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Guest Column

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POTATO BREEDING — A NORTH DAKOTA SUCCESS STORY

Potatoes have been cultivated as a food crop for thousands of years in South America. When disease destroyed the potato crop in Europe during the 19th century, millions of people died and a great migration of people to the United States occurred. The European potato famine also inspired the first efforts to improve the potato by selection and plant breeding.

A systematic attempt to develop improved potato varieties began in both Europe and North America in the 1850s. At first, selections were made from seedlings grown from naturally pollinated seed. Since little cross pollination occurs in potato, this technique met with only limited success. In an attempt to acquire increased resistance to the blight, potatoes were imported from South and Central America for use in selection and breeding programs. Some of the selections made from these materials were later used as breeding materials and are probably in the parentage of all modern potato varieties.

Between 1860 and 1890 there was a flurry of potato breeding in both Europe and the United States. Genetic stocks were exchanged between the European and American plant breeders and exploration trips were made to South America to acquire additional germplasm. This activity resulted in developing the potato as we know it today and establishing the possibility of manipulating the genetics of the potato to meet specific needs.

A revival of interest in potato breeding that occurred in the 1930s was amplified in the '40s by World War II. The potato breeding program in North Dakota got its start during this period. A limited program had been initiated by A.F. Yeager, horticulturist and Harry Graves, extension horticulturist. When Yeager left the University in 1937, Harold Matson was hired as horticulturist with the responsibility for horticultural crop improvement. At this time the operation of the department was a one-man shop and Matson had breeding programs for tomatoes and potatoes along with a variety of other projects related to fruit, vegetables and ornamentals.

By 1938 the program was well underway, and Matson grew more than 60,000 seedlings that year. In 1939 he grew 35,121 seedlings. To do this he worked with several cooperators who supplied both greenhouse and field space. Matson left the University in 1950 and the potato breeding program was taken over by J.H. Schultz and R.H. Johansen.

The potato breeding program in North Dakota has from its beginnings been more than a university project. It has

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On the Cover: Robert Johansen's efforts in potato breeding have had far reaching effects on the potato industry in North Dakota and nationwide. Articles in this issue examine potato breeding at NDSU, past, present and future. Photo by Christle Ackerson, used courtesy of the Red River Valley Potato Growers Association.



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been close to the producers and the industry through cooperative efforts. Private citizens and the Red River Valley Potato Growers Association have contributed considerably to the success of this program. This interest by the industry has certainly meant the difference between success and failure.

Between 1950 and the present time, 14 new varieties of potatoes have been released from this program. Four of these have had a monumental influence on the potato industry nationally, as well as in the Red River Valley. In the Valley an entire industry has been built around the variety Norchip. The acceptance of this variety has built the Valley into the primary source of fall chipping potatoes and Norchip has become the standard for the industry nationwide.

Norland, a red fresh market potato, is the most used early red potato in the industry. It is grown extensively in the Red River Valley and other fresh market areas of the country. Since it can be stored for a considerable length of time, it is packed out of storage in the Valley for six to eight months each year.

Norgold Russet was for many years the second most important russet skinned potato grown in the United States. Its earliness made it possible to put a russet potato on the market well ahead of the most commonly used variety. Norgold was grown extensively in the Northwest and other potato production areas.

The latest success story from this program is the Russet Norkotah. This has been termed the hottest potato in the industry. It has found wide acceptance and is grown extensively as an early fresh market variety and is used some as an early processor.

Several of the other varieties are also used to some extent and several numbered selections hold the promise of becoming the new varieties of years to come.

From the point of view of the potato industry in North Dakota and the Red River Valley, the acceptance of the North Dakota varieties has stimulated the seed potato industry. The adaption of modern seed production practices puts North Dakota grown seed into the hands of growers in all the potato growing regions of the country and, of course, makes quality seed available for commercial production in North Dakota.

The potato breeding program at North Dakota Agriculture Experiment Station is lead by Dr. R.H. (Bob) Johansen. He can justifiably claim the success of the North Dakota varieties. His efforts to develop the potato industry in the Red

River Valley by responding to the needs of the growers has, in many ways, made growing potatoes a profitable venture. He has dedicated nearly 40 years to his tasks as North Dakota's "Dr. Potato." During the last half of this time he has been assisted by Bryce Farnsworth. The success of this team may never be equaled.

The demands on the characteristics of future potato varieties will undoubtedly be different than they have been in the past. It is quite likely that the extensive use of pesticides for the control of insects and disease will be severely limited in the future. Although resistance to diseases has always been a primary goal of breeding programs around the world, modern varieties are still plagued by many viruses, bacteria and fungi. In most North American growing areas the Colorado potato beetle is a major threat to the profitable production of potatoes. Resistance to this and other insect pests could reduce the need for insecticide use.

Dr. Shelley Jansky and Dr. Mark Ehlenfeldt are working on various aspects of potato breeding that will make possible the incorporation of many new characteristics into potatoes. Through the extensive use of exotic germplasm they are attempting to incorporate resistance to several potato pests and improved quality factors into commercial potato varieties. Their work includes conventional plant breeding techniques as well as biotechnology. Future potato varieties may not look different from today's but hopefully they will carry traits that make their production less dependent on chemical pesticides and more profitable for the grower.

Of the half dozen or more potato breeding programs in the United States, no one would dispute that the North Dakota program has been the most productive in new variety releases. It should also be noted that it has been a bargain for the potato growers and taxpayers. Budget considerations have always limited this program and of the major programs around the country, the North Dakota project probably has the least money to operate with. Funding from the Red River Valley Potato Growers Association has provided the nuts and bolts for keeping it going. Recent funding from grants from the USDA-Cooperative States Research Service and the USDA-Agricultural Research Service have made it possible to expand the scope of the program into needed genetic studies.

Potatoes fill an important niche in the American diet. Good, high quality potatoes that can be profitably produced are needed to fill this requirement. The potato breeding program at the North Dakota Agriculture Experiment Station will continue to provide the varieties that are needed to get the job done.

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