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Daren S. Mueller

Iowa State University, dsmuelle@iastate.edu

Kenneth T. Pecinovsky

Iowa State University, kennethp@iastate.edu

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Effect of Fungicides and Plant Populations on Soybean Disease and Yield

Abstract

Fungicides on soybeans provide growers an effective management strategy for foliar diseases, especially soybean rust. However, many questions about fungicides and how common practices affect fungicide efficacy are still unresolved. One possible cultural practice that may affect fungicide efficacy is plant population. Higher plant populations may provide a more conducive microenvironment for certain plant diseases and may reduce the penetration of fungicides to the lower canopy. The objective of these studies was to evaluate the efficacy of fungicides in different soybean plant populations.

Keywords

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Disciplines

Agricultural Science | Agriculture | Plant Pathology

Effect of Fungicides and Plant Populations on Soybean Disease and Yield

RFR-A9118

Daren Mueller, extension specialist
Department of Plant Pathology
Ken Pecinovsky, farm superintendent

Introduction

Fungicides on soybeans provide growers an effective management strategy for foliar diseases, especially soybean rust. However, many questions about fungicides and how common practices affect fungicide efficacy are still unresolved. One possible cultural practice that may affect fungicide efficacy is plant population. Higher plant populations may provide a more conducive microenvironment for certain plant diseases and may reduce the penetration of fungicides to the lower canopy. The objective of these studies was to evaluate the efficacy of fungicides in different soybean plant populations.

Materials and Methods

This is the third year plant populations were evaluated. On May 21, Pioneer 92Y30 RR was planted at four populations (Table 1). Headline[®] (pyraclostrobin, BASF) was applied to half of the plots on August 6 when soybeans were at growth stage R3 (beginning pod). All other plots were the non-treated controls. An insecticide (Warrior) was applied on all plots on August 3. There were eight replications of each plant population and fungicide treatment combination.

Disease was assessed on September 2 by estimating the percentage of blighted (0–100%) leaf tissue on 10 leaves in the lower canopy and 10 leaves in the upper canopy from each plot. Diseases observed were Septoria brown spot in the lower canopy and Cercospora leaf blight in the upper canopy. Frogeye leaf spot, downy mildew, sudden death syndrome, and white mold were also observed but at levels well below 1% severity.

In the fall, final plant population was determined, soybeans were harvested, and yields were calculated.

Results and Discussion

Final populations ranged from 82–86% of the initial population and were not influenced by the fungicide application. The lowest plant population yielded less than the other three populations.

There were moderate levels of brown spot and Cercospora leaf blight (Table 1). Fungicides lowered Septoria brown spot severity in all four populations. However, only the reductions in the two middle populations were statistically significant. Fungicides did not reduce Cercospora leaf blight severity.

Fungicides resulted in over a 3-bushel increase in yield across all populations (Table 1). There were statistically significant increases in yield at the lowest three populations, but not at the highest population. Fungicides had no effect on grain moisture.

Table 1. Effect of fungicide and plant populations on soybean diseases and yield.

Treatment	Initial population	Final population	Brown spot ^a	Total disease ^b upper canopy	Yield	Moisture
Headline	80,000	64,614	4.5	3.6	60.9*	14.5
Headline	128,000	108,174	3.6*	5.2	63.9*	14.4
Headline	175,000	150,282	7.3*	4.2	64.6*	14.3
Headline	225,000	193,116	6.8	5.1	64.1	14.3
Average for Headline-treated plots			5.5	4.5	63.4	14.4
None	80,000	65,340	10.9	0.9	57.5	14.4
None	128,000	108,900	13.1	7.6	59.3	14.3
None	175,000	151,008	15.4	6.7	61.2	14.3
None	225,000	192,390	9.4	4.4	62.6	14.3
Average for Headline-treated plots			12.2	4.9	60.1	14.3

^aBrown spot was assessed on 10 leaves in the lower canopy.

^bDisease was assessed on 10 leaves in the upper canopy; predominately *Cercospora* leaf blight.

*Statistical differences between the treated and non-treated equivalent.