



**ONTARIO
AGRICULTURAL COLLEGE**

DEPARTMENT OF PLANT AGRICULTURE



March 2, 2023

Timing of ascospore release of *Anisogramma anomala*, pathogen of eastern filbert blight

PRESENTER: ASIFA MUNAWAR

PROJECT SUPERVISOR:

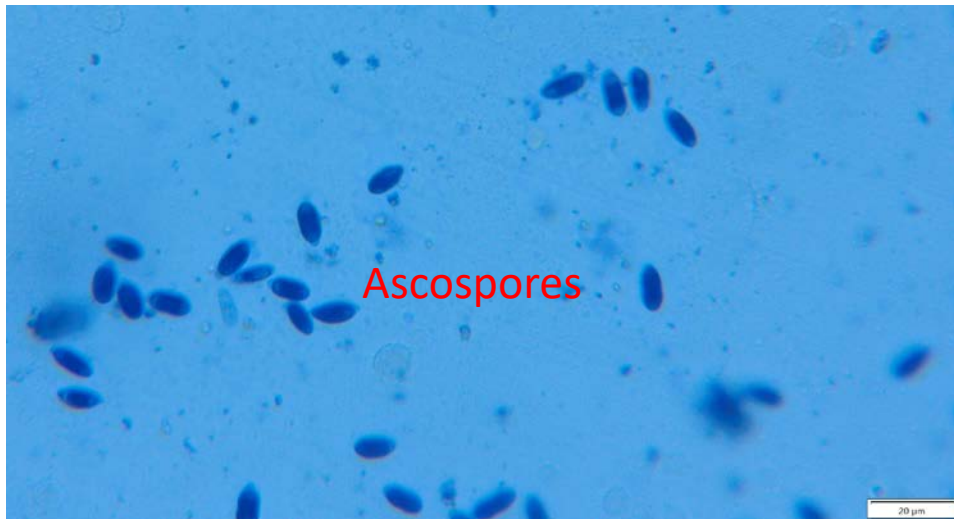
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Eastern Filbert Blight: Symptoms and Pathogen



Pathogen: *Anisogramma anomala*



The ascospores are produced inside the stroma. These spores infect actively growing stem tissue in young shoots.

What Do We Already Know?

- In the Pacific Northwest infection typically occurs from bud break to shoot elongation.
- Spores are ejected into the air all winter but can not infect hazelnut until the spring when new growth emerges.
- In the spring the heavy spore release was observed from March to May (12-weeks-Period).
- In the spring the spores are ejected forcibly into the wind and rain.
- Climate of Oregon and Ontario is different (Nov-March)
 - Oregon: Average monthly low temperature, above freezing. Monthly precipitation is high in Nov-March but low in May -October
 - Ontario: Below Freezing temperature in Nov-March and high precipitation in May – October.
- Differences in climate could mean high levels of inoculum in Ontario that may release for longer periods of time than Oregon.





Why to know the Ascospore Release Time?

Based on my previous slide:

- It is not known when the spores of the fungus are released under Ontario weather conditions.
- This information is important for timing of preventative fungicide applications.

How Did We Observe the Spore Release?

The spore sampler was used to track air borne spores .

Spores were tracked from 2 sites

Site 1:

March 1 - Nov 28, 2022

Site 2:

March 9 – Nov 25, 2022.

Both sites were in Norfolk County, Ontario.

Weather data was also recorded from both sites.

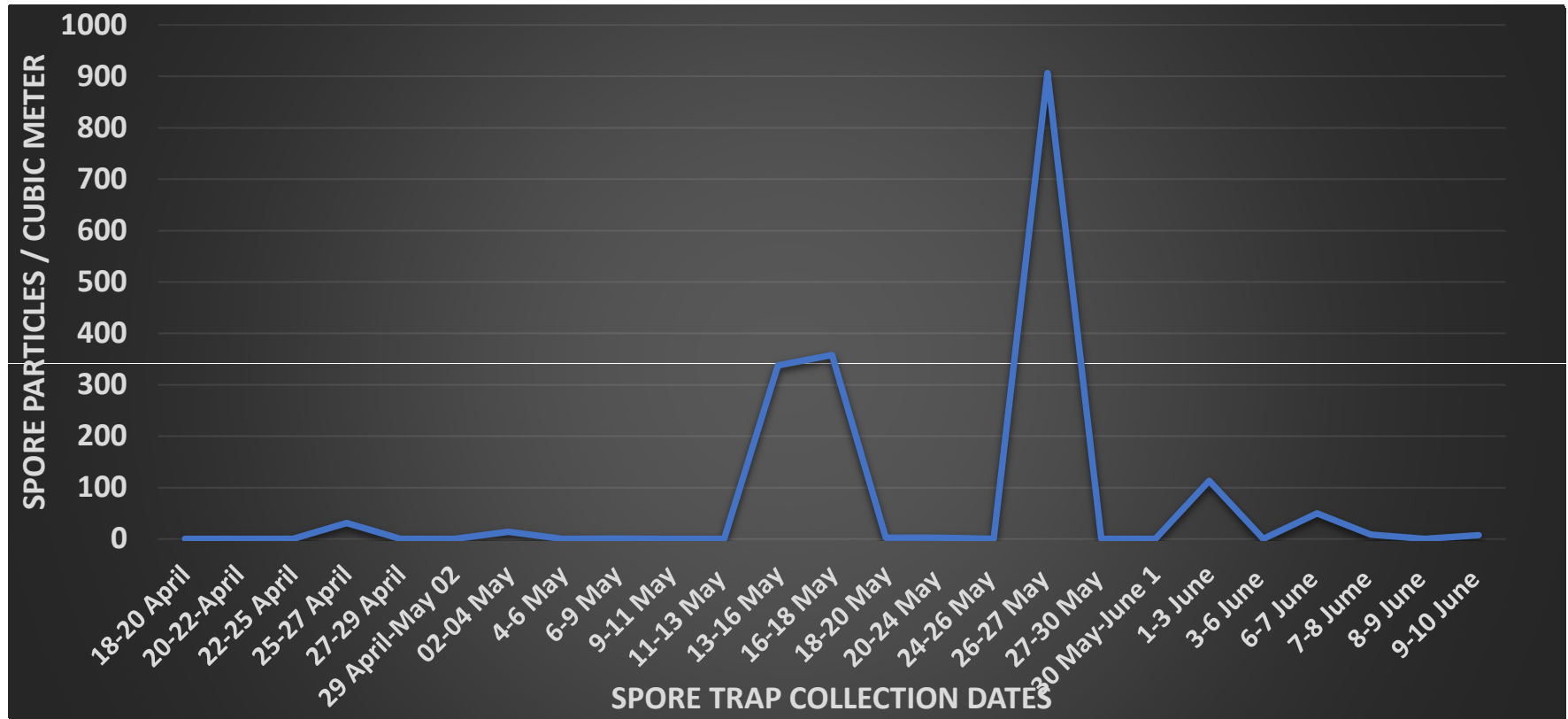
Phenological stages were recorded 6 days/week using staging guides adapted from those developed by Oregon State University and Ferrero.

GRIPST-2009 spore sampler



What did we Observe in 2022?

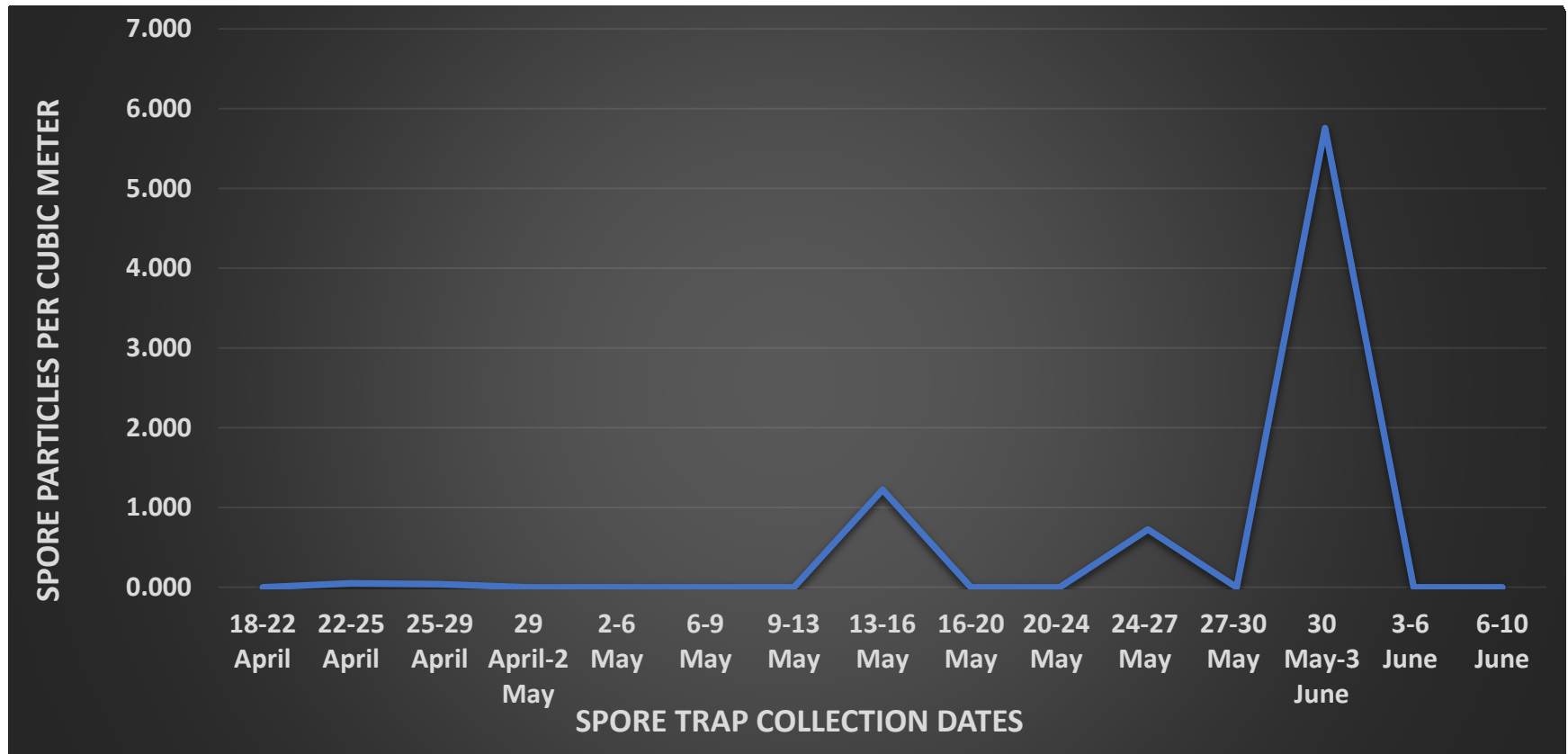
Site 1: The first release was observed close to the bud break time (April 18, 2022)



Release of ascospores of *Anisogramma anomala* from April to June 2022 at site 1, Norfolk county Ontario.

What did we Observe in 2022?

Site 2: At site 2 spores were first detected on April 22, 2022, corresponding with late bud swell in that orchard.



Release of ascospores of *Anisogramma anomala* from April to June 2022 at site 2, Norfolk county Ontario.

What did we Observe in 2022?

Phenology of Hazelnut trees tracked using cv “Yamhill” at site 1, Norfolk county in the 2022 growing season.



April 14, 2022
Stage 02 (Swollen Bud)



April 22, 2022
Stage 3 (Bud Break)



April 29, 2022
Stage 4 (Leaf Burst)



May 06, 2022
Stage 5 (Emergence of Third Leaf)



May 20, 2022
Stage 06 & 07 (First Mature Leaves & Mature Leaves)

- Spore release time in 2022 coincided with the bud break period and continued until June 10 (mature leaf stage).

What did we Observe in 2022?

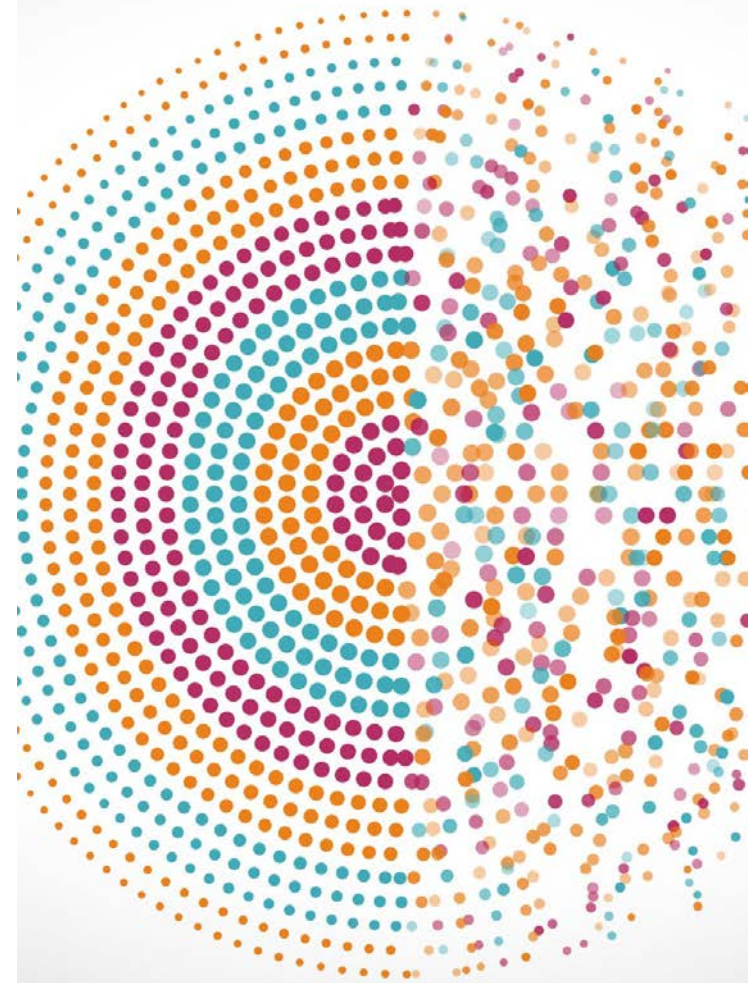
Weather Data:

Statistical analysis of weather data indicated the average daily temperature and windspeed may play a significant role in spore dispersal. The influence of rainfall and humidity on spore release is still being analyzed.



How Our observation relates to previous knowledge?

In the first year (2022) of this study, we observed spores are released for approximately 8 weeks from Mid-April to Mid June. The highest release was observed in May. It is close to the previous information though additional years of data are needed to determine if this is consistent.



FUTURE PLANS:

The spore tracking work will continue in the year 2023.

Based on the spore release profile of both years (2022 & 2023), fungicide management recommendations will be discussed.



Improvement of Ontario hazelnut cultivars focusing on winter hardiness and pest tolerance, with an emphasis on management of Eastern filbert blight



Efficacy Trials

- Two efficacy trials are being carried out at Simcoe.
- The research orchard at Simcoe was established in June 2020 and the fungicide timing and efficacy trials commenced in 2021; trial is planned to run through 2026.
- Nuts have been harvested in 2021, 2022 to see if there is a treatment effect on production.
- Any disease (other than EFB) or pest presence has been noted and treated accordingly to develop a history for our orchard.
- Phenological development and growth of the trees is also being tracked annually.

Improvement of Ontario hazelnut cultivars focusing on winter hardiness and pest tolerance, with an emphasis on management of Eastern filbert blight



What are we testing?

Trial #1 is a timing trial that is testing a rotation of chlorothalonil (Bravo) and trifloxystrobin (Flint).

There are a total of 4 treatments:

1: Untreated Control

2: 2 sprays applied at bud break (BB) and 4 wk after BB

3: The standard practice of 4 sprays applied at BB, 2, 4, 6 wks after BB

4: 6 sprays applied at BB, 2, 4, 6, 8, 10 wks after BB

Results will be available in future years.

Improvement of Ontario hazelnut cultivars focusing on winter hardiness and pest tolerance, with an emphasis on management of Eastern filbert blight



What are we testing?

Trial #2 is an efficacy trial that is testing commercially and non-commercially available products that could have utility for registration in Ontario.

TREATMENTS

- 1: Non-inoculated check**
- 2: Inoculated check**
- 3: Bravo (Chlorothalonil)**
- 4: Copper spray (Copper Oxychloride 50%)**
- 5: Quash (Metaconazole)**
- 6: Flint 50 WG (Trifloxystrobin)**
- 7: Bumper 432EC (Azoxystrobin)**
- 8: Miravis Duo (Pydiflumetofen+Difenaconazole)**
- 9: Unregistered Product 1 (Propiconazole, Bumper 432EC)**
- 10: Unregistered Product 2 (Pyraclostrobi + Fluxaop, Mervion)**

Results will be available in future years.



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Thank
you

- From Left to Right:
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- Vivian Adam
- Emma Robertson
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