The Morrow Plots offer an opportunity to study the soil changes which accompany long-continued cropping and fertilizer treatment. As established in 1876 there were ten plots. The three plots now remaining, which consist of a continuous corn plot, a corn-oats rotation, and a corn-oats-red clover rotation, have continued in these cropping systems essentially unchanged from the beginning. After the first twenty-eight years of cropping each plot was reduced in size and subdivided in 1904, the south half receiving limestone, manure, and phosphate, the north half remaining unfertilized as before. The present grass borders, which have been undisturbed since 1904 were, previous to that date, a part of the plots carrying the respective cropping systems.

Crop yield trends (1) are downward in all cropping systems without fertilizers. The MLP treatment reversed these trends into an upward direction, which continued for about ten years with continuous corn, for about twenty years with corn-oats, and for about fifteen years with corn-oats-clover. At these peaks, yields tended to level off or decline.

Chemical studies of soil samples taken at ten-year intervals from the west half of the field, where phosphorus was added as rock phosphate, furnish the basis for the observations reported in this paper.

During the past twenty-nine years (four samplings) the organic carbon content of the surface soil has remained approximately constant on both the fertilized and unfertilized plots of the three-year rotation, and on the fertilized portion of the two-year rotation. Organic carbon has undergone a progressive decline in the surface soil of the other plots, i.e., on the unfertilized plot of the two-year rotation and on both the fertilized and unfertilized continuous corn plots (Table 1).

An unexplained feature of these data is the fact that in two of three cases fertilized soils contained more organic carbon than the unfertilized soils in 1904, the year in which the MLP treatment was started. Unless this fact is accepted as due to inaccuracy in the sampling of that early date, it suggests the probability that the manuring of the south halves may have been begun at earlier date than is indicated in the records. It is not plausible to suppose that the variation of soil organic carbon was the nature of alternating high and low tentieth-acre areas.

Total nitrogen follows organic carbon rather closely, the C/N ratio varying slightly around 12.5 in the surface strata of all plots. This high ratio is in accord with other evidence that this soil (Carrington silt loam) is in early maturity rather than in an advanced stage of development. There was a progressive decline with depth, becoming 8.0 in the 20-40” stratum.

Total phosphorus declines more on the continuous corn plot than under the other rotations. In the latter, root and stubble residues probably can more nearly maintain this element in the surface at the expense of deeper strata. Addition of 6.6 tons of rock phosphate between 1904 and 1925 more than doubled the 700 to 800 pounds an acre of phosphorus in the surface soil, but little of this P is not entirely accounted for by increases in soil content combined with the amounts removed in harvested crops. Error in sampling (i.e., sampling the 0”-6 2/3” stratum too deep) could account for some apparent loss, by diluting what should be the 0-6 2/3-inch sample with low-phosphorus soil below. It appears, however, that in eighteen borings per plot, error from this cause should be inconsequential.

No evidence of phosphorus penetration below the plow depth as a result of the rock phosphate applications was detected by the total phosphorus determinations. A