

Field evaluation of fungicides for management of anthracnose on lentils

Carrington, ND (2013)

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KEY FINDINGS:

- Under a mixture of anthracnose and Sclerotinia disease pressure, the registered fungicides Headline (6 fl oz/ac) and Priaxor (4 or 6 fl oz/ac) and the experimental fungicides Bravo Top (2 pt/ac) and Omega (0.85 pt/ac) performed well.
- The efficacy of Priaxor was derived exclusively from the pyraclostrobin active ingredient. Priaxor is a premix of pyraclostrobin and fluxapyroxad, the active ingredients in Headline and Xemium, respectively. Headline performed well in this trial, and Xemium did not.
- Omega exhibited a rate response, with anthracnose control increasing as the application rate increased. Under the high anthracnose disease pressure observed in this trial, 0.85 pt/ac of Omega was necessary for satisfactory anthracnose control.
- Approach (12 fl oz/ac), Endura (6 oz/ac), Inspire (4 fl oz/ac), Proline (5 fl oz/ac), ProPulse (8 fl oz/ac), Quadris (6.2 fl oz/ac), and Xemium (3.34 fl oz/ac) provided poor control of anthracnose in this field trial.

Active ingredients: Approach contains 250 g picoxystrobin per liter, Bravo Weather Stik contains 720 g chlorothalonil per liter, Bravo Top contains 50 g difenoconazole + 500 g chlorothalonil per liter, Endura contains 700 g boscalid per kilogram, Headline contains 250 g pyraclostrobin per liter, Inspire contains 250 g difenoconazole per liter, Omega contains 500 g fluazinam per liter, Priaxor contains 333 g pyraclostrobin + 167 g fluxapyroxad per liter, Proline contains 480 g prothioconazole per liter, ProPulse contains 200 g prothioconazole + 200 g fluopyram per liter, Quadris contains 250 g azoxystrobin per liter, Xemium contains 300 g fluxapyroxad per liter.

SUMMARY OF KEY RESULTS:

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

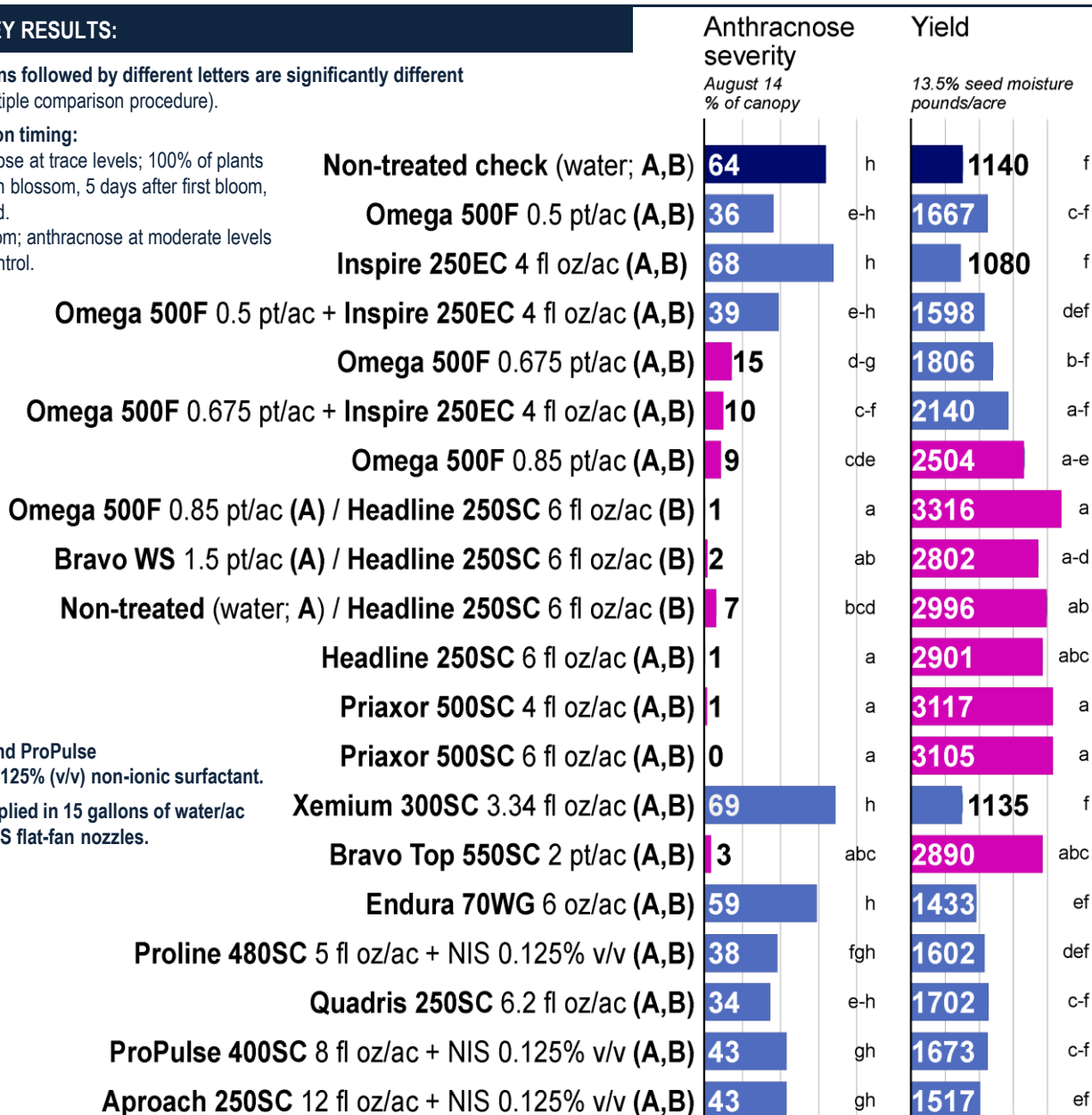
Fungicide application timing:

A = July 3; anthracnose at trace levels; 100% of plants with at least one open blossom, 5 days after first bloom, canopy not yet closed.

B = July 16; full bloom; anthracnose at moderate levels in the non-treated control.

Approach, Proline, and ProPulse were applied with 0.125% (v/v) non-ionic surfactant.

Fungicides were applied in 15 gallons of water/ac at 35 psi with 8001VS flat-fan nozzles.



The fungicides INSPIRE, BRAVO TOP, and OMEGA are currently not registered for use on lentils and should not be used. Future registration of some of these fungicides is anticipated. Results are provided for reference only.

$P > F$: < 0.0001
CV: 18.7

$P > F$: < 0.0001
CV: 22.1

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- **Location of trial:** NDSU Carrington Research Extension Center, Carrington, ND. **GPS coordinates:** 47.509, -99.132
- **Soil type:** Heimdal-Emrick loam **Previous crop:** barley
- **Tillage:** Disked once in October 2012; cultivated twice (once deep, once shallow) on May 8, 2013.
- **Rhizobium inoculant:** Cell-Tech granular nitrogen fixing inoculant for pea and lentil (*Rhizobium leguminosarum* biovar viceae, 100 million viable cells per gram; Novozymes BioAg, Saskatoon, SK Canada) was mixed with the seed and applied at a rate of 2 dry ounces per 1000 feet of row.
- **Maintenance herbicide applications:** Sonalan HFP (ethalfluralin; Dow AgroSciences) was applied at 2 pts/ac in 11 gallons of water/ac on May 8. It was manually incorporated twice on May 8, once with a deep cultivation and once with a shallow cultivation.
- **Variety:** 'CDC Richlea'
- **Seed treatment:** Seeds were treated with 1.6 fl oz/cwt Axxess (imidacloprid) insecticide + 0.4 fl oz/ac Stamina (pyraclostrobin) fungicide.
- **Experimental design:** randomized complete block **Replicates:** 4
- **Seeded plot size:** 5 ft (center-to-center) x 25 ft long **Harvested plot size:** 5 ft (center-to-center) x approx. 21 ft long
- **Untreated buffer plots were established between treatment plots.**
- **Row spacing:** 7 inches **Rows per plot:** 7
- **Planting date:** May 9, 2013 **Seeding rate:** 18 pure live seeds/square foot
- **Fungicide application A:** July 3, 2013 at 10:20 to 11:45 am, no foliar disease present above trace levels, 100% of plants with at least one open blossom and 5 days after first bloom, canopy not yet closed.
- **Fungicide application B:** July 16, 2013 at 8:20 to 9:45 pm, foliar disease at moderate levels (approx. 5% incidence, with diseased plants exhibiting both stem and leaf lesions but no plant mortality), full bloom; Wind = 2.5 to 7 mph, temperature = 70 to 76°F, relative humidity = 66 to 75%.
- **Fungicide application details:** Fungicides were applied with a 57-inch hand boom equipped with four equally spaced Spraying Systems TeeJet XR 8001VS flat-fan nozzles at a spray volume of 15 gal water/A operated at 35 psi.
- **Disease establishment:** On July 5 when the lentils were in full bloom, anthracnose-infested lentil residues from the 2012 growing season were spread in buffer and guard plots. During bloom, overhead irrigation was applied to this trial through microsprinklers established on a 20 ft x 20 ft grid.
- **Anthracnose disease assessment:** On August 1 and August 14, anthracnose severity was assessed as the percent of the canopy exhibiting anthracnose disease symptoms and anthracnose associated necrosis and lodging. On August 1, the severity of anthracnose stem lesions was also assessed on a 0 to 5 scale, in which 0 = anthracnose lesions on stems and leaves at zero to trace levels, lower canopy green; 1 = an average of one to three anthracnose stem lesions per plant, lower canopy green; 2 = an average of four to five anthracnose stem lesions per plant, lower canopy green; 3 = an average of five or more anthracnose stem lesions per plant and the bottom 1 to 25% of the lentil canopy necrotic; 4 = an average of ten or more anthracnose stem lesions per plant and the bottom 25 to 50% of the lentil canopy necrotic; and 5 = an average of ten or more anthracnose stem lesions per plant and more than 50% of the internal lentil canopy necrotic.
- **Harvest date:** September 12 **The lentils matured naturally and were neither desiccated nor swathed.**
- **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 the model assumption of homoskedasticity, a systematic natural-log transformation [$\text{LN}(x+1)$ for data sets including values below 1.0, otherwise $\text{LN}(x)$] was applied to the August 1 and August 14 anthracnose severity data. All other data met model assumptions without transformation. 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 implemented in PROC GLM of SAS (version 9.3; SAS Institute, Cary, NC).

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**. Supplementary financial support was provided by **ISK BioSciences**.

We gratefully acknowledge **BASF** for donating the seed treatment products Axxess and Stamina 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 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.