Wheat Breeding and Genetics
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Research Question

The objectives of this proposal are to i) develop improved varieties and germplasm combining high grain yield, disease resistance, and end-use quality; and ii) provide performance data on wheat varieties adapted to the state of Minnesota.

Results

‘Tom’ (MN01311-A-1) was released in 2008. Tom (97T-1003/Verde) has medium maturity, height, and straw strength. Tom has shown consistently high grain yields, especially in northern locations, moderate leaf rust resistance, and Fusarium head blight resistance comparable to Alsen. Tom has above average test weight and grain protein. Tom has moderate resistance to stem rust race Ug99 that is currently damaging wheat crops in Africa. Tom is comparable to the AgriPro variety Freyr in terms of its performance and attributes.

The variety was named in memory of Tom Anderson, of Barnesville, MN who passed away in 2007. Tom, a proud member of the Minnesota Wheat Growers Association was a leader in obtaining state and federal funding for Fusarium Head Blight (scab) research. Tom served a number of other organizations and was recognized numerous times for his contributions and commitment to agriculture.

During the 2007/2008 crossing cycle, 323 crosses were made. The Variety Trial, which contained 26 released varieties, 11 University of Minnesota experimental lines, and 6 experimental lines from other programs and was grown at Crookston, Lamberton, Morris, Roseau, St. Paul, Stephen, Waseca, and 5 on-farm locations in the Red River Valley. During the 2008 growing season, 120 advanced experimental lines were evaluated in replicated advanced yield trials at Crookston, Morris, and St. Paul. A total of 370 preliminary yield trial lines were tested in unreplanted plots at Crookston, Morris, and St. Paul. Fusarium-inoculated, misted, replicated nurseries were established at Crookston, Morris, and St. Paul. The disease nurseries involve collaboration with agronomists and pathologists at Crookston and Morris and with personnel from the Plant Pathology Department and the USDA-ARS. Data from the yield and scab nurseries are summarized and published in Prairie Grains and the U of M Extension Service’s Minnesota Varietal Trials Results.

One advanced experimental line, MN03358-4, underwent seed increase during 2008 and is a candidate for release in 2009. MN03358-4 is a mid-maturity hard red spring wheat with high grain yields and good scab resistance. The pedigree of MN03358-4 is MN98389/MN97518. MN03358-4 has been a consistently high yielder in Minnesota and the hard red spring wheat region, performing well in the 2006 and 2007 regional performance nurseries. Grain protein and test weight are average compared to other cultivars. MN03358-4 is moderately resistant to pre-harvest sprouting with good falling numbers. Straw strength is below average. MN03358-4 is resistant to stem rust and moderately resistant to prevalent races of leaf rust and other leaf diseases. MN03358-4 has moderate resistance to Fusarium head blight (scab), comparable to Tom and better than RB07.

Application/Use

Experimental lines that show improvement over currently available varieties are recommended for release. Improved germplasm is shared with other breeding programs in the region. Scientific information related to efficiency of breeding for particular criteria is presented at local, regional, national, and international meetings and published.

Materials and Methods

All yield nurseries are grown in small, replicated plots (typically 40-50 sq. ft. harvested area per plot). Fusarium-inoculated nurseries at Crookston, Morris, and St. Paul consist of single 4 to 6 ft. rows, with 1 to 3 replications. Fusarium-infected corn seed or spray-applied macroconidia are used as inoculum. The plot areas are misted periodically to maintain a high humidity environment for at least three weeks after anthesis.
Related Research

These funds provide general support for our breeding/genetics program. Additional monetary support for breeding-related research comes from the Minnesota Agricultural Experiment Station and the U.S. Wheat and Barley Scab Initiative via USDA-ARS.

Our breeding project is a participant in a new USDA-CSREES project whose objectives are to discover DNA markers linked to pre-harvest sprouting resistance and use DNA markers associated with other key genes to increase the efficiency of the breeding project.

Publications


Tsilo, T.J., S. Chao, Y. Jin, and J.A. Anderson. 200X. Identification and validation of SSR markers linked to the stem rust resistance gene Sr6 on the short arm of chromosome 2D in wheat. Theor. Appl. Genet. in press.