



WILLISTON BRANCH STATION

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The Williston Branch Station was established in 1907 as a part of the North Dakota Agricultural Experiment Station to serve the people and agriculture in northwestern North Dakota. The purpose for the Station, as quoted from early annual reports, "is to conduct experiments and gather information of value for the northwest section of North Dakota on as many phases of the production and improvement of crops and their practical utilization as circumstances permit." The Research Program at the Station has always been directed toward accomplishing these objectives. In 1954 when the Station was relocated, the larger acreage made it possible to direct more research effort to the problems and concerns of agriculture in this area.

For many years the research program was centered around problems and concerns of farmers using a crop-fallow rotation and who were farming under government programs. The need for flexibility in cropping systems was limited. The use of summerfallow tended to stabilize

crop production in this area where wide variations in seasonal rainfall caused crop yields from annual cropping to vary considerably. Little effort was made to investigate new crops, better land use, and more intensive cropping systems.

As important as summerfallow is to our economy, its use is not without problems. Soil losses from wind and water erosion were serious and in years of high rainfall it promoted the development of saline seep areas in a large part of western North Dakota. The concern over the problems caused by summerfallow and land use led to a change in the emphasis of the Station's research program. The alternative to fallow was more intensive cropping, more efficient land use, and better utilization of all the precipitation that was received, all of which could mean more return from the land for the farmer who adopted a cropping system of this type.

The research program has put more emphasis now on developing guidelines for intensive cropping practices;

evaluating alternate or specialty crops that could be grown in this area; and utilizing the latest technical developments for weed control, fertilizer use, and no-till seeding.

Several alternate crops are being evaluated to determine their adaptability to this area. Safflower, sunflowers, and mustard perform very well in this area. They also fit well into intensive cropping systems, in that they have different rooting depth and water requirements and when used in sequence with cereal crops they tend to break up the plant disease cycle. Winter wheat is another crop that is well adapted for seeding on recrop ground and is good for controlling wild oats. Adequate amounts of fertilizer must be used on recrop ground to insure adequate nutrients for plant growth. Fertilizer trials on recrop have consistently shown the need for proper fertilization if yields comparable to those on fallow are to be obtained. The soil test will provide excellent recommendation for obtaining desired yield goals. Weed control will be more of a problem in an intensive cropping system. Selection of crops for use in the rotation and the use of herbicides will help to reduce the weed problem. The use of no-till seeding in more intensive cropping systems could reduce labor and equipment requirements and mean savings in energy.

The potential for more intensive cropping in western North Dakota looks very good. Recent developments in technology such as soil testing, herbicides, new crops, and larger more efficient machinery have made possible more efficient use of the land resources. Hard red winter wheat has been grown in North Dakota probably since farming began in this state, but according to Census of Agriculture statistics, acreage and production were relatively small. Traditionally, the major portion of the winter wheat was and still is produced in southwestern North Dakota. Within the last fifteen years, this acreage has expanded north and east in North Dakota, until in 1976, most counties in North Dakota were producing significant amounts of hard red winter wheat.

Experimentation with winter wheat in more recent times began in 1962 at the Williston Experiment Station. The most important requirement to stabilize winter wheat production is consistent survival of the crop. Thus all experimentation on cultural practices was designed to increase the chances of survival.

In 1969 the Agronomy Department at NDSU was able to obtain the services of a man whose entire job was to improve winter wheat production in North Dakota by breeding new varieties adapted to this state. Thus the work on winter wheat at the Station was expanded to accommodate testing of early generation materials collected and developed by North Dakota's winter wheat breeder. As many as 15,000 to 20,000 early generation materials per year are planted, selections made after natural selection (winter kill), and further tests made on those selections. Trial testing varieties from other states and Canada are conducted, as well as trials to evaluate potential varieties developed in North Dakota. This is a cooperative effort between the staff at the Station and the winter wheat breeder. Recently the variety Roughrider was released by North Dakota for commercial production and the Station participated in its initial seed increase.

Safflower is an annual oilseed crop adapted to North Dakota. It has the ability to root to a depth of eight or nine feet, making it more drought tolerant than the more commonly grown cereal crops. Most safflower varieties are susceptible to diseases, such as *Alternaria*, bacterial blight, and root rot, and as with most destructive cereal diseases, these diseases of safflower are most common in wetter, more humid environments. Consequently most of the production in the northern plains area has been in eastern Montana and western North Dakota.

Safflower research began in 1957 at the Williston Experiment Station. This coincided with the construction and subsequent operation of a safflower crushing plant at Culbertson, Montana, which is just 45 miles from Williston. This plant, originally built by Pacific Vegetable Oil Corporation, is now owned by Continental Grain Company. Early research on the "new" crop included variety testing and all facets of cultural practices, such as date and rate of planting, fertilizer use and weed control practices. More recently research has been conducted on dates of planting and rates of seeding, using herbicides for weed control.

In 1973, a safflower breeding program began at the Eastern Montana Agricultural Experiment Station at Sidney, Montana, and to a lesser extent at the Williston Experiment Station. Close cooperation is maintained between the two states in testing of experimental lines. As a result of this coordinated effort, a variety of safflower, named Sidwill, was released jointly by Montana and North Dakota State Universities. Sidwill has resistance to *Alternaria* leaf spot and bacterial blight, diseases considered to be the major agronomic deterrent to stabilized safflower production in the Northern Great Plains.

Tillage trials and investigations have been a part of the Station's research program for many years. In this area where the crop-fallow rotation is widely practiced and where low precipitation generally limits crop production, tillage operations on fallow and for seedbed preparation can greatly influence the cost of production and crop yields. Soil tillage has a major effect on water intake, storage and evaporation, and on the extraction of water from soil by the plant roots. Tillage practices have not changed greatly over the years, but they have gone through periods when one type of tillage or tillage equipment was more widely accepted than others. The concern about erosion on the fallow acres also determined what type of implement or practice should be used to help reduce the soil losses. The greatest change in tillage over the years has probably been in the choice of tillage implements and the great increase in tractor power to operate them.

Early studies in Canada indicated some advantages for no-till over conventional tillage and seeding methods. Some of these are a reduction in soil erosion, conserve more soil moisture, a reduction in labor and machine requirements and the possibility of the conservation of energy.

At the Station experimental work is in process on several aspects of no-till seeding. Trials on weed control in spring grains, types of furrow openers for no-till seeding; evaluating presently grown crop varieties for their performance under no-till conditions and a trial to compare no-till seeding to conventional practices now used.