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Effect of Fungicides and Plant Populations on Soybean Disease and Yield

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Effect of Fungicides and Plant Populations on Soybean Disease and Yield

Abstract

Applications of foliar fungicides on soybeans have been shown to reduce disease pressure and protect yield under the right conditions, especially in environments that have very wet or humid conditions. In the past decade, fungicide use in Iowa has increased. Initially, growers were concerned with the potential threat of soybean rust, which is controlled effectively by foliar fungicides. In Iowa, however, there has not been any case of yield reduction due to soybean rust. New potential purposes for foliar fungicides include “plant health” benefits and the reduction of foliar diseases endemic in Iowa such as Septoria brown spot, Cercospora leaf blight, and frogeye leaf spot. Currently what is not known is how the efficacy of fungicides is affected when agricultural practices change. Our question: How does plant population affect the efficacy of fungicides?

Keywords

RFR A1110, Plant Pathology and Microbiology

Disciplines

Agricultural Science | Agriculture | Plant Pathology

Effect of Fungicides and Plant Populations on Soybean Disease and Yield

RFR-A11110

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Introduction

Applications of foliar fungicides on soybeans have been shown to reduce disease pressure and protect yield under the right conditions, especially in environments that have very wet or humid conditions. In the past decade, fungicide use in Iowa has increased. Initially, growers were concerned with the potential threat of soybean rust, which is controlled effectively by foliar fungicides. In Iowa, however, there has not been any case of yield reduction due to soybean rust. New potential purposes for foliar fungicides include “plant health” benefits and the reduction of foliar diseases endemic in Iowa such as Septoria brown spot, Cercospora leaf blight, and frogeye leaf spot. Currently what is not known is how the efficacy of fungicides is affected when agricultural practices change. Our question: How does plant population affect the efficacy of fungicides?

Materials and Methods

There were two treatment levels in this study: plant population and fungicide application.

Soybeans were planted at 80,000, 128,000, 175,000, and 225,000 seeds/acre. Half of these plots were sprayed with pyraclostrobin (Headline®, BASF) at growth stage R3 (July 25) and the other half were used as non-treated controls.

Disease severity was assessed late in season (August 24) by visually estimating percent lesion area on 10 leaflets in the upper and lower canopy on each plot. The primary disease found in 2011 was Septoria brown spot and was primarily found in the lower canopy. After senescence, final plant population was determined, soybeans were harvested, and yields were standardized to bushels per acre at 13 percent moisture for comparison.

Results and Discussion

Fungal diseases were not present in great levels and fungicides were not effective in reducing disease in 2011 (Table 1). There were no differences in yield detected in plant population pairs, with and without fungicide applications. This is despite that plots treated with Headline® had averaged greater yield than plots not treated with fungicide (Table 1). Previous years of this study have given varying results. Data from 2011 is most like what was seen in 2007 and 2008. In those years, fungicides added no yield benefit.

Table 1. The effect of fungicide and plant population on Septoria brown spot and yield in northeast Iowa in 2011.

Initial population	Headline®	Final population	Brown spot^a	Moisture	Yield (bu/ac)
81,402	Yes	63,888	5.3	10.1	63.2
129,084	Yes	102,608	6.7	10.2	71.2
175,634	Yes	137,456	3.4	10.3	70.0
219,541	Yes	166,496	4.8	10.5	67.9
Average			5.1	10.3	68.1
81,402	No	69,696	7.5	10.0	64.6
129,084	No	100,672	7.7	10.1	66.8
175,634	No	133,584	4.8	10.0	67.2
219,541	No	179,080	6.5	10.0	65.6
Average			6.6	10.0	66.1

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

Table 2. The effect of fungicide and plant population on Septoria brown spot and yield in northeast Iowa in 2007–2010.

Initial plant population	Headline®	2007		2008		2009		2010	
		Brown Spot^a	Yield	Brown Spot	Yield	Brown Spot	Yield	Brown Spot	Yield
80,000	Yes	1.7	62.5	3.7	58.7	4.5	60.9*	2.5*	60.4
128,000	Yes	2.3	61.7	2.9	61.6	3.6*	63.9*	5.1*	63.3*
175,000	Yes	2.7	63.3	3.1	61.5	7.3*	64.6*	5.3*	59.7
225,000	Yes	3.0	60.3	3.8	61.4	6.8	64.1	4.5*	60.9
Average		2.4	62.0	3.4	60.8	5.6	63.4	4.4	61.1
80,000	No	4.0	57.4	2.9	59.2	10.9	57.5	10.1	57.4
128,000	No	3.7	59.7	2.7	61.3	13.1	59.3	11.7	57.2
175,000	No	4.3	56.7	5.2	62.0	15.4	61.2	18.7	59.0
225,000	No	5.0	56.7	6.2	62.5	9.4	62.6	12.2	60.7
Average		4.3	57.6	4.3	61.3	12.2	60.2	13.2	58.6

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

*Statistical differences (P=0.05) between the treated and non-treated equivalent.