Development of Edible Bean Cultivars for Production in Manitoba
2012 Annual Report to MPGA

Anfu Hou, Robert Conner and Parthiba Balasubramanian

With funding from the Manitoba Pulse Growers Association (MPGA), the Agri-Food Research and Development Initiative (ARDI) and the AAFC Pulse Science Cluster, the dry bean breeding activities at the AAFC-Morden Research Station were conducted according to the plan.

Cultivar Development

Two breeding lines were supported for registration in February 2012 at the PGDC meeting in Banff. GN13-10-1 is a high yielding great northern bean line with an upright indeterminate growth, good seed quality, high yield potential and adaptation to the Red River Valley of Manitoba. SR47-3-3 is a high yielding small red bean with good seed quality, partially upright indeterminate growth and early-maturity. Both lines are available for commercialization through the AAFC's Office of Intellectual Properties and Commercialization.

The common bacterial blight (CBB)-resistant new navy bean cultivar 'Portage' is currently in registered seed production. Additional breeder seed was transferred to Canterra Seeds Ltd. and used for pedigree seed production.

MPGA Dry Bean Variety Trials

The 2012 variety trials included 44 entries in navy (12), black (5), pinto (13), kidney (5), small red (2), cranberry (3), great northern (3), and yellow bean (1) market classes. The trials were conducted with three replications at four locations (Morden, Carman, Winkler and Portage la Prairie). The cultivars and breeding lines were evaluated for flowering date, plant height, lodging resistance, growth habit, maturity, yield and seed quality. Disease resistance was rated at all locations for CBB, anthracnose, rust and white mould. Despite the dry growing conditions, all trials were conducted successfully. Data from these trials were submitted for publication in Seed Manitoba and Pulse Beat.

Manitoba Cooperative Registration Trials

Forty entries were tested in the Long Season Wide Row (LSWR) Dry Bean Cooperative Registration Trials at four locations in (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 performance of these entries will be reported at the annual meeting of the Prairie Recommending Committee for Pulse and Special Crops (PRCPSC) of the Prairie Grain Development Committee (PGDC) in February 2013.

Disease Resistance Breeding

Breeding for improved resistance to CBB and anthracnose remains one of our top priorities. In 2012, breeding selections were screened for resistance to CBB in disease nurseries at Morden and Harrow. Field resistance to CBB in breeding lines and cultivars was also evaluated in various yield trials at four locations. Lines of navy, pinto and black beans were identified that

possessed resistance to CBB and/or anthracnose and bean common mosaic virus, providing new breeding materials for future cultivar development. Multiple disease-resistant lines were also entered in to the 2012 Coop Trials. Continuing efforts will be made to develop bean cultivars with multiple disease resistance in the various market classes.

Yellow Bean and Slow-Darkening Pinto Bean Yield Trials

Yellow bean and slow-darkening pinto advanced breeding lines were tested in the preliminary and pre-coop yield trials at two locations. The lines were evaluated for maturity, growth habits, field disease resistance, yield potential and seed quality. Significant variation was observed in the breeding lines for resistance to common bacterial blight, maturity, lodging resistance, and yield potential. The unique hot and dry growing season in 2012 offered conditions for additional stress-tolerance selection, this was especially important considering the narrow genetic basis of these beans. The selections will be subjected to evaluation in 2013. Elite lines will be entered in to the 2013 Coop Trials. In addition, large numbers of selections were made in the early generation nurseries of both bean types. Crosses were also made to improve resistance to anthracnose and CBB in these two market classes.

Evaluation of Dry Bean Breeding Materials for Adaptation to Manitoba

To broaden the 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, 2011, and 2012. Lines were identified that were adapted to the Manitoba growing conditions, and will be useful in our breeding program. Desirable traits that were observed included disease resistance to anthracnose races 73 and 105, good seed quality, early-maturity, and good germination under low temperature conditions. Some lines have been used in crossing for future breeding and genetic research.

Acknowledgements

The technical assistance for this research was provided by G. Dyck, L. Dyck, D. Young, W.C. Penner, and D.B. Stoesz. We greatly appreciate the financial support provided by the MPGA, ARDI, and the Pulse Science Cluster of AAFC.