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## Fertilizing No-Till Corn

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# AGRONOMY NOTES

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## FERTILIZING NO-TILL CORN

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Results of an experiment conducted in 1968 at Princeton, Kentucky on low phosphate soil showed that surface-applied phosphorus was sufficiently available to no-till corn to produce good yields. This experiment was repeated again in the 1969 growing season with the results well in line with those reported for 1968 in Agronomy Research (Misc. 377) pages 41-43.

Following harvest of the grain from the 1968 experiment, the stalks were chopped with a rotary mower and rye was seeded over the area. Seeding was done with a grain drill that scarcely disturbed the soil. In the spring of 1969, when the rye was approximately 24 inches high, the area was treated with a mixture of paraquat and atrazine as had been done in 1968. No additional phosphorus was added in 1969; however, 200 pounds of nitrogen and 200 pounds of potassium per acre were each broadcast over the area just as had been done in 1968. On May 13, 1969, the plots were planted to PAG SX 29 single-cross corn at a rate of 22,000 to 24,000 plants per acre. The experiment thus provided a measurement of the residual value of 0, 50, 100, and 200 pounds of phosphorus per acre that had been applied the year previous in each of two ways. The first method of application had been to add all the phosphorus as a broadcast application to the surface of the plots before planting. The second method was to apply 25 pounds of the added phosphorus in a band application two inches below the soil and to the side of the corn kernels with the remainder of the phosphorus broadcast on the soil surface.

Although the top yields were greater in 1969 than in 1968, essentially the same results were obtained (Table 1). The large increases in yield due to added phosphorus establishes the fact that the plants were able to absorb the phosphorus in both 1968 and 1969, although phosphorus was applied only in 1968. Since in 1968 and 1969 50-100 pounds of phosphorus per acre produced comparable yields regardless of the method of application, we have concluded that surface-applied phosphorus is adequately available to no-till corn. Indirect evidence also indicates that the same rate of applied phosphorus is just as effective on sod-planted corn as it is on conventionally planted corn.

There has been considerable speculation on why surface-applied phosphorus, although extremely immobile in soils, can be utilized by sod-planted corn. The mulch provided by the killed-sod improves moisture status at the soil surface. This has led people to speculate that this induces more root growth at or near the soil surface. A few attempts to measure such a difference have not resulted in any conclusive evidence that this is or is not true.

Table 1. Final Grain Yield from No-Tillage Corn as Influenced by Application of Superphosphate on a Zanesville Silt Loam Soil Low in Available Phosphorus

Treatment	Method of Phosphorus Application				
	All Surface		bu/A*	Part Surface and Part Banded	
	1968	1969		1968	1969
0 lb P/A	74	76	76	70	
50 lb P/A	120	147	94	136	
100 lb P/A	100	155	98	154	
200 lb P/A	104	157	108	160	
Average	99	134	94	130	

\*Grain yield based on 70 lb. of shucked ear corn per bushel, moisture content 15.5%

Another explanation offered is that phosphorus applied on the surface behaves like banded fertilizer because it has relatively limited contact with the soil. Band applications of phosphorus have proven more available in most, but not all, experiments conducted.

Finally, some workers have reasoned that the decaying plant roots and plant materials at the soil surface provide a high organic matter content and tend to increase the availability of phosphorus compared to where the fertilizer phosphorus is mixed into the soil.

All these reasons have theoretical basis; however, none has been proven to the point of being generally accepted as the explanation of why surface-applied phosphorus is highly available to no-till corn. The fact remains, however, that results at Princeton in 1968 and 1969, along with results of investigators such as Singh, Shear and Thomas (Agronomy Journal 58:147-148, 1966), provide strong evidence that surface application of fertilizer on no-till corn is an effective and practical way of producing high yields of corn. The fertilizer does not necessarily have to be mixed into the soil in order for the crop to use it.