

Starter Fertilizer Boosts Yields of No-till Corn

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Fertilizer management is affected by tillage because aglime and immobile nutrients such as phosphorus (P) and potassium (K) move slowly in most soils when not mixed by tillage. Such nutrients tend to stratify near the soil surface. While the stratification has been documented in a number of studies, it has not been shown to reduce yields of corn and soybeans in Illinois. Limited research does indicate that plants develop more roots near the surface in conservation tillage systems, apparently due to increased levels of surface residues and higher levels of available nutrients.

Starter fertilizer is more effective than broadcast applications under cool, moist conditions when P soil tests are low, irrespective of tillage system. At high levels, starter fertilizer often results in early growth response on conventional tillage systems, but seldom results in increased

yield at harvest.

Early season growth of no-till corn is frequently less vigorous than conventional tillage. This slower growth is likely the result of cooler soil temperatures and higher soil moisture conditions associated with the high residue mulch. Both of these conditions tend to slow root growth and thus the ability of the plant to absorb nutrients.

In a 3-year study at four locations in Illinois, starter fertilizer placed 2 inches below and 2 inches to the side of the seed increased grain yield at 10 of the 11 site years (**Table 1**). Study results revealed several important considerations when deciding whether to use starter fertilizer for no-till corn.

- Nitrogen (N) provided the majority of the response at Ashton, Pana, and Oblong sites. The table does not show this for Oblong, but the individual year data show that N was the most important

Conditions for early growth of no-till corn often involve cool soil temperatures and high soil moisture due to residue cover from the previous crop. Illinois research continues to show advantages of starter fertilizer placed 2 inches to the side and 2 inches below the seed in no-till corn production.

TABLE 1. Effect of starter fertilizer on grain yield of no-till corn.

Starter fertilizer lb/A	Location/previous crop			Yield, bu/A
	N	P ₂ O ₅	K ₂ O	
0	0	0	Ashton/corn	120
25	0	0	Gridley/soybean	123
25	30	0	Pana/soybean	129
25	30	20	Oblong/soybean	137



NO-TILL CORN production may benefit from starter fertilizer, particularly if cool, moist conditions prevail or if soil test P levels are low.

element in 2 of the 3 years.

- Addition of P with the N increased yield more than enough to pay for the P. This was true even at Ashton, which had a Bray P test level in excess of 90 lb/A.

- Including K in the starter did not significantly affect yield at either Ashton or Pana. At the other two locations, K did have a significant impact in 1 of the 3 years of the study. At Gridley, the increase from K occurred in a year with a wet spring, which resulted in delayed planting, followed by very dry conditions during early plant growth. Since this was a long-term no-till field, the inherent K was primarily in the upper inch of the soil profile, where root activity was limited during the dry period. There was adequate moisture at the 4-inch depth for good root activity and K uptake from the fertilizer band. At Oblong, soil test K was low. In the year in which K was not broadcast

prior to planting, there was good response to K in the starter. However, in the other 2 years, when K was broadcast, there was no response to starter K.

Getting yield response with other starter application methods met with limited success. While placement of N at rates up to 10 lb/A directly with the seed increased yield, the increase was not as consistent as with the 2x2 starter. And, in a dry spring, placement of as little as 10 lb/A of N significantly reduced stand in some experiments. Band placement of N (25-0-0) or N plus P (25-30-0) on the soil surface near the seed row resulted in higher average yields than with no starter, but not as high or consistent as with banded NPK treatments. [BC](#)

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