

# Field evaluation of fungicides for management of anthracnose and Sclerotinia on lentils

Carrington, ND (2012)

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## KEY FINDINGS:

- Under a mixture of anthracnose and Sclerotinia disease pressure, the registered fungicides Headline (pyraclostrobin) and Priaxor (pyraclostrobin + fluxapyroxad) and the experimental fungicide Omega (fluazinam) performed well.
- The efficacy of Priaxor appeared to be derived 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.
- When applied as two sequential applications, Xemium (fluxapyroxad), Proline (prothioconazole), Endura (boscalid), and Quash (metconazole) provided poor control of anthracnose.

## 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 = June 22**; 90% of plants with an open blossom; anthracnose at low levels in inoculated buffer plots but not in treatment plots

**B = July 5**; lentils near the end of bloom; anthracnose at moderate levels in non-treated controls

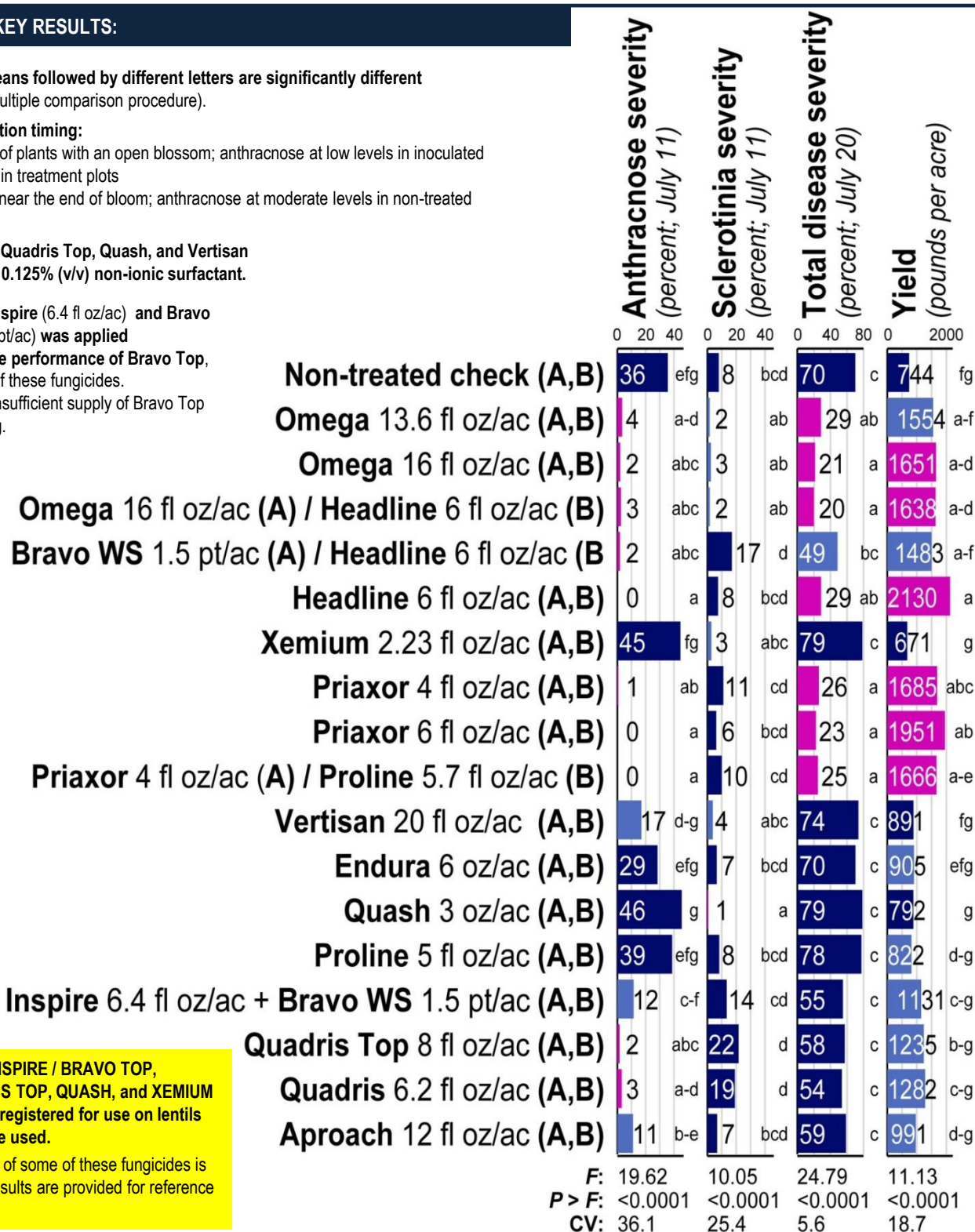
Approach, Proline, Quadris Top, Quash, and Vertisan were applied with 0.125% (v/v) non-ionic surfactant.

The tank-mix of Inspire (6.4 fl oz/ac) and Bravo

Weather Stik (1.4 pt/ac) was applied

to approximate the performance of Bravo Top, which is a premix of these fungicides.

Syngenta had an insufficient supply of Bravo Top available for testing.



The fungicides INSPIRE / BRAVO TOP, OMEGA, QUADRIS TOP, QUASH, and XEMIMUM are currently not registered for use on lentils and should not be used.

Future registration of some of these fungicides is anticipated, and results are provided for reference only.

F: 19.62      10.05      24.79      11.13  
 P > F: <0.0001      <0.0001      <0.0001      <0.0001  
 CV: 36.1      25.4      5.6      18.7

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**Non-treated check (A,B)**    **Omega 13.6 fl oz/ac (A,B)**    **Omega 16 fl oz/ac (A,B)**    **Omega 16 fl oz/ac (A) / Headline 6 fl oz/ac (B)**    **Bravo WS 1.5 pt/ac (A) / Headline 6 fl oz/ac (B)**    **Headline 6 fl oz/ac (A,B)**



**PHOTOS TAKEN ON JULY 17, 2012**

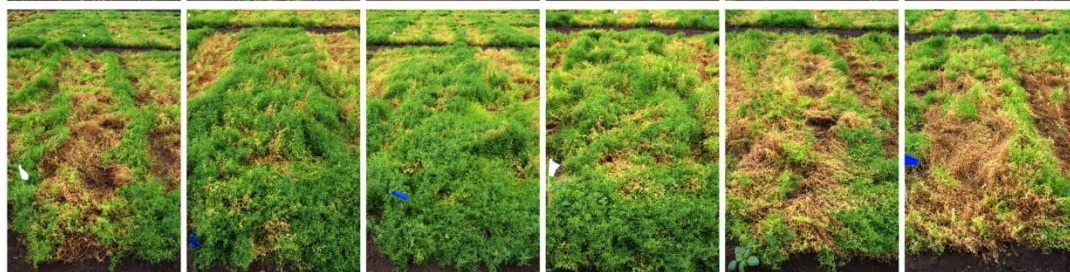
**Fungicide application timing:**  
**A = June 22;** bloom initiation, anthracnose at trace levels  
**B = July 5;** near end of bloom, anthracnose at moderate levels

**Approach, Proline, Quadris Top, Quash, and Vertisan were applied with 0.125% (v/v) non-ionic surfactant.**



**Xemium 2.23 fl oz/ac (A,B)**    **Priaxor 4 fl oz/ac (A,B)**    **Priaxor 6 fl oz/ac (A,B)**    **Priaxor 4 fl oz/ac (A) / Proline 5.7 fl oz/ac (B)**    **Proline 5 fl oz/ac (A,B)**    **Vertisan 20 fl oz/ac (A,B)**

**The tank-mix of Inspire (6.4 fl oz/ac) and Bravo Weather Stik (1.4 pt/ac) was applied to approximate the performance of Bravo Top, which is a premix of these fungicides. Syngenta had an insufficient supply of Bravo Top available for testing.**



**Endura 6 oz/ac (A,B)**    **Quash 3 oz/ac (A,B)**    **Inspire 6.4 fl oz/ac + Bravo WS 1.5 pt/ac (A,B)**    **Quadris Top 8 fl oz/ac (A,B)**    **Quadris 6.2 fl oz/ac (A,B)**    **Approach 12 fl oz/ac (A,B)**

**The fungicides APPROACH, INSPIRE / BRAVO TOP, OMEGA, QUADRIS TOP, QUASH, and XEMIUM are currently not registered for use on lentils and should not be used.**

Future registration of some of these fungicides is anticipated, and results for these products are provided for reference only.

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### METHODS:

- **Location of trial:** NDSU Carrington Research Extension Center, Carrington, ND.
- **GPS coordinates of research trial location:** 47.4714,-99.1374
- **Variety:** CDC 'Richlea' (a medium-green lentil)
- **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:** 7 inches      **Rows per plot:** 7
- **Non-treated buffer plots were established between treatment plots.**
- **Previous crop:** soybean      **Planting date:** April 25, 2012
- **Seeding rate:** 18 pure live seeds per square foot
- **Seed treatment:** Cruiser 5FS 1.28 fl oz/cwt + ApronMaxxRTA 5.0 fl oz/cwt + Mertect 340F 1.05 fl oz/cwt
- **Rhizobium inoculant:** "Nodulator" peat-based granular inoculant for peas and lentils (*Rhizobium leguminosarum*; Becker Underwood, St Joseph, MO); applied at the commercially recommended rate of 6 oz/1000 feet of row.
- **Sclerotinia control:** To reduce Sclerotinia disease pressure in this trial, Contans (a commercial formulation of the Sclerotinia mycoparasite *Coniothyrium minitans*) was applied to the soil prior to seeding the trial. On April 18, 6 lbs/ac of Contans were applied in 17 gallons of water/ac and incorporated by harrowing to 1.0-1.5 inches within 30 min. of application. On April 25, 6 lbs/ac of Contans was applied in 28 gallons of water/ac and incorporated by harrowing to 1.0-1.5 inches within 1 hour of application.
- **Fungicide application A:** June 22, 2012 at 6:30-7:30 am; 90% of plants with an open blossom; anthracnose symptoms present at low levels in the inoculated buffer plots but not the non-inoculated treatment plots. Wind = 4 mph out of the west, temperature = 55-61°F, relative humidity = 80-91%.
- **Fungicide application B:** July 5, 2012 at 6:15-7:30 am; lentils near the end of bloom; anthracnose at moderate levels in the non-treated checks. Wind = 3-5 mph out of the north to northwest, temperature = 53-60°F, relative humidity = 79-90%.
- **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/acre operated at 35 psi.
- **Anthracnose inoculation details:** To promote disease, anthracnose-infected lentil residues from the 2011 growing season were spread in the center of the buffer and guard plots on June 15 (just prior to bloom initiation). No residues were placed in the treatment plots. The residues were collected from a lentil variety trial that had a severe outbreak of anthracnose but no other foliar diseases above trace levels.
- **Disease assessments:** Anthracnose was the first foliar disease to develop above trace levels in this trial; approximately 2 weeks after the first appearance of anthracnose symptoms, Sclerotinia stem rot began to develop. Sclerotinia stem rot only developed in treatment plots where anthracnose was controlled with fungicides and the canopy was dense. No other diseases were present above trace levels. Anthracnose and Sclerotinia severity were assessed on July 11 as the percent of the plot exhibiting each disease. When the second disease assessment was conducted on July 20, anthracnose and Sclerotinia had caused considerable plant mortality, and it was no longer possible to accurately assign the cause of mortality to either disease. As a consequence, only total necrosis (caused by a combination of anthracnose and Sclerotinia) was recorded on July 20.
- **Irrigation:** To facilitate disease establishment, overhead irrigation was applied with a center pivot shortly before and during bloom.
- **Harvest date:** August 6, 2012. The trial was swathed July 31, 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. To meet model assumptions, a systematic natural-log transformation  $[\ln(x+1)]$  for data sets including values below 1.0;  $\ln(x)$  for data sets in which no values were below 1.0] was applied to the disease severity data. All other 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, Tukey's 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).

### WE GRATEFULLY ACKNOWLEDGE:

This project was made possible with grants from the **Northern Pulse Growers Association** and the **North Dakota Department of Agriculture Crop Protection Product Harmonization Board and Registration Board**. Supplementary financial support was provided by the **BASF Corporation** and **ISK BioSciences**.

We gratefully acknowledge **Becker Underwood** for donating the Rhizobium inoculant used in this trial, **Syngenta Crop Protection** for donating the seed treatment products Cruiser and Mertect, and **JM Grain** for helping us obtain seed of CDC Richlea lentils for use 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 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.