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
- 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







#### 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 extent of 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

#### Inoculations

- Treatments pathogen needs some type of opening or wound on host
  - Control
  - Wound with ball-peen hammer
  - Wound with hammer + inoculation
  - Wound with a cork borer
  - Wound with cork borer + inoculation

### Yield Reduction

- Yield reductions compared with control with no inoculations
  - -2017-40%-45% in NE and
    - 30% in SD
  - -2018-45-60% in NE
  - -2019 45-50% in both NE and SD

#### What We Learned

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

## **Inoculation Procedures**















## Sclerotinia Head Rot



## Methodology - 2022

- 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 at R5 stage)
- Disease ratings late September to mid-October
- Harvest late October

#### 2022 Studies in NE and SD

- NE tested 4 fungicides and 2 copper alternative products
- SDSU tested 3 fungicides at two application timings
- Each had 7 treatments

#### 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)



#### **Ratings of 4**







### Nebraska Results 2022

	<b>Disease</b>	<b>Yield (lbs)</b>
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

### South Dakota Results 2022

Control Headline R3 Headline R5 Folicur R3 Folicur R5 Endura R3 Endura R5

**Yield (lbs)** Disease 0.92a 86.5a 0.24a 98.0a 92.0a 0.39a 0.72a 86.0a 72.0a 0.32a 90.0a 0.22a 81.5a 0.32a

## 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?** 

