Corn Plots.—Soil samples were taken from duplicate corn plots March 28, May 18, June 26, July 13 and August 31, 1950, for chemical analysis; the average of 10 soil samples was used. Plant samples were taken from duplicate corn plots on May 18, June 26, July 13 and August 31. The average chemical composition of eight plant samples was used.

Chemical analyses of soils and plants from corn plots and yield of corn for 1950 are shown in Table 21. As the rate of phosphate was increased the phosphorus and calcium contents of the soil and corn plants and the yield of corn increased. When the rate of potash was increased the potossium contents of the soil and plants and the yield of corn increased. As the potassium content of the corn plants increased the calcium content decreased. When the rate of dolomitic lime was increased the phosphorus, calcium and magnesium contents of the soil, the phosphorus and magnesium contents of the corn plants, and the yield of corn increased slightly.

Calcium and magnesium contents of soil and plants and yield of corn were lower in continuous corn than in corn in rotation. The phosphorus content of the corn plants was much lower in the continuous than in the rotation corn. However, the available phosphorus content of the soil was much higher in the continuous than in the rotation corn. While the chemical method used (extracting with .002 N H_2SO_4) (*6*) showed the phosphorus to be available, plant analysis showed that the continuous corn was unable to use as much of the phosphorus as the rotation corn.

It seems that legumes in the rotations used phosphorus; and when they were turned under, they added to the soil considerable organic phosphorus that did not show in the chemical soil test for available phosphorus. As this organic phosphorus decomposed, it was used by the corn plant, resulting in a higher phosphorus content. Part of the inorganic phosphorus was fixed by the soil before it could be used by the corn, while the organic phosphorus decomposed slowly during the growing season and could be used by the corn before it became unavailable. Also the decomposition of the organic matter tended to make some of the fixed phosphorus available.

In another experiment (*4*) soil tests showed that this soil type fixed a very large amount of inorganic phosphate, which was partly made available later. This may explain why corn shows phosphorus deficiency symptoms early in the spring and