GREENHOUSE EVALUATION OF DIFFERENT FUNGICIDES AT MULTIPLE RATES TO CONTROL *PHOMOPSIS HELIANTHI*

Ruchika Sharma[1], Nathan Braun[1], Sam Markell[2], Bob Harveson[3] and Febina Mathew[1]

[1]SDSU, DEPT. OF AGRONOMY, HORTICULTURE & PLANT SCIENCE, BROOKINGS, SD;
[2]NDSU, DEPT. OF PLANT PATHOLOGY, FARGO, ND;
[3]UNL- PANHANDLE RES. & EXT. CENTER, SCOTTSBLUFF, NE

South Dakota State University
College of Agriculture, Food and Environmental Sciences

INTRODUCTION

Source: Mathew et al. 2018

Phomopsis stem canker is a yield-limiting disease in the U.S.

Over 40% yield loss was reported in upper Midwest in 2010 (Mathew et al. 2015)

Diaporthe helianthi, *D. gulyae* and *D. stewartii* are reported in the U.S., out of the 20 species worldwide

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MANAGEMENT

- Limited disease management options
- No commercial hybrids have complete resistance to Phomopsis stem canker
- Crop rotation not effective as pathogen survives as endophyte on corn and wheat

Therefore, fungicides may provide short-term solution to Phomopsis stem canker

PREVIOUS RESEARCH

- In Europe, protectant fungicides were used at R1 stage using conventional/ground-driven sprayers (Debaeke et al. 2003)

- In U.S., Olson (2017) observed higher yields in plots with a single application of pyraclostrobin at R1 growth stage

JUSTIFICATION

- Fungicides containing QoI or QoI premixes are effective against Phomopsis stem canker in the field (Guidini et al. 2020)

- A greenhouse study was thus planned to compare different rates of QoI and QoI premixes to control *Diaporthe helianthi*

RESEARCH OBJECTIVE

To evaluate the fungicide efficacy and specificity towards *Phomopsis helianthi* causing sunflower disease in the greenhouse

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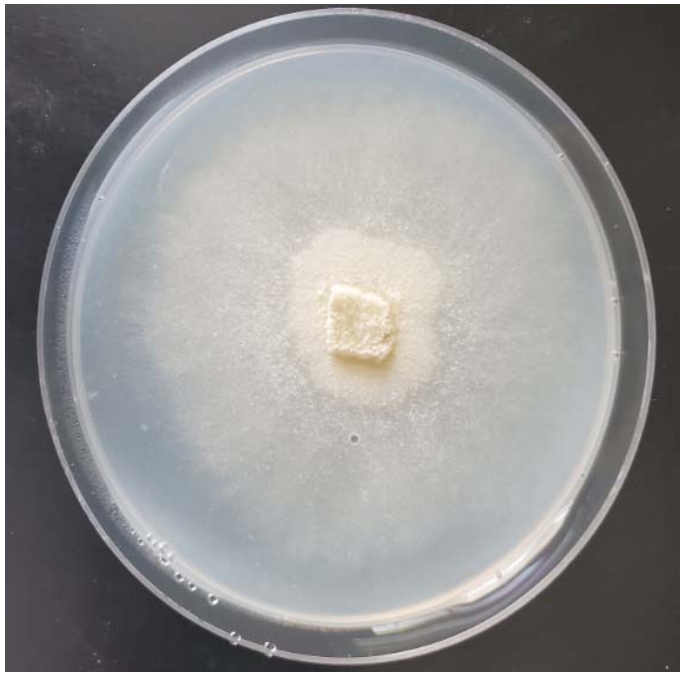
MATERIALS AND METHODS

- Treatments:
  - NTC
  - NTC + NIS (Induce)
  - Headline (FRAC 11) – EC – (1.5, 2.8, 4.5 ml/0.5 liter)
  - Approach Prima (11 + 3) – SC – (0.85, 1.7, 2.5 ml/ 0.5 liter)
  - BAS 75303F (3 + 7+ 11) – SC – (2, 2.5, 2.8 ml/0.5 liter)
  - BAS 75106F (3 + 11) – SC – (1.75, 2.5, 3.1 ml/0.5 liter)

- Experimental design: CRD, 3 pots per treatment (2 plants in each pot), experiment performed twice

MATERIALS AND METHODS

- Susceptible hybrid (CHS genetics)
- Treatments sprayed @ R1 using a hand-held pump sprayer before inoculation.
- Plants wounded using a SD isolate of *D. helianthi*



Spraying technique

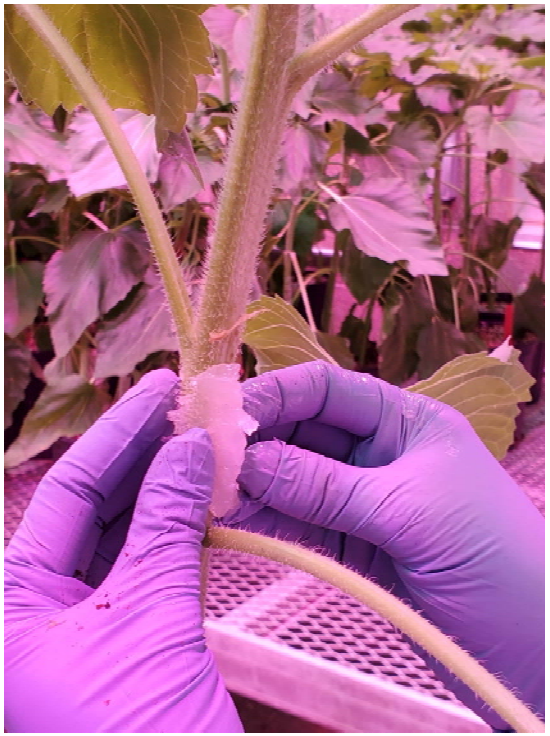
Schneiter and Miller 1981

R1 stage – Bud initiation stage

(the miniature floral head appears at the top)

MATERIALS AND METHODS

- Greenhouse conditions
- Disease evaluated @ 14 days post-inoculation using 0-5 rating scale
- Data analyzed using non-parametric statistics
- RTE calculated




NTC


Adjuvant


Headline

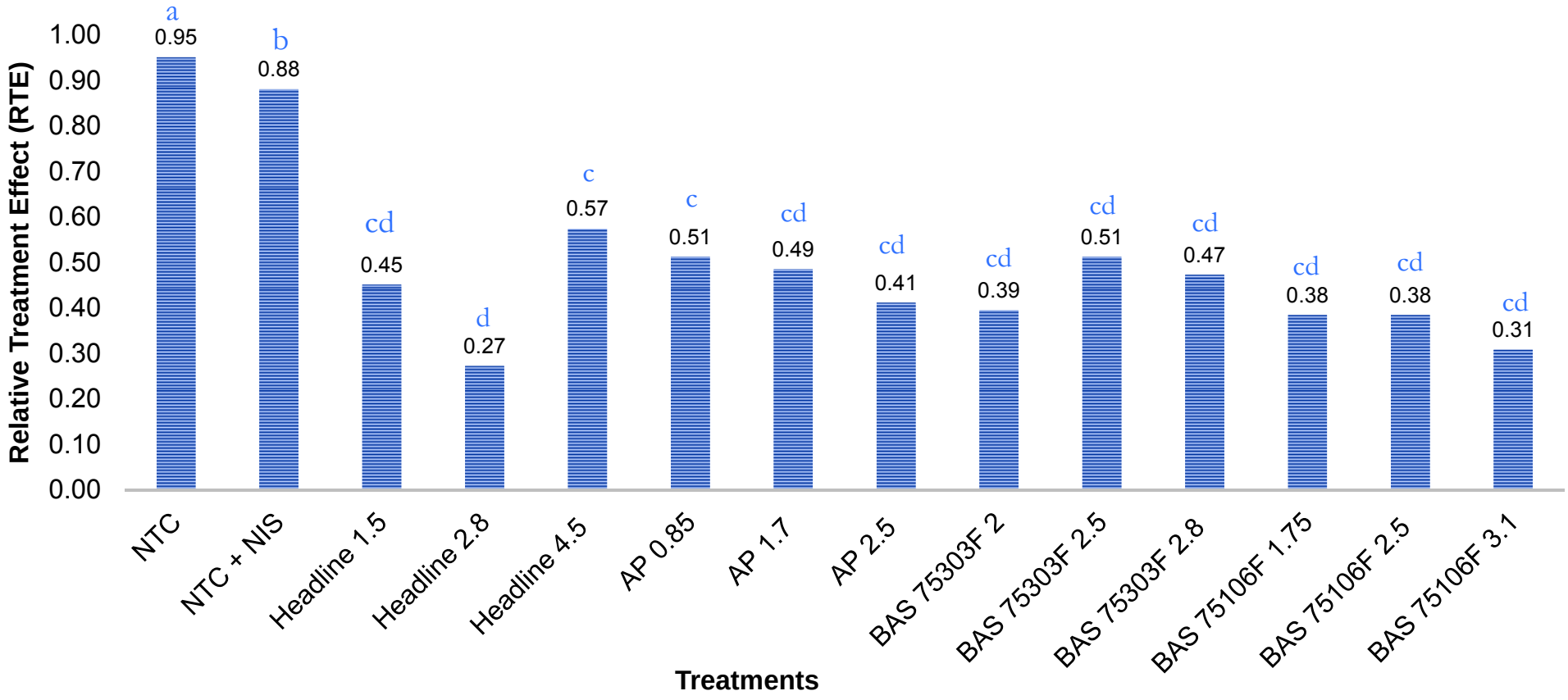

Approach Prima


BAS 75303F


BAS 75106F

INTERNAL BROWNING

RESULTS


Relative Treatment Effect (RTE)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
a 0.95
b 0.88
cd 0.45
d 0.27
c 0.57
c 0.51
cd 0.49
cd 0.41
cd 0.39
cd 0.51
cd 0.47
cd 0.38
cd 0.38
cd 0.31
NTC
NTC + NIS
Headline 1.5
Headline 2.8
Headline 4.5
AP 0.85
AP 1.7
AP 2.5
BAS 75303F 2
BAS 75303F 2.5
BAS 75303F 2.8
BAS 75106F 1.75
BAS 75106F 2.5
BAS 75106F 3.1
Treatments

RESULTS

- Few treatments were examined in the field for their efficacy against Phomopsis stem canker by Guidini et al. (2020)

- Correlation between the greenhouse and field experiments were non-significant ($r = 0.72$; $P = 0.0658$)

SUMMARY

- Fungicides containing QoI (by itself or as premix) were determined to effective against *Diaporthe helianthi*

- *Multiple rates*
  - Headline rates 2.8 and 4.5 ml/0.5 liter were significantly different from each other

SUMMARY

- QoI (e.g. pyraclostrobin) by itself was a strong treatment in the study.

- This suggests that QoI possibly contributes the most to the efficacy in the combination fungicide products.

FUTURE WORK

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

- Determine the sensitivity of *D. helianthi* and *D. gulyae* to QoI (FRAC 11), triazoles (FRAC 3) and SDHI (FRAC 7) fungicides *in vitro*

THANK YOU

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South Dakota OILSEEDS COUNCIL

NDSU

USDA

University of Nebraska Lincoln

Dow DuPont CORTEVA agriscience

BASF The Chemical Company

CHS

National Sunflower Association