

Field evaluation of fungicides for management of Sclerotinia on dry edible (pinto) beans

Carrington, ND (2013) ■ 14-inch row spacing

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KEY FINDINGS:

- Applied as two sequential applications 13 days apart, Endura (8 oz/ac) and Topsin (30 fl oz/ac) provided better control of Sclerotinia than Aproach (9 or 12 fl oz/ac) or Proline (5.7 fl oz/ac).

Concentrations of active ingredients in products evaluated in this trial:

Aproach = 250 grams picoxystrobin per liter

Endura = 700 grams boscalid per kilogram

Proline = 480 grams prothioconazole per liter

Topsin = 540 grams thiophanate-methyl per liter

SUMMARY OF KEY RESULTS:

Treatment (Fungicide timing) ^w	Sclerotinia incidence ^z Sept. 11 percent	Sclerotinia severity ^y Sept. 11 percent	Sclerotinia severity index ^{x†} Sept. 11 percent	Yield 13% moisture lbs/ac
1 Non-treated check (water; A,B)	91 c*	61 b*	56 c*	2162 bc*
2 Aproach 250SC 9 fl oz/ac + NIS 0.25% v/v (A,B)	91 c	63 b	57 c	2020 c
3 Aproach 250SC 12 fl oz/ac + NIS 0.25% v/v (A,B)	88 c	48 b	42 c	2183 bc
4 Topsin 4.5FL 30 fl oz/ac (A,B)	59 b	27 a	16 b	2682 ab
5 Proline 480SC 5.7 fl oz/ac + NIS 0.25% v/v (A,B)	79 c	51 b	40 c	2084 c
6 Endura 70WG 8.0 oz/ac (A,B)	33 a	17 a	5 a	2750 a
Treatment differences, <i>F</i> :	24.81	14.31	47.23	3.47
Treatment differences, <i>P</i> > <i>F</i> :	< 0.0001	0.0001	< 0.0001	0.0360
C.V.:	12.6	21.8	8.2	14.8

^z **Sclerotinia stem rot incidence:** The percent of plants exhibiting Sclerotinia stem rot. In each plot, 40 plants were evaluated (20 plants in each of the two center rows of each plot)

^y **Sclerotinia stem rot severity:** Disease severity of those plants exhibiting Sclerotinia stem rot. In each plot, 40 plants were evaluated (20 plants in each of the two center rows in each plot).

^x **Sclerotinia stem rot disease severity index:** Average disease severity (including non-diseased plants). In each plot, 40 plants were evaluated (20 plants in each of the two center rows of each plot).

^w **Fungicide timing:**

Fungicide application A: July 25 at 7:15-7:45 am (temperature = 70°F, relative humidity = 100%, wind speed = 7-8 miles per hour); dry beans at 100% bloom (at least one open blossom on each plant); no Sclerotinia was present.

Fungicide application B: Aug. 7 at 10:30 am to 12:00 noon (temperature = 74°F, relative humidity = 47%, wind speed = 9 miles per hour); Sclerotinia was present at low levels (approx. 5% incidence) in the non-treated controls.

* **Within-column means followed by different letters are significantly different** (alpha = 0.05; Fisher's protected least significant difference)

† **In order to meet model assumptions of normality and homoskedasticity, analysis of variance was conducted on the natural-log transformation of the disease severity index [LN(x)]. For ease of interpretation, treatment means are reported as the (untransformed) percent disease.**

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METHODS:

- **Location of trial:** NDSU Carrington Research Extension Center, Carrington, ND.
- **GPS coordinates of research trial location:** 47.507983,-99.127452
- **Variety:** Maverick (pinto bean)
- **Experimental design:** randomized complete block **Replicates:** 4
- **Seeded plot size:** 25 feet long x 5 feet (center-to-center)
- **Harvested plot size:** approx. 19 feet x 5 feet (center-to-center)
- **Row spacing:** 14 inches **Rows per plot:** 4
- **Non-treated buffer plots were established between treatment plots.**
- **Previous crop:** canola (reps 1 and 2); fallow (reps 3 and 4)
- **Planting date:** June 15, 2012
- **June 15.**
- **Seeding rate:** 84,500 pure live seeds/ac
- **Fungicide application A:** July 25 at 7:15-7:45 am (temperature = 70°F, relative humidity = 100%, wind speed = 7-8 miles per hour); dry beans at 100% bloom (at least one open blossom on each plant); no Sclerotinia was present.
- **Fungicide application B:** Aug. 7 at 10:30 am to 12:00 noon (temperature = 74°F, relative humidity = 47%, wind speed = 9 miles per hour); Sclerotinia was present at low levels (approx. 5% incidence) in the non-treated controls.
- **Fungicide application details:** Fungicides were applied with a 60-inch hand boom equipped with four equally spaced Spraying Systems TeeJet XR 8001VS flat-fan nozzles at a spray volume of 17.5 gal water/A operated at 35 psi.
- **Disease establishment:** This trial was established on a site with a history of Sclerotinia epidemics. Overwintered sclerotia of Sclerotinia sclerotiorum were spread across treatment plots in October 2011 (approx. 0.2 sclerotia per square foot). Ascospores of Sclerotinia sclerotiorum were applied July 29 at 11:00 pm (4,150 spores/ml in 45 gallons of water/ac) and Aug. 3 (2,500 spores/ml in 47.7 gallons of water/ac) using a 60-in. hand boom with four equally spaced 8003 twin-jet nozzles operated at 20 psi. To facilitate disease establishment and development, microsprinklers were used to apply water to the trial 5 minutes every 30 minutes from July 26 to September 7.
- **Sclerotinia disease ratings:** Sclerotinia stem rot incidence and severity were evaluated September 11 at the R6 growth stage (mid seed-fill; 50% of pods with fully developed seeds). In each plot, 40 plants (20 plants in each of two locations in the interior of each plot) were assessed individually for the percent of the plant tissue exhibiting Sclerotinia disease symptoms.
- **Harvest date:** October 1, 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 model assumptions, a natural-log transformation [LN(x)] was applied to the Sclerotinia 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, Fisher's protected least significant difference 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).

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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 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 under the conditions partially summarized in this report.
- 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.