

Evaluating Dry Bean Breeding Lines Using the
Midwest Regional Performance Nursery.

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The Midwest region of the United States is a major area of dry edible bean (*Phaseolus vulgaris* L.) production. The combined production of four states (Colorado, Nebraska, Michigan, and North Dakota) in this region was 70%, 68.5%, and 66.2% of total U.S. dry bean production in 1991, 1992, and 1993, respectively (1). Traditionally, each state produced one major market class of bean (eg., the major market class produced in Nebraska is the great northern bean, while Michigan concentrated on production on navy bean). However, grower demands for greater diversification among market classes of dry bean has forced dry bean breeders in the Midwest to develop breeding programs in market classes that were not typically grown in the region (eg., great northern bean production in Michigan). The dominance of this region in dry bean production and the increased diversity of production in a particular state have resulted in new opportunities for collaborative evaluation of bean breeding lines for potential cultivar release.

A serious constraint facing dry bean breeders located in the eastern U.S. is to evaluate their materials over broad geographic areas to estimate the adaptation and stability of their breeding lines. The Cooperative Dry Bean Nursery (CDBN) is one mechanism to estimate these traits. This nursery, established in 1950, has grown over the years to include 21 locations in 14 states and three Canadian provinces (2). A constraint that the breeder in the Midwest encounters is to produce sufficient amounts of western-grown seed of advanced lines for entry into the CDBN. Seed requirements for this large nursery often taxes the diminishing resources available to dry bean breeding programs; often, by the time sufficient amounts of seed are available for the CDBN, cultivar release decisions concerning the breeding line may already have been made. Because of these stringent seed requirements, public breeding programs east of the Rocky Mountains may not be using the CDBN effectively.

While the CDBN remains effective in evaluating performance of breeding lines in a wide spectrum of environments, initiating a complementary, but smaller, evaluation nursery for advanced bean breeding lines focused on the Midwest was proposed. The Midwest Regional Performance Nursery was developed within the framework of the W-150 regional project on bean improvement with the objective to

provide information, at an early stage of evaluation, on adaptation, yield performance, and overall merit of dry bean breeding lines developed by State Experiment Stations. The MRPN, as envisioned, would foster increased cooperation within the region toward developing well adapted, stable dry bean cultivars. This nursery also would facilitate identification and use of desirable genotypes.

PROCEDURE: Locations for this nursery are Ft. Collins, CO; Scottsbluff, NE; Saginaw, MI; and Fargo, ND. Entries are composed of advanced pinto and great northern bean breeding lines, with commercial cultivars as checks. Collaborators have the flexibility to manage this nursery as their other yield tests, but RCBD's or lattices are recommended, with a minimum of three replicates. Each collaborator may enter up to five advanced lines for testing, with the understanding that these entries should be maintained for at least two years. North Dakota State University acts as the coordinator of this nursery and is responsible for receiving and distributing entries and preparing a summary of data collected. Data on flowering, maturity, architecture, yield, and seed weight generally are recorded. A summary of these data are provided to participants and the technical committee of the W-150 regional project for further dissemination of trial results.

Seed requirements of the MRPN are minimal, at 0.5-1.5 kg per entry. This is sufficient for each collaborator to plant a three rep test using one-row plots. If additional seed is available, the entries may be tested in local disease evaluation nurseries. Entries should have minimal seedborne disease problems, although, since all collaborators are breeding in areas where some seedborne diseases exist, the requirements for this nursery are less stringent than those required by other regional or national trials.

Since this nursery has been in existence, data from the nursery has been used to justify release of a minimum of three cultivars. A more important use of this nursery, however, is the organized distribution of germplasm. Breeding lines entered into the MRPN have been used as parents by one or more participants, thereby increasing the genetic base of the market classes tested. This cooperative effort among the four states has enhanced each breeding program.

REFERENCES

- USDA, 1993. Bean Market News. Vol. 29, No. 41.
- Myers, J. R. 1992. Values and Use of the National Dry Bean Nurseries. BIC 35:1-2.