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Effect of Seed Treatment and Foliar Fungicides on Soybean White Mold and Yield Response

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Effect of Seed Treatment and Foliar Fungicides on Soybean White Mold and Yield Response

Abstract

Soybean white mold has been a production problem for soybean producers since early 1990. Sclerotia germinate and produce apothecia, and apothecia produce ascospores. These spores attack soybean plants at flowering. In addition, sclerotia can germinate and colonize soybean plants. Therefore, seed treatment and or foliar application may help reduce incidence and severities and yield loss due to white mold. In Iowa, for the first time in the 2009 growing season, we observed wide spread of both the soybean sudden death syndrome (SDS) and white mold (WM). Sporadically, the simultaneous occurrence of SDS and WM had only been observed once in 2007. Many growers experienced the occurrence of SDS and WM on the same farm, and some in the same field. This is complicating management strategies. Objectives of these studies were to assess effects of seed treatment and foliar spray on soybean white mold and yield response at the ISU Northeast Research Farm, Nashua, Iowa.

Keywords

RFR A11107, Plant Pathology and Microbiology

Disciplines

Agricultural Science | Agriculture | Plant Pathology

Effect of Seed Treatment and Foliar Fungicides on Soybean White Mold and Yield Response

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Introduction

Soybean white mold has been a production problem for soybean producers since early 1990. Sclerotia germinate and produce apothecia, and apothecia produce ascospores. These spores attack soybean plants at flowering. In addition, sclerotia can germinate and colonize soybean plants. Therefore, seed treatment and or foliar application may help reduce incidence and severities and yield loss due to white mold. In Iowa, for the first time in the 2009 growing season, we observed wide spread of both the soybean sudden death syndrome (SDS) and white mold (WM). Sporadically, the simultaneous occurrence of SDS and WM had only been observed once in 2007. Many growers experienced the occurrence of SDS and WM on the same farm, and some in the same field. This is complicating management strategies. Objectives of these studies were to assess effects of seed treatment and foliar spray on soybean white mold and yield response at the ISU Northeast Research Farm, Nashua, Iowa.

Materials and Methods

Seed treatment study. The experiments had three replications at the ISU Northeast Research Farm, Nashua. Fungicide treated soybean seed Pioneer 92M40RR was planted at 188,000 PPA in 30-in. row spacing with a Kinze planter on May 11, 2011. Plots per

replication were 15 ft wide and 108 ft long. Results are in Table 1.

Foliar fungicide trails. The experiments had four replications. Companies that participated were BASF (21 treatments), Bayer (10), Cheminova (4), FMC Agro (11), and ISK Biosciences (10). Untreated seed were planted on May 19. In ISK Bioscience, Pioneer 92Y51RR and in other trials Kruger seed 23-02 RR was planted at 188,000 PPA in 30-in. row spacing (plots 15 ft × 50 ft). Weeds were kept under control by spraying roundup Weathermax at 22 oz/acre twice during the season. Fungicides were sprayed at different growth stages (Tables 2-3) with CO₂ backpack 10 ft hand boom/XR8003 tips. In addition to white mold incidence and severities, plots were evaluated for foliar diseases. Results are in Tables 2–4. Trials were harvested the first week of October and plot yields were measured in bushels per acre.

Results and Discussion

Percent change in white mold incidence and severity and soybean yield over untreated and unsprayed controls are given in Tables 1–4. Incidence percentage = (WM infected plants/total plants*100), Severity percentage = percent damage of WM infected plants.

Acknowledgements

We thank BASF, Bayer Crop Science, Cheminova, FMC Corporation, HeadsUp Plant Protectant, and ISK Biosciences companies in testing their products on soybean diseases. We also thank them for their funding support to carry out these experiments. Products tested in this study do not imply endorsement of one product over another, nor is discrimination intended against any similar products tested in our studies.

Table 1. Percent change in white mold incidence and severity and soybean yield over untreated control during 2011 for seed treatments.

Company Products tested	Application		White mold ^{2,3}		
	Rate	time	Inc%	Sev%	Yield
HeadsUp Plant Protectant	1g/L	at planting	-0.93	3.33	0.82
BFNI50% ¹	4ml/kg	at planting	-0.10	13.33	1.10
BFNI25% ¹	4ml/kg	at planting	-0.89	3.33	-0.40

¹Unregistered bio-fungicide, Plant Pathology and Microbiology, ISU; Variety Planted: Pioneer 92M40RR.

²Mean of three replications each with plot size of 15 ft wide × 108 ft long.

³Incidence percentage = (WM infected plants/total plants*100), Severity percentage = percent damage of WM infected plants.

Table 2. Percent change in white mold incidence and severity and soybean yield over unsprayed control during 2011 for foliar fungicides.

Company	Products tested ¹	Application		White mold ^{2,3}		
		Rate	Time	Inc %	Sev %	Yield
BASF	End/HSOC + End/Priaxor/HSOC	6/0.5%+6/4/0.5%	R1+R3	0.76	0.00	12
BASF	End/HSOC + Priaxor/NIS	6 oz+0.5%/4oz+0.25%	R1+R3	0.70	17.50	10
BASF	End/HSOC + End/HSOC	6+0.5%/6+0.5%	R1+R3	0.38	-16.25	6
BASF	Endura/HSOC	8 oz/ac+0.5%v/v	R1	0.89	15.00	2
BASF	Proline + NIS	3 oz/ac+0.25%v/v	R1	0.88	-7.50	1
BASF	Topsin M 4.5L	20 oz/ac	R1	1.60	10.00	1
BASF	Endura/HSOC	6 oz/ac+0.5%v/v	R1	1.07	2.50	1
BASF	Endura/HSOC	4 oz/ac+0.5%v/v	R1	0.70	-12.50	1
BASF	Domark + NIS	4 oz/ac+0.25%v/v	R1	0.41	2.50	-1
BASF	Cobra + COC	6 oz/ac+1 pt/ac	R1	0.03	-25.00	-2
Cheminova	Topguard	7+7 oz/ac	R1+R3	0.30	30.00	4
Cheminova	Topguard	7 oz/ac	R1	0.40	37.50	2
Cheminova	Domark + Domark	5+5 oz/ac	R1+R2	0.24	2.50	-1
FMC	Cadet Hrb + COC	0.5 oz/ac+1%v/v	R1	0.05	-5.00	5
FMC	Cadet + Topsin M + NIS	0.5+1Lba/a+0.25%	R1	0.00	7.50	5
FMC	Cadet Herbicide + NIS	0.9 oz/ac+0.25%v/v-	R1	-0.18	-7.50	5
FMC	Cadet + COC	0.5 oz/ac+1%v/v	V4	0.23	7.50	4
FMC	Cadet Hrb + COC	0.9 oz/ac+1%v/v	R1	-0.04	-2.50	4
FMC	Cadet + NIS	0.5 oz/ac+0.25%v/v	V4	0.18	12.50	3
FMC	Topsin M 4.5L	20 oz/ac	R1	0.20	2.50	3
FMC	Cobra Hrb + COC	8 oz/ac+1%v/v	R1	-0.08	10.00	2
FMC	Cadet Hrb + NIS	0.5 oz/ac+0.25%v/v	R1	-0.14	-12.50	1
FMC	Cadet +Regalia +COC	0.5+3qt+1%v/v	R3	-0.13	-20.00	0

¹Some of the products listed may be competitive treatments for comparison purpose.

²Mean of four replications each with plot size of 15 ft wide × 50 ft long. White mold incidence is based on 1972.20 plants in 455 sq ft plot per replication. Variety planted: Kruger 23-02RR, Plant population: 188.8K per acre; NIS=Non-ion surfactant, COC=crop oil concentrate; HSOC= High surfactant oil concentrates.

³Incidence percentage = (WM infected plants/total plants*100), Severity percentage = percent damage of WM infected plants.

Table 3. Percent change in white mold incidence and severity and soybean yield over unsprayed control during 2011 for foliar fungicides.

Company	Products tested ¹	Application		White mold ^{2,3}		
		Rate oz/acre	Time	Inc %	Sev %	Yield
Bayer	P'line+ (P'line+Stratego YLD)	3+4.65+1.5	R1+R3	-0.07	-35.00	17
Bayer	Proline + Stratego YLD	3+4.65	R1+R3	0.04	12.50	14
Bayer	Proline + Proline	5+5	R1+R3	0.08	-5.00	12
Bayer	Endura + Endura	5.5+5.5	R1+R3	-0.05	2.50	12
Bayer	Proline + Proline	3+3	R1+R3	0.10	-7.50	8
Bayer	Domark + Dormark	4+4	R1+R3	-0.05	-5.00	6
Bayer	Cobra + Domark	6+4	R1+R3	0.09	-17.50	3
Bayer	Cobra	6	R1	-0.07	-35.00	2
BASF	Priaxor + Fastac + NIS	4 + 3.2 + 0.25%v/v	R3	0.16	-45.00	16
BASF	Stratego YLD+ Leverage + NIS	4 + 3.76+0.25%v/v	R3	0.36	-6.25	16
BASF	Headline + Fastac +NIS	6 + 3 + 0.25%v/v	R3	0.06	-8.75	14
BASF	Quadris Xcel +Warrior+NIS	10.5+2.56+0.25%vv	R3	0.44	5.00	13
BASF	Priaxor + NIS	4 + 0.25%v/v	R3	0.10	-25.00	12
BASF	Headline + NIS	6 + 0.25%v/v	R3	0.15	-15.00	11
BASF	Stratego YLD + NIS	4 + 0.25%v/v	R3	-0.06	-37.50	10
BASF	Quilt Xcel	10.5 + 0.25%v/v	R3	0.58	0.00	6

¹Some of the products listed may be competitive treatments for comparison purpose.

Mean of four replications each with plot size of 15 ft wide × 50 ft long. White mold incidence is based on 1972.20 plants in 455 sq ft plot per replication. Variety planted Kruger 23-02RR, Plant population: 188.8K per acre; NIS=Non-ion surfactant.

³Incidence percentage = (WM infected plants/total plants*100), Severity percentage = percent damage of WM infected plants.

Table 4. Percent change in white mold incidence and severity and soybean yield over unsprayed control during 2011 for foliar fungicides.

Company	Products tested ¹	Application		White mold ^{2,3}		
		Rate per acre	Time	Inc %	Sev %	Yield
ISK Biosciences	Omega	1 pt	R3	-0.98	-35.00	5
ISK Biosciences	Omega	1 pt @ 3-5 gpa	R3	-1.12	-41.25	5
ISK Biosciences	Endura	8 oz	R3	-0.70	-10.00	4
ISK Biosciences	Domark	5 oz	R3	-0.42	0.00	3
ISK Biosciences	Topsin 4.5F	20 oz	R3	0.83	-6.25	3
ISK Biosciences	IKF-5411	22 oz	R3	-0.40	-20.00	2
ISK Biosciences	Omega	0.75pt	R3	-0.71	-22.50	1
ISK Biosciences	IKF-5411	13.5 oz	R3	-0.51	-15.00	0
ISK Biosciences	IKF-5411	17.0 oz	R3	-0.23	-5.00	-0.4

¹Some of the products listed may be competitive treatments for comparison purpose.

²Mean of four replications each with plot size of 15 ft wide × 50 ft long. White mold incidence is based on 1972.20 plants in 455 sq ft plot per replication. Variety planted: Pioneer 92Y51RR, Plant population: 188.8K per acre; Pt=Pint, gpa=gallons per acre.

³Incidence percentage = (WM infected plants/total plants*100), Severity percentage = percent damage of WM infected plants.