

Evaluation of fungicides for their efficacy against Phomopsis stem canker of sunflower



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OUTLINE

- Introduction = Phomopsis stem canker

- Research
 - Objective
 - Experiment
 - Summary
 - Future work



PHOMOPSIS STEM CANKER

- An economically important disease of sunflower
- Yield losses of 40%; Oil reduced by 10-15% (Mathew et al 2015)
- Caused by several species of *Diaporthe*
 - *D. helianthi* and *D. gulyae* = predominant in the U.S.



DISEASE MANAGEMENT

- Cultural practices
- Genetic Resistance
- Chemical control: fungicides



PREVIOUS RESEARCH

- Study by Debaeke and Estragnat (2003) in Europe found that a single fungicide application at the early bud stages resulted in fewer infected plants

- Study by Olson (2017) found the highest yield occurred with a single application at R1



RESEARCH OBJECTIVE

- Compare the efficacy of the fungicides against Phomopsis stem canker at R1 growth stage



EXPERIMENT

- Felt Farm, Brookings SD
- A susceptible hybrid (CHS genetics)
- Randomized complete block design
- 18 treatments and non-treated control, 4 replications per treatment



EXPERIMENT

- Plot size: 4 rows spaced at 30 inches, 20 feet in length
- Population: 18.000 plants/acres
- Application at R1 growth stages



EXPERIMENT

- Fungicides rates were applied according to the label recommendation
- Applied with a CO₂ powered backpack sprayer (Model T4, R&D Sprayers, Opelousas, LA)



EXPERIMENT

- 1.5 m boom equipped with four TeeJet (Spraying Systems Co., Wheaton, IL) flat fan nozzle tips spaced 0.51 m apart

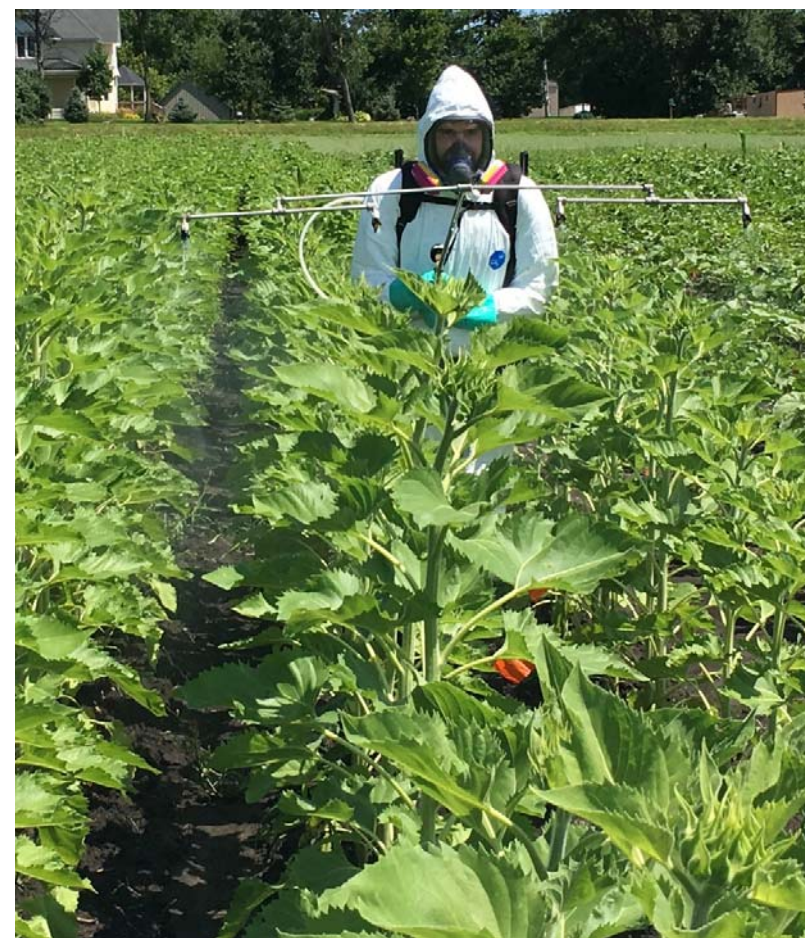
- Spray pressure of 40 psi and approximately 30 gallons water per acre



Treatments

1 - Non treated control	11 - Zolera FX 4.4 oz/a FRAC 11 + 3
2 - Headline 6 oz/a FRAC 11	12 - Trivapro 13.7 oz/a FRAC 3 + 7 + 11
3 - Aproach 6 oz/a FRAC 11	13 - Aproach Prima 6.8 oz/a FRAC 11 + 3
4 - Quadris 6 oz/a FRAC 11	14 - BAS 75007F 3.5 oz/a FRAC 3
5 - Priaxor 4 oz/a FRAC 7 + 11	15 - BAS 75007F 5 oz/a FRAC 3
6 - Luna 9 oz/a FRAC 7 + 9	16 - BAS 75106F 7 oz/a FRAC 11 + 3
7 - Luna 12.8 oz/a FRAC 7 + 9	17 - BAS 75106F 10 oz/a FRAC 11 + 3
8 - Miravis NEO 13.7 oz/a FRAC 7	18 - BAS 75303F 8 oz/a FRAC 11 + 3 + 7
9 - Lucento 5 oz/a FRAC 7 + 3	19 - BAS 75303F 10 oz/a FRAC 11 + 3 + 7
10 - Sovran 3.2 oz/a FRAC 11	All fungicides applied with adjuvant INDUCE





DISEASE EVALUATION

- Disease severity was evaluated by plot at R6- R7 using scale 0 to 5 (Mathew et al. 2015)

- A total of 10 random plants on the two middle rows

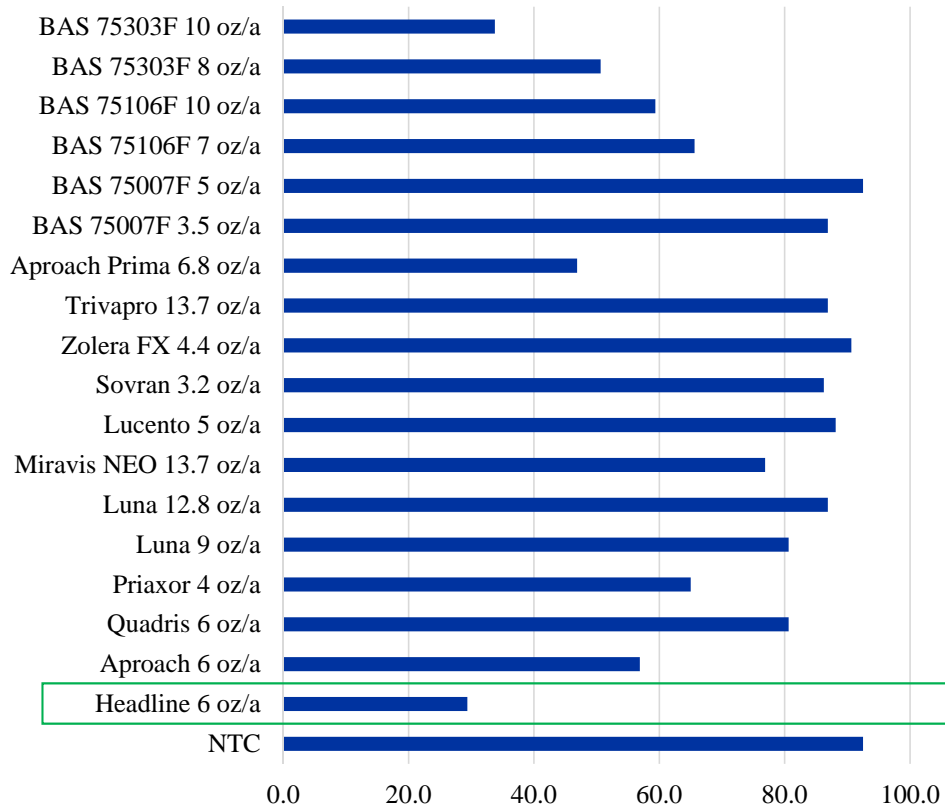


DATA ANALYSES

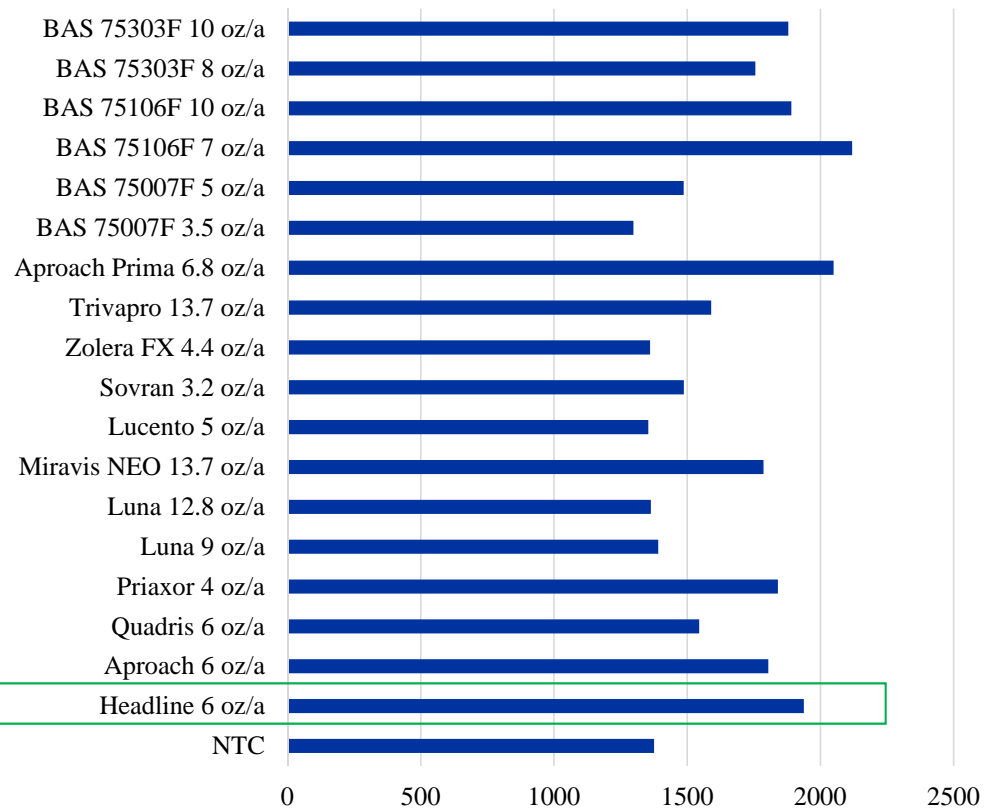
- Disease severity index (DSI) calculated by plot and yield data was analyzed in R.



DSI

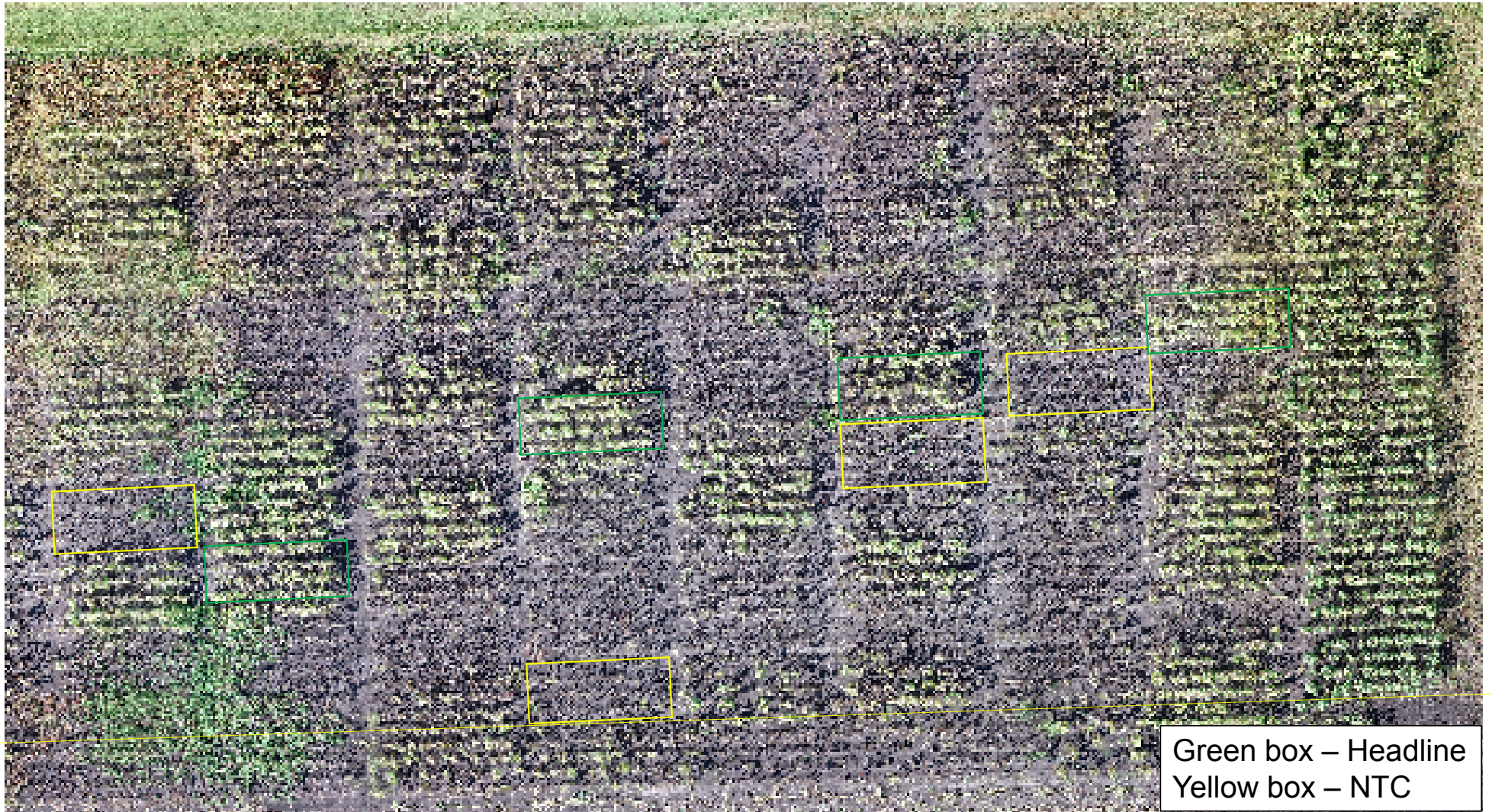


Yield lb/acre



	DSI	Yield (lbs/ac)
P-value	<0.05	0.03
LSD @ .05	15.34	538.83
LSD @ .1	12.82	449.91





Green box – Headline
Yellow box – NTC



SUMMARY

- Nine treatments had DSI significantly lower compared to the non-treated control
- Three treatments had yield significantly higher compared to the non-treated control
- Fungicides with FRAC 11 seems to be effective against Phomopsis stem canker



SUMMARY

- Headline, had the lowest DSI and high yield
- NTC(1375) – Headline(1938): 563 lbs/acre profit



FUTURE WORK

- Evaluate these fungicides at multiple rates under field conditions in Nebraska, North Dakota, and South Dakota in 2020

- Determine the effect of fungicide mobility on *Diaporthe helianthi* and *D. gulyae* in the greenhouse



THANK YOU



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