RELATIVE MAXIMUM YIELD OF CORN

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In reporting the yield of corn grain from various types of experiments where leaf area is taken, calculation of grain per square decimeter of leaf area, relative maximum yield, and the percent the actual yield is of the relative maximum yield is suggested for evaluating the effects of treatments on yield. To illustrate the value of this kind of analysis, data from a few experiments are treated in this way and presented in Tables 1, 2, and 3.

In Table 1, the top third leaves of the corn plants produced more grain per unit of leaf area (3.7 g./dm.²) than any other group of leaves from the plant. Therefore, the actual yield of grain per plant of these top third leaves (79g.) is defined as the relative maximum yield and also represents 100% of the relative maximum yield. The relative maximum yield per plant for the other groups of leaves is obtained by multiplying their leaf area (dm.²) by 3.7. Actual yield as percent of the relative maximum yield may be calculated from the yield data or from grain/dm.² of leaf area.

The data in Table 1 show the effects of competition, mostly mutual shading, on the efficiency of grain production by the various groups of leaves remaining on the plants after partial defoliation. For example, the bottom third leaves produced only 43% of its relative maximum yield whereas the middle third leaves yielded 74% of its relative maximum yield. Presumably, the bottom leaves received more mutual shade than the middle leaves.

Data in Table 2 show that leaf area per plant and per acre increased from fertilizer treatment F to D but not for the higher applications of treatments C, B, and A. However, it will be noted that yield of grain per plant, per acre, and grain/dm.² of leaf area increased from the lowest (F) to the highest (A) application of fertilizer. Although treatment D produced almost as much leaf area per plant or per acre as treatment A, the former produced only 53% of its relative maximum yield of grain as compared to 100% for treatment A.

In this experiment, fertilizer treatment A gave the largest amount of grain/dm.² of leaf area. Therefore, the yield of grain per plant or per acre for this treatment was defined as the relative maximum yield and also as 100% of the relative maximum yield. The relative maximum yield of grain (g./plant) for the other fertilizer treatments was obtained by multiplying their leaf area (dm.²) by 2.8. Relative maximum yield in bushels per acre and actual yield as percent of the relative maximum yield were calculated from grams per plant.

The failure of a given fertilizer treatment to produce as much grain per plant or per acre as the highest yielding treatment A, was due to a reduction in leaf area and/or a reduction in grain/dm.² of leaf area. Grain reduction per plant and per acre was due to a reduction in leaf area and/or a reduction in grain/dm.² of leaf area. Grain reduction per plant and per acre was due to a reduction in leaf area and/or a reduction in grain/dm.² of leaf area.

If an experiment of this kind were repeated, it would be necessary to include a low rate of planting, or plants per acre or less on the highest fertilizer treatment for use in calculating the relative maximum yield per plant for the higher rate of planting and the higher fertilizer treatments. Only in this way can one determine how close the actual yield of corn per plant can come to the relative maximum yield of grain/dm.² of a given rate of planting. Perhaps actual yields are of the relative maximum yield may be somewhat lower than the true value.

Data from a rate of planting experiments in Table 3. The largest amount of grain/dm.² of leaf area (4.8g.) was obtained from 3,970 plants per acre. Therefore, the yield of grain per plant and per acre for this treatment was calculated from this data, and was used for comparison with the maximum yield per plant obtained from 4,510 plants per acre.