

Field evaluation of fungicides for management of Ascochyta blight on chickpeas

Carrington, ND (2010)

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KEY FINDINGS:

Proline (5.0 or 5.7 fl oz/ac), Endura (6 oz/ac), and ProPulse (8.6 or 10.3 fl oz/ac) provided excellent control of Ascochyta blight. No differences in efficacy were observed among these products.

Under the conditions tested in this trial (first application made shortly before bloom, when the canopy was open, and fairly dry weather at early bloom), chlorothalonil (applied as Echo 720 at 1.4 pt/ac) showed excellent efficacy against Ascochyta blight when applied as the first application in a fungicide resistance management program. The performance of the protectant fungicide chlorothalonil may be lower when the canopy is closed (and fungicide coverage is reduced) and/or when weather is more conducive for disease.

Rotational strategies with Proline (5.0 fl oz/ac) or ProPulse (8.6 fl oz/ac) and Endura (6 oz/ac) performed equivalently to sequential applications of Proline or ProPulse.

Means followed by different letters are significantly different ($\alpha = 0.05$)

Treatment, application rate (timing = A,B) ¹	ASCOCHYTA, Aug 6		ASCOCHYTA, Aug 20		YIELD lbs/ac	TEST WEIGHT lbs/bu	SEED DIAMETER						
	Incidence ² percent	Severity ² percent	Incidence ² percent	Severity ² percent			> 10 mm percent	9-10 mm percent	8-9 mm percent	7-8 mm percent	< 7 mm percent		
Non-treated control	100.0 d	60.0 b	100.0 b	60.0 b	529 b	60.0 a	12.9 bc	12.7 bc	20.8 b	25.3 b	28.4 b		
Proline 480SC 5.0 fl oz/ac (A,B,C,D)	100.0 d	61.3 b	100.0 b	61.3 b	580 b	40.8 a	7.1 c	10.1 c	18.0 ab	27.1 b	37.7 b		
Echo 720 54SC 1.4 pt/ac (A)/ Proline 480SC 5.0 fl oz/ac (B,C,D)	40.8 abc	4.0 a	92.5 ab	4.0 a	3738 a	61.0 a	58.1 a	19.0 abc	11.6 ab	6.8 a	4.5 a		
Echo 720 54SC 1.4 pt/ac (A)/ ProPulse 400SC 10.3 fl oz/ac (B,C,D)	56.3 bc	4.5 a	92.5 ab	4.5 a	3708 a	61.6 a	58.1 a	20.0 ab	10.1 ab	7.3 a	4.4 a		
Echo 720 54SC 1.4 pt/ac (A)/ ProPulse 400SC 10.3 fl oz/ac (B,C,D)	58.8 c	5.0 a	88.8 a	5.0 a	3591 a	61.5 a	55.4 ab	20.6 ab	11.6 ab	8.0 a	4.4 a		
Endura 70WG 6.0 oz/ac (A,B,C,D)	26.3 a	3.5 a	88.8 a	3.5 a	3776 a	61.6 a	56.3 ab	23.7 ab	10.6 a	5.7 a	3.7 a		
ProPulse 400SC 8.6 fl oz/ac (A,B,C,D)	33.8 ab	3.0 a	88.8 a	3.0 a	3751 a	62.0 a	63.4 a	19.9 ab	8.6 a	5.0 a	3.1 a		
ProPulse 400SC 10.3 fl oz/ac (A,B,C,D)	30.0 a	3.0 a	86.3 a	3.0 a	3620 a	62.1 a	57.2 ab	22.1 ab	10.7 a	6.4 a	3.6 a		
Proline 480SC 5.7 fl oz/ac (A,B,C,D)	41.3 abc	3.8 a	92.5 ab	3.8 a	3820 a	61.2 a	55.5 ab	21.4 ab	10.6 a	8.2 a	4.2 a		
Echo 720 54SC 1.4 pt/ac + Proline 480SC 5.0 fl oz/ac (A,C)/ Endura 70WG 6.0 oz/ac (B,D)	29.5 a	3.5 a	91.3 ab	3.5 a	3674 a	61.5 a	50.8 ab	26.4 a	11.0 a	7.0 a	4.8 a		
Echo 720 54SC 1.4 pt/ac + Proline 480SC 5.0 fl oz/ac (A,C)/ ProPulse 400SC 8.6 fl oz/ac (B,D)	27.5 a	3.5 a	91.3 ab	3.5 a	3874 a	61.5 a	50.6 ab	22.9 ab	11.8 a	9.8 a	5.0 a		
	Treatment differences, F:		31.48	40.64	4.69	173.5	41.32	2.25	48.95	6.19	5.83	20.95	56.7
	Treatment differences, P > F:		< 0.0001	< 0.0001	0.0012	< 0.0001	< 0.0001	0.065	< 0.0001	0.0003	0.0004	< 0.0001	< 0.0001
	C.V.:		19.6	51.2	4.4	15.8	11.8	1.1	6.99	17.8	22.1	31.6	8.7

¹ Proline and ProPulse were applied with 0.25% (v/v) non-ionic surfactant

² Application timing: (A) June 25 between 3:30 and 4:00 pm at first onset of disease and prior to flowering. June 25 was the first day in which symptoms were apparent in the trial, and disease was minimal in the trial. The adjacent chickpea nursery had showed disease symptoms for several days and had a broader distribution of Ascochyta. (B) July 9 between 1:30 and 2:15 pm; chickpeas were flowering heavily. Weather the previous 14 days was extremely dry, and the presence of Ascochyta disease symptoms was still minimal. (C) July 23 between 10:45 and 11:40 am; chickpeas were still flowering. Weather the previous 14 days was a mix of wet and dry conditions, and Ascochyta was becoming more significant. Non-treated controls were still relatively clean, but Ascochyta incidence among checks was near 100%. (D) August 6 between 9:30 and 10:20 am.

³ Ascochyta incidence and severity. Percent of plants and percent of chickpea canopy necrotic; Ascochyta (*Ascochyta rabiei*) predominant disease; rated August 6 and August 20.

⁴ Treatment differences, F: F-values associated with the test of the null hypothesis that there are no differences among treatments.

⁵ Treatment differences, P > F: Probability of observing an F-statistic greater than that observed; an assessment of the significance of treatment differences.

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METHODS:

- **Experimental design, seeding, planting, and harvest:** The experiment was a randomized complete block design with four replicates. Plots were seeded May 18 and harvested September 27. The medium-kabuli chickpea 'Sierra' was seeded in 7-inch rows with a target planting density of 4 plants per square foot. Plots consisted of seven rows, each 25 ft long, with an 18-inch alley between plots (plot size, including alley = 5 feet by 25 feet). Buffer plots were established between treatment plots in order to minimize spray drift between treatments; in the buffer plots, a desi-type chickpea less susceptible to Ascochyta blight was planted. Plot ends were trimmed prior to harvest. After harvest, seed moisture content was determined for each plot, and seed yield and test weight were adjusted to 13% moisture.
- **Fungicide applications:** Fungicides were applied June 25 between 3:30 and 4:00 pm at first appearance of disease symptoms and prior to flowering (June 25 was the first day that Ascochyta symptoms appeared in the fungicide trial but Ascochyta developed earlier in an adjacent chickpea nursery and disease was more developed in that nursery), July 9 between 1:30 and 2:15 pm during full flower (note that weather during the past 11 days had been extremely dry), July 23 between 10:45 and 11:40 am (chickpeas still flowering; weather the past 14 days was a mix of wetter and dry conditions; Ascochyta disease symptoms were becoming more significant; checks had nearly 100% incidence, though severity was still moderate), and August 6 between 9:30 and 10:20 am. A 60-in. hand boom with four equally spaced TeeJet 8002 (twin-jet) nozzles was used for applications. Applications were made with 17.5 gal/ac water and 35 PSI pressure.
- **Inoculation:** The plots were not artificially inoculated.
- **Disease assessment:** Disease incidence and disease severity (the percent of plant canopy necrotic) were evaluated August 6 and August 20. Ascochyta blight, caused by *Ascochyta rabiei*, was the only disease present.
- **Statistical analysis:** Disease incidence and severity, seed yield, and seed quality were evaluated with analysis of variance. Seed moisture levels were evaluated for harvested seed from each plot, and yields and test weights were adjusted to 13.0% moisture. 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 assumptions were not met for the percent of seeds with diameters greater than 10 mm and less than 7 mm; to meet model assumptions, a systematic square-root transformation was applied to the dataset of seed diameters greater than 10 mm, and a systematic cube-root transformation was applied to the dataset of seed diameters less than 7 mm. No systematic transformations were applied to the other data. Single-degree-of-freedom contrasts were performed for all pairwise combinations 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 with interactions included in the model, and they were implemented in PROC GLM of SAS (version 9.2; SAS Institute, Cary, NC).

ACTIVE INGREDIENTS OF FUNGICIDES EVALUATED IN THIS TRIAL:

Echo 720: 720 grams chlorothalonil per liter

Endura: 700 grams boscalid per kilogram

Proline: 480 grams prothioconazole per liter

ProPulse: 200 grams prothioconazole + 200 grams fluopyram per liter

FUNDING:

This study was funded by **Bayer CropScience**.

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 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.