

2011 Dry Bean Breeding Research at the Morden Research Station

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With funding from the Manitoba Pulse Growers Association (MPGA), the Agri-Food Research and Development Initiative (ARDI) and the Pulse Science Cluster, the dry bean breeding program at the AAFC-Morden Research Station was able to conduct research activities that included the MPGA Variety Trials, the Manitoba Cooperative Registration Trials, yield trials of yellow bean and slow-darkening pinto bean selections, disease resistance screening, and development of advanced bean breeding lines in various market classes. Data from the trials are being analyzed and the final reports will be published in journals and on websites that include Seed Manitoba and *Pulse Beat*.

Cultivar Development

A new navy bean line, NA06-002, was supported for registration in Canada. NA06-002 is a high-yielding line with upright growth. It has resistance to anthracnose races 73 and 105 which are common races in Manitoba. The tolerance of NA06-002 to white mould disease is also improved compared to the check cultivars.

The common bacterial blight (CBB) resistant navy bean cultivar 'Portage' was registered in 2010. Working with Canterra Seeds, pedigree seed was produced in 2011 in the Portage la Prairie area. Despite the late-seeding conditions in 2011, Portage matured early and the field plots showed high yield potential and good seed quality.

MPGA Dry Bean Variety Trials

The 2011 variety trials included entries in the navy, black, pinto, kidney, small red, cranberry, pink and yellow bean market classes. A total of fifty entries were tested under long season growing conditions at four locations (Morden, Carman, Winkler and Portage la Prairie). The entries included fourteen navy, fourteen pinto, nine black, five kidney, three cranberry, two small red, two yellow, and one pink bean cultivar. These cultivars were evaluated for their adaptation, agronomic performance and disease resistance in Manitoba. With the favourable summer growing conditions, all test sites performed very well. Data from these trials will be published in Seed Manitoba and *Pulse Beat*, which can be accessed at the MPGA website (http://manitobapulse.ca/production-variety_results.htm).

Manitoba Cooperative Registration Trials

Forty entries were tested in the Long Season Wide Row (LSWR) Dry Bean Cooperative Registration Trials at four locations in Manitoba (Morden, Carman, Winkler and Portage la Prairie). The entries were provided by private and public breeders/companies/institutions in Canada and the U.S. The breeding lines and check cultivars were evaluated for seedling resistance to anthracnose races 73 and 105 in growth chambers. These lines were also screened for resistance to white mould in an irrigated disease nursery at Winkler. The comprehensive evaluation of all these entries will be reported to support cultivar registration in

Canada at the annual meeting of the Prairie Recommending Committee for Pulse and Special Crops (PRCPSC) of the Prairie Grain Development Committee (PGDC) in February 2012.

Common Bacterial Blight (CBB) Resistance Breeding

Breeding for improved resistance to CBB remains one of our top priorities. In 2011, two CBB disease nurseries were conducted at Morden with artificial inoculation to screen bean lines and cultivars for responses to CBB infection. Field resistance to CBB in breeding lines and cultivars was also evaluated in various yield trials at four locations. Breeding populations developed from crosses involving CBB-resistant lines as parents were also evaluated in CBB nurseries at both Morden and Harrow. This in combination with molecular markers identified individual lines of navy, pinto and black beans that possessed both the resistance genes and improved resistance to CBB which will be used in crossing for future cultivar development. Superior selections were also tested in preliminary yield trials at multiple locations. Continued efforts will be made to develop bean cultivars with multiple disease resistance.

Yellow Bean and Slow-Darkening Pinto Bean Yield Trials

Yellow bean and slow-darkening pinto breeding lines were tested in the preliminary yield trials at two locations (Morden and Carman). In previous studies funded by MPGA, advanced populations of twenty six yellow beans and thirty six slow-darkening pinto beans were selected. The lines were evaluated in 2011 for maturity, growth habits, field disease resistance, yield potential and seed quality. At both locations, significant variation was observed in the breeding lines for resistance to CBB, maturity, lodging resistance and yield potential. The elite selections will be entered into the pre-cooperative yield trials in 2012 for further evaluation at two locations (Morden and Winkler). In addition, large numbers of selections were made in the early generation nurseries of both bean types. Crosses were also made to combine desirable agronomic traits with disease resistance to anthracnose and CBB in these two market classes.

Evaluation of Dry Bean Breeding Materials for Adaptation to Manitoba

To broaden the dry bean breeding genetic materials in Manitoba, one hundred and fifty black bean entries were introduced in 2008 from the USDA and evaluated at Morden in 2009, 2010 and 2011. While a number of the collections were not adapted to the Manitoba growing conditions, many lines would be useful in our breeding programs. Desirable traits were observed and they included disease resistance to anthracnose races 73 and 105, good seed quality and characteristics, and good germination under low temperature conditions. These lines will be subjected to more tests for various diseases and protein content. Performance of the collections over the three years will be compared and analyzed, and selections will be made and used in crosses.

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