Downy Mildew Update: Determination of Pathogen Sensitivity to Azoxystrobin (Dynasty)

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Outline

- *Plasmopara halstedii*
- Fungicide seed treatments
- Objective
- Two experiments
  - Discriminatory dose
  - Pathogen sensitivity

Importance of Downy Mildew

Yield loss

- Most infected plants die
- Survivors yield zero – and compete
- Rarely are fields uniformly infected

Plasmopara halstedii Lifecycle

Oospore

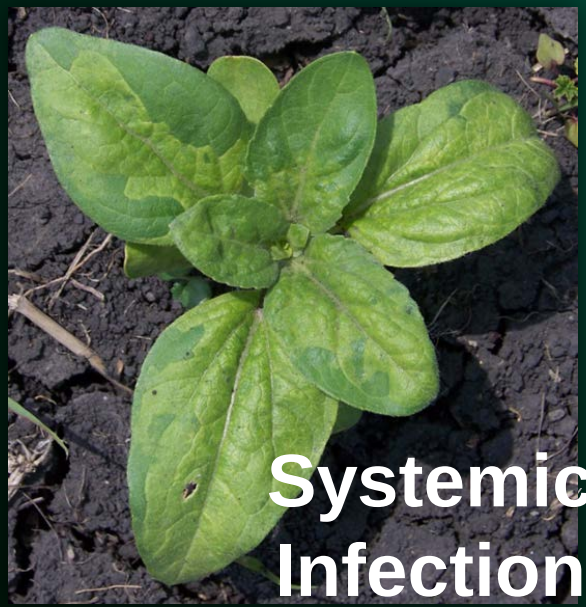
Antheridium

+

Oogonium

Zoosporangium

Zoospore



Systemic Infection

Gulya et al. 1997

Fungicide Seed Treatments for Downy Mildew

- Metalaxyl (Apron)
- Azoxystrobin (Dynasty)
- Acibenzolar-S-Methyl (Bion)
- Ethaboxam (Intego Solo)
- Oxathiapiprolin (Syngenta, Dupont)

Why This Research Matters

- *P. halstedii* was able to overcome metalaxyl
- Azoxystrobin has a high risk for resistance development
- Ongoing concern over whether azoxystrobin had become insensitive to the pathogen

Objective

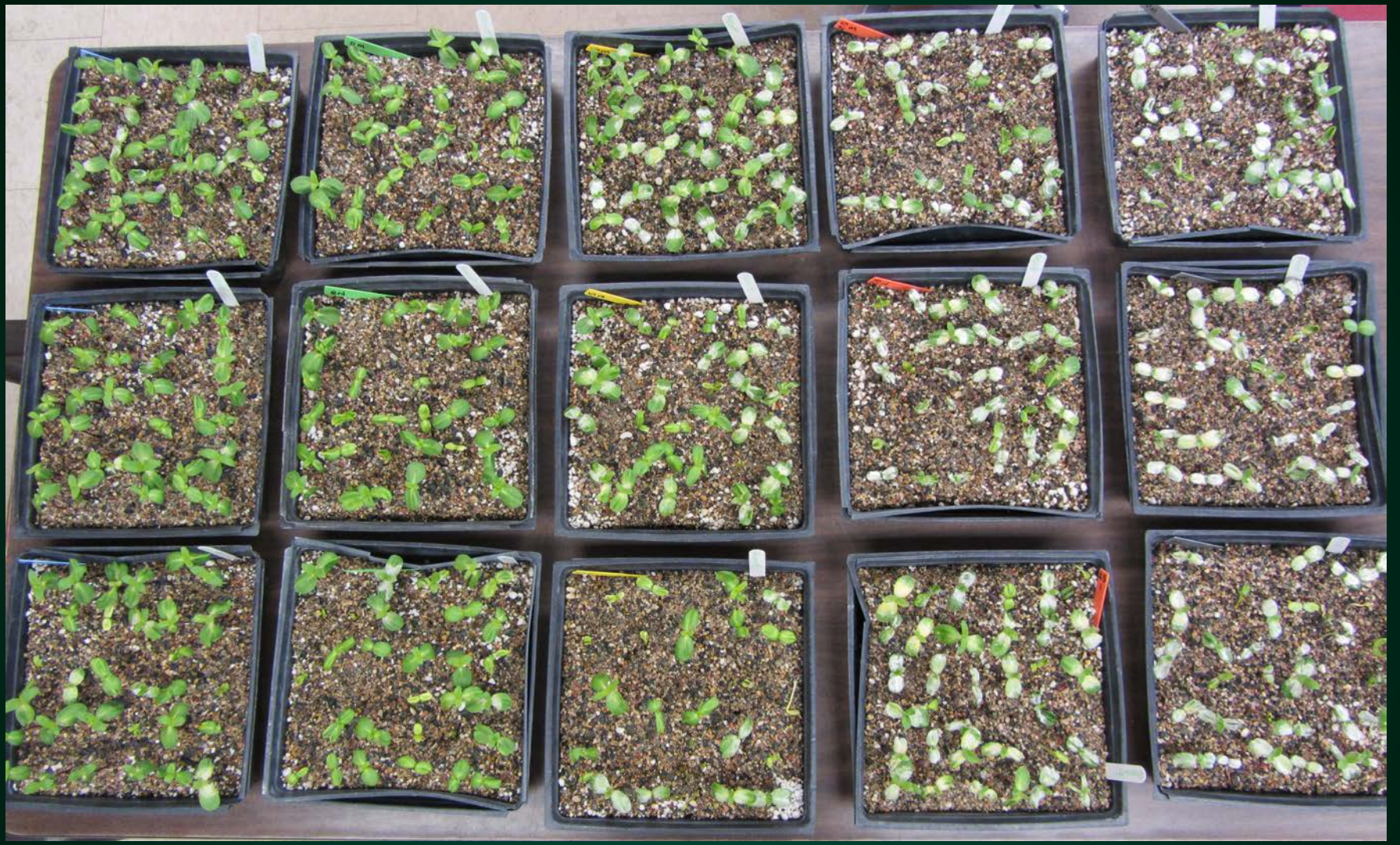
Determine whether *P. halstedii* has overcome azoxystrobin in the North Central Great Plains

Experiments

- Determine a discriminatory dose concentration at which 50% of the treated plants had visible sporulation (EC_{50})
- Assess pathogen sensitivity

Discriminatory Dose Experiment

- Three pre-1997 isolates
- Three 2015 isolates
- Soil-drench inoculation
- Randomized complete block design
- Three replications of 36 susceptible oilseeds
- 1st trial - 0, 0.25, 2.5, 25 and 250 ug ai/seed
- 2nd and 3rd trials – 0, 2.5, 5, 10 and 20 ug ai/seed



20 10 5 2.5 0

(ug ai/seed of azoxystrobin)

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20 10 5 2.5 0

(ug ai/seed of azoxystrobin)

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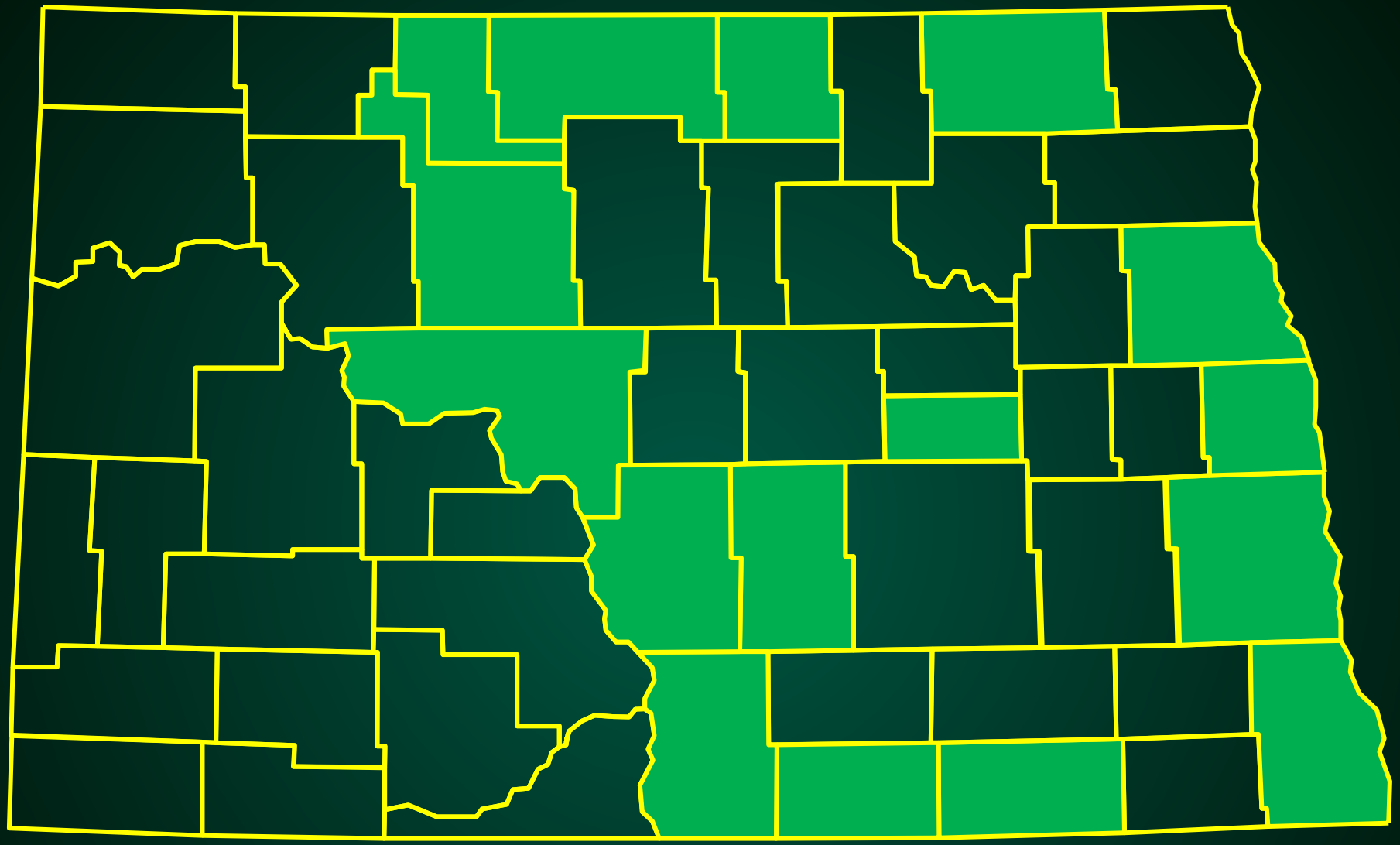
EC_{50} of 3.9 – 12.8
Discriminatory dose
= 10 ug ai/seed

Pathogen Sensitivity Experiment

- Pre-1997: 19 isolates from North Dakota (13), Minnesota (4), Kansas (1) and Texas (1)
- 2014 and 2015: 40 isolates from North Dakota (30), South Dakota (6), Minnesota (3) and Nebraska (1)



Current North Dakota Isolates

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Pathogen Sensitivity Experiment

- Four trials with 16 to 17 isolates at a time
- Repeated in a second greenhouse room
- Split plot arrangement with subplots of 0 and 10 ug ai/seed
- Three replications of 36 seeds
- Soil-drench inoculation

(ug ai/seed of azoxystrobin)

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Results and Conclusions

- Azoxystrobin was effective on all 42 *P. halstedii* isolates selected from the 2014 and 2015 surveys
- The pathogen has not overcome azoxystrobin, so Dynasty should still suppress downy mildew
- Use of resistant hybrids in combination with fungicide seed treatments is still the best management plan

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