Yield and Nitrogen Composition of Two Single-Cross Corn Hybrids When Grown in Alternate Rows

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THE relative ability of different corn hybrids to thrive and yield well and to compete with each other at different fertility levels is of agronomic interest. Some hybrids are reputed to yield well under favorable conditions while others are better able to withstand unfavorable conditions and yield relatively better on "poor" soils. Variations in nitrogen content of corn grain and stover also occur. Data reported here bear on this subject although the experiment was set up for another purpose.

Materials and Methods

In 1947 two single-cross hybrids, WF9 X Hy and K4 X L317, were planted in alternate 40-inch rows in rod-square plots receiving different water and fertility treatments. These fertility treatments were begun the year before this experiment and are given in the footnote to Table I. Prior to these treatments the plots had been under uniform management in a crop rotation study for several years and were uniform in yielding ability. The soil is a productive brown silt loam that is naturally fertile in potassium and moderately fertile in phosphorus. The plots have all been limed and have pH values of 6.0 to 6.5. The plots were in corn in 1946, following oats with sweet and red clover in 1945.

Corn was drilled by hand May 10, and the stands were adjusted by thinning to a rate of 15,000 stalks per acre 2 weeks later. Growing conditions were generally poor during 1947. Total rainfall for July, August, and September was 6.3 inches—about 60% of the 36-year average—and was poorly distributed. Nearly all the rain from mid-July to mid-September came during the week of August 20. High temperatures, with daily averages around 90°F, prevailed at pollination time.

These entire plots were husked by hand by individual rows, and field weights of ear corn were obtained. After a month's storage in a drying shed, the ear corn was weighed again and shelled. The shelled corn was then weighed and run through a mechanical divider to obtain a sample for analysis. Moisture in this grain sample was determined electrophoretically, and total nitrogen was determined by the standard Kjeldahl method.

The stover was cut by individual rows at harvest time and weighed immediately to obtain field weights. Several stalks were selected at random and were chopped to obtain the stover sample. These samples were weighed and later dried on a sand bath in the laboratory and reweighed to determine moisture in the field stover. These dried samples were prepared and used for the nitrogen analysis.

The Student method for paired data was used in comparing hybrids because the hybrids were grown in alternate rows in the plots. Conceding that the maturity difference was responsible for some difference in yield, the K4 X L317 was unexpected. This hybrid, in block plantings, is usually considered the higher yielding of the two and equally or better able to withstand unfavorable conditions. These data indicated that K4 X L317 did not compete well under unfavorable conditions but that with treatment, particularly water and nitrogen, it yielded as well or possibly better than WF9 X Hy.

When all plots were considered, the stover yields of K4 X L317 were significantly higher (at the 0.01 level) than K4 X L317 yields. Poor pollination contributed to the poor grain yields between the two hybrids which were not significant. Poor pollination contributed to the poor pollinated ears ran as high as 40% on the untreated plot. Poor pollination was responsible for some difference in yield, the behavior of the two being similar to the planted except that with treatment, particularly water and nitrogen, it yielded as well or possibly better than WF9 X Hy.

Presentation and Discussion of Results

Yields of grain and stover, nitrogen percentages, and nitrogen composition, the percentages of nitrogen in grain and stover also occur. Data reported here bear on this subject although the experiment was set up for another purpose.

Comparisons of Hybrids

Observations of the plots during the growing season indicated that WF9 X Hy, when in competition with K4 X L317, was better able to withstand unfavorable seasonal conditions and its grain yield was significantly higher (at the 0.01 level) than K4 X L317 on the four unwatered plots. When all plots of treatment, were compared, however, there were no significant differences in grain yields between the two hybrids. Poor pollination contributed to the poor pollinated ears ran as high as 40% on the untreated plot. Poor pollination was responsible for some difference in yield, the behavior of the two being similar to the planted except that with treatment, particularly water and nitrogen, it yielded as well or possibly better than WF9 X Hy.

When all plots were considered, the stover yields of K4 X L317 were significantly higher (at the 0.01 level) than those of WF9 X Hy. These differences in stover yields were larger on the four nitrogen treated plots, when all plots, regardless of treatment, were compared, however, the differences in stover yields between the two hybrids were small and not significant.