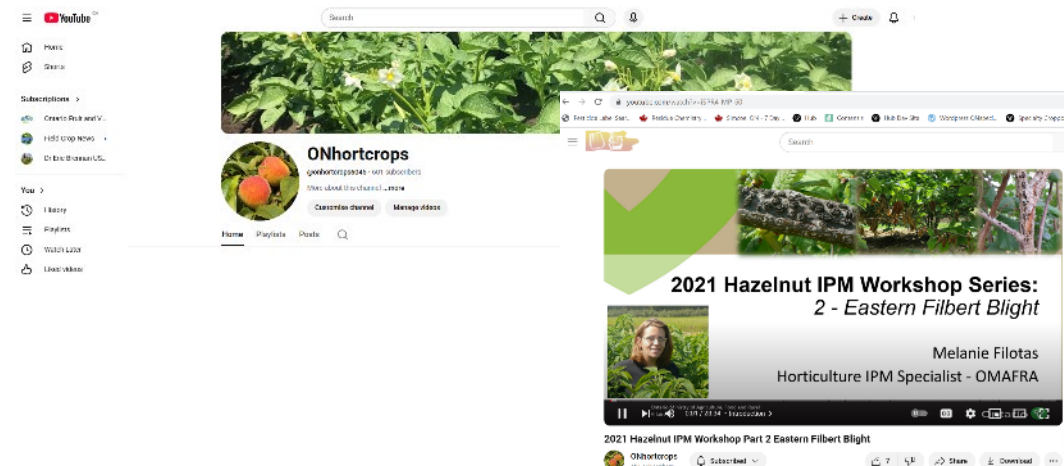
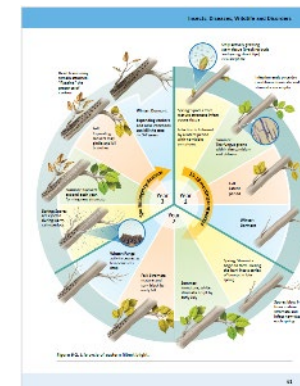
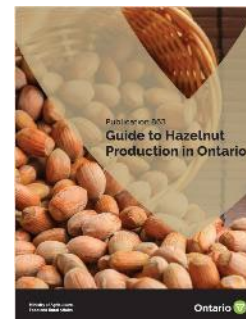


Managing Eastern Filbert Blight in Ontario Hazelnuts

Melanie Filotas
Horticulture IPM Specialist, OMAFA
OHA Symposium, March 19 2026

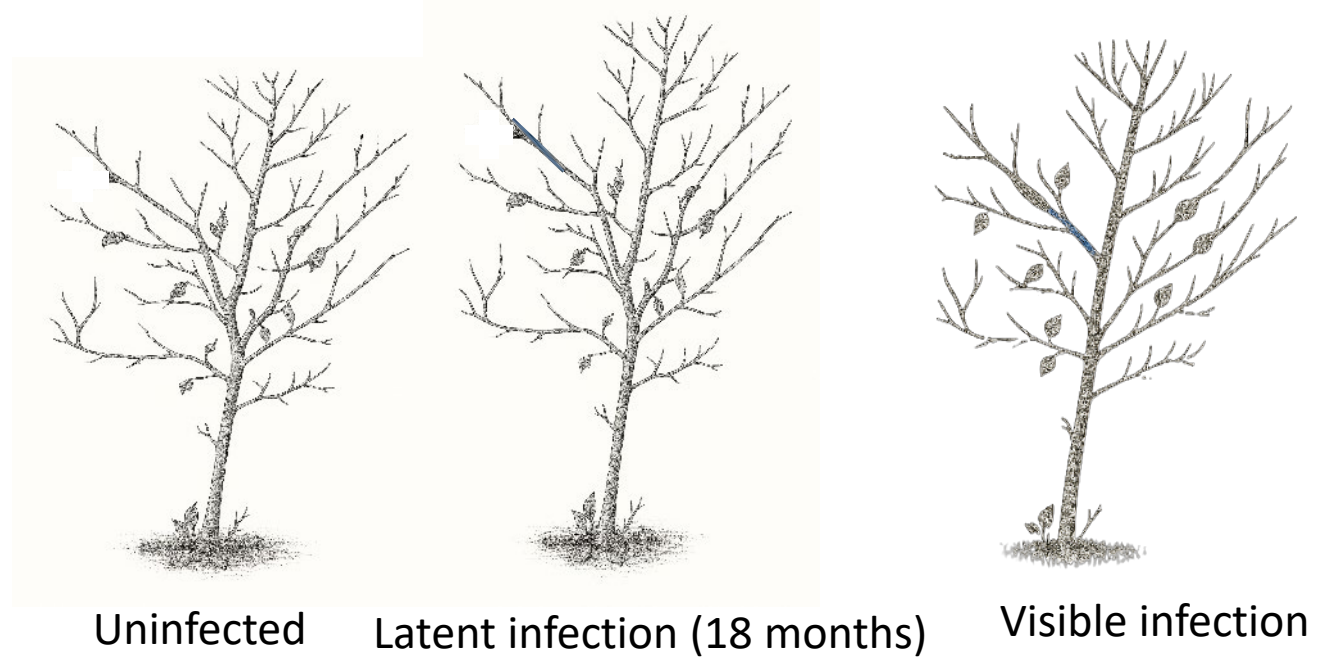
Biology and Identification:

- OMAFA Publication 863: Guide to Hazelnut Production in Ontario. For download and ordering information scan QR code or search for “guide to hazelnut production in Ontario”
- Instructional YouTube videos no longer publicly available. Email melanie.filotas@ontario.ca for link
- Hazelnut IPM Training – late May 2026 in Simcoe. Registration information posted at onspecialtycrops.ca and through OHA



EFB

- Infection = spores + rain + susceptible tissue
- Long latent period – easy to miss
- Fungicides are not curative
- Resistance versus tolerance



EFB Management in 2026

- Resistant cultivars
- Early detection – scout early and regularly
- Remove cankers
- Preventative fungicides

Resistant/Tolerant Varieties

- Resistance $\neq$ Immunity
- Immunity = Plant cannot be infected even under high pressure. Very rare, especially with an obligate, host-specific pathogen.
- Resistance = Plant can limit disease but still be infected
- it is still a host and can be infected. No visible symptoms, pathogen reproduction, etc.

Feature	Single R-gene (Qualitative)	Quantitative Resistance (QR)
Genetic basis	One major resistance gene (e.g. Gasaway)	Many small-effect genes
Defense	Rapid block of pathogen	Continuous partial suppression of pathogen
Spectrum of protection	Narrow (often strain-specific)	Broad and generally strain-insensitive
Durability	Low when pathogen diversity is high. Can break suddenly	High, stable across different environments and pathogen populations
Failure	“Boom and bust”. Sudden loss when pathogen evolves	Good. Possible gradual loss of suppression if tree is stressed and pathogen pressure is high
Energy cost to plant	Low if gene matches pathogen	Higher if plant must sustain defense response over time
Performance under high pest pressure	Excellent until resistance is defeated, then failure	Moderate to good. Disease may occur but is slowed. Possibility of being overwhelmed if plant is stressed
Breeding difficulty	Lower	Higher

TOP STORY

Resurgent EFB pathogen overcomes Oregon hazelnut tree defenses

By MATEUSZ PERKOWSKI Capital Press Jan 25, 2024 Updated Jan 25, 2024


OSU Extension Service

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Peer reviewed

Potential new aggressive EFB strain infecting resistant hazelnut varieties

English | Español



- Pyramiding R genes
- In the absence of a formal breeding program mechanism of resistance in symptomless cultivars may not be fully understood. Can infer from parentage.

Resistant/Tolerant Varieties

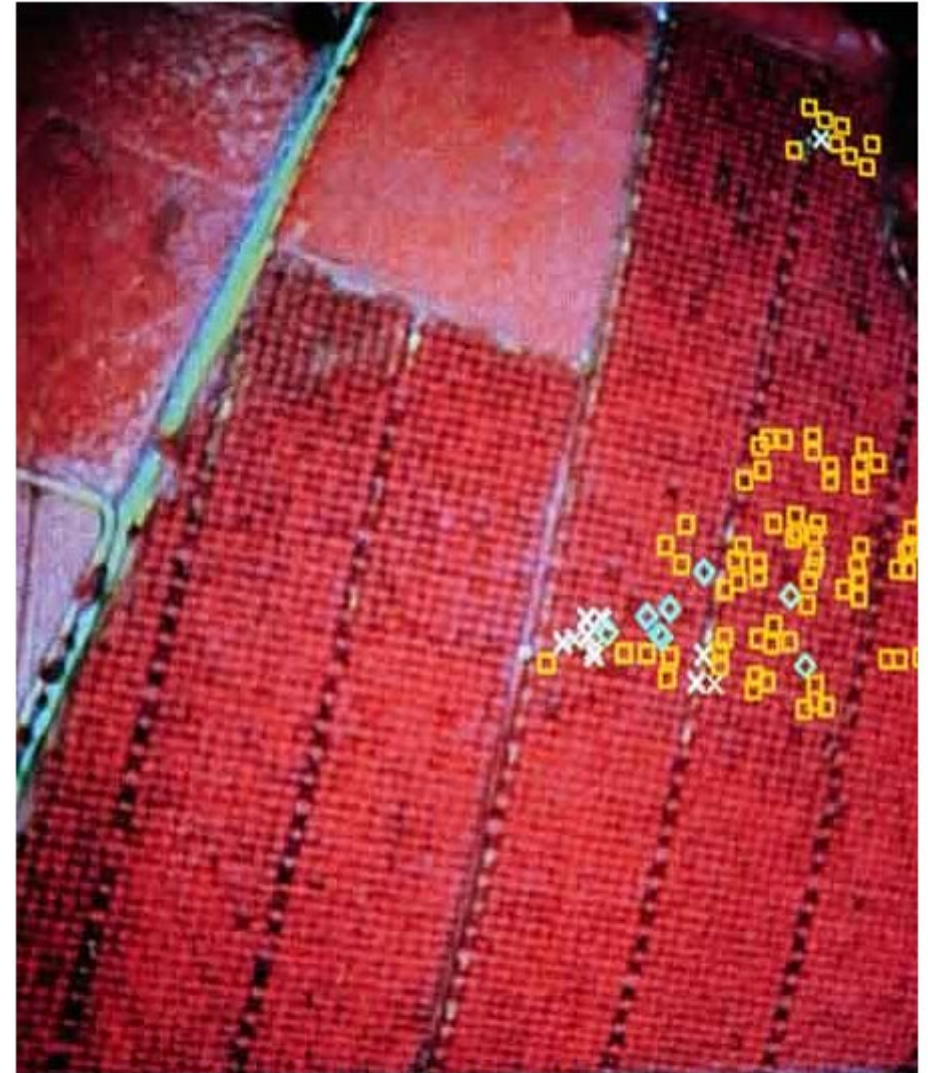
- Cultivars based on Gasaway are susceptible in Ontario. Becoming susceptible in Oregon. Tolerant trees:
 - May not be tolerant to all fungal strains
 - Tolerance may be overcome under very heavy disease pressure (rainy conditions, planting near an existing orchard with heavy EFB, etc.)
 - Tolerance may be overcome if the tree is stressed
 - Tolerance to EFB does NOT mean tolerance to all pests!
- New cultivars with QR (e.g. Rutgers cultivars) are promising and seem durable
 - But unknowns still exist... **Multiple approaches to EFB management required**

What to do....

- Avoid planting cultivars based on Gasaway gene (Jefferson, Yamhill, Dorris, McDonald, Wepster). In established orchards with these cultivars, intensive EFB management, including fungicides, is required.
- Plant cultivars with a diversity of resistance sources.
 - Placing QR cultivars in an orchard with heavily infected Gasaway-based cultivars = high disease pressure. Impact on ability of QR to overcome pathogen is unknown.
 - Reserve for planting in lower pressure situations, or manage them like susceptible cultivars
- Start with EFB free planting material
- Keep orchards free of disease through frequent pruning and regular scouting
- Fungicides if necessary
- **Keep plants as healthy as possible**

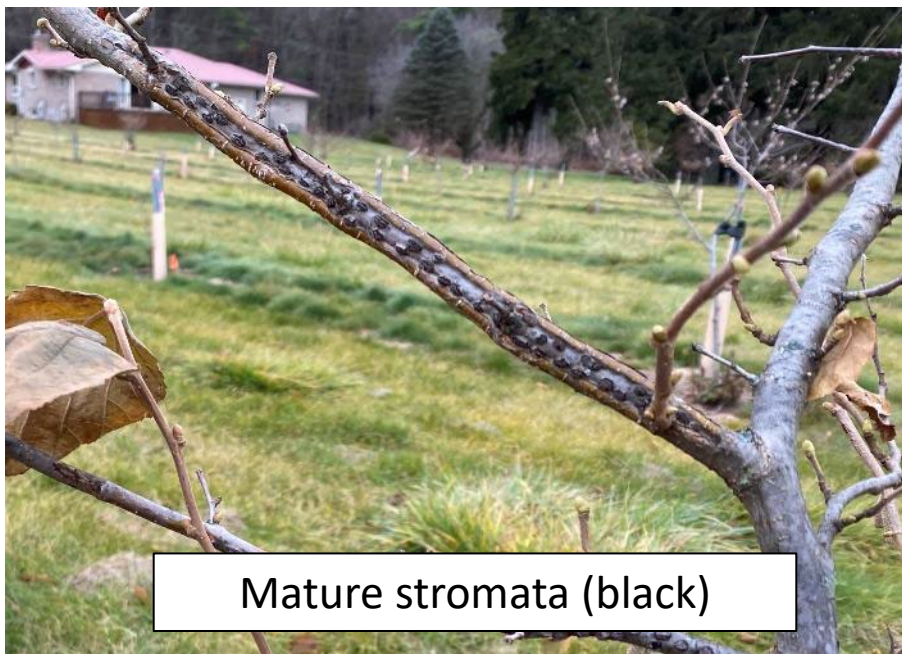
Scouting

- Critical to early detection and removal of EFB
- Objective: find and remove EFB cankers the year they form (before sporulation)
- Dedicated scout two times/year – more easily visible when leaves are off
- Flag and closely observe any tree where cankers were pruned, and surrounding trees
- Scout tolerant varieties as well! Report any QR failures!



An infrared picture of an infected hazelnut orchard. The white X symbol indicated where infected trees were first found. The blue diamonds indicated where infected trees were found the following year and the yellow boxes indicate where trees were found the year after that. Note the pie-shaped pattern of spread which is to the north-east along with the prevailing storm track.

Photo by John Pinkerton, 1991.



Mature stromata (black)



Immature stromata (white)



Saprophyte/weak pathogen growing on stromata

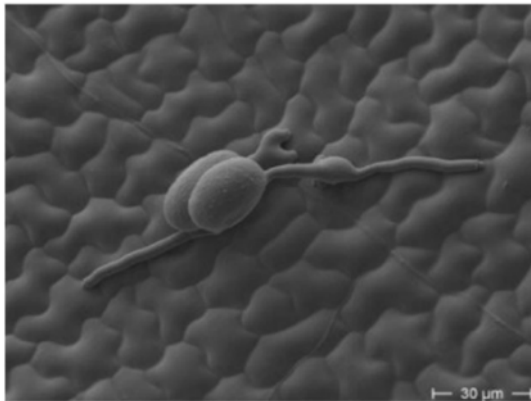


Saprophyte/weak pathogen growing on stromata

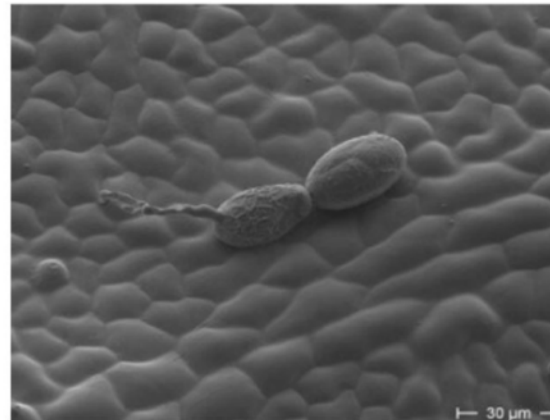
Fungicides

Purpose: Prevent new infections by protecting susceptible tissue

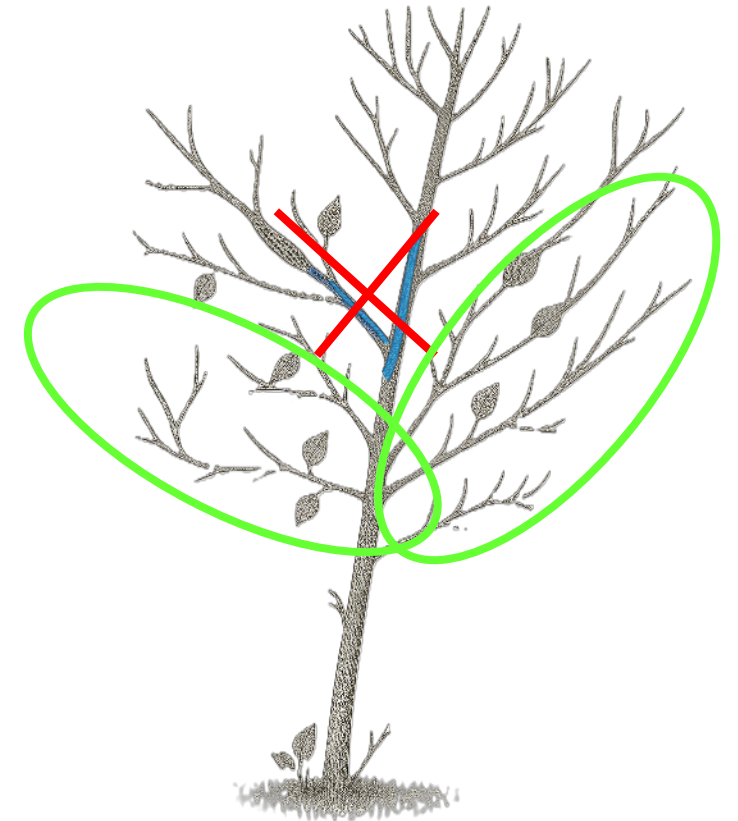
No Fungicide



Fungicide



No effect on fungus already inside the tree .



When to apply

When susceptible tissue is present – young actively growing tissue



Dormant

Not swollen, brownish colour



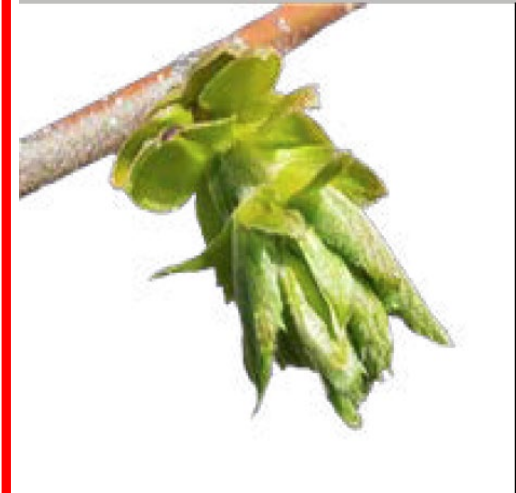
Bud swell

Buds swollen, green colour



Bud break

Green leaf tips visible



Advanced bud break

*Leaves begin to unfold
Highly susceptible at this stage!*

- Four sprays: First application at bud break (typically early to mid-April) and continue approximately every 2 weeks for 8 weeks (typically end of May)

EFB Spore Release Study 2023/2024

a): Budbreak, April 14 (104)



b): 11-13V, April 28 (118)



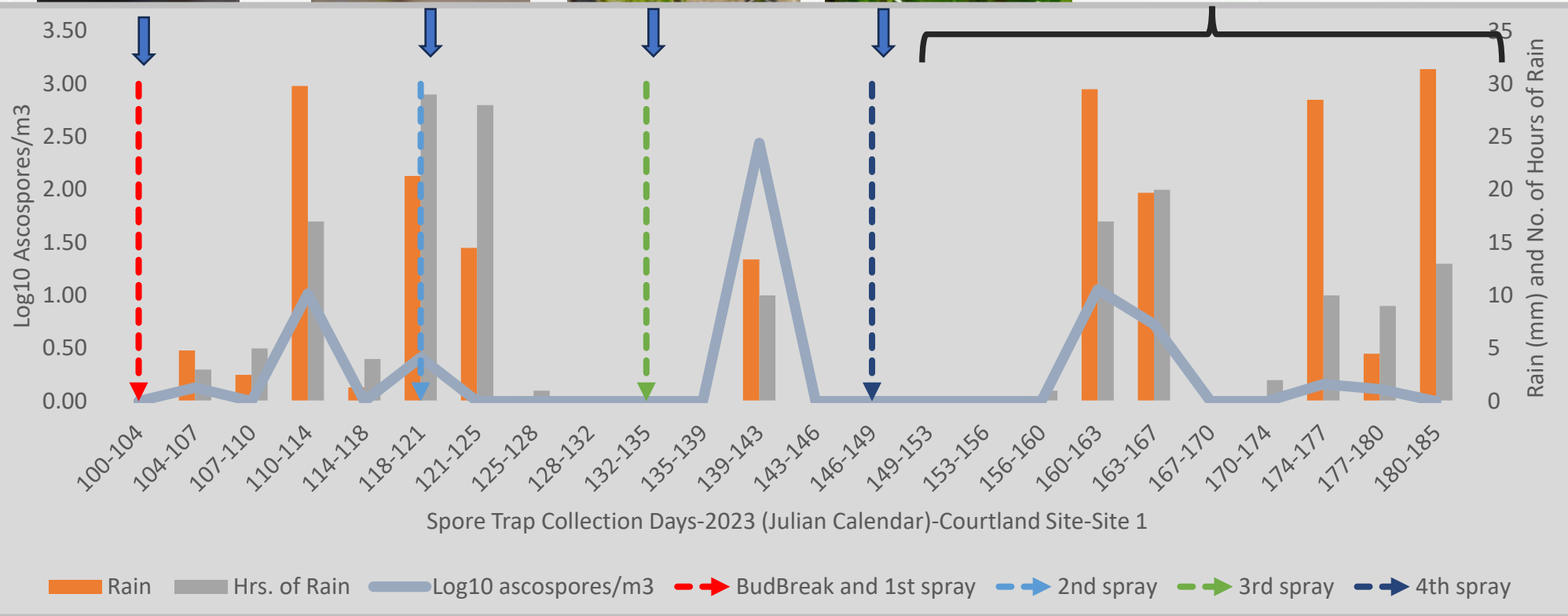
c): 15-17V, May 8 (128)



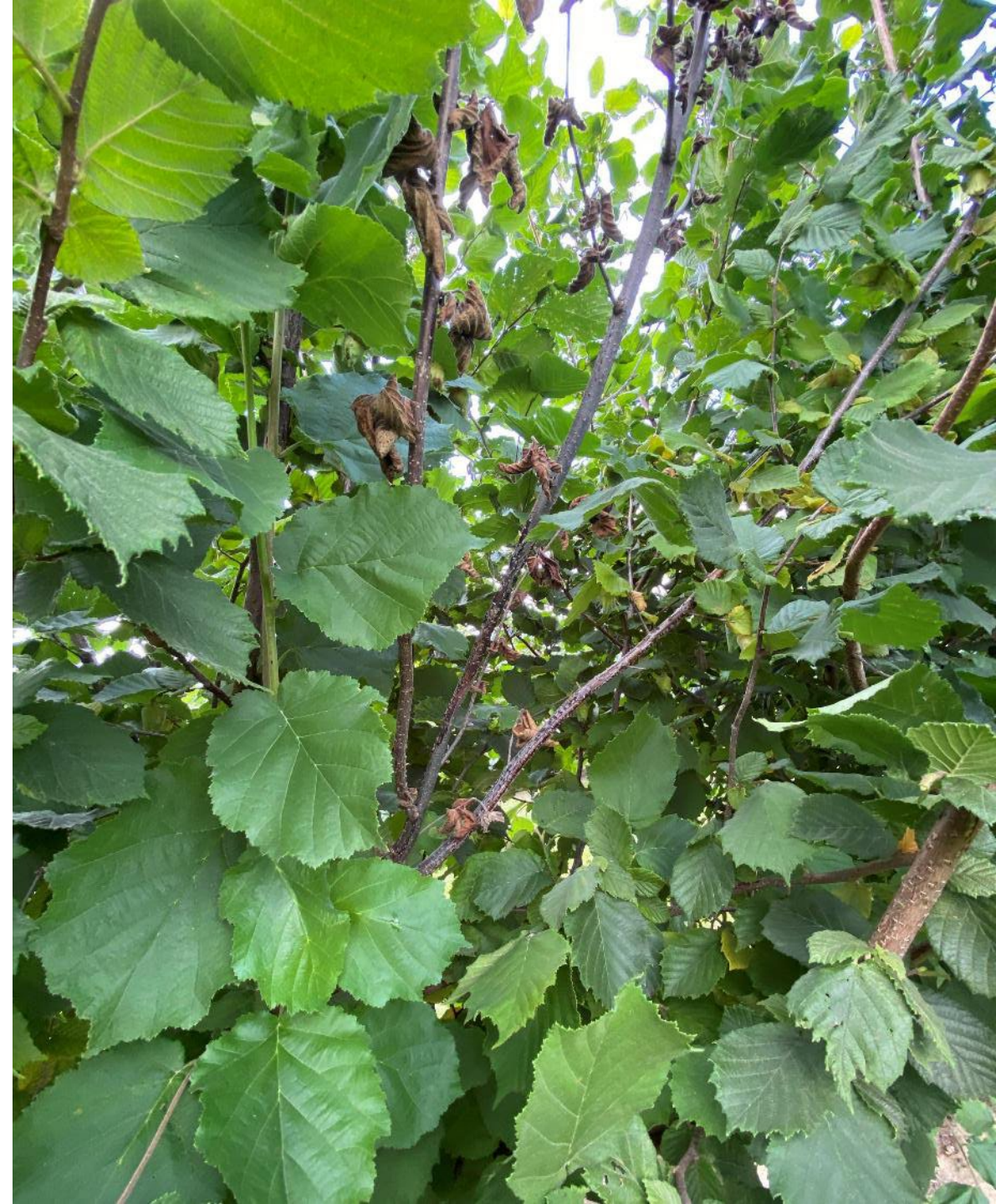
d): 17-19V, May 26 (146)



Spore release with rainy conditions can happen after the 4th spray but mature tissue is much less susceptible to infection.



- Fall applications for EFB are not necessary, even when black cankers are present
- Limited/no sporulation and no susceptible tissue to infect
- Fungicides may be needed for other diseases (bacterial blight), but not EFB



What to apply

Group	Active Ingredient	Product(s)	Efficacy	Preharvest Interval	Max apps/year	Price/ha*
M5	chlorothalonil	Bravo ZN Bravo ZNC Echo 720 Echo NP	Excellent	120 days	3	\$133 \$136 \$109 \$132
M1	copper oxychloride	Copper Spray	Good	2 days	3	\$85-255
M1	copper hydroxide	Parasol	Unknown	2 days	2	\$98-254
M1	copper octanoate	Cueva	Poor**	1 day	15	\$43-327
3	metconazole	Quash SC	Moderate to Good	25 days	4	\$63
3	<i>mefentrifluconazole</i>	<i>Cevya</i>	<i>Moderate to good**</i>	14 days	1.125 L/ha/yr (~3-4)	\$61-91
3 + 7	difenoconazol + pydiflumetofen	Miravis Duo	Moderate to Good	14 days	3	\$84
11	trifloxystrobin	Flint Extra	Good	60 days	4	\$117-234
11	azoxystrobin	Quadris Azoshy	Moderate to good	45 days	4	\$70 \$71

- Fungicide resistance is a risk. Do not use the same group twice in a row!
- Copper may need to be saved for later season control of bacterial blight
- Bravo:
 - Up to 18 day period before significant contact with trees
 - Long PHI – use as an earlier spray
 - Experiment with Bravo alternatives this season!

* Prices are averaged across vendors and represent standard retail (“walk-in”) pricing to be used as a general guideline for comparison. They do not reflect discounts or incentives for frequent or high-volume customers, which vary with the retailer.

** No efficacy for Ontario – based on data from Oregon

Ontario

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Fransais

Crop IPM

Weed Control

Crop Protection

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Fruit

Ginseng

Ornamentals (Greenhouse)

Tobacco (flue-cured)

Tree nut

Vegetables

Vegetables (Greenhouse)

Give feedback here

Popular on Crop Hub

Weed Control

Find and compare options to control weeds

Crop Protection

Find and compare options to manage insects, diseases, other pests and crop growth

Product Search

View product specifications, crop registrations and access label

Print view

Tree nut

Hazelnut (filbert) - Eastern filbert blight

Grid view List view Efficacy view Show unlabelled About view

This view is for a general comparison only. The product label is a legal document and label instructions must be followed. The information provided in this application is general information only. Click on details for more product information.

* Product type registration may vary for crop species. Please refer to product details for more information.

10 products with the selected pest included on the label.

Efficacy	Group Name	Trade Name / Product Type	Active Ingredient(s)	Rate	SDI	PHI	Total amt or max apps	Details
----------	------------	---------------------------	----------------------	------	-----	-----	-----------------------	---------

Eastern filbert blight

FRAC US

View details on this page or search for this product.

BRIVO ZN

fungicide

azoxystrobin

6.72 L/ha

See label or view details

120 days

3

Product caveats:

- All mixing and loading must be done with closed transfer systems.
- Do not combine with oils, other pesticides, surfactants or fertilizers, or apply within 1 week of an oil-based pesticide. See label for details.

General comments:

- Begin applications at bud break to protect new growth. Re-apply protective fungicides, rotating between registered products from different fungicide groups, every 10-14 days for at least 8 weeks, or longer if very wet conditions persist.
- Allow at least 20 days between applications of this product.
- Apply in 500-1,000 L/ha of water.
- Eastern filbert blight products registered in Ontario are preventative and will have no effect on existing infections (cankers). Prune out and destroy infected tissue.
- This product has a long preharvest interval and may not be suitable for applications later in the season, especially for water harvested nuts.

Search

FRAC US

View details on this page or search for this product.

BRIVO ZNC

fungicide

azoxystrobin

6.72 L/ha

See label or view details

120 days

3

Product caveats:

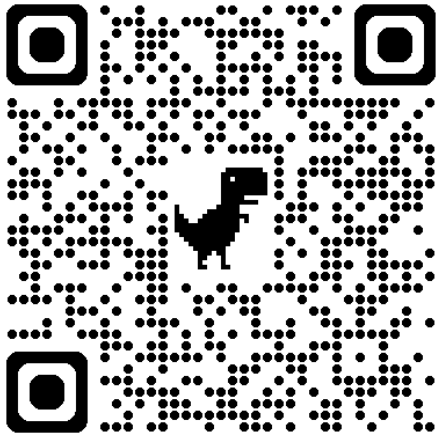
- Do not combine with oils, other pesticides, surfactants or fertilizers, or apply within 1 week of an oil-based pesticide. See label for details.
- When using this product, mixers and loaders cannot handle more than 340 kg active ingredient (azoxystrobin) per person per day.

General comments:

- Begin applications at bud break to protect new growth. Re-apply protective fungicides, rotating between registered products from different fungicide groups, every 10-14 days for at least 8 weeks, or longer if very wet conditions persist.
- This product has a long preharvest interval and consequently may not be suitable for applications in late spring or beyond, especially for water harvested nuts.
- Apply in 500-1,000 L/ha of water.
- Allow at least 20 days between applications of this product.
- Eastern filbert blight products registered in Ontario are preventative and will have no effect on existing infections (cankers). Prune out and destroy infected tissue.

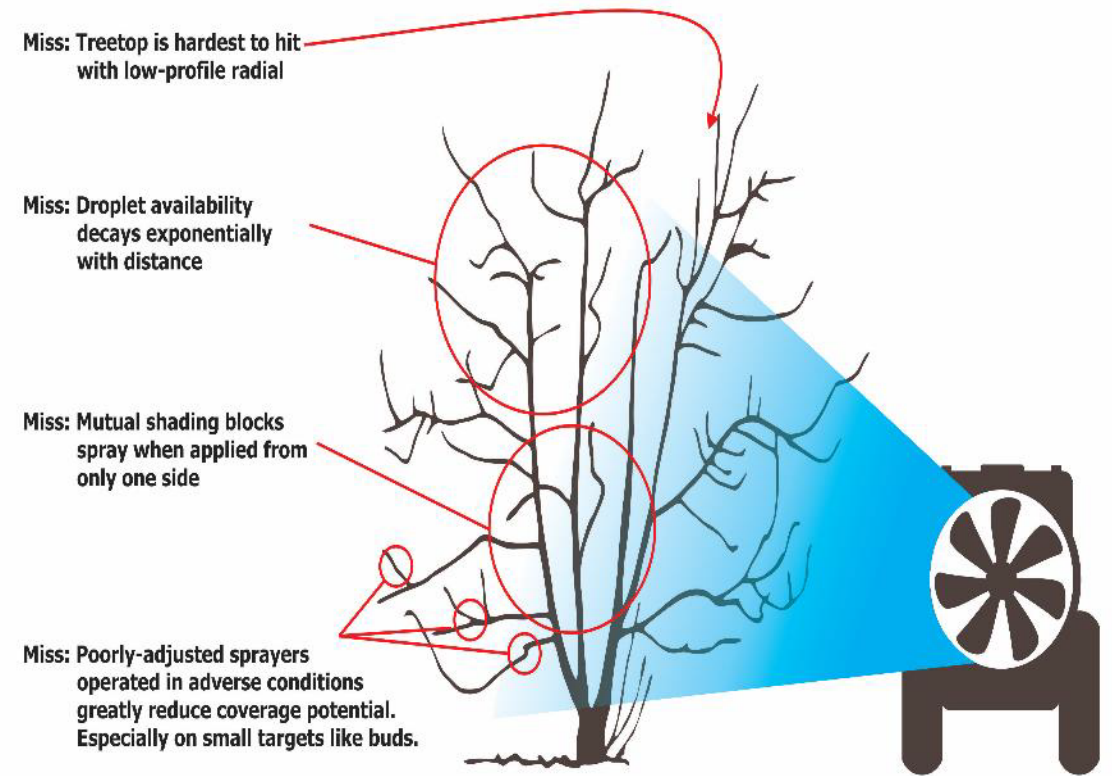
Search

FRAC US



Coverage

- Proper coverage is critical for EFB protection
- Airblast sprayer necessary once trees are more than a few years old. Some products can only be applied with airblast sprayers
- Bushy or tall hazelnut can dramatically reduce coverage
- Water sensitive paper can be used to assess coverage



Sprayers101.com



Group	Active Ingredient	Product	Registered on Ontario hazelnuts		Registered in Canada at all	
			Active	Product	Active	Product
3	flutriafol	TopGuard	✗	✗	✓	✗
3	flutriafol	Rhyme	✗	✗	✓	✗
3	mefentrifluconazole	Cevya	✓	✓	✓	✓
3	metconazole	Quash	✓	✓	✓	✓
3	propiconazole	Tilt and generics	✗	✗	✓	✓
3	triflumizole	Procure and generics	✗	✗	✗	✗
7	fluxapyroxad	Tesaris	✗	✗	✓	✗
11	azoxystrobin	Abound	✓	✗	✓	✗
11	picoxystrobin	Aproach	✗	✗	✓	✓
11	pyraclostrobin	Cabrio	✗	✗	✓	✓
11	trifloxystrobin	Flint	✓	✓	✓	✓
11+3	azoxystrobin plus difenoconazole	Quadris Top	✗	✗	✓	✓
11+3	trifloxystrobin plus propiconazole	Stratego	✗	✗	✓	✓
3+11	propiconazole plus azoxystrobin	QuiltXcel	✗	✗	✗Mix	✗
3+11	propiconazole plus azoxystrobin	Aframe Plus	✗	✗	✗Mix	✗
3+7	difenoconazole plus pydiflumetofen	Miravis Duo	✓	✓	✓	✓

compare hazelnuts

Group	Active Ingredient	Product	Registered on Ontario hazelnuts		Registered in Canada at all	
			Active	Product	Active	Product
7+11	pyraclostrobin plus fluxapyroxad	Merivon	✗	✗	✓	✓
9+3	cyprodinil plus difenoconazole	Inspire Super	✗	✗	✓	✓
M	chlorothalonil	Bravo	✓	✓	✓	✓
M	chlorothalonil	Echo	✓	✓	✓	✓
M	chlorothalonil	Bonide Fung-onil	✓	✗	✓	✗
M	copper ammonium complex	Monterey Liqui-Cop	✗	✗	✗	✗
M	Copper Hydroxide	Kocide	✓	✗	✓	✓
M	Copper Hydroxide	Champion 50WP	✓	✗	✓	✗
M	copper hydroxide	Nu-Cop	✓	✗	✓	✗
M	copper hydroxide+copper oxychloride	Badge	✗Mix	✗	✗Mix	✗
M	copper octanoate	Grotto	✓	✗	✓	✗
M	copper sulfate	Cuprofix Ultra Disperss	✗	✗	✓	✗
M	copper sulfate pentahydrate	MasterCop	✗	✗	✗	✗
M	cuprous oxide	Nordox	✗	✗	✗	✗
M	ziram	Ziram 76 DF	✗	✗	✗	✗
U	cinnamon oil	Cinnerate	✗	✗	✗	✗

Fungicide drenches to control EFB

Home » Industry News » Featured Post » Fungicide Drenching to Combat Hazelnut Blight

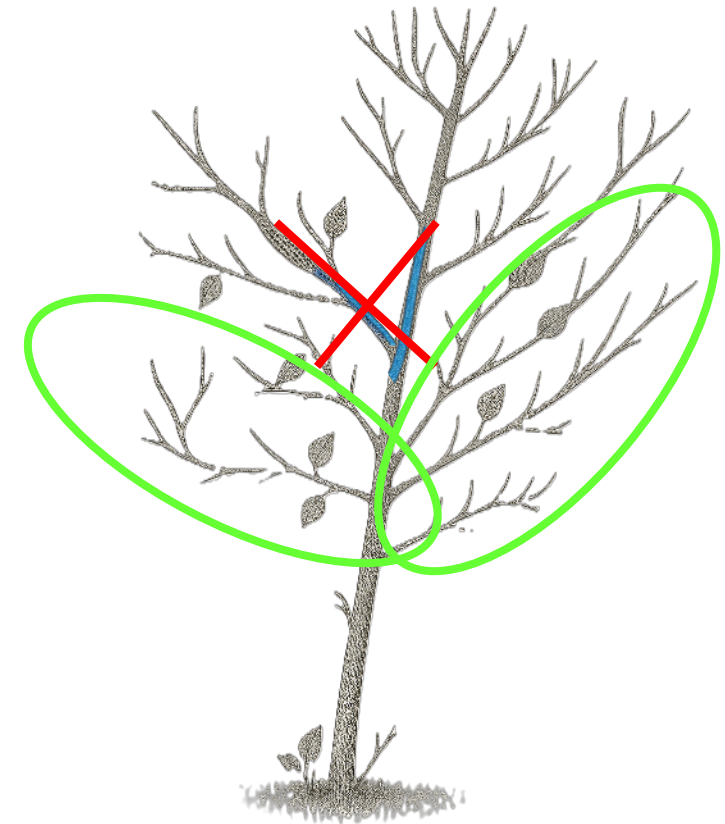
Fungicide Drenching to Combat Hazelnut Blight

Posted on 02/17/2026



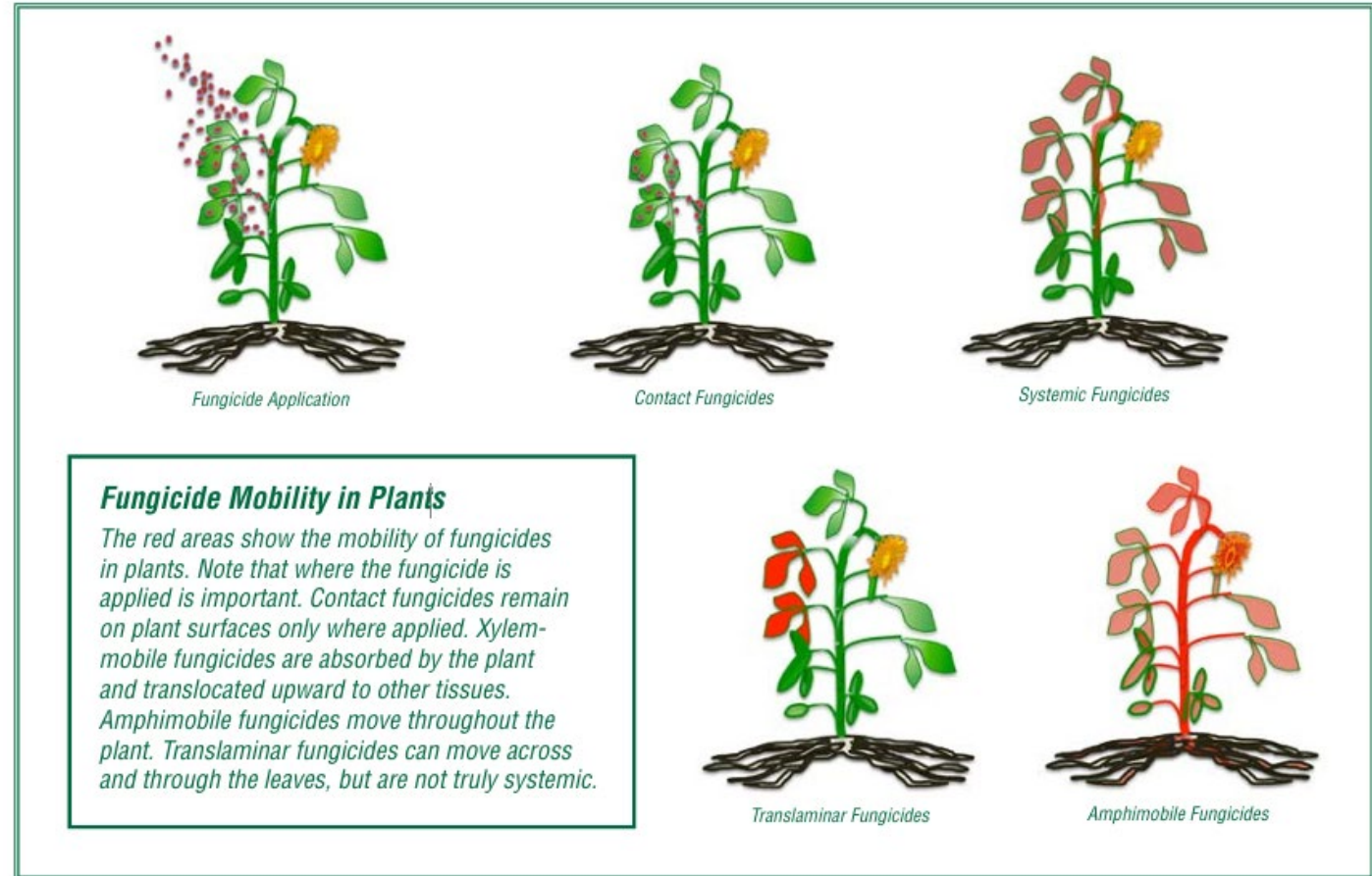
Eastern filbert blight is an ongoing and costly problem for hazelnut growers, but researchers at the Oregon State Extension are researching newer and more efficient ways to combat it. At the Nut Growers Society's Winter Meeting, Jay Pscheidt spoke with Matthew Malcolm at Malcolm

- Oregon research – application of TopGuard (flutriafol) around root system of young potted trees. 1-2 years EFB control with a single application
- Needs to be validated in the field and with mature trees
- Systemic = xylem mobile. The product moves up from point of application through the xylem to the buds.
 - Activity is still preventing new infections
 - Will not cure existing cankers
 - Fewer applications, longer control
- Flutriafol is not registered on hazelnuts in Canada. It is registered on other crops, but as a different product (Fullback). Product formulation can affect the movement of the fungicide
- Flutriafol is under re-evaluation in Canada = no possibility of a new registration for several years



Mobility of fungicides

- Contact = does not enter plant
- Translaminar = moves from one side of the leaf to the other
- Locally systemic = moves partly up and down the plant, but not far
- Xylem mobile = moves from point of contact up through the plant
- Systemic = move up and down throughout the plant
- For a root zone application to work, the product must be xylem mobile or a true systemic
- Depends on active ingredient and product formulation



- The product also must be able to move through the soil from the point of drenching to the roots. A xylem mobile product is not necessarily mobile in the soil.

Implications for ON hazelnuts

- A few registered products *may* have some mobility. But possibly not as good as flutriafol
- Companies are not always willing to support a soil drench application because:
 - Possible issues with resistance development
 - Issues with too little or too much soil mobility
 - Other reasons
- Further research needed to determine if there are any potential products (registered or not) which may have similar activity to flutriafol

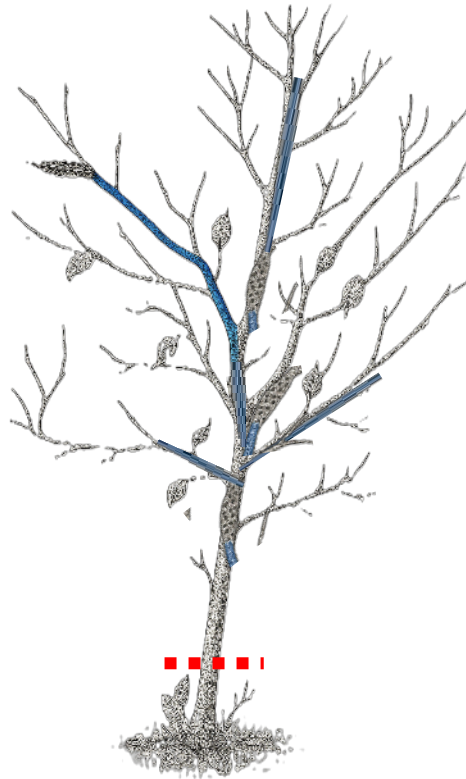
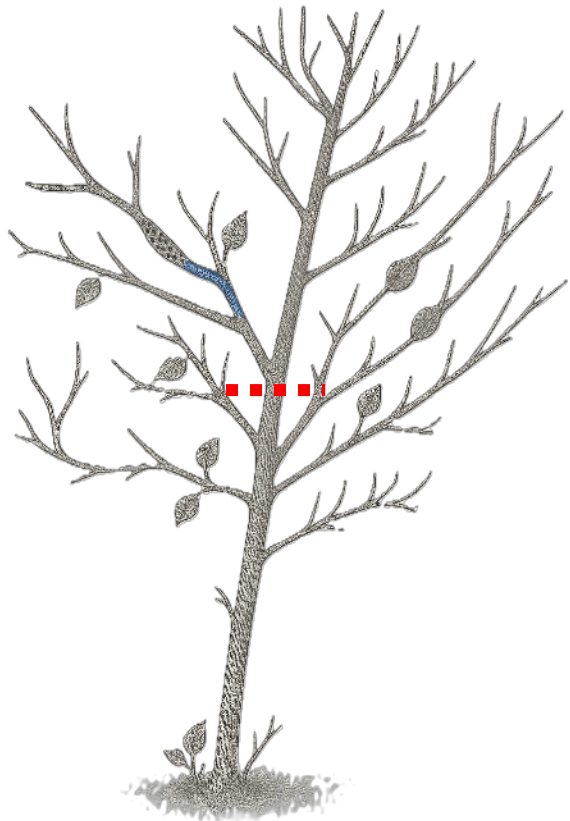
Group	Active Ingredient	Product(s)	Mobility in Plant
M5	chlorothalonil	Bravo,Echo	Contact
M1	copper hydroxide	Parasol	Contact
M1	copper oxychloride	Copper Spray, Guardsman	Contact
M1	copper octanoate	Cueva	Contact
3	metconazole	Quash	Local, Up?
3	<i>mefentrifluconazole</i>	<i>Cevya</i>	Local, Xylem?
3 + 7	difenoconazol + pydiflumetofen	Miravis Duo	Local, Up, leaf
11	azoxystrobin	Quadris, Azoshy, Emissarius	Leaf, Up?
11	trifloxystrobin	Flint	Leaf, Up?

Contact = does not enter plant, Leaf (translaminar) = moves from one side of the leaf to the other, Local (locally systemic) = moves partly up and down the plant, Up (xylem mobile) = moves from point of contact up through the plant

Canker Removal (Pruning)

Purpose:

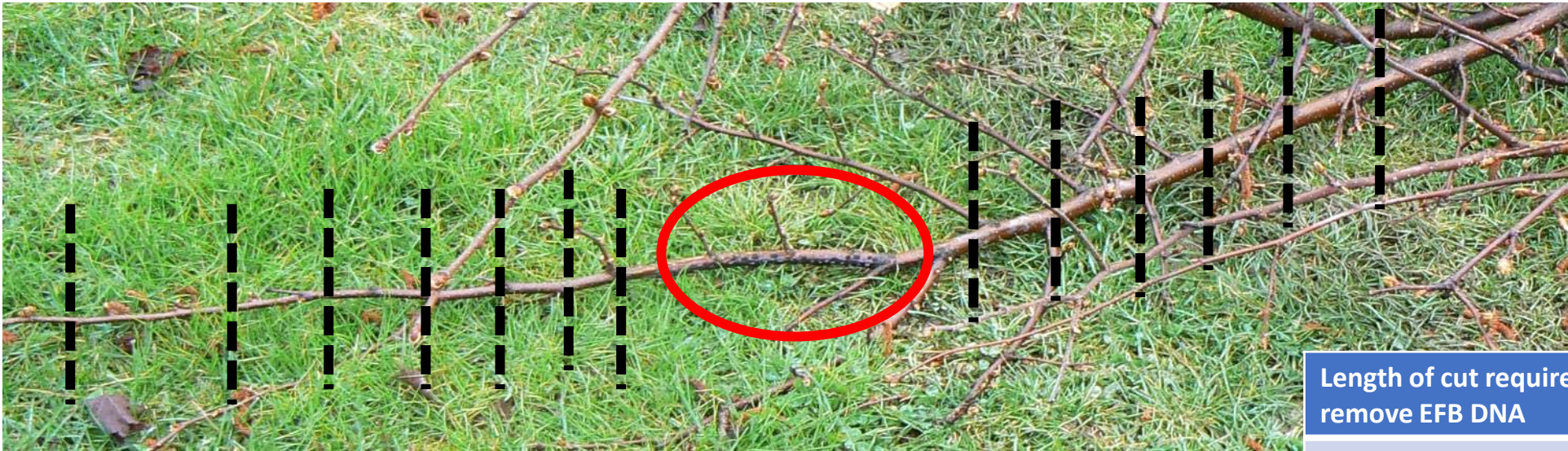
- Reduce fungal spore load in orchard (removing visible canker)
- Remove existing infections in tree (removing latent infections on either side of canker)



- Much more effective with only 1 or 2 small cankers!
- General guideline: Prune 2-3 ft below canker. May not always be sufficient!

Canker DNA testing 2019

A. Munawar, C. Bakker, K. Jordan, University of Guelph

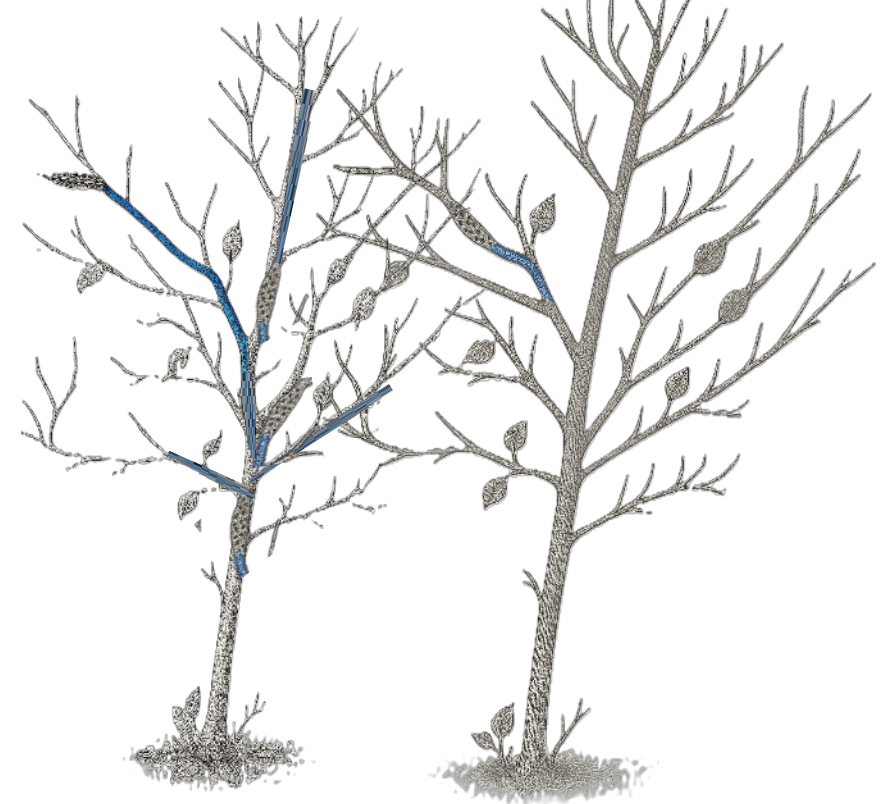


- Sampled trees with visible cankers and tested for EFB DNA at various distances above and below the canker (15-180 cm) plus adjacent suckers

Length of cut required to remove EFB DNA	% Samples
1 ft (30 cm)	39%
2ft (60 cm)	22%
3 ft (91 cm)	22%
4 ft (122 cm)	6%
≥ 5 ft (≥ 150 cm)	11%
Asymptomatic suckers	60% positive for EFB DNA
% samples with DNA detected above canker	17% (11% found 2-3ft, 5% found >5 ft)

Pruning

- Cut at least 3 ft (90 cm) below the visible canker. More is better.
- Flag pruned branches and watch for new cankers. If these appear, .
- If there are multiple branches affected, or cankers are extensive, consider pulling the tree or cutting it to the ground and restarting from suckers.
- Closely monitor suckers from infected trees.
- Destroy cuttings before budbreak!



For more information:

melanie.filotas@ontario.ca

<https://onspecialtycrops.ca>



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