Managing Rhizopus Head Rot with Fungicides

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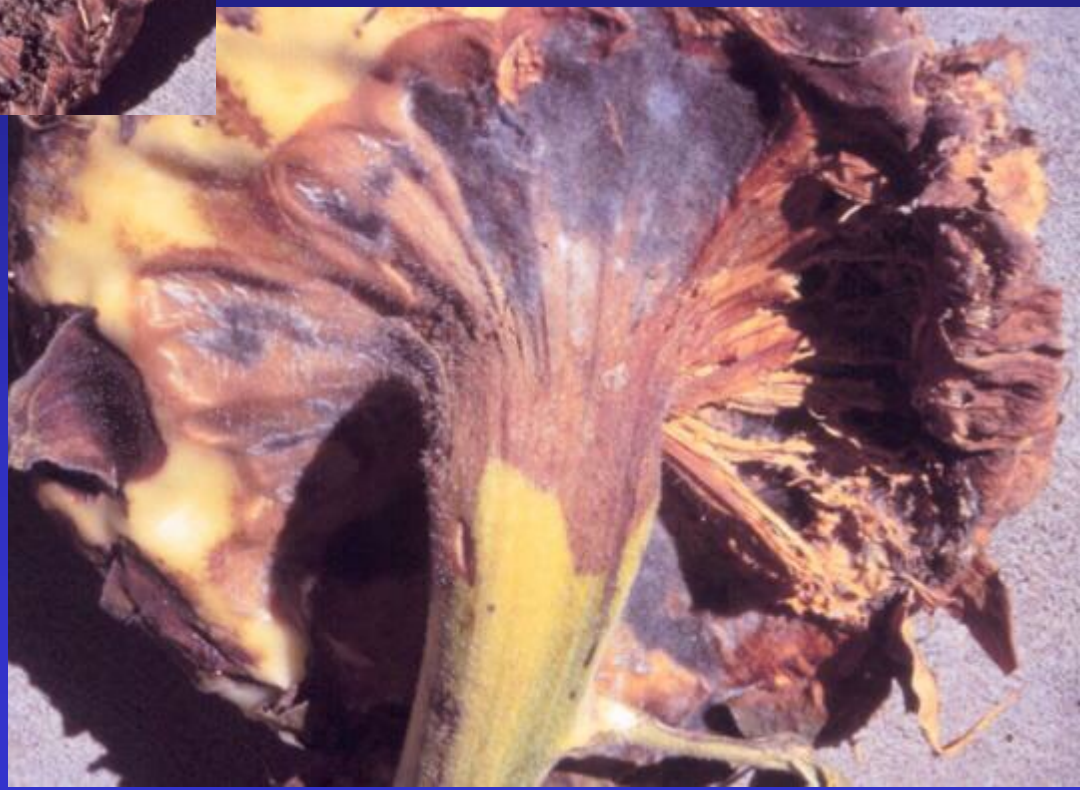
Rhizopus Head Rot

- Caused by several fungal pathogens: *Rhizopus arrhizus*, *R. stolonifer*, and *R. microsporus*
- Overwinters in soils and opportunistically infects through wounds under conditions of high humidity and warm temperatures
- Occurs on maturing plants
- Capable of causing serious yield losses

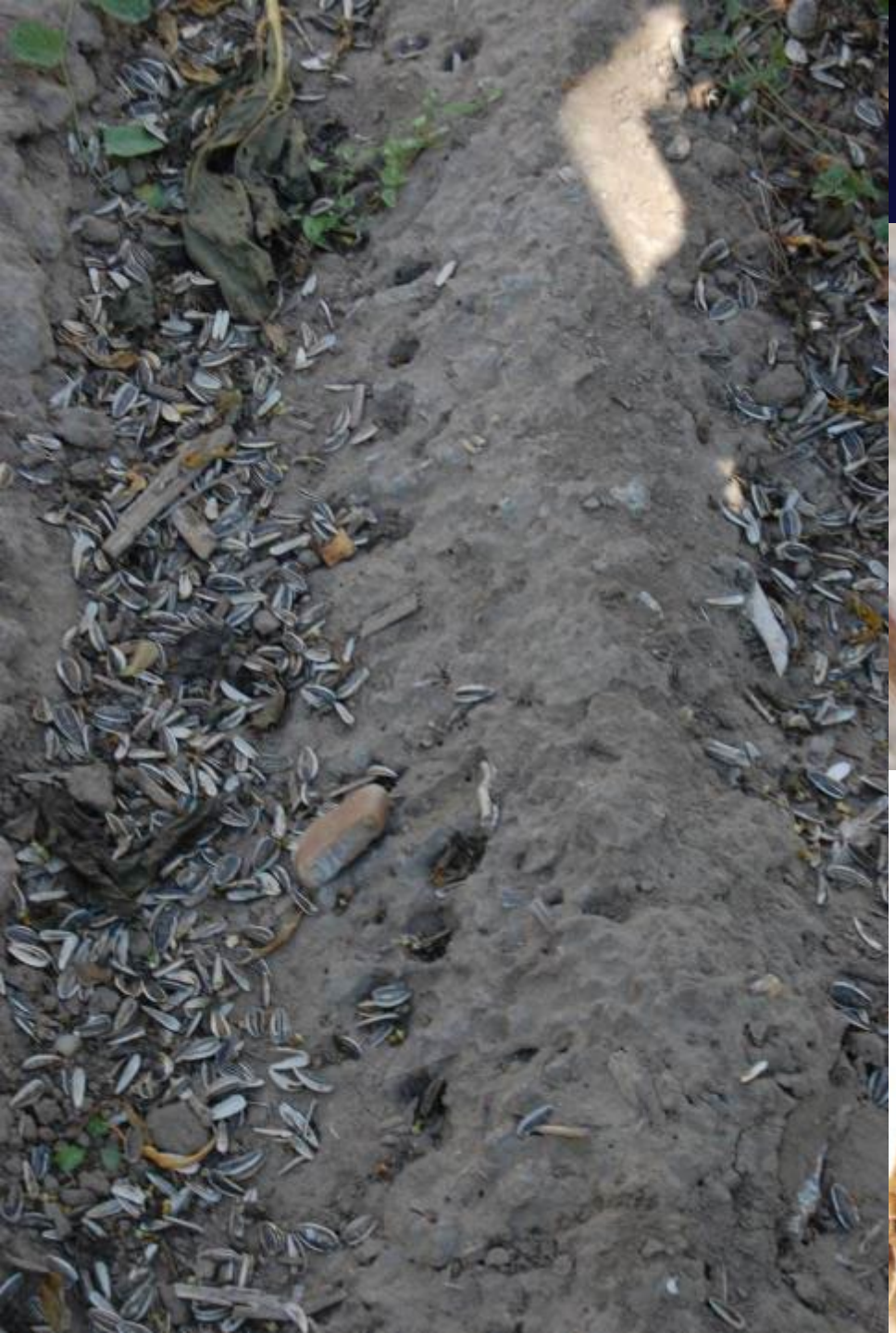
Signs and Symptoms

- Dark spots on back of ripening heads
- Watery soft rot that turns dark with age
- Grayish, fuzzy fungal growth seen on flower side of head
- Heads dry prematurely, and become shredded
- Disease severity and spread increased by wounds - summer storms/hail, insects, and birds

Hail Damage Initiates Infection



Seed Drop – Hail, Insect, Bird



Collaborative Studies

- Over last 10-15 years –studies have been conducted on several sunflower diseases – disease management and yield losses
- Sam Markell, Febina Mathew, Bob Harveson – multiple graduate students and technicians
- NDSU, SDSU, and UNL
- Rust, Phomopsis, and Rhizopus Head Rot

Purpose of the Rhizopus Head Rot Project

- In 2016, it was problematic in North Dakota, South Dakota, and Minnesota
- More commonly seen in CHP – Nebraska, Colorado, and Kansas
- Induce disease and document the potential damage to both oil and confectionary sunflower yields under field conditions
- Multiple geographically and environmentally different locations within sunflower production areas of the Great Plains

Purpose of the Rhizopus Head Rot Project

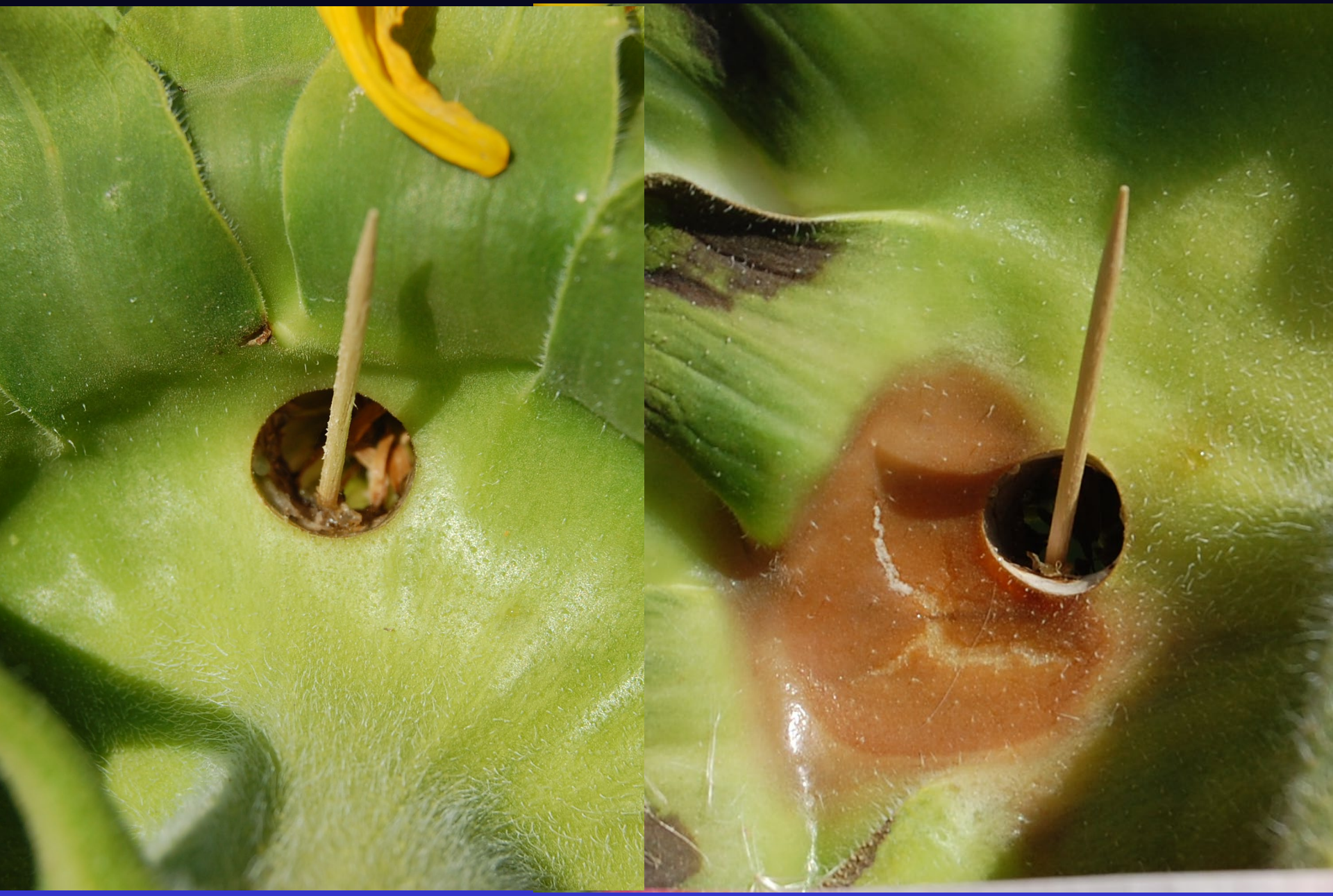
- Little current information as a resource
- Difficult disease to study

  -does not occur every year

  - needs wounding

  -must inoculate for consistent disease pressure

  -unknown methodology for optimal creation of disease



What We Learned

- Best method for wounding and inoculating
- Achieved consistent disease levels within fields
- Quantify losses due to Rhizopus head rot
- Next Step?

Studies in NE and SD 2002-2023

- Each had 7 treatments
- NE - tested 4 fungicides and 2 copper alternative products applied 10-12 days after inoculation (R6)
- SDSU - tested 3 fungicides at two application timings (R3 and R5 – two days after inoculation)

Methodology

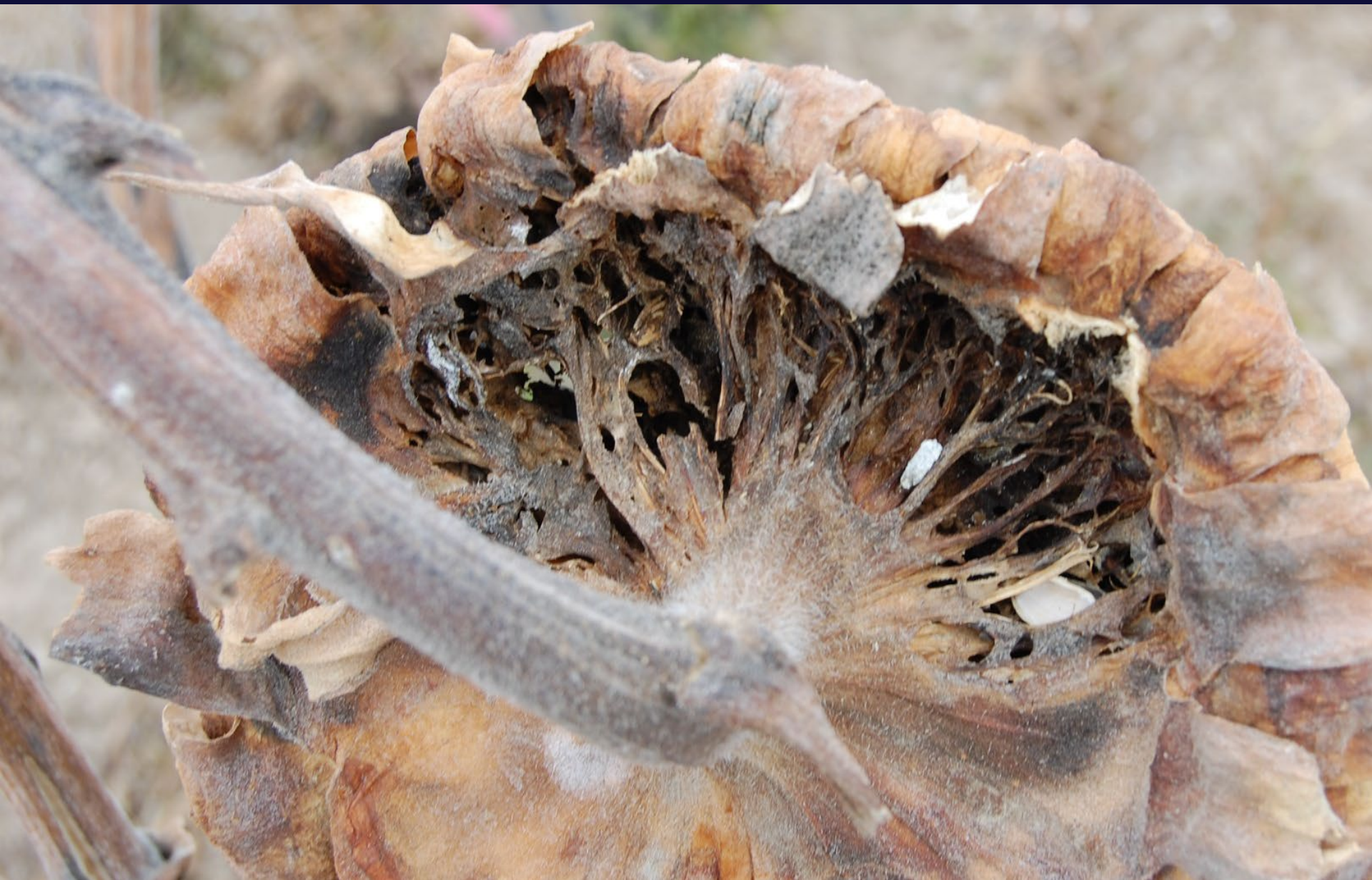
- Plots established in South Dakota, and Nebraska – planted in May
- Plots 4 30 inch rows – 25 ft in length
- NE – confectionary type and sprinkler irrigated
- SD – oil type and rainfed (dry-land)
- Inoculated mid-August (10 plants per plot)
- Disease ratings – late September to mid-October
- Harvest late October

Disease Ratings 0-4

- 0 = no signs or symptoms of disease
- 1 = 1-25% of head affected
- 2 = 26-50% of head affected
- 3 = 51-75% of head affected
- 4 – 76-100% of head affected

Rating of 1

Rating of 2



Rating of 3 (left) and 4 (right)

Nebraska Results 2022

	Disease	Yield (lbs)
Control	52.1a	1.97a
SaniDate	50.0a	1.93a
Folicur	63.1a	1.89a
Topsin	67.5a	1.82a
Life Guard	63.1a	1.77a
Endura	63.7a	1.68a
Priaxor	53.6a	1.63a

Nebraska Results 2023

	Disease	Yield (lbs)
Control	84.3a	0.89a
SaniDate	83.7a	0.76a
Folicur	94.3a	0.63a
Topsin	78.7a	0.73a
Life Guard	90.6a	0.69a
Endura	75.0a	1.14a
Priaxor	80.0a	0.90a

South Dakota Results 2022

	Disease	Yield (lbs)
Control	86.5a	0.92a
Headline R3	98.0a	0.24a
Headline R5	92.0a	0.39a
Folicur R3	86.0a	0.72a
Folicur R5	72.0a	0.32a
Endura R3	90.0a	0.22a
Endura R5	81.5a	0.32a

South Dakota Results 2023

	Disease	Yield (lbs)
Control	61.5a	0.91a
Headline R3	58.5a	0.87a
Folicur R3	62.7a	0.39a
Endura R3	55.5a	0.83a
Headline R5	54.0a	0.81a
Folicur R5	56.0a	0.77a
Endura R5	54.5a	0.73a

Summary and Conclusions

- We do know how to inoculate and consistently create disease for studies
- We also know the extent of damage that is possible
- Still do not know how we can manage this disease with chemical products
  - Which one works best?
  - What time period?

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Questions?