

# Field evaluation of fungicides for management of Ascochyta blight on chickpeas

Nesson Valley / Hofflund – approx. 30 miles east of Williston, ND (2013)

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- **DMI fungicides (FRAC 3):** Proline (5.7 fl oz/ac) performed similarly to Bravo Top (2 pt/ac). Bravo Top is a premix of difenoconazole (FRAC 3) and chlorothalonil (FRAC M5); Proline contains prothioconazole (FRAC 3).
- **SDHI fungicides (FRAC 7):** Priaxor (4 or 6 fl oz/ac) performed similarly to Endura (6 oz/ac). Priaxor is a premix of pyraclostrobin (FRAC 11) and fluxapyroxad (FRAC 7), but because *Ascochyta rabiei*, the cause of Ascochyta blight of chickpeas, has developed resistance to QoI fungicides such as pyraclostrobin, Priaxor should be considered primarily a FRAC 7 fungicide when used on chickpeas. Note the poor performance of pyraclostrobin applied as Headline and strong performance of fluxapyroxad applied as Xemium in this trial.
- **Other modes of action:** Omega contains the active ingredient fluazinam (FRAC 29). Applied at 0.5 or 0.85 pt/ac, it showed activity against Ascochyta blight, but it was not clear whether its efficacy was satisfactory. Omega resulted in trend towards reduced disease control and reduced seed yield relative to Proline, but the differences were not statistically significant.

## SUMMARY OF KEY RESULTS:

Description (application timing) <sup>u</sup>	Ascochyta severity: <sup>y</sup>	Ascochyta severity: <sup>y</sup>	Yield: lbs/ac	Test weight: lbs/bu	Seeds per pound: seeds/lb	Seed diameter <sup>w</sup>			
	July 23 <sup>v</sup> percent	Aug. 12 <sup>v</sup> percent				> 9.5 mm percent	8.7-9.5 mm percent	< 8.7 mm percent	
1 Non-treated check (water; A,B,C)	15 efg*	72 c *	1448 bcd*	62.5 a *	1467 ab *	1 a *	18 a *	82 a *	
2 Priaxor 500SC 4 fl oz/ac (A,B,C)	3 a-d	21 a	2400 a	63.1 a	1321 a	1 a	21 a	78 a	
3 Priaxor 500SC 6 fl oz/ac (A,B,C)	1 a	9 a	2233 ab	63.1 a	1428 ab	1 a	16 a	83 a	
4 Proline 480SC 5.7 fl oz/ac + NIS 0.125% v/v (A,B,C)	1 a	18 a	2381 a	62.5 a	1401 ab	0 a	18 a	82 a	
5 Headline 250SC 6 fl oz/ac (A,B,C)	15 efg	75 c	1257 cd	62.3 a	1581 b	1 a	17 a	82 a	
6 Xemium 300SC 3.34 fl oz/ac (A,B,C)	2 abc	18 a	2331 ab	63.3 a	1431 ab	1 a	24 a	75 a	
7 Bravo Top 550SC 2 pt/ac (A,B,C)	1 ab	28 ab	2146 abc	63.0 a	1333 a	1 a	25 a	74 a	
8 Endura 70WG 6 oz/ac (A,B,C)	2 abc	16 a	2565 a	63.3 a	1427 ab	1 a	20 a	80 a	
9 Omega 500F 13.6 fl oz/ac (A,B,C)	9 b-f	30 ab	2203 ab	62.9 a	1365 ab	2 a	24 a	74 a	
10 Omega 500F 8 fl oz/ac (A) / Priaxor 500SC 4 fl oz/ac (B) / Proline 480SC 5.7 fl oz/ac + NIS 0.125% v/v (C)	10 c-f	30 ab	2272 ab	62.7 a	1350 a	1 a	24 a	75 a	
11 Omega 500F 13.6 fl oz/ac (A) / Priaxor 500SC 4 fl oz/ac (B) / Proline 480SC 5.7 fl oz/ac + NIS 0.125% v/v (C)	6 a-d	24 a	2140 abc	62.3 a	1351 ab	1 a	23 a	77 a	
12 Bravo WS 1.5 pt/ac (A) / Priaxor 500SC 4 fl oz/ac (B) / Proline 480SC 5.7 fl oz/ac + NIS 0.125% v/v (C)	12 d-g	40 ab	2169 ab	63.4 a	1368 ab	2 a	25 a	73 a	
13 Non-treated check (water; A) / Priaxor 500SC 4 fl oz/ac (B) / Proline 480SC 5.7 fl oz/ac + NIS 0.125% v/v (C)	16 fg	54 bc	1822 a-d	63.4 a	1424 ab	1 a	23 a	77 a	
14 Omega 500F 13.6 fl oz/ac (A,B) / Priaxor 500SC 4 fl oz/ac (C)	8 a-e	34 ab	2097 abc	63.6 a	1311 a	2 a	30 a	68 a	
15 Non-treated check (water; A,B) / Priaxor 500SC 4 fl oz/ac (C)	19 g	74 c	1147 d	62.5 a	1396 ab	1 a	21 a	78 a	
16 Proline 480SC 5.7 fl oz/ac + NIS 0.125% v/v (A,C) / Priaxor 500SC 4 fl oz/ac (B)	0 a	20 a	2239 ab	62.5 a	1469 ab	0 a	20 a	80 a	
17 Proline 480SC 5.7 fl oz/ac + NIS 0.125% v/v (A,C) / Endura 70WG 6 oz/ac (B)	2 abc	23 a	2600 a	63.6 a	1398 ab	0 a	19 a	81 a	
18 Priaxor 500SC 4 fl oz/ac (A,C) / Proline 480SC 5.7 fl oz/ac + NIS 0.125% v/v (B)	1 a	22 a	2128 abc	63.2 a	1395 ab	0 a	20 a	80 a	
19 Priaxor 500SC 6 fl oz/ac (A,C) / Proline 480SC 5.7 fl oz/ac + NIS 0.125% v/v (B)	1 abc	13 a	2478 a	62.7 a	1367 ab	1 a	20 a	79 a	
20 Priaxor 500SC 4 fl oz/ac (A,C) / Bravo Top 550SC 2 pt/ac (B)	4 a-d	22 a	2495 a	63.1 a	1432 ab	0 a	19 a	81 a	
	F:	14.68	13.33	6.01	2.34	2.07	1.49	1.45	1.49
	P > F:	< 0.0001	< 0.0001	< 0.0001	0.0117	0.0260	0.1410	0.1603	0.1413
	CV:	51.1	34.8	15.7	0.9	6.1	94.6	26.8	8.1

<sup>y</sup> **Ascochyta disease severity:** Percent of the canopy exhibiting symptoms of Ascochyta blight and/or necrosis caused by Ascochyta blight.

<sup>w</sup> **Seed diameter:** Seed size was determined by assessing the percent (by weight) of a 200-gram seed sample that passed through sieves with round 26/64, 24/64, and 22/64-inch diameter holes.

<sup>v</sup> **Fungicide application timing:**

**Application A:** July 8, 2013 at 10:30 am to 12:00 pm; chickpeas 14 inches tall, 10% bloom, canopy closed; air temperature = 73 to 78°F, relative humidity = 69 to 73%, wind

**Application B:** July 25, 2013 at 11:00 am to 1:00 pm; air temperature = 63 to 64°F, relative humidity = 59 to 63%, wind = 14.7 to 15.5 mph

**Application C:** August 7, 2013 at 10:00 am to 12:00 pm; 62 to 65°F, relative humidity = 52 to 74%, wind = 7.8 to 8.2 mph

<sup>u</sup> **On July 23**, the chickpeas were in full bloom and mid pod-fill; **on Aug. 12**, the chickpeas were at late pod-fill.

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

**BRAVO TOP and OMEGA are currently not registered for use on chickpeas. Results for these products are provided for reference only.**

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## METHODS:

- **Location of trial:** NDSU Williston Research Extension Center Nesson Valley Irrigation Research Site
- **GPS coordinates of research trial location:** 48.167,-103.104
- **Tillage:** conventional    **Soil type:** Lihen - fine sandy loam
- **Variety:** 'CDC Frontier' (a kabuli type)
- **Seed treatment:** Seeds were treated with 1.6 fl oz/cwt Axxess (imidacloprid) insecticide + 0.4 fl oz/ac Stamina (pyraclostrobin) fungicide. Seed used for this study tested negative for seed-borne Ascochyta.
- **Experimental design:** randomized complete block    **Replicates:** 4
- **Untreated buffer plots were established between treatment plots.**
- **Row spacing:** 7.5 inches    **Rows per plot:** 7    **Harvested plot size:** 5 ft (center-to-center) x approx. 14 ft long
- **Previous crop:** durum wheat
- **Planting date:** May 6, 2013    **Seeding rate:** 4.5 pure live seeds/square foot (targeted plant population = 4 plants/square foot).
- **Fungicide application A:** July 8, 2013 at 10:30 am to 12:00 pm; chickpeas 14 inches tall, 10% bloom, canopy closed; chickpeas 14 inches tall, 10% bloom, canopy closed; air temperature = 73 to 78°F, relative humidity = 69 to 73%, wind = 4.6 to 6.9 mph
- **Fungicide application B:** July 25, 2013 at 11:00 am to 1:00 pm; air temperature = 63 to 64°F, relative humidity = 59 to 63%, wind = 14.7 to 15.5 mph
- **Fungicide application C:** August 7, 2013 at 10:00 am to 12:00 pm; 62 to 65°F, relative humidity = 52 to 74%, wind = 7.8 to 8.2 mph
- **Fungicide application details:** Fungicides were applied with a 57-inch hand boom equipped with four equally spaced Spraying Systems TeeJet 8002VS flat-fan nozzles at a spray volume of 20 gal water/A operated at 40 psi.
- **Disease establishment:** All disease development was caused by ambient inoculum; this trial was not inoculated. To facilitate disease development, overhead irrigation was applied to this trial during the bloom and early pod development period.
- **Ascochyta disease assessment:** Ascochyta severity was assessed as the percent of the canopy exhibiting Ascochyta disease symptoms. Severity was assessed at two to three locations per plot.
- **Desiccation:** The chickpeas were desiccated September 4 with paraquat (Gramoxone, 2 pt/ac + non-ionic surfactant, 3 oz/ac in 15 gallons water/ac).
- **Harvest date:** September 16
- **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).

## ACTIVE INGREDIENTS OF FUNGICIDES EVALUATED IN THIS TRIAL:

**Bravo Top:** 50 grams difenoconazole + 500 grams chlorothalonil per liter; **Bravo Weather Stik:** 720 grams chlorothalonil per liter; **Endura:** 700 grams boscalid per kilogram; **Headline:** 250 grams pyraclostrobin per liter; **Omega:** 500 grams fluazinam per liter; **Proline:** 480 grams prothioconazole per liter; **Priaxor:** 333 grams pyraclostrobin + 167 grams fluxapyroxad per liter; **Xemium:** 300 grams fluxapyroxad per liter

## WE GRATEFULLY ACKNOWLEDGE:

This project was made possible with grants from the **Northern Pulse Growers Association** and the **North Dakota Crop Protection Product Harmonization Board and Registration Board**.

We gratefully acknowledge **BASF Corporation** for donating the seed treatment products Stamina and Axxess used in this trial.

## 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 Williston Research Extension Center's Nesson Valley Irrigation Research Site 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.