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

Carrington, ND (2012) ■ 14-inch row spacing

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KEY FINDINGS:

Under conditions of high disease pressure (susceptible variety, temperature and rainfall conducive to Sclerotinia, and narrow row spacing),

- **Endura** (boscalid) **applied at 8 oz/ac as two sequential applications provided excellent control of Sclerotinia.**
- **Proline** (prothioconazole) **applied at 5.7 fl oz/ac, ProPulse** (prothioconazole + fluopyram) **applied at 8.6 fl oz/ac, and Topsin** (thiophanate-methyl) **applied at 20 fl oz/ac did not provide satisfactory Sclerotinia control.**
- **A rate response was apparent for Topsin.** Disease control and yields improved as the application rate increased from 20 to 30 to 40 fl oz/ac.

DETAILED RESULTS:

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

	Treatments (APPLICATION TIMING)[v]	Sclerotinia incidence[z] Sept. 7, 10[w] percent	Sclerotinia severity[y] Sept. 7, 10[w] percent	Sclerotinia sev. index[x] Sept. 7, 10[w] percent	Yield 13% moisture lbs/ac	Test Weight 13% moisture bu/ac
1	**Non-treated check** (water)	**85** a *	**53** b *	**46** b	**2271** ab	**61.7** a *
2	**ProPulse 400SC** 8.6 fl oz/ac + **NIS** 0.125% v/v **(A,B)**	**90** a	**48** ab	**43** b	**2291** ab	**61.5** a
3	**Proline 480SC** 5.7 fl oz/ac + **NIS** 0.125% v/v **(A,B)**	**91** a	**58** b	**53** b	**1982** b	**61.2** a
4	**Topsin 4.5FL** 30 fl oz/ac **(A,B)**	**77** a	**42** ab	**35** ab	**2602** ab	**61.8** a
5	**Omega 500F** 0.85 pt/ac **(A,B)**	**78** a	**35** ab	**30** ab	**2310** ab	**61.6** a
6	**Endura 70WG** 8.0 oz/ac **(A,B)**	**54** a	**19** a	**10** a	**3009** a	**61.8** a
7	**Topsin 4.5FL** 20 fl oz/ac **(A,B)**	**93** a	**51** b	**48** b	**2350** ab	**61.7** a
8	**Topsin 4.5FL** 40 fl oz/ac **(A,B)**	**75** a	**35** ab	**26** ab	**2917** ab	**61.7** a
	***F*:**	1.89	4.49	4.50	3.26	0.65
	***P*>*F*:**	0.1382	0.0062	0.0061	0.0239	0.7067
	C.V.:	23.1	27.9	36.4	15.7	0.8

[z] **Sclerotinia stem rot incidence** was assessed by evaluating 40 plants in each plot (20 plants in each of two locations per plot).

[y] **Sclerotinia severity:** Percent disease severity among those plants exhibiting Sclerotinia stem rot. In each plot, 40 plants were evaluated.

[x] **Sclerotinia disease severity index:** Average percent disease severity across all plants, including those that were not diseased. In each plot, 40 plants were evaluated.

[w] Dry beans were at the R6 growth stage on Sept. 7 and 10 (mid seed-fill; 50% of pods with fully developed seeds).

[v] **Fungicide application timing:**

Fungicide application A: July 25 at 7:45 to 8:45 am (temperature = 71-74°F, relative humidity = 93-99%, wind speed = 8 miles per hour); dry beans at 100% bloom (at least one open blossom on each plant). No sclerotinia disease symptoms were present.

Fungicide application B: Aug. 7 at 10:30 am to 12:00 noon (temperature = 73 to 75°F, relative humidity = 47 to 49%, wind speed = 7.6 to 10.4 miles per hour). Sclerotinia stem rot was at low levels (approx. 5% incidence) in the non-treated controls.

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

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METHODS:

- **Location of trial:** North Dakota State University Carrington Research Extension Center; Carrington, ND
- **GPS coordinates of research trial location:** 47.507795,-99.127452
- **Variety:** 'Othello' (pinto bean)
- **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:** 14 inches **Rows per plot:** 4
- **Non-treated buffer plots were established between treatment plots.**
- **Previous crop:** soybeans
- **Planting date:** June 15, 2012. This experiment was originally planted May 24. Due to problems with soil crusting, emergence was poor, and the experiment was replanted on June 15.
- **Seeding rate:** 86,500 pure live seeds/ac
- **Fungicide application A:** July 25 at 7:45 to 8:45 am (temperature = 71-74˚F, relative humidity = 93-99%, wind speed = 8 miles per hour); dry beans at 100% bloom (at least one open blossom on each plant). No sclerotinia disease symptoms were present.
- **Fungicide application B:** Aug. 7 at 10:30 am to 12:00 noon (temperature = 73 to 75˚F, relative humidity = 47 to 49%, wind speed = 7.6 to 10.4 miles per hour). Sclerotinia stem rot was 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 sclerotiorium were spread across treatment plots in October 2011 (approx. 0.2 sclerotia per square foot). Ascospores of Sclerotinia sclerotiorum were applied July 29 at 11:30 pm (4,150 spores/ml in 30 gallons of water/ac) and Aug. 3 at 4:30-5:15 pm (2,550 spores/ml in 53 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 late July to early September.
- **Disease assessments:** Sclerotinia stem rot incidence and severity were evaluated September 7 and 10 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:** September 25, 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. The 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).

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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 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.