Effective soybean disease management with fungicides and nematicides and soybean disease education for South Dakota

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Research summary:

Eleven foliar fungicide products were evaluated for their efficacy in controlling fungal diseases and increasing soybean yield at three locations in FY15. Also, three nematicide seed treatments were compared to a non-treated check in reducing SCN population density for both SCN susceptible and resistant cultivars at two locations. At all three locations, both seedling disease and foliar disease pressure was very low. As a result, no significant grain yield differences were observed between treated and non-treated plots. Nematicide seed treatments were not consistent in reducing SCN population density or increasing grain yield, however, the SCN resistant cultivar yielded consistently 4 bushels or more compared to the susceptible cultivar at both locations.

Introduction:

Plant protection products are a major component of disease management in soybeans. However, their maximum benefit is realized when there is significant disease pressure. Because of new products that are added on the market annually, there is a need for growers to be availed unbiased research-based information on the effectiveness of these products. There is also a need to test these products from year to year as environmental conditions change from season to season.

Soybean nematicide seed treatment products also continue to be added to the market. For instance Clariva, complete beans for SCN control from Syngenta, is a new product combining nematicide, fungicide and insecticide. Because of the complexity of SCN, no single method can be sufficient in managing SCN. Therefore evaluating the efficacy of nematicide seed treatment is essential to help producers decide on which product(s) to use.

The objectives of this grant were to:

(i) Establish robust efficacy trials for foliar fungicide products and validate the economics of their application on soybeans in South Dakota, and

(ii) Test the efficacy of fungicide seed treatments on soybeans in South Dakota and examine the economic impact of their use.

Description of achievements

Foliar fungicide trials were established at three sites, Beresford and Volga Research farms, and at a cooperator's field in West Browns Valley. At Beresford and West Browns Valley, soybean was planted into corn stubble. At Volga, soybean was planted into wheat stubble. Nematicide seed treatments were established at the Beresford research farm and at a cooperators field in Hurley, SD. For nematicide seed treatment trials, a SCN susceptible cultivar (Syngenta S14-J7) and a SCN resistant cultivar (Syngenta S17-B3) were used. Three nematicide seed treatment products and 11 foliar fungicide products were evaluated. Treatments were replicated four times. Foliar fungicides were applied at the R3 growth stage at all three locations. Soybean plots were assessed for all diseases and stand counts were determined for seed treatment plots. Initial SCN population density was determined at the beginning of the season (at planting) and then at the end of the season (at harvest) to determine change in SCN numbers due to nematicide seed treatment.

Foliar fungicides

At all sites and in all treatments, there was very low disease pressure (<3%). The most common fungal disease observed at all sites was brown spot. Downy mildew, white mold, and Cercospora blight were observed at very low incidence. Due to low disease pressure, all fungicides had no significant difference for grain yield between treated and non-treated plots at all locations (Tables 1&2). Lack of statistical difference indicates that the difference between treated and non-treated was not consistent among the four replications and was due to random chance.

Based on these data, it was not profitable to apply foliar fungicides to soybean, i.e. there was not consistent yield gain as a result of fungicide application to offset the fungicide and application cost.

Table 1. Soybean grain yield (bu/ac) as influenced by different foliar fungicides applied at R3 growth stage in 2014 at Southeast Research Farm, Beresford and at Volga Research Farm.

			Beresford			Volga		
Treatment	Rate	unit	Brown spot %	Yield bu/A	Test Weight lb/bu	Brown spot %	Yield bu/A	Test Weight lb/bu
Untreated			2	56.38	55.8	1.38	61.87	56.2
Fortix	5	fl oz/a	1.75	56.08	55.7	0.88	56.66	56.01
Stratego YLD	4	fl oz/a	1.75	57.36	56.01	0.88	64.62	56.49
Priaxor	4	fl oz/a	1.25	66.92	55.75	1.25	58.37	56.28
Quilt Xcel	10.5	fl oz/a	2.5	58.53	55.74	1	63.88	56.18
Stratego YLD	4	fl oz/a	1.5	63.98	55.99	0.68	60.81	56.23
Aproach	6	fl oz/a	1.75	57.55	55.79	1.38	64.13	56.09
Aproach Prima	6.8	fl oz/a	1.5	63.23	55.79	1.5	61.55	56.23
Quadris Top	8	fl oz/a	1.25	57.24	55.62	1.38	67.38	56.47
Priaxor	4	fl oz/a	1.75	62.76	56.45	0.88	63.96	56.56
Fastac	3.8	fl oz/a						
Priaxor	4	fl oz/a	1.5	60.77	56.23	1.13	65.76	56.6
Domark	4	fl oz/a						
Custodia	8.6	fl oz/a	1.75	60.38	56.08	1	60.43	56.72
	F-LSD (P=0.05)		NS	NS	NS	NS	6.11	NS
	CV		47.39	9.55	1.07	52.58	6.84	0.78

Table 2. Soybean grain yield (bu/ac) as influenced by different foliar fungicides applied at R3 growth stage in 2014 at West Browns Valley.

Treatment Name	Rate	Rate Unit	Brown Spot Rating %	Yield bu/A	Test Weight lb/bu
Untreated			1.00	52.82	56.65
Fortix	5	fl oz/a	1.25	62.08	56.57
Stratego YLD	4	fl oz/a	1.25	61.51	56.44
Priaxor	4	fl oz/a	1.50	56.18	56.62
Quilt Xcel	10.5	fl oz/a	1.00	59.98	55.51
Stratego YLD	4	fl oz/a	2.00	58.27	55.72
Aproach	6	fl oz/a	1.00	57.19	56.85
Aproach Prima	6.8	fl oz/a	2.00	53.40	56.63
Quadris Top	8	fl oz/a	1.50	53.32	57.17
Priaxor	4	fl oz/a	1.00	63.43	56.28
Fastac	3.8	fl oz/a			
Priaxor	4	fl oz/a	1.00	57.29	56.72
Domark	4	fl oz/a			
Custodia	8.6	fl oz/a	0.88	59.91	55.49
		F-LSD (P=0.05)	NS	NS	NS
		CV	80.01	12.85	1.47

Nematicide seed treatments

Initial SCN population density was comparable within all plots at both Beresford and Hurley locations. Final SCN population at the end of the season was, however, higher at the Hurley location than at the Beresford location. Nematicide seed treatments had no significant effect on yield for both the susceptible and resistant cultivars at the two locations (Tables 3&4). This was in comparison to the standard non-treated check or fungicide only seed treatment check. However, there was a consistent four bushel or higher yield gain for the resistant cultivar across the treatments especially at the Hurley location where SCN numbers were much higher than at Beresford.

Table 3. Effect of nematicide seed treatments on plant stand (plants/acre), SCN population density, and grain yield (bushels/acre) at the Southeast Research Farm, Beresford 2014.

Treatment Name	Rate	Rate Unit	Stand Counts Plants/A 6/11/2014	Yield bu/A 10/14/2014	Test Weight lb/bu	SCN Spring Numbers eggs/J2	SCN Fall Numbers egg/J2
Susceptible cultivar: S14-J7							
Untreated			83865.04	50.98	54.83	383.33	6400
CruiserMaxx Beans	0.0907	mg ai/seed	95119.66	54.44	55.54	516.67	5316.67
Vibrance	0.0038	mg ai/seed					
Avicta Complete Beans 500	0.2419	mg ai/seed	98387.12	49.24	55.24	366.67	6333.33
Vibrance	0.0038	mg ai/seed					
Clarva Complete Beans	0.0907	mg ai/seed	93667.45	57.64	54.59	266.67	4183.33
Vibrance	0.0038	mg ai/seed					
Clariva PN	2	fl oz/cwt					
Evergol Energy	1	fl oz/cwt	88947.77	46.78	55	333.33	7316.67
Poncho/VoTivo	2	fl oz/cwt					
Allegiance	0.75	fl oz/cwt					
		F-LSD (P=0.05)	NS	NS	NS	NS	NS
		CV	6.31	13.78	0.64	27.28	46.87
SCN resistant cultivar : S17-B3							
Untreated			91126.08	54.63	55.53	200.00	4850.00
CruiserMaxx Beans	0.0907	mg ai/seed	90036.93	58.23	55.25	433.33	5816.67
Vibrance	0.0038	mg ai/seed					
Avicta Complet Beans 500	0.2419	mg ai/seed	97661.02	55.80	55.42	200.00	7816.67
Vibrance	0.0038	mg ai/seed					
Clarva Complete Beans	0.0907	mg ai/seed	83138.93	57.26	55.43	583.33	4066.67
Vibrance	0.0038	mg ai/seed					
Clariva PN	2	fl oz/cwt					
Evergol Energy	1	fl oz/cwt	86406.41	53.04	55.47	900.00	4616.67
Poncho/VoTivo	2	fl oz/cwt					
Allegiance	0.75	fl oz/cwt					
		F-LSD (P=0.05)	NS	NS	NS	NS	NS
		CV	5.97	13.97	0.66	81.37	51.55

Table 4. Effect of nematicide seed treatments on plant stand (plants/acre), SCN population density, and grain yield (bushels/acre) at Hurley location, 2014.

Treatment Name	Rate	Rate Unit	Stand Counts Plants/A 6/11/2014	Yield bu/A 10/10/2014	Test Weight lb/bu	SCN Spring Numbers eggs/J2	SCN Fall Numbers eggs/J2
Susceptible cultivar: S14-J7							
Untreated			87858.61	34.93	55.65	2950.00	10050.00
CruiserMaxx Beans	0.0907	mg ai/seed	88221.66	40.29	55.48	1366.67	6533.33
Vibrance	0.0038	mg ai/seed					
Avicta Complet Beans 500	0.2419	mg ai/seed	107100.38	46.55	55.37	1100.00	10266.67
Vibrance	0.0038	mg ai/seed					
Clarva complete Beans	0.0907	mg ai/seed	95482.71	31.49	56.04	2700.00	8583.33
Vibrance	0.0038	mg ai/seed					
Clariva PN	2	fl oz/cwt					
Evergol Energy	1	fl oz/cwt	103832.91	37.42	55.50	4100.00	8783.33
Poncho/VoTivo	2	fl oz/cwt					
Allegiance	0.75	fl oz/cwt					
		F-LSD (P=0.05)	NS	NS	NS	NS	NS
		CV	8.12	35.80	0.87	58.14	57.37
Resistant cultivar: S17-B3							
Untreated			100565.44	47.81	55.73	1933.33	5483.33
CruiserMaxx Beans	0.0907	mg ai/seed	108915.63	47.85	55.95	2666.67	10116.67
Vibrance	0.0038	mg ai/seed					
Avicta Complete Beans 500	0.2419	mg ai/seed	98387.12	51.62	55.84	1383.33	6833.33
Vibrance	0.0038	mg ai/seed					
Clarva Complete Beans	0.0907	mg ai/seed	96208.81	44.85	56.10	2450.00	14816.67
Vibrance	0.0038	mg ai/seed					
Clariva PN	2	fl oz/cwt					
Evergol Energy	1	fl oz/cwt	91852.19	52.31	55.60	3800.00	9700.00
Poncho/VoTivo	2	fl oz/cwt					
Allegiance	0.75	fl oz/cwt					
		F-LSD (P=0.05)	NS	NS	NS	NS	NS
		CV	20.06	15.82	0.67	39.69	58.65

Education component

Two field days were held at Hurley and West Browns Valley to provide producers with hands-on experience in diagnosing soybean diseases and SCN. Data from our field trials have been published in a data book and is available on iGrow. Disease progress and alerts were published

in form of newsletter articles, tweets, radio interviews, and through field days and other extension talks throughout the year.

Future projections

We achieved the goals of this grant – testing foliar fungicides and nematicide seed treatments. The foliar fungicide results continue to show limited yield gain when there very low disease pressure. The nematicide seed treatment results indicate inconsistent results and the use of resistant cultivar has consistently given higher yields. Results from this study were posted on iGrow for producers to have access. We hope to continue providing unbiased information to enable producers to make informed decisions regarding fungicide applications.

Publications

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