

Hazelnut Production 101 and Artificial Pollination Research Update

Jenny Liu

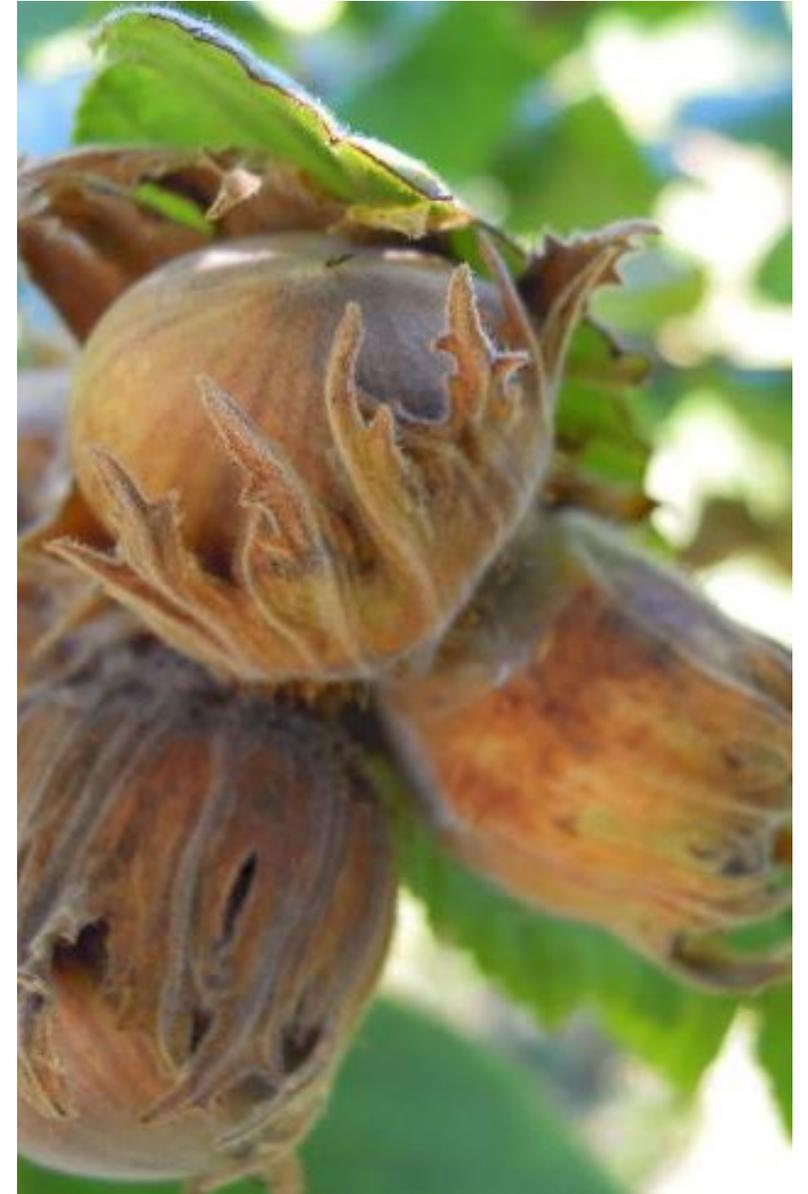
OMAFRA Maple, Tree Nut, and Agroforestry Specialist

March 2, 2023

OHA AGM

THE HAZELNUT TREE

- Grow naturally as multi-stem shrub
- Suckers grow liberally from base of stems and roots
- 3-4 years to produce nuts
- Full production in 10-12 years



HAZELNUTS IN ONTARIO



European Hazelnut

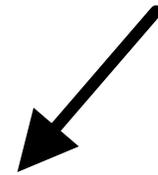
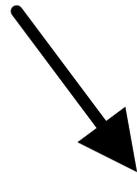
- Native to Europe and Asia
- Large, thin-shelled nuts
- Desired by confectionary companies
- Cold sensitive
- Highly susceptible to eastern filbert blight



American Hazelnut

- Native to eastern North America
- Small, thick-shelled nuts
- Not commercially desirable
- Cold hardy
- Tolerant of eastern filbert blight

HYBRIDIZATION



SELECT FROM EUROPEAN VARIETIES



Selection Pressure

- Consistently processing quality?
- Cold-tolerant?
- EFB-resistant?

QUALITY AND CONSISTENCY

- Processors require consistent shape and size of nuts for cracking and roasting
- Confectionary markets in particular can have very specific requirements for quality and flavour
- Other markets may be less stringent, BUT make sure your buyer knows your variety





COLD HARDINESS

- Hazelnut wood, buds, catkins (male flowers) susceptible to frost damage
- European varieties will not survive in Ontario, but hybrids will
- Temperatures below which trees will be killed:
 - The most cold-hardy varieties: -40°C
 - Other varieties: -28°C
- Exercise caution when planting in areas where temperatures frequently drop below -28°C

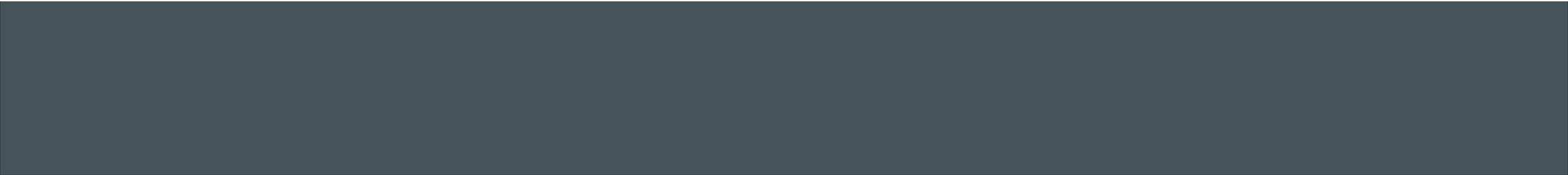
EASTERN FILBERT BLIGHT (*ANISOGRAMMA ANOMALA*)

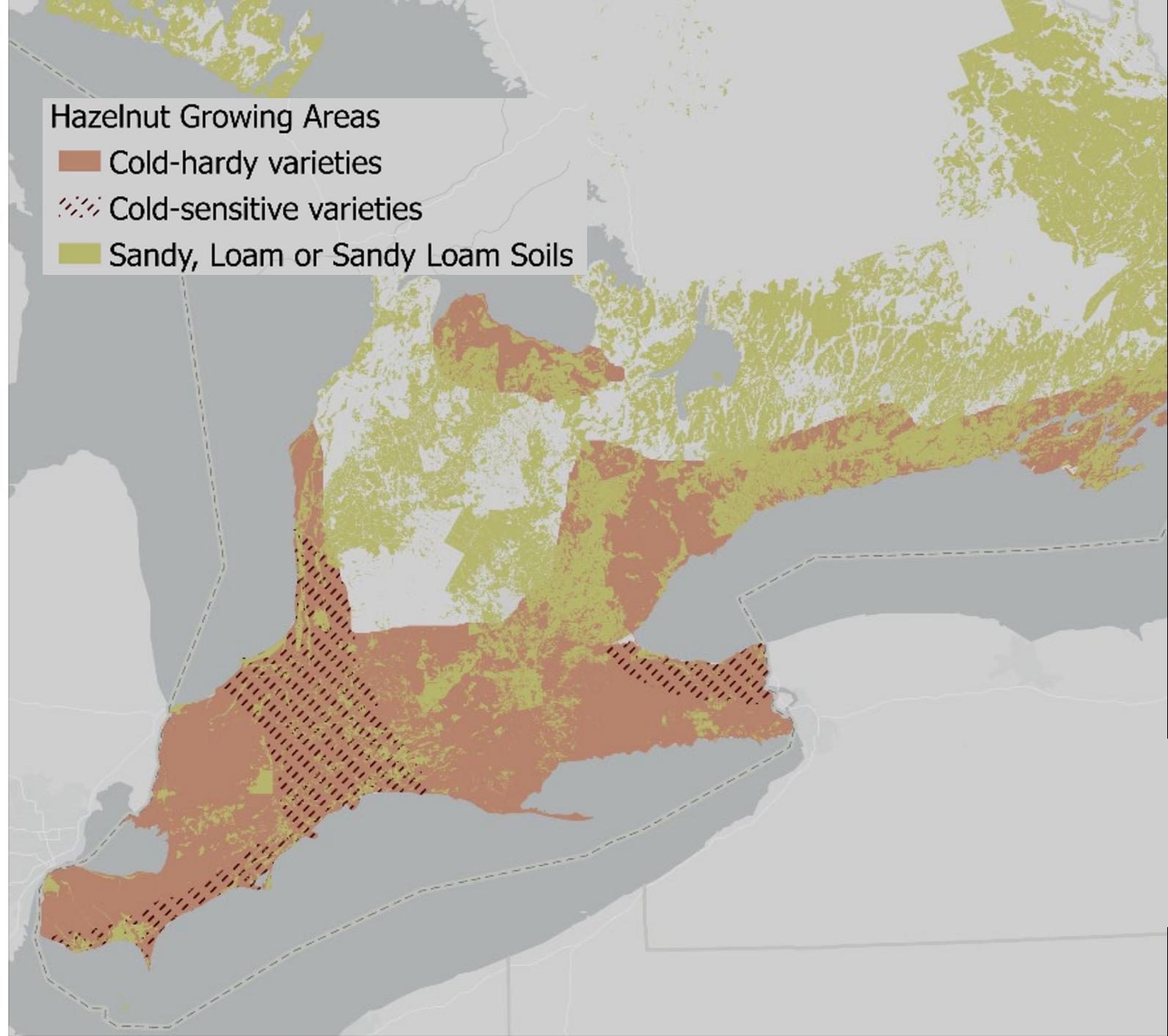
- Fungal disease that grows under the bark
- Cankers
- Almost inevitable premature death of susceptible hazelnuts





PRODUCTION REQUIREMENTS





SITE SELECTION

- Climate
- Soil type – well-drained loam to sandy loam, tilled
- Soil fertility and pH
- Slope

SOURCING PLANT MATERIAL

- Sourcing hazelnut nursery stock for new orchards is currently a limiting factor in Ontario
 - Supply capacity is growing
- An ideal nursery supplier:
 - Propagated trees: “true-to-name” cultivars
 - Free of disease: eastern filbert blight, bacterial blight

SOURCING PLANT MATERIAL

- Avoid seedlings if possible; buy cultivars instead
 - Cultivars = genetically identical to parent, vegetatively propagated
 - Seedlings = not genetically identical to parent
- Beware of mislabelling



VARIETIES

- Pollen compatibility
 - At least 2 different varieties
 - Coordinate pollen release with receptive female flowers
- Disease resistance
- Cold hardiness
- Market/buyer requirements



INPUTS

- Irrigation
 - Important during establishment and periods of low rainfall
- Fertilizer
- Pesticides



CROP MANAGEMENT

- Sucker control (2-3x/year)
- Training and pruning (winter/early spring)
 - Maintain size and shape of main scaffold limbs for optimal yield
 - For EFB (year round)
- Weed control sprays
- Fertility treatments
- Mowing/flailing (growing season)





HARVEST

- Prepare orchard floor
 - Flail/mow
- Harvest equipment depends on size of harvest

POST-HARVEST

- De-husking
- Cleaning
- Sanitizing
 - Food safety is a whole other topic
- Drying
- Storage
- Cracking
- Packing and shipping





TRACEABILITY

- Essential throughout the production chain if you want to sell to processors/value-added companies



HOW ARE HAZELNUTS DIFFERENT FROM TRADITIONAL CASH CROPS?



CHALLENGES

- Fewer options
 - Varieties, pest control
- Less Ontario-specific information
 - Agronomy, fertilizer, pest control
- Less infrastructure
 - Few aggregators
 - Building processing capacity
- No guaranteed market



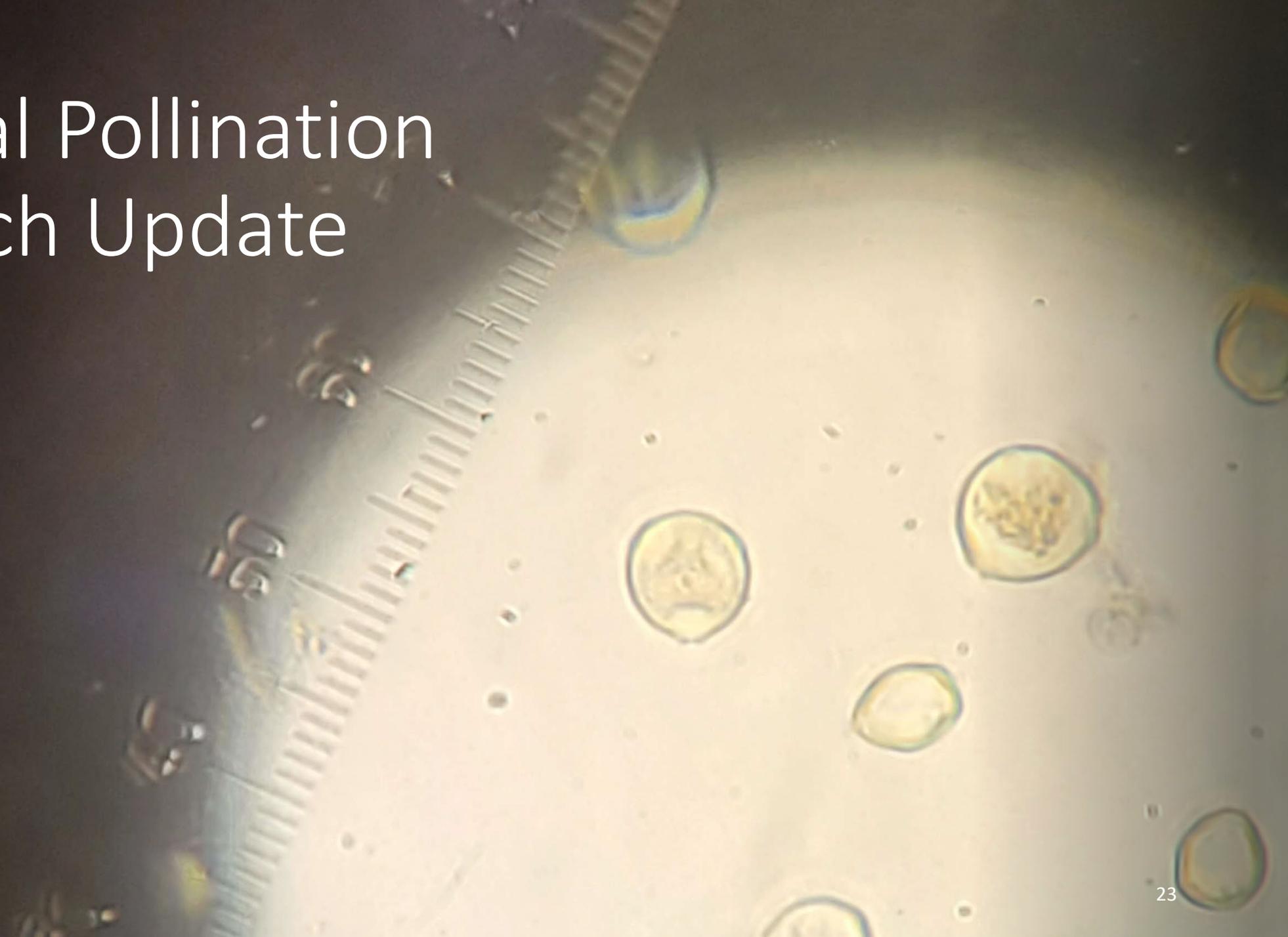
DIFFERENCES

- Equipment needs different compared to many field crops
 - Do not need combines, large tractors, seed drills
 - Do need airblast sprayer, mechanized harvester (for larger acreages), pruning equipment, **labour**
- Lower input than some orchard crops (i.e. apples), significantly higher than field crops

A COMMENT ON RETURNS ON INVESTMENT

- ROI depends heavily on multiple factors, including acreage, establishment costs, labour, yield, sale price
- The investment it takes to build a profitable commercial hazelnut operation should not be understated, especially if you're new to horticulture production
- OMAFRA has created a cost of production budgeting tool
- There is potential in hazelnut production! But like any other crop, it is crucial to understand your marketing channels and the realistic costs and efforts of production

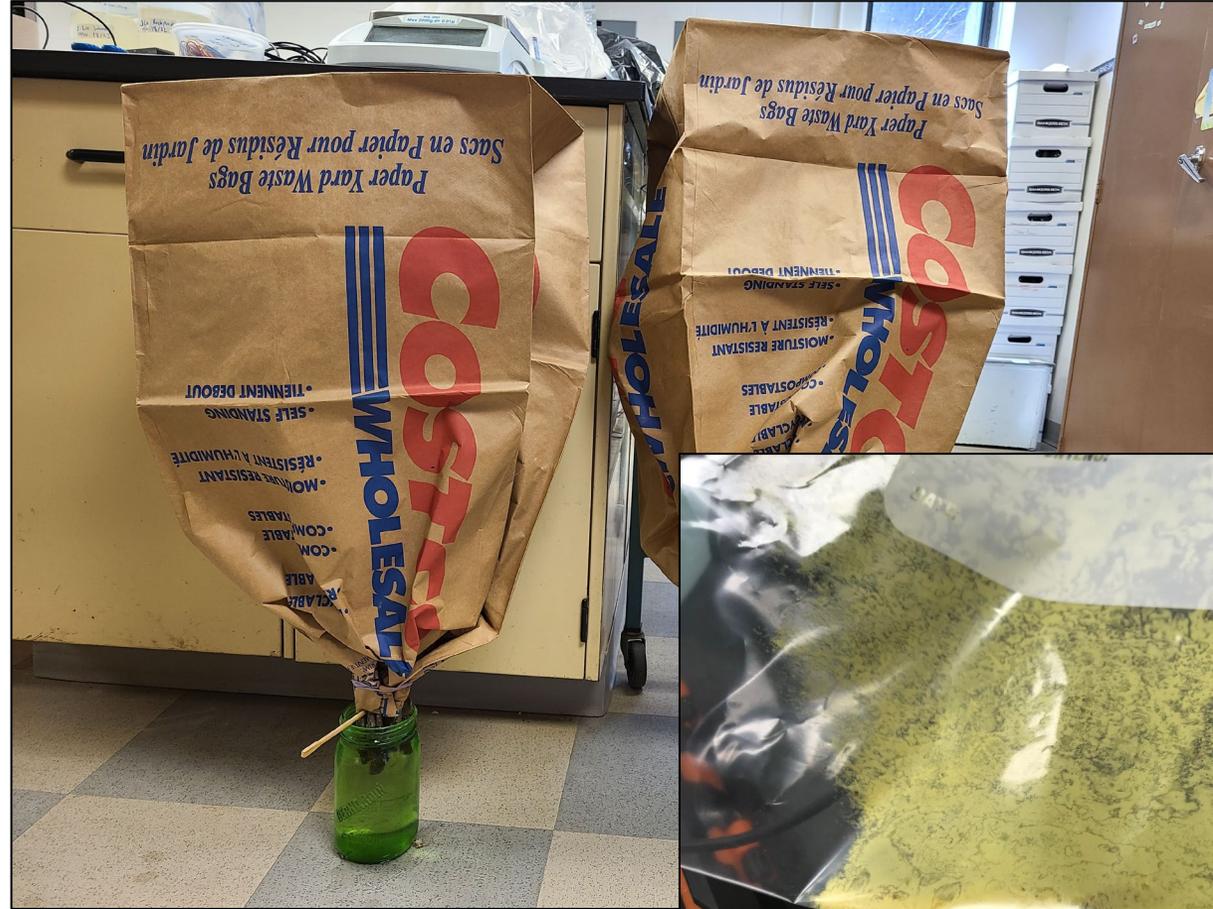
Artificial Pollination Research Update



Overview

- Many growers interested in potential increased yields artificial/supplemental pollination provide
- Growers apply additional pollen during hazelnut flowering to increase yields

Pollen Collection



Spray Equipment

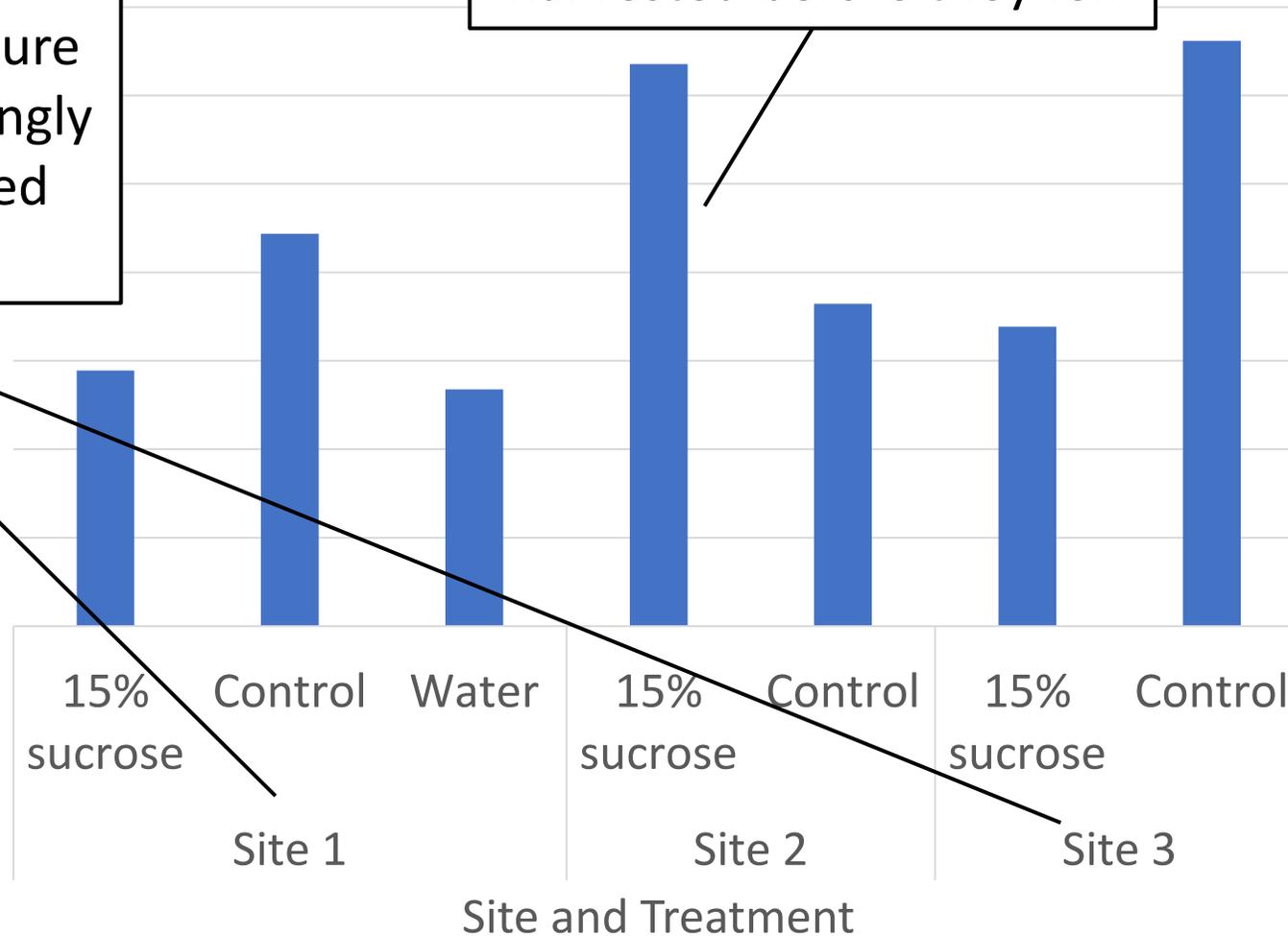
15% sucrose solution
+ 0.5g pollen per tree



Preliminary Results

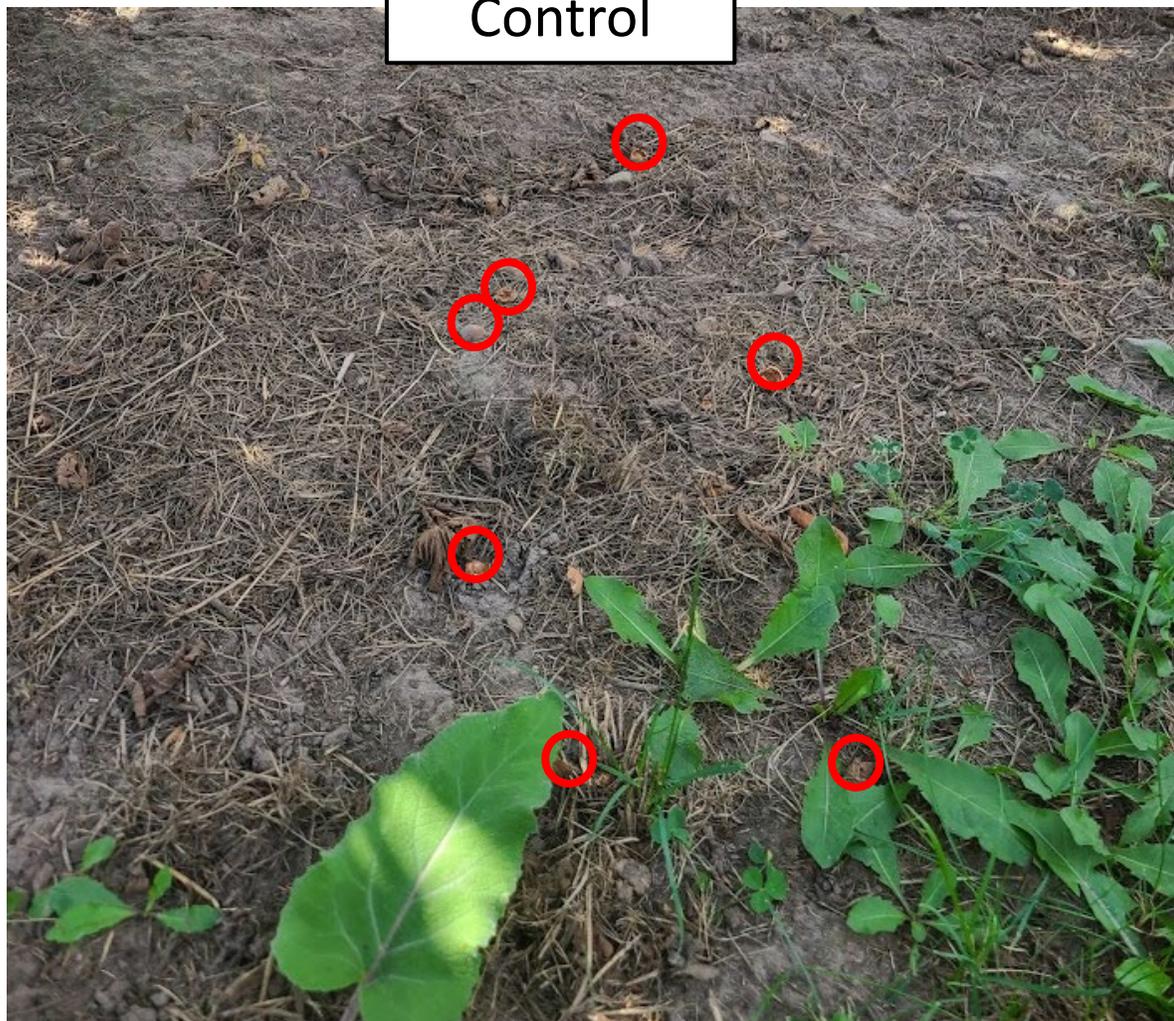
There was moderate to heavy predation pressure at Sites 1 and 3, seemingly selective for pollinated trees

Site 2 was the only site where treatment yielded more than control, and the only site where nuts were harvested before they fell

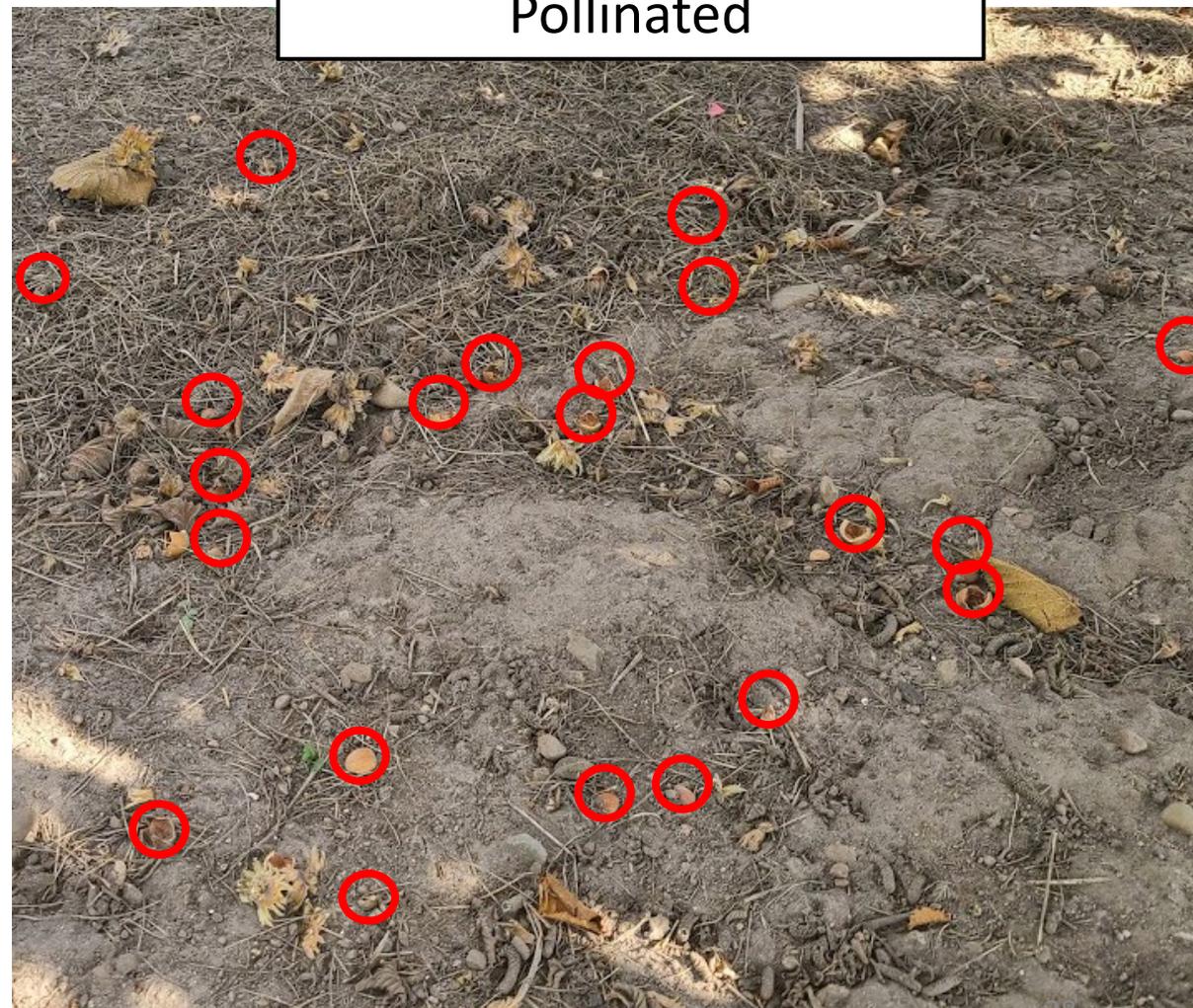


Predation Pressure/Shell Fragments

Control



Pollinated



Takeaways

- Artificial pollination has some type of effect
- More research is needed

Resources

- OMAFRA
 - [Hazelnut Production Guide](#) (2021)
 - [Establishment and Production Costs](#) (2018)
 - [Hazelnut IPM Workshops](#) on YouTube (ONHortCrops)
- Oregon State University website and publications
 - Good for general advice but NOT Ontario-specific
- Society of Ontario Nut Growers
 - <https://www.songonline.ca/nuts/hazelnuts.htm>
- Jenny Liu – OMAFRA Maple, Tree Nut, and Agroforestry Specialist
jenny.liu2@ontario.ca

Thank you!