Field evaluation of the fungicides Endura and Proline for management of Ascochyta blight of chickpeas - Carrington and Minot, ND (2011)

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KEY FINDINGS:

- **Endura** (boscalid) **may not always provide satisfactory control of Ascochyta blight on chickpeas.**
- **Disease control conferred by Endura does not appear to be reduced when the application rate of Endura is modestly lowered below the labeled rate of 6 oz/ac.**
- The poor efficacy demonstrated by Endura in the trial conducted in Minot suggests that **Endura may not be an optimal fungicide to utilize in rotation with Proline.**

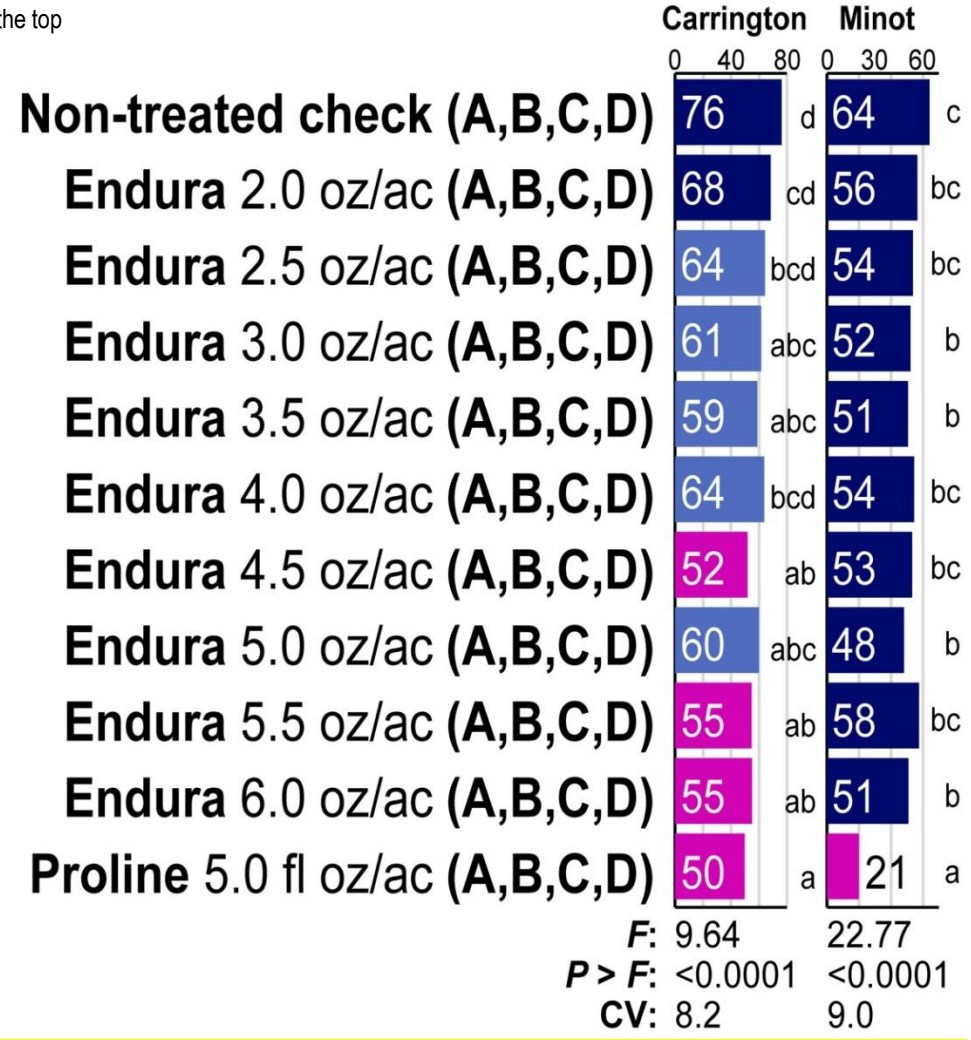
SUMMARY OF KEY RESULTS:

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

CARRINGTON - Fungicide application timing:
A = June 23; prior to bloom and 3 days after the first appearance of disease symptoms
B = July 6 **C = July 18** **D = July 29**

MINOT - Fungicide application timing:
A = July 2; Ascochyta severity less than 10% in the bottom of the canopy an 0% in the middle and the top
B = July 15 **C = July 29** **D = Aug. 12**

Ascochyta disease severity
Disease progression over the summer (0 to 100 scale)



Due to very high disease pressure, chickpea yields were zero or nearly zero in all treatments.
A highly susceptible cultivar (CDC Xena) was planted, and recurrent, heavy rainfall occurred from mid-June to mid-August.

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METHODS – CARRINGTON, ND:

- **Location of trial:** NDSU Carrington Research Extension Center, Carrington, ND.
- **Experimental design, seeding, planting, and harvest:** Soil type was Heimdal-Emrick loam, and conventional tillage was used. Chickpeas were planted May 25 at 4.5 pure live seeds per square foot (targeted plant population was 4 plants per square foot). Seeds were treated with Cruiser 5FS (1.28 fl oz/cwt), ApronMaxxRTA (5.0 fl oz/cwt), and Mertect 340F (2.04 fl oz/cwt). The experiment was a randomized complete block design with four replicates. Plots consisted of seven rows, each 25 ft long and 7 in apart; an 18-in alley separated plots (plot size = 5 ft by 25 ft). To minimize spray drift between treatments, treatment plots were separated by buffer plots. 'CDC Xena', a large kabuli chickpea highly susceptible to Ascochyta blight, was seeded in treatment plots; 'Amit', a Desi-type chickpea moderately resistant to ascochyta blight, was seeded in most buffer and guard plots, but because of planting errors 'Xena' was planted in some buffer and guard plots. The trial was not harvested. Due to (1) recurrent, torrential rains; (2) the use of a highly susceptible cultivar; and (3) inoculation of the trial, disease severity was very high, and no seed production occurred.
- **Fungicide applications:** Fungicides were applied Thursday, June 23 at 6:30-8:00 am (chickpeas 5-6 in. tall, ascochyta blight incidence approx. 1-3%, ascochyta severity approx. 1%), Wednesday, July 6 at 11:15 am - 12:00 pm, Monday, July 18 at 7:30-10:00 am, and Thursday, July 29 at 9:00 am. A 60-in hand boom with four equally spaced XR TeeJet 8001VS nozzles was used for applications. Applications were made with 17.5 gal/ac water and 35 psi pressure.
- **Inoculation:** Chickpea residues from the 2010 field season that were naturally infected with Ascochyta rabiei were spread evenly across the trial on June 10 at the V1 crop stage (first multifoliate leaf unfolded from stem).
- **Relative AUDPC calculations:**
  Disease progress over time was calculated with the formula $$\text{Relative AUDPC} = \left\{\sum_{i=1}^{n}\left[\left(\frac{x_i+x_{i+1}}{2}\right)*(t_{i+1}-t_i)\right]\right\}\Big/(t_n-t_i)$$
  Where xi = disease severity index at the ith observation, ti = time in days at the ith observation, and n = number of observations.
- **Statistical analysis:** All 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. The data met model assumptions, and no transformations were applied. 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 with interactions included in the model, and they were implemented in PROC GLM of SAS (version 9.2; SAS Institute, Cary, NC).

METHODS – MINOT, ND:

- **Location of trial:** NDSU North Central Research Extension Center, Minot, ND
- **Experimental design, seeding, planting, and harvest:** Chickpeas were planted May 19 at 4 pure live seeds per square foot. The experiment was a randomized complete block design with four replicates. Plots consisted of four rows, each 18 ft long and 10 in apart; a 30-in alley separated plots (plot size = 5 ft by 18 ft). To minimize spray drift between treatments, treatment plots were separated by buffer plots. 'Xena', a large kabuli chickpea highly susceptible to ascochyta blight, was seeded in treatment plots; 'Amit', a Desi-type chickpea moderately resistant to ascochyta blight, was seeded in most buffer and guard plots. The trial was harvested Oct. 31.
- **Fungicide applications:** Fungicides were applied July 2 (disease severity less than 10% on bottom of canopy and 0% in middle and top of canopy), July 15, July 29, and Aug 12. Applications were made at 3 mph and 40 psi in 15 gallons water/ac with 80015 flat fan nozzles.
- **Relative AUDPC calculations:**
  Disease progress over time was calculated with the formula $$\text{Relative AUDPC} = \left\{\sum_{i=1}^{n}\left[\left(\frac{x_i+x_{i+1}}{2}\right)*(t_{i+1}-t_i)\right]\right\}\Big/(t_n-t_i)$$
  Where xi = disease severity index at the ith observation, ti = time in days at the ith observation, and n = number of observations.
- **Statistical analysis:** All 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. The data from the second (Aug. 7) and third (Aug. 21) disease ratings were characterized by several large outliers that violated the assumption of normality; however, no systematic transformation could be idenified to resolve the problem, and analyses were conducted on the untransformed data. The 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, 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).

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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 and North Central Research Extension Centers in 2011 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.