A Study of the Response of Malting Barley Varieties to Different Fertilizer Analyses


It is a common practice for agronomists to recommend a different variety of a field crop for planting in a soil with a high rather than with a low level of fertility. Usually these recommendations are based upon agronomic characteristics such as resistance to lodging, date of maturity, and other more or less empirical characteristics, but not very often are data available concerning the yield response of different varieties to differing fertilizer applications or fertility levels. Accordingly, in the spring of 1947, a series of experiments were started for the purpose of determining whether or not the malting barley varieties commonly grown in the midwest responded alike to different fertilizer treatments. Response was based on yield. In addition to reporting the results of these experiments, it is also the purpose of this paper to attempt to develop from past literature some scheme to show within which field crop species the varieties are most apt to respond in a similar manner to different fertility levels.

LITERATURE REVIEW

As early as 1922 (8) the Tennessee Experiment Station was recommending varieties of corn on the basis of fertility level of the soil. The varieties which were recommended for poor soil were entirely different than those for the rich land. Mooers (8) working with four corn varieties on medium and highly fertile soils found an interaction between natural fertility levels and corn varieties.

Stringfield and Salter (13) using six corn hybrids and varieties found a significant variety by fertilizer interaction.

Smith (12) found, by growing four corn inbreds in nutrient solution, that two of the inbreds (MC and K187) made a greater percent of growth on lower levels of phosphorus than did the other two (LA and Ldg). In a similar study Arceneaux (1), obtained a significant variety by fertility level interaction with the top crosses of 10 inbred lines of corn grown at three fertility levels.

Studying wheat yields in Ohio, Lamb and Salter (5) reported that varieties responded differently to changes in fertility level. One poorly adapted variety, Michikof, was compared with N.T. 1006, and the difference in yield widened considerably as fertility level became higher. This showed that N.T. 1006 utilized additional nutrients to better advantage than did Michikof (8). Worzella (14) found eight significant interactions with fertility level. However, when total yield of wheat was considered only five of the interactions were significant, and Myers (10) working in Kansas concluded that varieties of similar adaptation tend to respond in the same way to nitrogen fertilization.

Hurst (4) planted two sugar beet varieties on light, medium, and high fertility levels. Yield response was similar for each variety. Several potato varieties showed the same yield pattern when manure was applied (6). Another experiment reported by Fisher and MacKenzie (2) showed that four varieties of potatoes were alike to varying levels of fertility. Likewise soybeans failed to show differential yields at varying fertility levels.

MATERIALS AND METHODS

The experiments were conducted in Tuscola and Iroquois Counties, Illinois. The field design was a split plot arrangement with four replications. The soil on each farm was mapped as a well-drained clay loam which is considered to be well adapted to the production of malting barley.

All barley varieties grown were acceptable to the malting trade except Moore. They were as follows:

1947—Bay, Wisconsin 38, O.A.C. 21, Kindred, Mountcalm, Kindred,.
1948—Bay, Wisconsin 38, O.A.C. 21, Montcalm, Kindred.
1949—Bay, Wisconsin 38, O.A.C. 21, Montcalm.
1950—Bay, Wisconsin 38, O.A.C. 21, Montcalm.

Three fertilizers, 0-16-16, 4-16-8, and 4-16-0, were applied at the rate of 500 pounds per acre in 1947. In 1948 and 1949, a fourth fertilizer, 0-16-0, was included. In 1947, all plots received a complete fertilizer.

The field design was a split plot arrangement with three replications in which varieties were the large plots. Yield, test weight, and test weights were taken on the samples.

EXPERIMENTAL RESULTS

1947 Results

The grain yields of the three barley varieties grown in 1947 are given in table 1. The greatest increase in yield was produced on plots receiving a complete fertilizer. While O.A.C. 21 showed no significant response to fertilization, the average yields of Bay and Wisconsin 38 increased 14.5 bushels per acre where complete fertilizer was used.