NORTH DAKOTA Farm Research

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Guest Column

Earl Foster, Chairman,
Crop and Weed Sciences

Crop varieties first grown in North Dakota in the late 1800s usually contained mixtures of several different types of plants. Thus, the first plant breeding efforts in the state consisted of selecting superior plants from these mixtures. Selection of desirable plants was done occasionally by farmers but primarily by plant scientists at the North Dakota Agricultural College. The scientist or the farmer increased seed of the selected plants for eventual planting over a wide area.

Records indicate that plant breeding in the traditional sense, i.e. plant hybridization and selection, began with wheat crosses at the NDAC in 1892. The first NDAC plant breeder, L.R. Waldron, began working on wheat in 1910. A corn breeding program was added shortly after.

In crop and weed sciences, we now have major plant breeding efforts on 12 crops, hard red spring wheat, durum wheat, hard red winter wheat, six-rowed barley, two-rowed barley, oat, flax, corn, dry bean, soybean, sunflower, and sugar beet. Statewide average yields for these crops have increased dramatically in the last 30 years, as is pointed out in detail in the lead article in this issue.

The gradual increases in yield have resulted from genetic improvements, improved weed control, changed cultural practices, and fertilization. Various researchers have reported that yield increases of 1 to 2 percent per year resulted from plant breeding.

The economic impact of the rust resistant wheat varieties released after the severe rust epiphytotics of the 1950s is difficult to estimate, but the benefit to North Dakota alone totals in the billions of dollars when considered over years. Without the rust resistant varieties, wheat production would be dependent on use of fungicides, and production costs would be much greater than they now are.

The rust catastrophe did have some positive results, in that additional support was provided for the breeding teams for wheat and other crops. The additional money for research built greenhouse facilities and allowed for winter seed increases so that more than one crop could be grown each year, resulting in more rapid development and distribution of new varieties. Also, breeding programs were expanded and cooperating scientists in related fields were hired. Most breeding programs now involve cooperative efforts from a plant breeder, a plant pathologist, and a cereal or food scientist. The breeding programs also have a long history of cooperation with USDA-ARS scientists.

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In This Issue

On the Cover: As discussed in this issue, plant breeding programs at NDSU have had a huge impact on North Dakota's economy over the years and continue to produce improved varieties and hybrids. Current members of the plant breeding team include: (standing, left to right) Jim Hammond, flax; Richard Horsley, six-rowed barley; Jerry Franckowiak, two-rowed barley; Ken Grafton, dry beans; Ted Helms, soybeans and Darrell Cox, winter wheat. (Seated, left to right) Elias Elias, durum; Michael McMullen, oats; Richard Frohberg, hard red spring wheat and Jim Hanzel, sunflower. Not pictured are Harold Cross, corn and Jerry Miller, flax. (Photo by Harold Caldwell)

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Weeds, diseases, and insects are some of the yield limiting factors of crop production in North Dakota. Crop plants do not compete well with weeds, and weed control is accomplished by both herbicides and cultural practices. Scientists using biotechnological techniques are attempting to develop crop varieties resistant to herbicides which quickly decompose, thus reducing possible negative impacts on the environment. Plant breeding has resulted in development of varieties with improved resistance to various diseases and insects, although it is a never ending struggle for the breeding team to keep up with changing biotypes of diseases and insects. Genetic resistance to pests is by far the most economical means of control and represents the best method of biological pest control.

A less tangible benefit of our plant breeding programs is the training of young scientists to work in the plant breeding field. Well over 100 masters and doctoral graduates from the crop and weed sciences department at NDSU now are working throughout the world for universities or private companies in plant breeding programs. Some of these programs produce crop varieties or hybrids which are grown here in North Dakota and provide a return on the state's investment.

North Dakota's economy is very dependent on agriculture, and over 50 percent of the state's agricultural income is directly related to sale of crop commodities. New higher yielding crop varieties provide the producer with greater income, so plant breeding is a basic form of economic development and continues to merit strong support from the citizens of the state.

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