Relative Yields of Varieties of Wheat on Fallow and Cropland at Hays, Kans., 1921-52

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IT IS generally recognized that variety yield tests should be conducted in a manner to distinguish real differences among varieties. The tests also should be conducted under soil and climatic conditions as nearly as possible duplicating conditions throughout the area for which varietal recommendations are to be made. The need for several years' data before making recommendations of new varieties is universally recognized. In areas such as the Great Plains, which have extreme climatic conditions, it is frequently impossible to obtain yield data due to poor or irregular stands, wind erosion damage, late freezes, drought, hail, or other factors. Therefore, it is important that every effort be made to assure good stands and adequate moisture supplies by using fallow land for yield tests, provided yields obtained in this manner are comparable to yields on land previously cropped to wheat. In the Hays, Kans., area fallow is recommended 1 year out of 4 for wheat farms. Land, time, equipment, and financial resources available must, of necessity, be taken into consideration in deciding on a plan for making yield tests.

From 1921 to 1952, inclusive, variety plots of winter wheat at Hays, Kans., were 1/50th acre in size; a systematic design with two replications each was employed on fallow and land previously cropped to wheat. The average yield of all four replications was always reported as the yield of any variety for any particular year in Annual Reports, state-wide summaries, and varietal recommendations. This paper reports the results of an investigation of the relationship between yields of wheat on fallow and on previously cropped land. The purpose was to eliminate unnecessary duplication of effort if the results indicated a close relationship between yields of winter wheat on fallow and cropland.

No statistical correlations of yields on fallow and cropland have been found in the literature on wheat. However, several investigators have reported comparisons by analysis of variance or on the basis of relative ranks of yields on cropland and fallow. Using analysis of variance for 8 wheat varieties grown for 9 years, 1938-46, on cropland and fallow at Woodward, Okla., Schlehuber reported statistically significant differences for varieties, for years, for methods (cropped or fallow), and for varieties × methods.

Casady reported 4 years' data for 13 wheat varieties on yield and test weight grown in 2 replications each of 1/50th acre plots on fallow at Hays, Kans. He compared varieties on yield and test weight grown in 2 replications each of 1/50th acre plots on fallow at Hays, Kans. He compared varieties by rank and did not rank yield. No significant differences were found.

Reitz reported a 24-year period, 1925-48, on fallow and following corn. Ranks in both groups were fairly similar with variability being found following corn. Crop failures occurred in 6 years on cropland and twice on fallow. Reitz compared 7 varieties during the period 1938-48 following corn. Hail destroyed both plantings of crop failures occurred after corn in 1940 and 1942. Data were omitted from all comparisons. Of 86 comparisons, 34 ranked the varieties the same—but not for varieties × methods. To rank yield there was some trend for early varieties to rise in rank on cropland while midseason varieties appeared to decrease in rank. Rank on cropland was not affected. For test weight he found no significant varietal difference in rank on cropland and fallow.

Haus at Akron, Colo., compared 9 wheat varieties over a 9-year period on fallow and following corn for yield and test weight. No significant differences were found.

EXPERIMENTAL METHODS

Data used in this study were accumulated at Hays, Kans., by A. F. Swanson during 1921-1951 and by W. M. Ross on a varying number of winter wheat varieties grown in 1/50th acre plots in 2 replications each on fallow land previously cropped to wheat. Entire plots were harvested and threshed or combined. Data were unavailable for 1923, 1931, 1934, 1935, 1937, 1939, and 1952 due to failures on cropland due mainly to drought, but few failures on fallow land. Hail destroyed crops under both systems. A systematic design was employed in 6 years on cropland and twice on fallow.

Reitz also compared 5 varieties at North Platte, Nebr., over a 24-year period, 1925-48, on fallow and following corn. Ranks in both groups were fairly similar with variability being found following corn. Crop failures occurred after corn in 1940 and 1942. Data were omitted from all comparisons. Of 86 comparisons, 34 ranked the varieties the same—but not for varieties × methods. To rank yield there was some trend for early varieties to rise in rank on cropland while midseason varieties appeared to decrease in rank. Rank on cropland was not affected. For test weight he found no significant varietal difference in rank on cropland and fallow.

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