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Susceptibility of commercial lentil varieties to anthracnose and Sclerotinia

Carrington, ND (2012)

Michael Wunsch, Michael Schaefer, and **Billy Kraft**
North Dakota State University Carrington Research Extension Center

KEY FINDINGS:

- **'CDC Imigreen CL' (a medium-green lentil) and 'CDC Viceroy' (a small green lentil) exhibited the best resistance to anthracnose.**
- **'CDC Impala CL' (an extra-small red lentil) and 'CDC Maxim CL' (a small red lentil) exhibited intermediate resistance to anthracnose.**
- **The medium-green lentils 'CDC Richlea' and 'CDC Impress CL' and the large-green lentils 'Pennell' and 'Riveland' showed poor resistance to anthracnose.**
- **The field performance of some of these varieties differed from the resistance levels to race 1 of anthracnose provided by the Canadian breeding program.** Lentil anthracnose is caused by at least two different races of the causal pathogen, and resistance to race 1 does not confer resistance to race 2. Both races of the anthracnose pathogen occur in Saskatchewan and are presumed to occur in North Dakota.

SUMMARY OF KEY RESULTS:

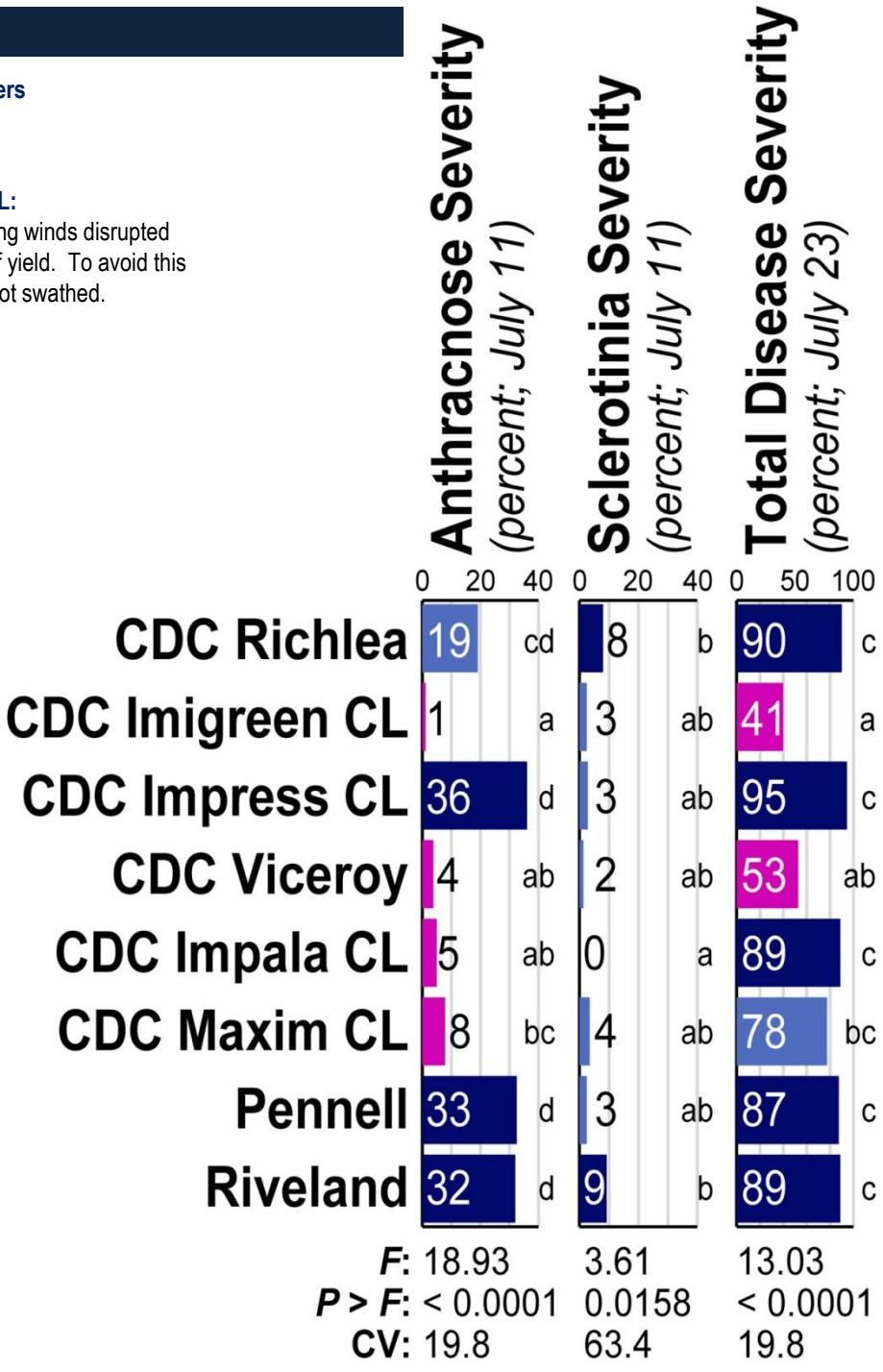
Within-column means followed by different letters are significantly different
($P < 0.05$; Tukey multiple comparison procedure).

YIELDS WERE NOT EVALUATED IN THIS TRIAL:

The lentils were swathed prior to harvest, and strong winds disrupted the windrows, preventing accurate assessments of yield. To avoid this problem in future trials, lentils will be desiccated, not swathed.

MARKET CLASSES OF LENTIL VARIETIES SCREENED IN THIS TRIAL:

CDC Richlea – MEDIUM GREEN
CDC Imigreen CL – MEDIUM GREEN
CDC Impress CL – MEDIUM GREEN
CDC Viceroy – SMALL GREEN
CDC Impala CL – EXTRA SMALL RED
CDC Maxim CL – SMALL RED
Pennell – LARGE GREEN
Riveland – LARGE GREEN



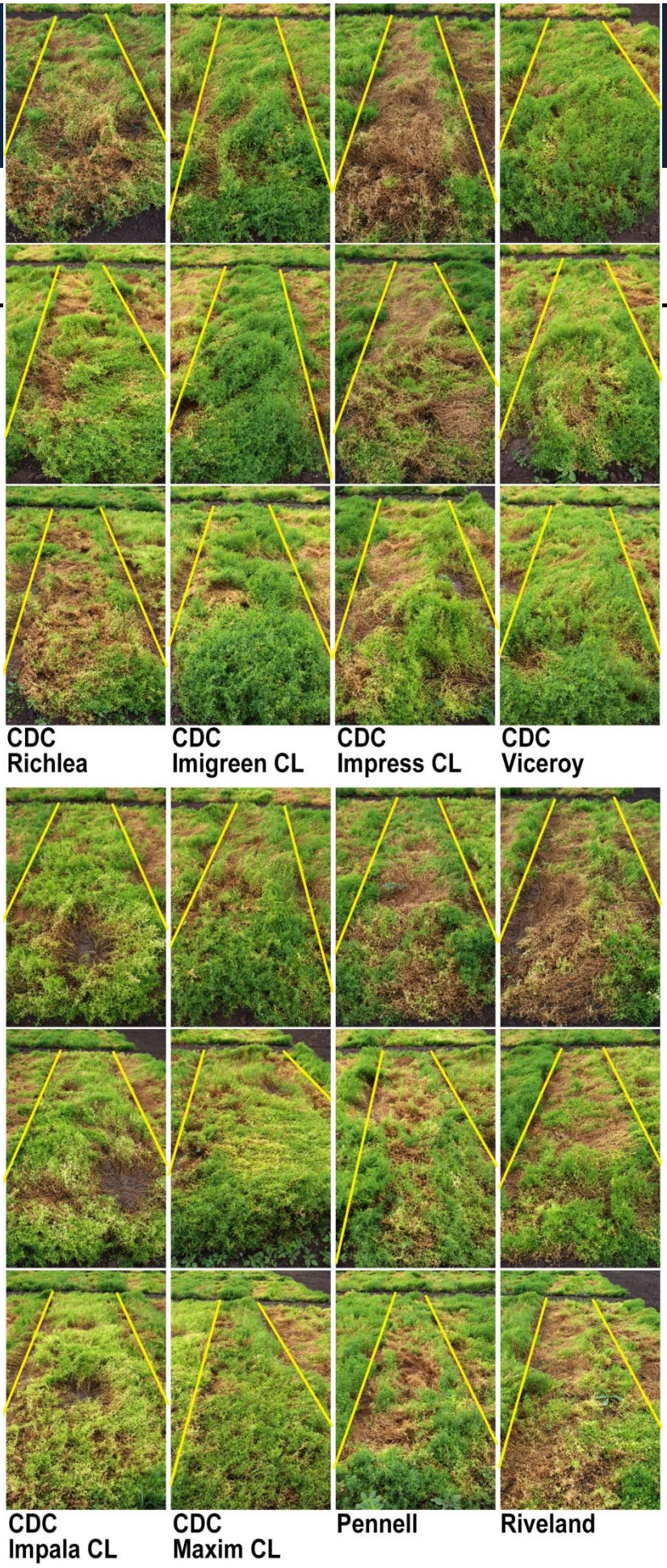
Susceptibility of commercial lentil varieties to anthracnose and Sclerotinia stem rot

Carrington, ND (2012)

Michael Wunsch, plant pathologist
Michael Schaefer, research specialist
Billy Kraft, research technician
North Dakota State University
Carrington Research Extension Center

Photos were taken July 17, 2012.

Anthracnose was the primary cause of lentil necrosis in this trial, but Sclerotinia stem rot was also important. Anthracnose occurred at high levels, and Sclerotinia stem rot occurred at moderate levels. No other diseases occurred above at trace levels.



MARKET CLASSES OF LENTIL VARIETIES SCREENED IN THIS TRIAL:

CDC Richlea – MEDIUM GREEN
CDC Imigreen CL – MEDIUM GREEN
CDC Impress CL – MEDIUM GREEN
CDC Viceroy – SMALL GREEN
CDC Impala CL – EXTRA SMALL RED
CDC Maxim CL – SMALL RED
Pennell – LARGE GREEN
Riveland – LARGE GREEN

Susceptibility of commercial lentil varieties to anthracnose Carrington, ND (2012)

Michael Wunsch, plant pathologist; **Michael Schaefer**, research specialist; and **Billy Kraft**, research technician
North Dakota State University Carrington Research Extension Center 701-652-2951 / michael.wunsch@ndsu.edu

METHODS:

- **Location of trial:** NDSU Carrington Research Extension Center, Carrington, ND.
- **GPS coordinates of research trial location:** 47.512103,-99.130412
- **Soil type:** Heimdal-Emrick loam
- **Tillage:** conventional
- **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.
- **Anthracnose inoculation details:** To promote disease, on June 15 anthracnose-infected lentil residues from the 2011 growing season were spread in the 18-inch gap between the exterior rows of adjacent plots. No residues were placed within plots. The residues were collected from a lentil variety trial conducted in 2011 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. No other diseases were present above low 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 23, 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 23.
- **Irrigation:** To facilitate disease establishment, overhead irrigation was applied with a center pivot during bloom.
- **This trial was not harvested.** The trial was swathed July 31, 2012. A severe windstorm several days later disturbed the windrows, precluding the ability to accurately assess plot-level yields. To prevent this problem in future trials, lentils will be desiccated, not 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 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 July 11 disease data. The July 23 disease 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:

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 used in this trial, and
- **Pulse USA** for providing seed of most of the varieties screened in this trial.

Without their support, this project would not have been possible.

IMPORTANT NOTICE:

- Variety performance differs in response to environmental conditions, agronomic practices, and biotic and abiotic stresses including diseases.
- This report summarizes variety performance as tested at the NDSU Carrington Research Extension Center in 2012 under the conditions partially summarized in the methods section (above).
- Variety performance may differ under other conditions; when choosing varieties, always evaluate results from multiple trials.
- This report is shared for educational purposes and is not an endorsement of any specific products.