

# Increase of Wheat Yields Resulting from Modern Breeding Methods

By L. R. Waldron<sup>1</sup>

**A**n active wheat breeding program was started at this Experiment Station some thirty years ago and results from this have already been reported upon in the Bimonthly Bulletin. Additional results are reported at this time. For good or ill North Dakota continues to grow a large acreage of spring wheat and while in some years farmers have made questionable profits from the crop, wheat growing has persisted and during the war the crop was of great value.

A variety of reasons have caused wheat to rank high in the minds of growers during the past few years. Good prices and good weather have both prevailed. Good wheat weather in earlier years was not easy to define, for sometimes weather of the highest apparent value, suitable moisture and suitable temperatures, was a forerunner of crop failure.

The spirit of the rust blew from the South bringing with it clouds of spores which resulted in desolated wheat fields. One big advantage the wheat grower has of today is the rust resistant wheats that, for the present, accept these spore showers with unconcern, the same spores that nurtured the stem rust disease in earlier days.

## Plot Yields

The North Dakota Experiment Station is fortunate in having carried for many years a few varieties of wheat that extend their lineage to the early days of our wheat culture. Planting these old varieties each year no doubt looks like wasted effort to some but the records such wheats have left may have a use as I will attempt to show. The so-called plot trials for wheat are areas of one drill width and long enough for about one-fortieth of an acre. Each group of plots contains all the varieties in the trial or experiment and

the three groups are seeded in three different areas. The aim is to seed the same number of kernels for equal areas and all varieties are seeded the same day, at least for each area or group. And all the land of each area is treated the previous year as a unit with respect to culture, such as corn or flax. Wheat varieties do not follow any small grain. Twenty or more varieties are under trial each year but this discussion will be limited to only a few. The wheat variety plot have been under the direction of T. E. Stoa for many years.

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### Discussion of Yields

The yields to be presented here go back to 1916 when Marquis was rapidly coming into favor and average yields are given for five-year periods. To make the pattern of varieties easy to understand, a new variety is entered into the picture each five years except at the start of breeding when two are compared. Additional varieties have been introduced into farming to be sure, some of which have

been of excellent value, such as Pilot and Regent, and others not. But only six varieties are discussed here, important ones in previous years, or at present and these have been chosen for developing the argument the writer has in view, the increased efficiency which has been secured in the breeding of new wheat varieties.

Table 1 shows the five-year behavior of the six wheats.

**Table 1—Relationship between successively introduced varieties based on five-year averages of Fargo plot yields bushels per acre 1916-1945**

Five year Period	Varieties and average annual yields per acre by 5 year periods						Successive differences bushels per acre					Sum of differences Bushels per acre
	(1) Power	(2) Marquis	(3) Ceres	(4) Thatcher	(5) Rival	(6) Mida	Col. 2 mi-nus Col. 1	Col. 3 mi-nus Col. 2	Col. 4 mi-nus Col. 3	Col. 5 mi-nus Col. 4	Col. 6 mi-nus Col. 5	
1916-1920	17.9	19.8	.....	.....	.....	.....	1.9	.....	.....	.....	.....	1.9
1921-'25	20.8	27.0	.....	.....	.....	.....	6.2	.....	.....	.....	.....	6.2
1926-'30	26.7	29.7	31.7	.....	.....	.....	3.0	2.0	.....	.....	.....	5.0
1931-'35	21.9	22.6	27.2	27.6	.....	.....	0.7	4.6	0.4	.....	.....	5.7
1936-'40	11.5	15.4	19.4	23.3	24.6	.....	3.9	4.0	3.9	1.3	.....	13.1
1941-'45	20.8	22.4	25.2	26.1	28.2	30.2	1.6	2.8	0.9	2.1	2.0	9.4
Averages	.....	.....	.....	.....	.....	.....	2.9	3.4	1.7	1.7	2.0	6.9

The variety Marquis, bred in Canada by crossing a wheat from India with Red Fife, is distinctly earlier than the Power (fife) listed in the table. This character is a distinct advantage in years of rust epidemics and also in years of drought. The greater yield of Marquis over Power may be associated with its earliness rather than to any real difference in resistance to rust. Any actual difference in reaction toward rust may not be of much importance. The Ceres variety was bred at the North Dakota Experiment Station by crossing Marquis and Kota. The cross was made in 1918 and the new variety was distributed in 1926. Thatcher was produced by

the Minnesota Experiment Station from three crosses. Its resistance to stem rust comes from its durum parent Iumillo. Its acreage increased rapidly in North Dakota from 1935. Rival was introduced in 1939 and Mida in 1944.

The right-hand portion of the table shows the successive differences resulting when the indicated new varieties were introduced. These values are all positive showing each new variety resulted in larger yields. The averages at the bottom indicate the gain in bushels per acre due to each new variety. The average value 2.9 is the gain over the fife wheat by the intro-

duction of Marquis, and so on. The column at the right shows the gain in yield for any five-year period for the variety introduced at that time over the original life. The largest gain was for 1936 to 1940 which included the two rust years 1937 and 1938. The average of this column is 6.9 bushels which is the yearly gain over the original

Power in bushels per acre due to the introduction of varieties bred for improved performance. As these plot yields are about 50 percent higher than the farm yields, an improvement of 3.5 bushel per acre on the farm should be considered conservative. This would be the increased return per acre due to the plant breeding work.

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## FARM-WORK ACCIDENTS

### A Review

The number of fatal farm-work accidents in North Dakota based upon available vital statistics for the period 1940-1943 was 140 according to J. D. Rush, Agricultural Economist, Bureau of Agricultural Economics, U.S.D.A., who has recently (July 1, 1945) published "An Analysis of 7,851 fatal farm work accidents in the United States, 1940-43". Of the 140 North Dakota deaths, 86 were men (or boys) and 4 women (or girls) working with or caused by farm machinery; 26 men (or boys) and 2 women (or girls) were killed by livestock. There were 21 miscellaneous farm work fatal accidents to men and one to women. The farm accidents reported here include only those which occurred to people in connection with farm operations; they do not include accidents to farm people in homes, on the road or elsewhere unless the cause of death was a farming operation. Older people suffer more farm accidents than younger people. About 6 percent of all deaths due to farm work accidents were to children less than ten years old, and of these about 60 percent were caused by machinery. (Reviewed by H. L. Walster)

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## SWEET CLOVER SEED

North Dakota farmers harvested sweet clover from 14,000 acres in 1945, an increase of 56 percent over the 9,000 acres harvested in 1944 according to Ben Kienholz and O. E. Grenier, Agricultural Statisticians, Bureau of Agricultural Economics, U.S.D.A., of Fargo, North Dakota. The yield per acre was 3.0 bushels compared to the 3.2 bushels last year. Total production is 42,000 bushels of thresher run seed or 31,000 bushels of clean seed compared to 29,000 and 21,000 bushels respectively in 1944.

The seed production of sweet clover has been forecast by the Bureau of Agricultural Economics at 277,200 acres, about 14 percent larger than the 1944 crop but 14 percent smaller than the ten-year average. The loss in cleaning sweet clover this year is expected to average around 23.2 percent, the same as last year.