

## **NPSAS Farmer-Breeder Club**

Steve F. Zwinger and Theresa Podoll

Staff at the Carrington Research Extension Center have been instrumental in the development of a relatively new area of plant breeding and variety development called participatory plant-breeding (PPB). The center has been working with a group of farmers from the Northern Plains Sustainable Agriculture Society with the intent to build teams of plant breeders and farmers to develop varieties applicable to the growing conditions of this group.

The Northern Plains Sustainable Agriculture Society Farmer Breeder Club (FBC) has not conducted any form of plant breeding (crosses) up to this point. The FBC has worked mainly with evaluation of existing varieties of cereals and evaluation of experimental germplasm for possible release by the FBC. Currently, the greatest effort is in the area of developing a participatory plant-breeding model with partnerships among public plant breeders, farmers, and end-users.

*Return to Resistance* author Rauol Robinson was invited to keynote the NPSAS Annual Winter Conference in February of 1999 and to host a workshop on participatory plant breeding entitled, "Developing a Farmer Breeder Club." That event resulted in the formation of the *NPSAS Farm Breeder Club* with the vision of developing farmer-based participatory plant breeding partnerships with public plant breeders. The membership is primarily comprised of organic producers throughout the Northern Great Plains with most of the members located in the Dakotas. These producer members raise a diversity of small grains, feed grains, pulse crops, oilseeds, and livestock.

The FBC began its work by asking questions about the crop varieties available to organic producers and their suitability to organic farming systems. Conversations began with research agronomists and plant breeders at land grant universities (LGUs) about what traits are most desirable in organic farming systems. During an open forum at the NPSAS Annual Winter Conference in February of 2000 between NPSAS members and land grant university researchers, the farmers presented their questions and concerns about the crop varieties available to them and their application to organic agriculture. They requested a series of organic variety trials and field days to answer some of the questions. These trials were initiated in the spring of 2001. The trials and the field days also served as introduction to the vision of the FBC and a point of involvement for additional plant breeders and researchers. Farmers worked together with plant breeders and research agronomists in studying traits of interest to organic producers including growth characteristics, disease and pest resistance, along with yield and quality traits in replicated trials of wheat, oats, and barley at four locations, two in Minnesota and two in North Dakota.

The FBC has been evaluating existing varieties of wheat, oats, and barley in organic systems with principal investigator, Dr. Pat Carr at the NDSU Dickinson Research Extension Center, Steve Zwinger at the NDSU Carrington Research Extension Center, Dr. Paul Porter and Dr. Hans Kandel of the University of Minnesota. These on-farm variety trials began on participating certified organic farms to learn how the available germplasm performs in the organic production systems the Farm Breeder Club is seeking to address.

Field tours were held at each of these locations with the active participation of organic farmers to better assess the variety selection criteria of importance in organic environments. During these events the participants partnered with plant breeders and research agronomists to evaluate the varieties in replicated trials. The farmers evaluated the plots and scored them on what they considered to be the most important characteristics of a good wheat, oat or barley variety. The scores were averaged to produce the group's ranking of the varieties. The plant breeders then looked at the varieties with the group and discussed their perspective on the merits and weaknesses of each of the varieties. The farmers in turn responded with comments on criteria that organic farmers might consider important that were not necessarily selection criteria on conventional farms. The scores that the varieties were given were then compared to the previous year's performance in organic environments.

Farmer collaborators who hosted the variety trials and field days were encouraged to take part in whatever level of observation and involvement they desired. This input from the farmer provided the researchers and plant breeders with an educational opportunity to learn about an organic farmer's perspective, observations, selection criteria and concerns. The two-year NCR-SARE organic variety trials have been completed and the data has been evaluated and published in a report by Dr. Pat Carr. Steve Zwinger, Hans Kandel, and Paul Porter have continued to trial varieties of wheat, dry peas, soybeans and organic hybrid corn on organic farms, gathering additional data beyond the SARE-funded grant.

NPSAS partnered with the Tri-Societies (American Society of Agronomy, Crop Science Society of America, Soil Science Society of America) through a Kellogg funded initiative, *Cultivating Leadership for a Changing Agriculture*, involving CAST and the Institute for Conservation Leadership, to sponsor a planning retreat on participatory plant breeding in November, 2004. This retreat determined the next steps in the development of the FBC participatory plant-breeding (PPB) model. The FBC received a Bush Foundation planning grant in August 2005 to continue developing a PPB model involving partnerships between public plant breeders, land grant universities, farmers, and end-users (millers, bakers, processors, and distributors).

As part of this project, the FBC is in the process of developing a working group to take up the issues of university relations and research foundations at LGUs, specifically material transfer agreements, intellectual property and public plant breeder involvement in this effort. An additional effort is to foster networks with other non-government organizations in developing alternative, participatory plant breeding and seed saving systems to learn from the models being developed and the experience gained in their development.

Jim Coors, CSSA President, and Marcelo Carena, NDSU's corn breeder, hosted a panel discussion titled "Developing Farmer-Breeder Teams" in November 2005 at the Tri-Societies Annual Meeting in Salt Lake City, Utah. The panel focused on participatory plant breeding by forming PPB partnerships among attendees.

To increase the sustainability of PPB, the FBC is collaborating with other PPB efforts to identify self-funding strategies. Central to this goal is the involvement of end-users in the planning and identification of traits to be bred/selected for to enhance the market utility of the varieties developed.

The Carrington Research Extension Center will continue to participate in the development of PPB teams and in building relationships among farmers, public plant breeders, and end-users to meet the overall goal of variety development.