Sugarbeet Disease Management

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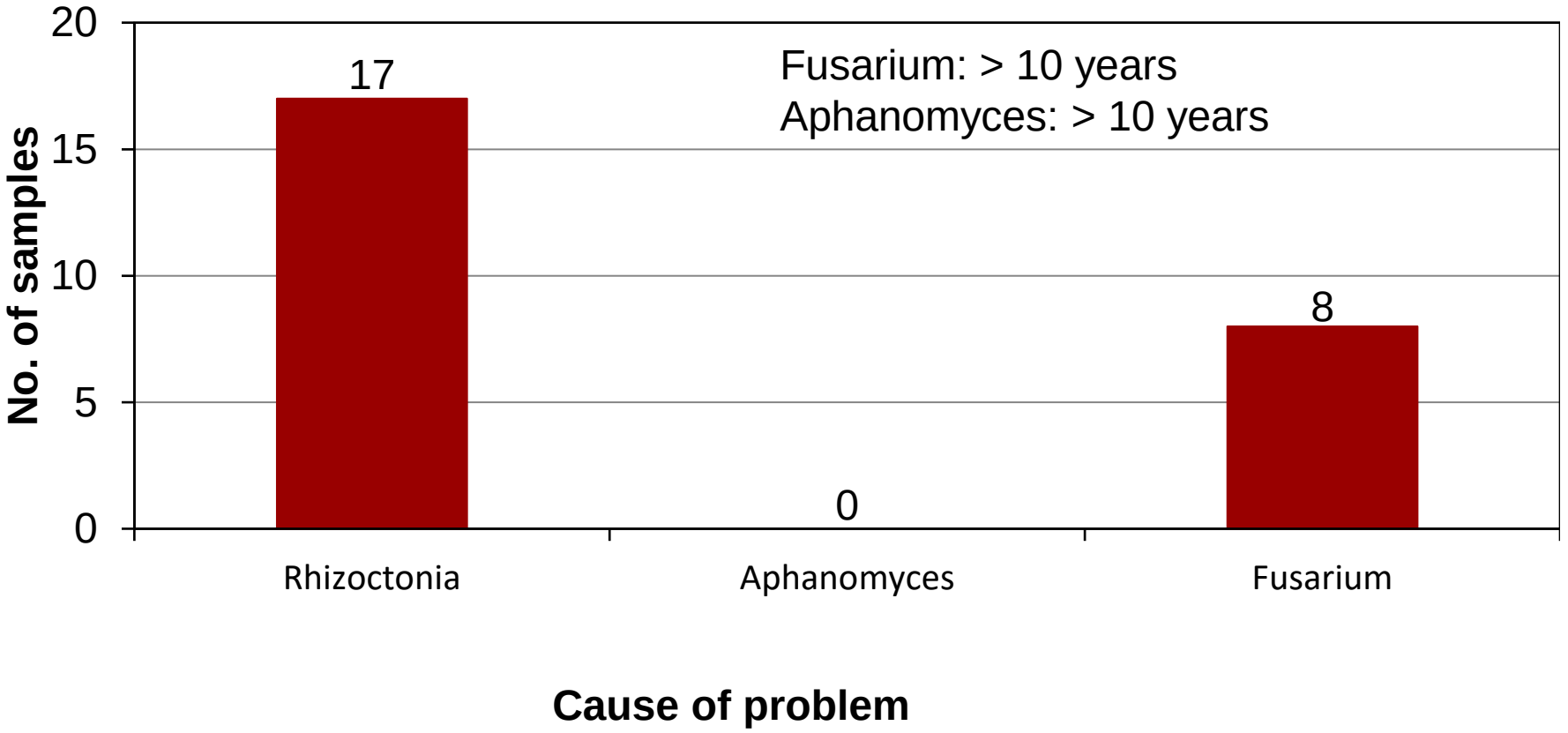
2024 MDFC Sugarbeet Production Seminar
Feb 15, 2024

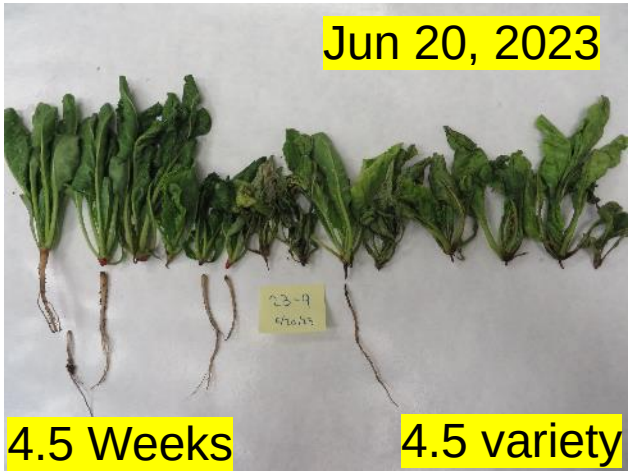
Summary of 2023 Disease Samples



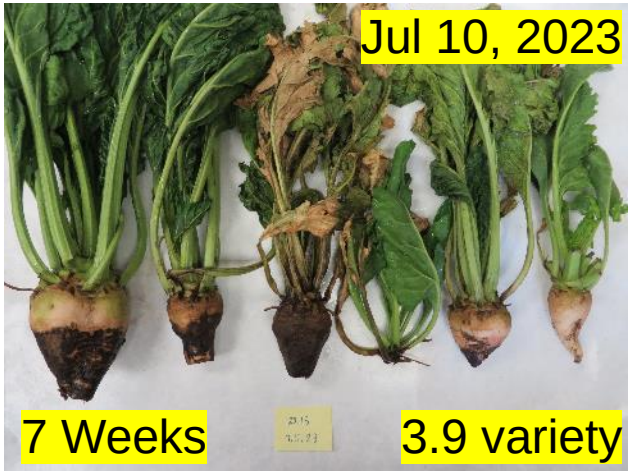
More than one problem is very common!

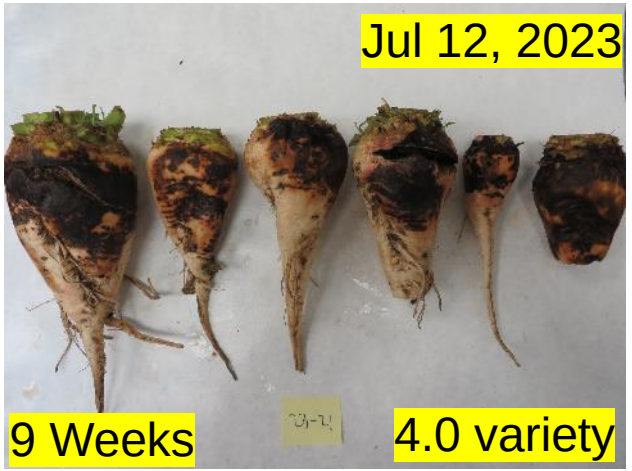
Rhizoctonia Damping-off

Crown and Root Rot


Jun 20, 2023
4.5 Weeks
4.5 variety


Jun 23, 2023
7 Weeks
3.9 variety


Jul 10, 2023
7 Weeks
3.9 variety


Jul 12, 2023
9 Weeks
4.0 variety

Key points about Rhizoctonia

- Can survive 2-3 years in soil as dormant resting structures (sclerotia)
- *Rhizoctonia solani*– groups AG 2-2 (IIIB & IV) and AG 4
- Full-season pathogen, develops in patches
- Most fields have Rhizoctonia (based on DNA) in top 4 inches, some fields have in top 6 inches
- Cultivation can increase the risk for crown rot as inoculum gets into the crowns
- Wide host range– Sugarbeet, soybean, edible beans, corn, including weeds

Soybeans

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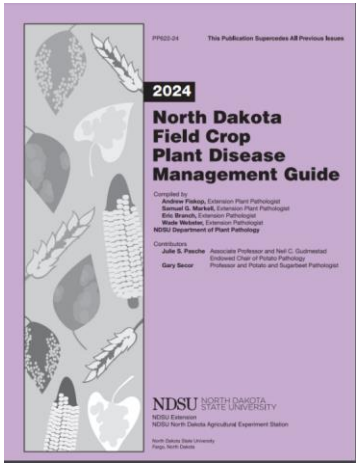
https://extension.umn.edu/pest-management/rhizoctonia-root-and-stem-rot-soybean

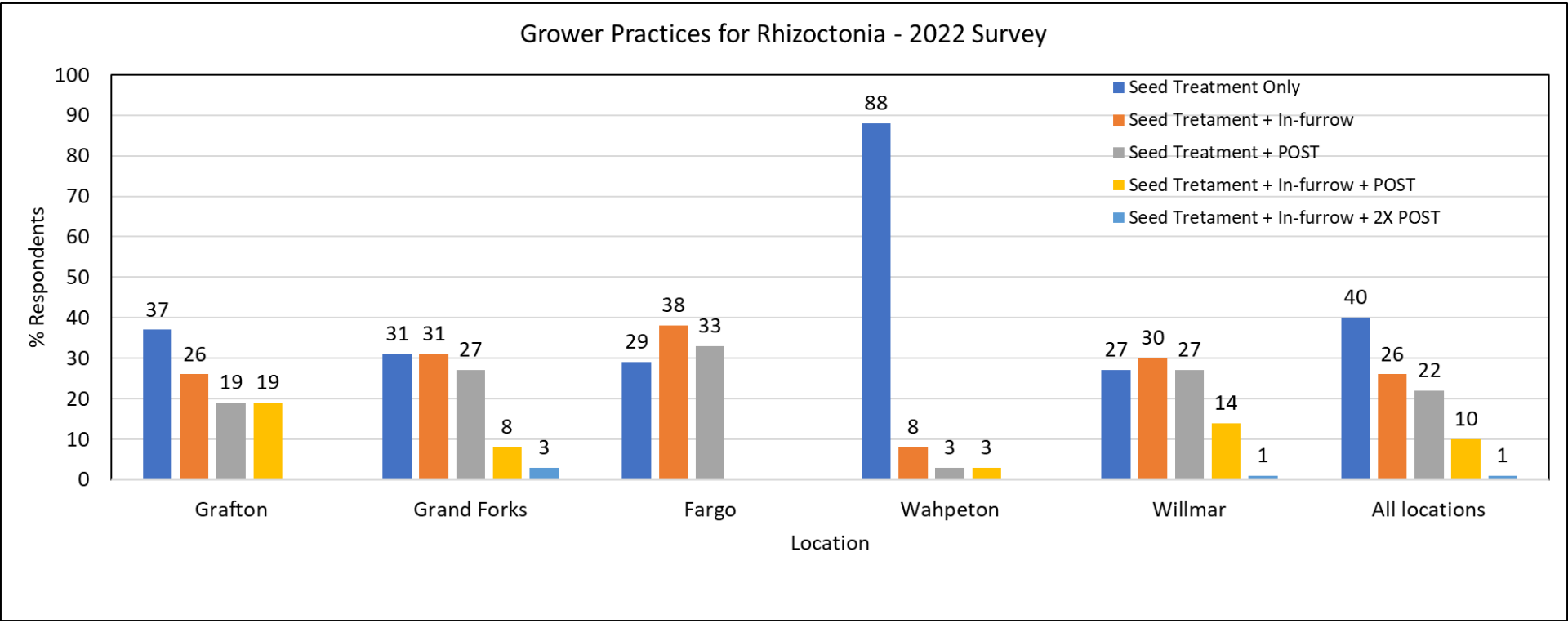
https://extension.umn.edu/pest-management/rhizoctonia-root-and-stem-rot-soybean

Navy beans

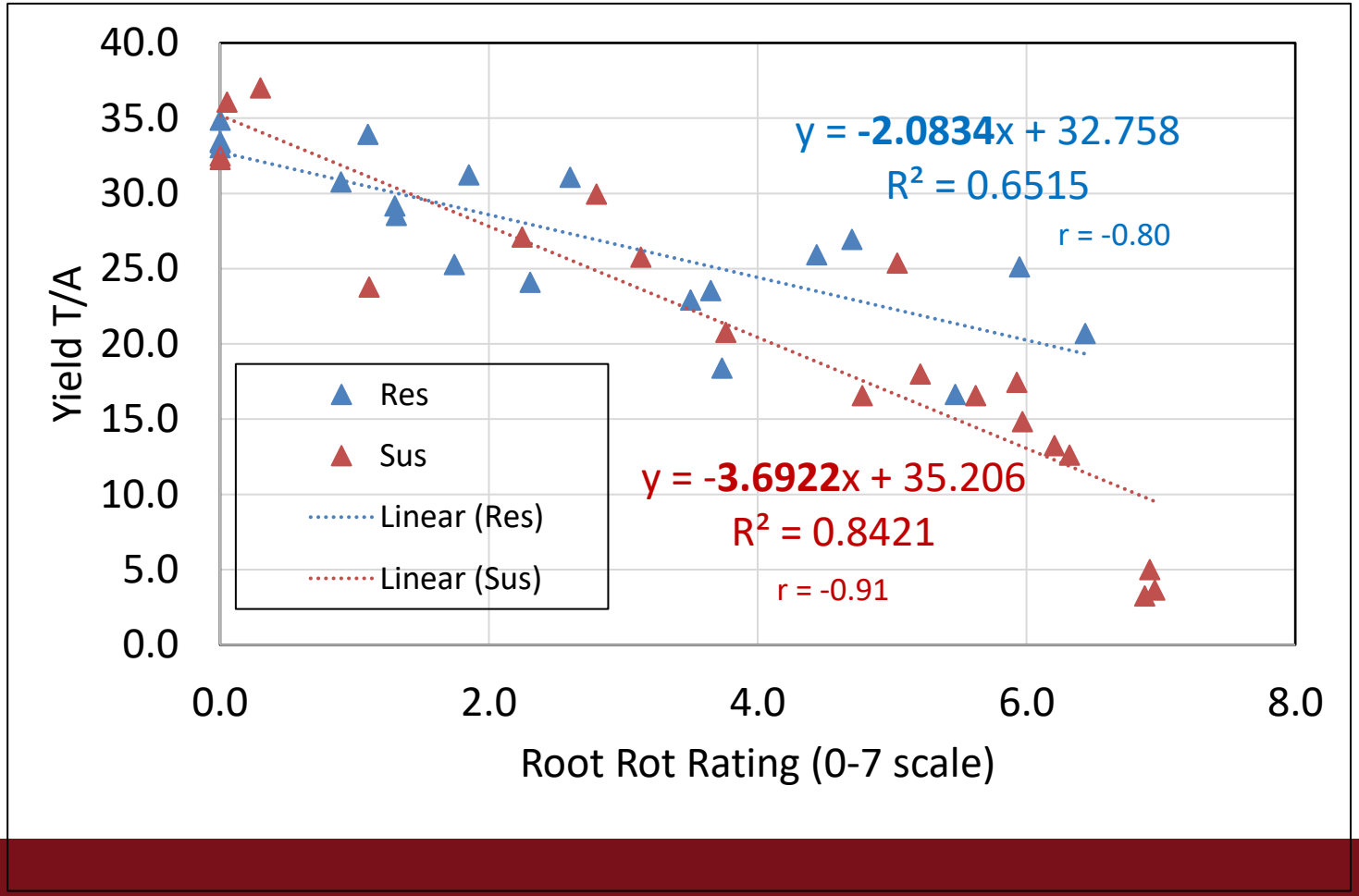
Crop Rotation

- Small grains prior to sugarbeet is ideal
- Increase the length of rotation
- Managing Rhizoctonia in other crops can reduce the inoculum build up
- Soybean and dry beans
  - Seed treatments
    - Fluxapyroxad, Sedaxane
  - In-furrow/POST application
    - Azoxystrobin, Pyraclostrobin



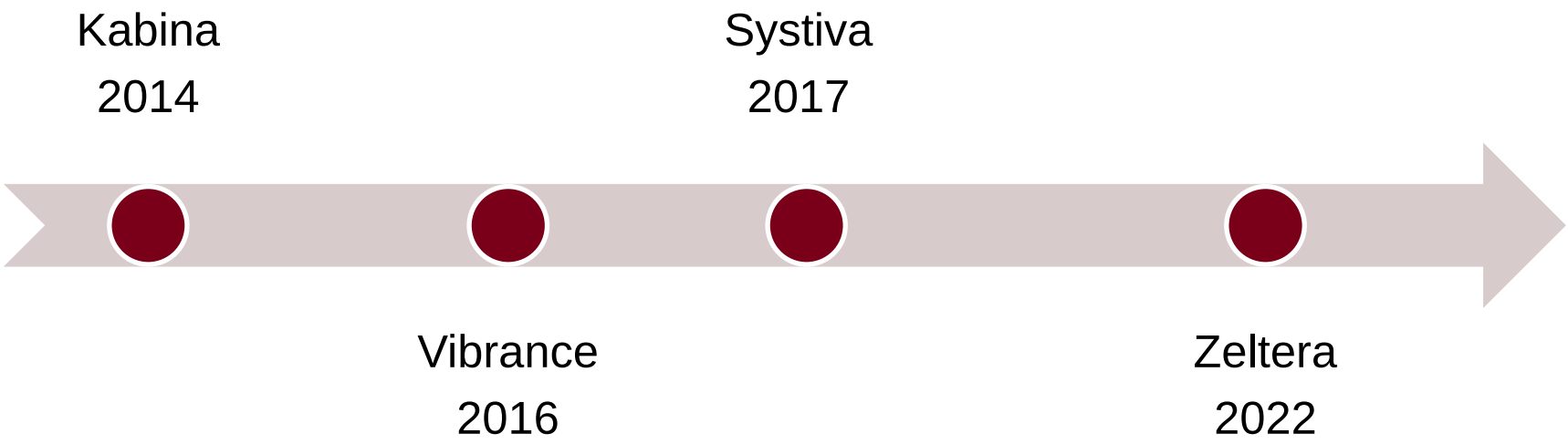

Grower Practices for Rhizoctonia - 2022 Survey
% Respondents
100
90
80
70
60
50
40
30
20
10
0
Seed Treatment Only
Seed Tretament + In-furrow
Seed Treatment + POST
Seed Tretament + In-furrow + POST
Seed Tretament + In-furrow + 2X POST
37
26
19
19
31
31
27
8
3
29
38
33
88
8
3
3
27
30
27
14
1
40
26
22
10
1
Grafton
Grand Forks
Fargo
Wahpeton
Willmar
All locations
Location

Resistant variety can lose yield!

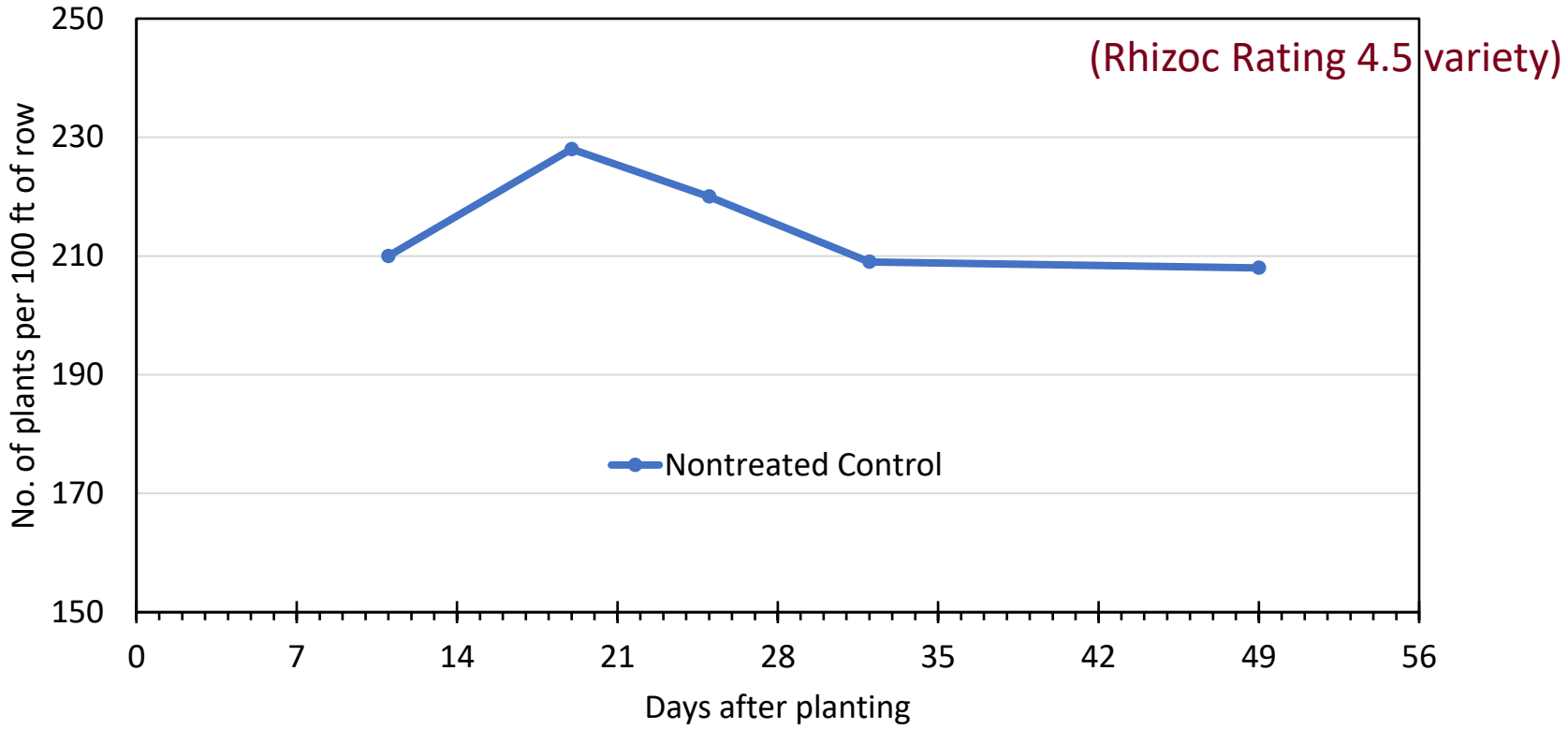


Seed Treatments

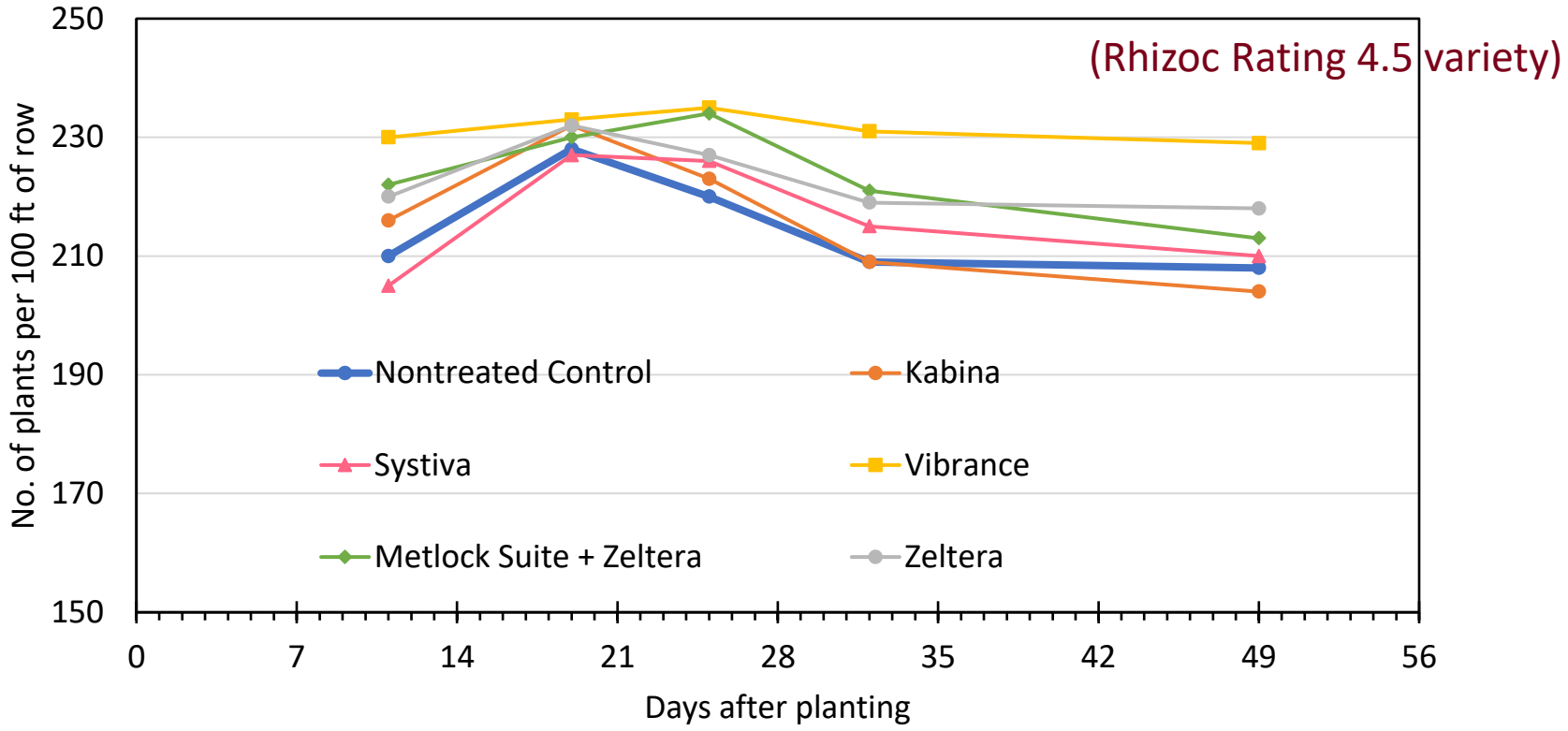
- SDHI class of fungicides (**S**uccinate **D**e**H**ydrogenase **I**nhibitor, FRAC group 7)
- Single site of action - Inhibit fungal respiration



Seed Treatments



Seed Treatments

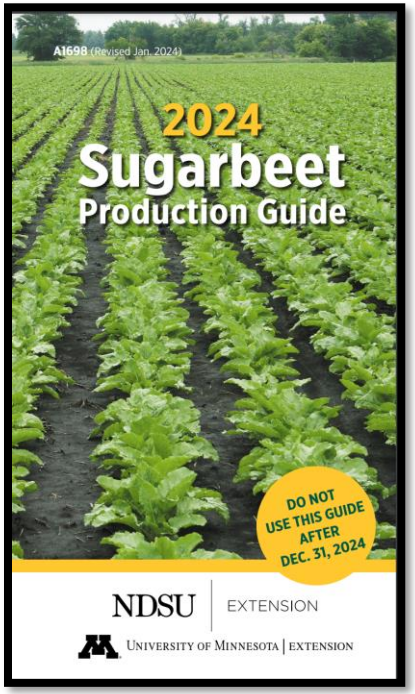


In-furrow Fungicides

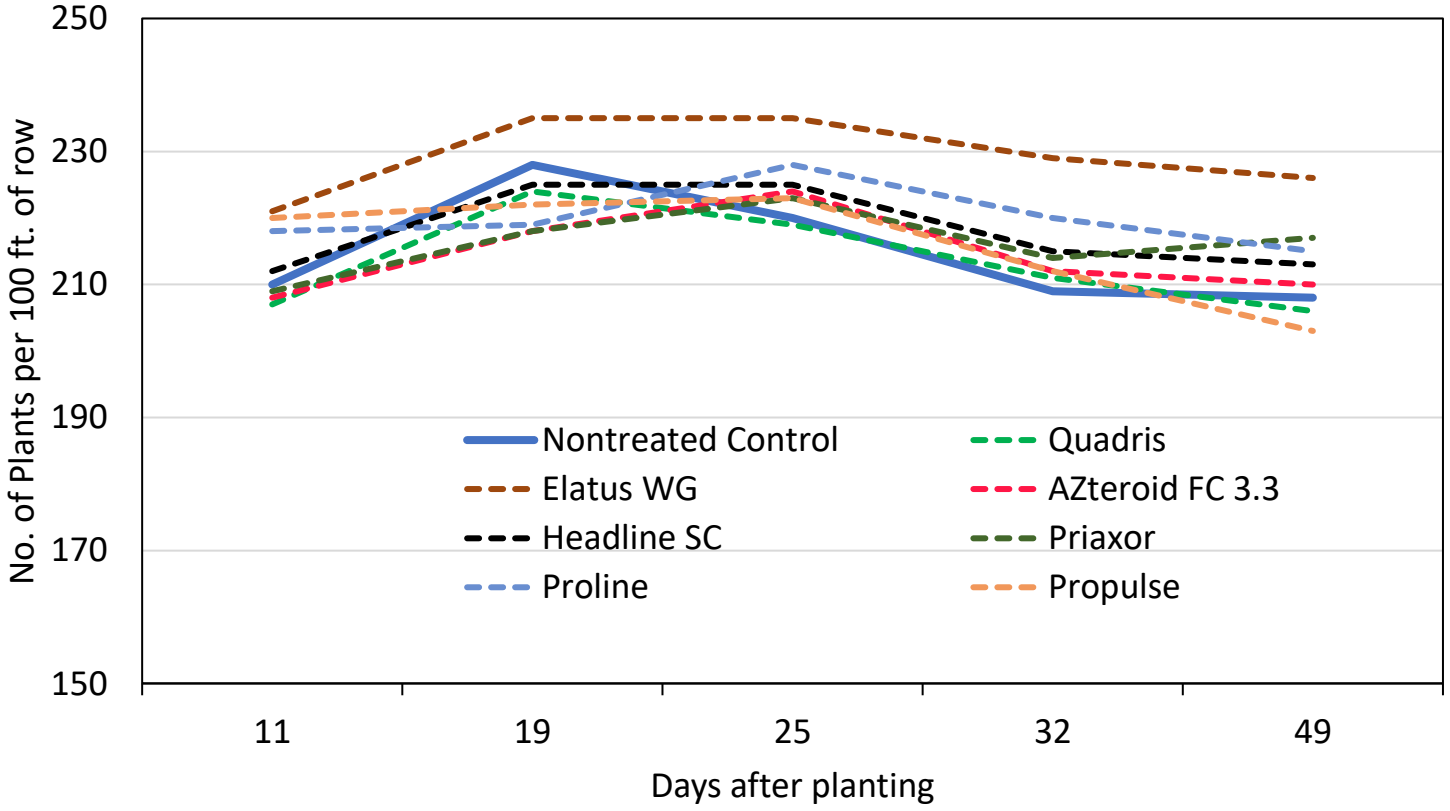
- Fungicide in 3 gal. water + 10-34-0 @ 3 gal. applied via drip tube
- Agitation in the tank is important to avoid nozzle clogging
- Do a jar test
- Find compatible fungicides for mixing

In-furrow Fungicides (rates per acre)

- Quadris 9.5 fl oz (QoI)
- AZteroid 5.7 fl oz (QoI)
- Elatus 7.1 fl oz (QoI + SDHI)
- Headline 9 fl oz (QoI)
- Priaxor 6.7 fl oz (QoI + SDHI)
- Proline 5.7 fl oz (DMI)
- Propulse 13.6 fl oz (DMI + SDHI)



In-furrow Fungicides (Rhizoc Rating 4.5 variety)



Root rot rating scale 0-10

0 1 2 3 4 5 6 7 8 9 10

1 = 1 – 10% rot, 10 = 91 – 100 % rot

Seed treatments vs In-furrow (2023)

Description	# Harvested roots	Root Rot Rating (%)	Root Rot Incidence (%)	Yield (T/A)	RSA (Lbs/A)
Untreated	157	8.6	33.8	26.0	9324
Seed treatments	168	9.9	39	25.0	9312
In-furrow treatments	175	6.3	31	26.9	9916
Seed vs in-furrow contrast (P-value)	**0.0033**	**0.0148**	**0.0073**	**0.0338**	**0.0411**

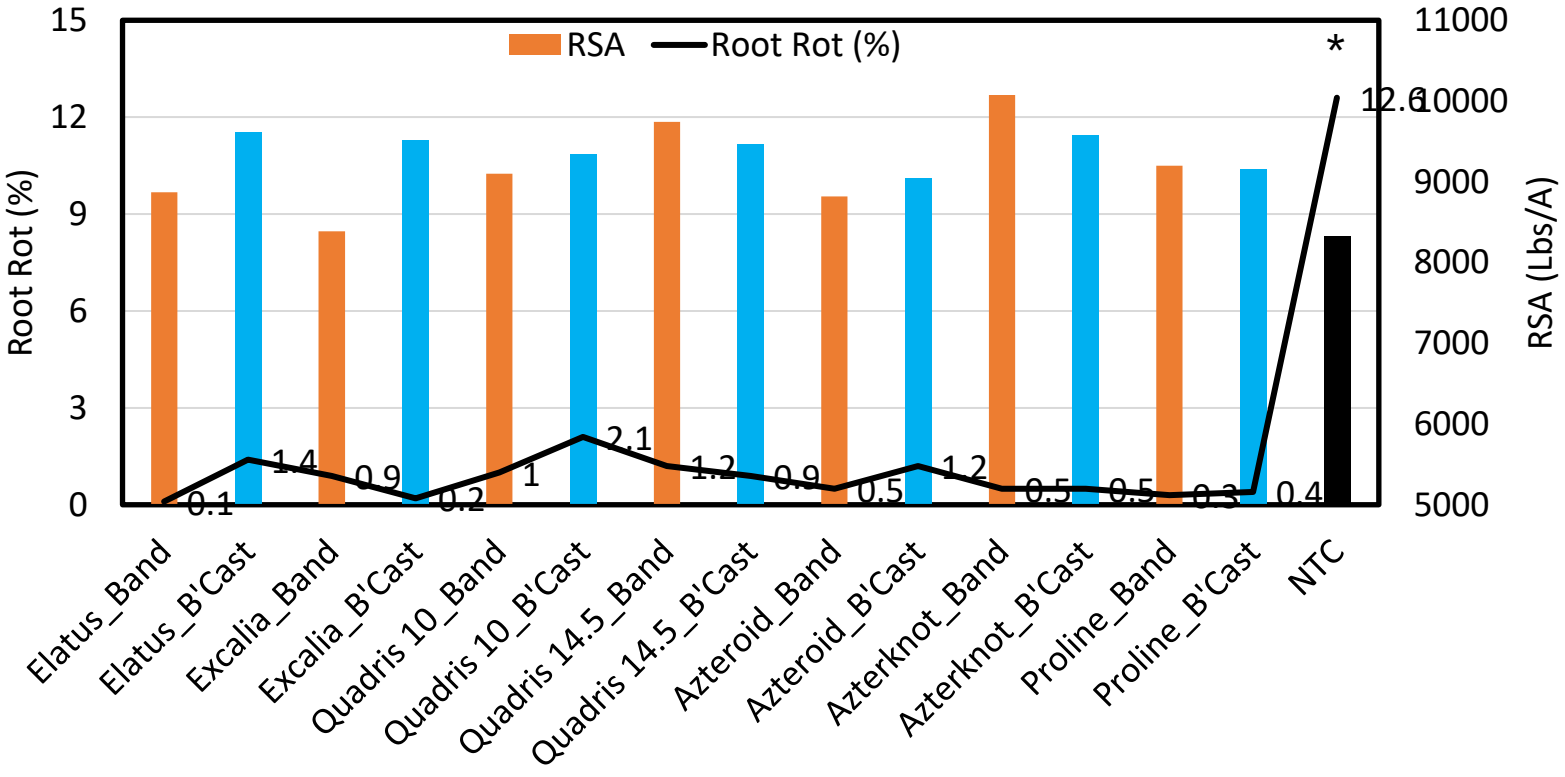
Postemergence Fungicides (rates per acre)

- Quadris 10 & 14.5 fl oz (QoI)
- AZteroid 9.2 fl oz (QoI)
- AZterknot 16.6 fl oz (QoI)
- Elatus 7.1 fl oz (QoI + SDHI)
- Proline 5.7 fl oz. (DMI)
- Excalia 0.64 fl oz (band), 2.0 fl oz (broadcast) (SDHI)

Recommended Timing: 4-8 leaf stage

Postemergence Fungicides (2023)

(Rhizoc Rating 4.5 variety)



Fungicides for Rhizoctonia – Mode of Action

- Rhizoctonia is a monocyclic disease cycle so the risk of developing fungicide resistance is relatively low
- Rotate different MoAs if you can

Seed Treatment			In-Furrow			POST		
Kabina			Headline			Quadris		
Systiva			Quadris			Elatus		
Vibrance			Elatus			AZterknot		
Zeltera			AZteroid			Excalia		
			Proline			Topguard EQ		
			Propulse			Proline		
						Propulse		
						Priaxor		

SDHI | QoI | DMI

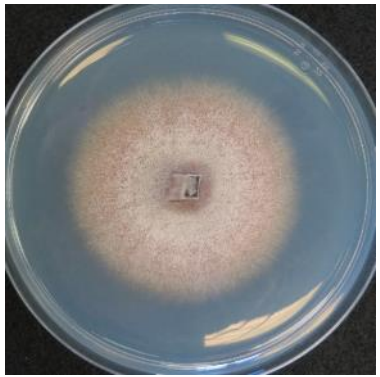
Rhizoctonia Management – Take home message

- Best Practices
  - Seed treatment + POST (4- to 8-leaf stage, band or broadcast) – **most fields**
  - Seed treatment + In-furrow (make sure they mix well with the starter fertilizers) + POST – may be needed for **fields with severe history**
- Even resistant varieties can underperform under severe Rhizoctonia pressure
- Thoroughly pressure wash machinery to limit soil movement between fields

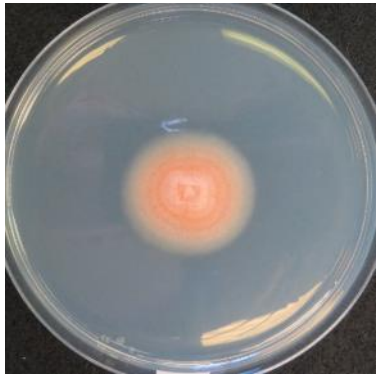
Accurate Diagnosis is critical for Fusarium!

Only tolerant varieties can withstand Fusarium

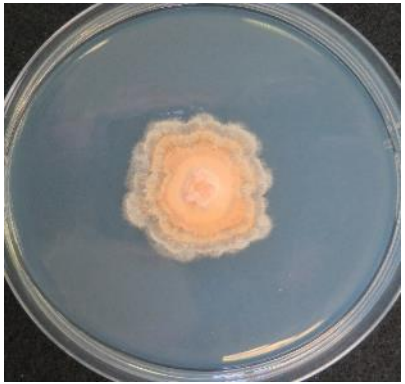
Fusarium Yellows



F. oxysporum



F. secorum



F. equiseti

More than one Fusarium spp. can be present in the same field

Moorhead, MN 2021

4 weeks after planting

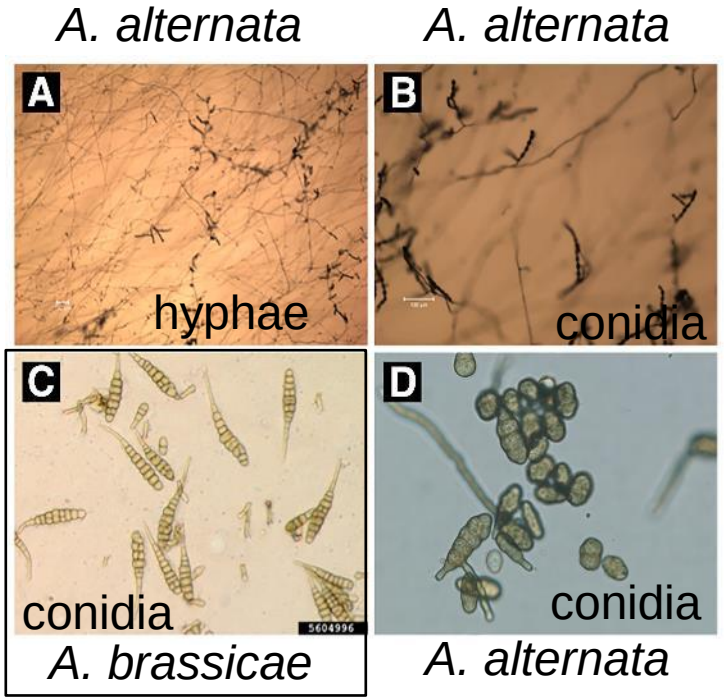
Fusarium Yellows

Fusarium Yellows

Aug 06, 2019 (4.3 Variety)

Aug 14, 2019 (2.5 variety)

Alternaria Leaf Spot (ALS)

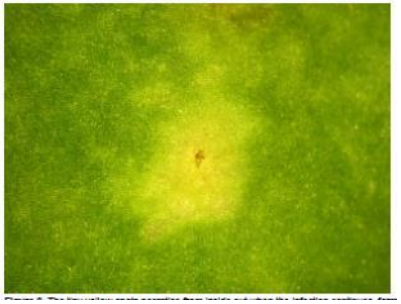


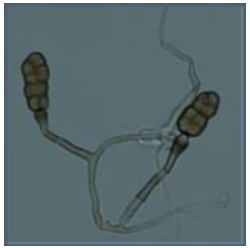
Cortes et al. 2022, https://doi.org/10.1094/PHP-03-22-0025-DG

Alternaria Leaf Spot (ALS)

- Varietal susceptibility
  - More CR+ acres – making room for Alternaria?
- Stressed plants are more susceptible
  - Secondary pathogen
- CLS fungicides have good efficacy for ALS
  - DMI, QoI and Tin resistance (Michigan)
- Maintaining a healthy sugarbeet canopy is the best way to manage Alternaria

Stemphylium





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STEMPHYLIUM, A NEW FOLIAR DISEASE IN SUGAR BEET

Other hosts: Potato, White Mustard, Red Beet, Spinach, Lambsquarter

Stemphylium

- Michigan (Metheny et al. 2019), *S. vesicarium* (mild symptoms compared to *S. beticola*)
- MN and ND
  - Foxhome, MN (Khan et al. 2021), *S. vesicarium*
  - Five samples (2022) – Always present along with Alternaria at a very low frequency - *S. vesicarium*




Acknowledgements

- **Sugarbeet Research and Education Board of Minnesota and North Dakota**
- American Crystal Sugar Company
- Southern Minnesota Beet Sugar Cooperative
- Minn-Dak Farmers Cooperative
- Scott Pahl, Germains Seed Technology
- Seed, chemical and allied industries
- American Crystal Sugar Company quality labs – East Grand Forks and Moorhead
- U of M, NWROC facilities

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Questions?