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

Carrington, ND (2012) ■ 30-inch row spacing

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KEY FINDINGS:

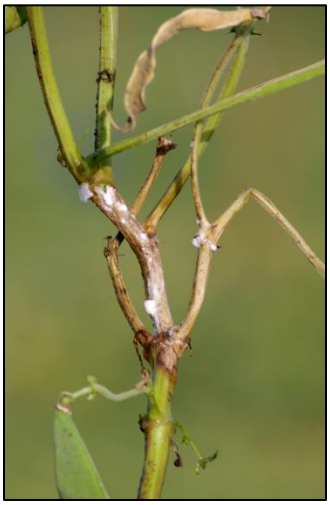
- **When applied as sequential applications, Endura** (boscalid), **ProPulse** (prothioconazole + fluopyram)**, and Switch** (cyprodinil + fludioxonil) **significantly reduced Sclerotinia disease severity relative to the control.**
- **Tank-mixing low rates of Quash** (metconazole) **and Topsin** (thiophanate-methyl) **gave excellent results.** The tank-mix of Quash (2 oz/ac) plus Topsin (20 fl oz/ac) performed similarly to the best products.
- **The rotational strategy of Topsin** (40 fl oz/ac) **followed by Endura** (8 oz/ac) **performed well,** but low disease pressure in the two weeks following the first fungicide application made it difficult to assess this treatment rigorously.
- **Late disease development was likely responsible for the lack of significant yield differences across treatments.** Temperatures did not become favorable for Sclerotinia until early August, and much of the yield potential was likely determined by the time Sclerotinia developed.

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 18 (100% bloom; canopy open; no foliar disease present) **B** – July 31 (full flower)

Proline and ProPulse were applied with 0.125% (v/v) non-ionic surfactant;
Aproach, Quash, and Vertisan were applied with 0.25% (v/v) non-ionic surfactant.



	Sclerotinia severity (percent; August 23)		Yield (pounds per acre)	
	0 25		0 3000	
Topsin 40 fl oz/ac **(A) / Endura** 8.0 oz/ac **(B)**	2	a	3283	a
Endura 8.0 oz/ac **(A,B)**	2	a	3154	a
ProPulse 8.6 fl oz/ac + **NIS (A,B)**	2	a	2898	a
Topsin 20 fl oz/ac **+ Quash** 2.0 oz/ac + **NIS (A,B)**	4	a	3435	a
Switch 14.0 oz/ac **(A,B)**	5	a	3029	a
Topsin 30 fl oz/ac **(A,B)**	5	ab	3174	a
Topsin 40 fl oz/ac **(A,B)**	5	ab	3421	a
ProPulse 10.3 fl oz/ac + **NIS (A,B)**	6	ab	3191	a
Rovral 2.0 pt/ac **(A,B)**	7	ab	2966	a
Topsin 20 fl oz/ac **(A,B)**	8	ab	3274	a
Aproach 12 fl oz/ac + **NIS (A,B)**	9	ab	3198	a
Omega 0.85 pt/ac **(A,B)**	10	ab	3685	a
Endura 8.0 oz/ac **(A) / Topsin** 40 fl oz/ac **(B)**	12	ab	3571	a
Proline 5.7 fl oz/ac + **NIS (A,B)**	14	ab	3428	a
Vertisan 20 fl oz/ac + **NIS (A,B)**	15	ab	2986	a
Quash 2.0 oz/ac + **NIS (A,B)**	16	ab	3086	a
Quash 2.5 oz/ac + **NIS (A,B)**	17	ab	3057	a
Non-treated check (water **A,B**)	24	b	2906	a
***F*:**	2.91		1.32	
***P* > *F*:**	0.0035		0.2367	
CV:	78.4		12.4	

The fungicide QUASH is currently not registered for use on dry edible beans and should not be used.
Future registration of some of Quash is anticipated, and results are provided for reference only.

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METHODS:

- **Location of trial:** North Dakota State University Carrington Research Extension Center; Carrington, ND
- **GPS coordinates of research trial location:** 47.5084,-99.1343
- **Variety:** 'Maverick' (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:** 30 inches **Rows per plot:** 2
- **Non-treated buffer plots were established between treatment plots.**
- **Previous crop:** hard red spring wheat
- **Planting date:** May 24, 2012
- **Seeding rate:** 91,950 pure live seeds/ac (target plant population = 80,000 plants/ac; presumed seedling mortality = 13%)
- **Fungicide application A:** July 18, 2012 at 8:30 - 9:30 am at 100% bloom (R1 growth stage; beginning flowering with at least one open flower per plant); temperature = 73F, relative humidity = 81%, wind speed = 6.7 miles per hour from the east..
- **Fungicide application B:** July 31, 2012 at 9:00 - 11:00 am at the R2 growth stage (full flower); temperature = 74-80F, relative humidity = 59-71%, wind speed = 8.3 to 8.8 miles per hour from the south.
- **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. Ascospores of Sclerotinia sclerotiorum were applied July 23 at 1:00 - 2:00 am (200,000 spores/ml in 32 gallons of water/ac), Aug. 2 at 12:00 - 1:00 am (2,421 spores/ml in 48 gallons of water/ac), Aug. 3 at 12:00-12:40 pm (1,500 spores/ml in 55 gallons of water/ac), and Aug. 3 at 8:30-9:00 pm (13,650 spores/ml, 38.4 gallons of water/ac). Spores were applied to canopy interior using a 60-in. hand boom with four equally spaced Spraying Systems 8003 twin-jet nozzles operated at 20 psi. To facilitate disease development, overhead irrigation was applied to this trial through microsprinklers established on a 20 ft x 20 ft grid.
- **Disease assessments:** Sclerotinia disease incidence and severity were assessed August 23 at the R7 growth stage (at least one pod per plant changed color/ striped). In each plot, 40 plants (10 plants in each of two locations in each row) were evaluated individually for the percent of the canopy exhibiting Sclerotinia stem rot disease symptoms.
- **Harvest date:** September 18, 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. All 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:

This project was funded by the **Northarvest Bean Growers Association.**

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.