Field evaluation of fungicides for management of Sclerotinia stem rot on soybeans

Carrington, ND (2012)

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KEY FINDINGS:

- **Endura** (boscalid) **was the only fungicide to provide statistically significant improvments in disease control and soybean yield in this trial.** Applied as two sequential applications at 8 oz/ac, Endura improved disease control relative to the non-treated control. Applied as a single application of 4 oz/ac at the early R2 growth stage, Endura improved disease control and soybean yield relative to the worst-performing treatment.

- **Due to high variability in disease pressure across treatments, it was difficult to differentiate other treatments.** Additional testing will be conducted on Endura (boscalid), Aproach (picoxystrobin) and a tank-mix of Proline (prothioconazole) plus Topsin (thiophanate-methyl).
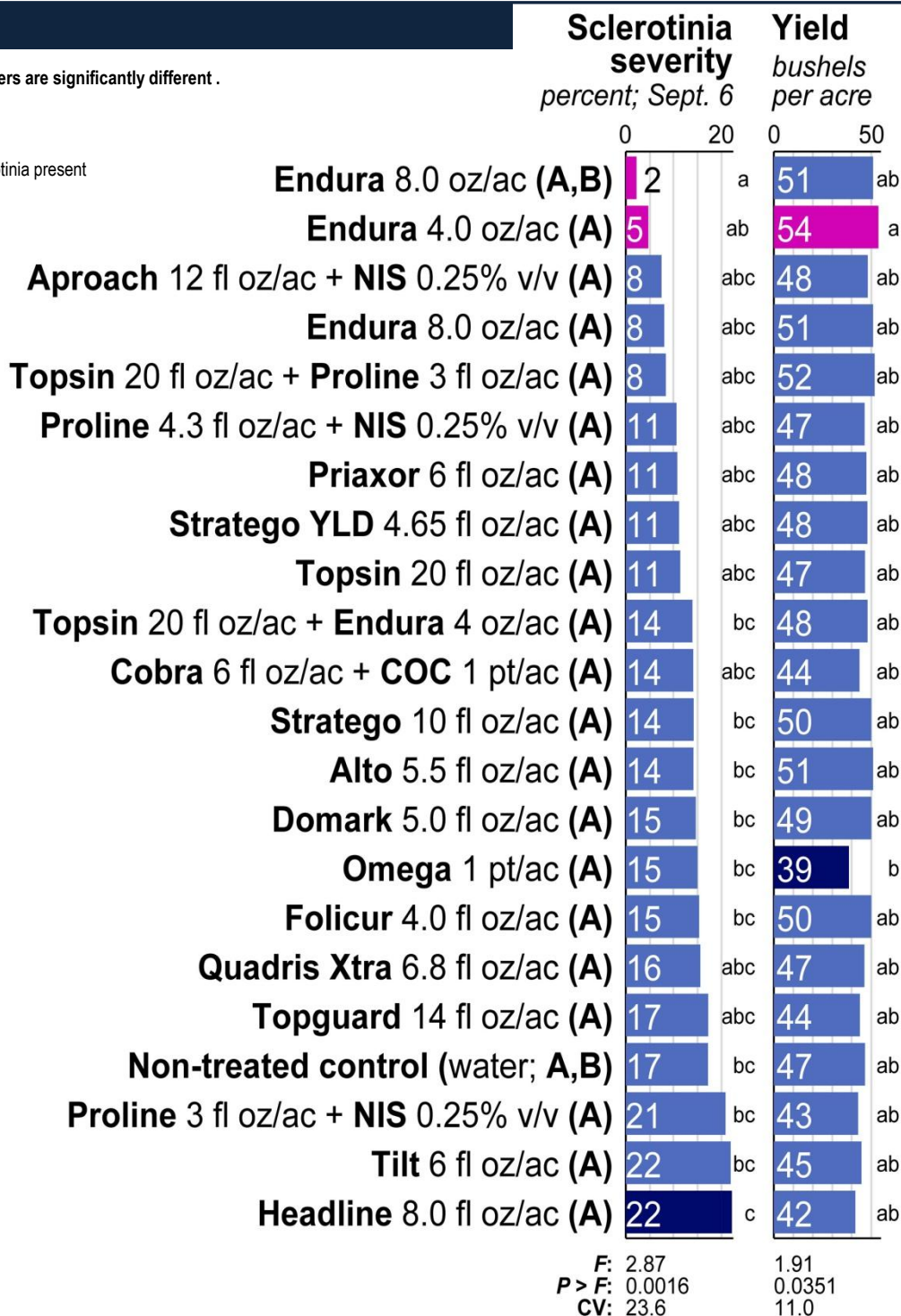
SUMMARY OF KEY RESULTS:

Within-column means followed by different letters are significantly different .
($P < 0.05$; Tukey multiple comparison procedure).

Fungicide application timing:
A: July 16 at the early R2 growth stage; no Sclerotinia present
B: July 27 at the R3 growth stage

The fungicide OMEGA is not currently registered on soybeans and should not be used. Registration of Omega on soybeans is anticipated, and results are provided for reference.

Treatment	Sclerotinia severity (percent; Sept. 6)		Yield (bushels per acre)	
Endura 8.0 oz/ac (A,B)	2	a	51	ab
Endura 4.0 oz/ac (A)	5	ab	54	a
Aproach 12 fl oz/ac + NIS 0.25% v/v (A)	8	abc	48	ab
Endura 8.0 oz/ac (A)	8	abc	51	ab
Topsin 20 fl oz/ac + Proline 3 fl oz/ac (A)	8	abc	52	ab
Proline 4.3 fl oz/ac + NIS 0.25% v/v (A)	11	abc	47	ab
Priaxor 6 fl oz/ac (A)	11	abc	48	ab
Stratego YLD 4.65 fl oz/ac (A)	11	abc	48	ab
Topsin 20 fl oz/ac (A)	11	abc	47	ab
Topsin 20 fl oz/ac + Endura 4 oz/ac (A)	14	bc	48	ab
Cobra 6 fl oz/ac + COC 1 pt/ac (A)	14	abc	44	ab
Stratego 10 fl oz/ac (A)	14	bc	50	ab
Alto 5.5 fl oz/ac (A)	14	bc	51	ab
Domark 5.0 fl oz/ac (A)	15	bc	49	ab
Omega 1 pt/ac (A)	15	bc	39	b
Folicur 4.0 fl oz/ac (A)	15	bc	50	ab
Quadris Xtra 6.8 fl oz/ac (A)	16	abc	47	ab
Topguard 14 fl oz/ac (A)	17	abc	44	ab
Non-treated control (water; A,B)	17	bc	47	ab
Proline 3 fl oz/ac + NIS 0.25% v/v (A)	21	bc	43	ab
Tilt 6 fl oz/ac (A)	22	bc	45	ab
Headline 8.0 fl oz/ac (A)	22	c	42	ab
F:	2.87		1.91	
P > F:	0.0016		0.0351	
CV:	23.6		11.0	

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METHODS:

- **Location of trial:** North Dakota State University Carrington Research Extension Center; Carrington, ND
- **GPS coordinates of research trial location:** 47.508233,-99.135299
- **Variety:** Dairyland Seeds 'DSR 0401'
- **Experimental design:** randomized complete block   **Replicates:** 4
- **Seeded plot size:** 5 feet wide (center-to-center) x 25 feet long
- **Harvested plot size:**   5 feet wide (center-to-center) x approx. 19 feet long
- **Row spacing:** 7 inches   **Rows per plot:** 7
- **Non-treated buffer plots were established between treatment plots.**
- **Previous crop:** spring wheat
- **Planting date:** May 16, 2012.
- **Seeding rate:** 220,000 pure live seeds/ac
- **Fungicide application A:**   July 16, 2012 at 6:30-8:00 am at the early R2 growth stage (an open flower at one of the two uppermost nodes); temperature = 71F, relative humidity = 95%, wind speed = 9-10 miles per hour from the northwest. No Sclerotinia stem rot was present.
- **Fungicide application B:**   July 27, 2012 at 9:50 am at the R3 growth stage (pods 5 mm at one of the four uppermost nodes); temperature = 70F, relative humidity = 59%, wind speed = 4 miles per hour from the west.
- **Fungicide application details:**   Fungicides were applied in 17.5 gallons of water/ac using a 60" hand boom equipped with four equally spaced Spraying Systems TeeJet flat-fan 8001VS nozzles and operated at 35 psi.
- **Disease establishment:** This trial was established on a site with a history of Sclerotinia epidemics. Laboratory-produced ascospores of Sclerotinia sclerotiorum were applied from 11:30 pm on July 22 to 1:00 am on July 23 (200,000 spores/ml in 54 gallons of water/ac). Spore applications were made using a 60-in. hand boom equipped with four equally spaced Spraying Systems 8003 twin-jet nozzles and operated at 20 psi. To facilitate disease development, overhead microsprinkler irrigation was utilized during the bloom and pod-fill growth stages.
- **Disease assessments:** Sclerotinia stem rot incidence and severity were evaluated Sept. 6 at the R6 to R7 growth stage (full seed to beginning maturity). The 0 to 3 scale developed by Craig Grau at the University of Wisconsin was used: 0 = no symptoms, 1 = lesions on lateral branches only, 2 = lesions on main stem, no wilt, and normal pod development, 3 = lesions on main stem resulting in wilting, poor pod fill, and plant death. In each plot, 90 plants were evaluated (30 plants in each of three locations per plot).
- **Harvest date:** October 3, 2012
- **Statistical analysis:** Data were evaluated with analysis of variance . The assumption of constant variance was assessed by plotting residuals against predicted values, and the assumption of normality was assessed with a normal probability plot.   To meet the assumption of homoskedasticity, a systematic natural-log transformation was applied to the Sclerotinia incidence and disease severity index data. All other data met model assumptions. Single-degree-of-freedom contrasts were performed for all pairwise comparisons of isolates; to control the Type I error rate at the level of the experiment, the Tukey multiple comparison procedure was employed. Analyses were conducted with replicate and treatment as main factor effects, and they were implemented in PROC GLM of SAS (version 9.2; SAS Institute, Cary, NC).

FUNDING:

IMPORTANT NOTICE:

- Fungicide performance can differ in response to which diseases are present, levels of disease when products are applied, environmental conditions, plant architecture and the susceptibility to disease of the chickpea variety planted, crop growth stage at the time of fungicide application, and other factors.
- This report summarizes fungicide performance as tested at the NDSU Carrington Research Extension Center in 2012 under the conditions partially summarized in the methods section (above).
- Fungicide efficacy may differ under other conditions; when choosing fungicides, always evaluate results from multiple trials.
- This report is shared for educational purposes and is not an endorsement of any specific products.