No-Till Corn Response to Starter Fertilizer and Starter Placement

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Higher farm profits are necessary for many farms to stay in business over the next several years. Higher crop yields are the key to reducing cost per unit of production and increasing farm profit. Increased yields cannot be attained by adjusting fertilizer rates alone but will come from placement that improves nutrient availability in a more intensively managed cropping system. Better nutrient use through placement does not necessarily mean that fertilizer rates can be reduced but that an increase in yield or other favorable results can be obtained from the same amount of nutrients. Several researchers have recorded the positive benefits of nutrient placement especially from close placement at planting (Follett et al. 1981; Richards 1977).

Corn is the primary crop to which starter fertilizer (usually N-P combinations) is applied. Besides having improved utilization of phosphorus (P) placed close to the seed, less P is fixed because of reduced soil contact when applied in a band.

When planting no-till corn, residue may vary from little, if planting behind soybeans, to several tons of dry matter from rye The factors that most influence P uptake in no-till or clovers. corn is (1) temperature and, (2) soil compaction. Phosphorus absorption and diffusion to the roots is slower at low soil temperatures (Epstein, 1971). Large amounts of surface residue and higher soil moisture levels can reduce soil temperatures 3-5⁰C or High nutrient concentrations close to the developing plant more. can help overcome the slow root development and low P uptake. untilled or no-till planted soils generally have a higher bulk density (more compaction) than tilled soils, and nutrient availability is depressed because of less root exploration. Close placement or starter fertilizer use under these conditions will normally result in plant growth and yield responses.

These studies were conducted under an intensive management system where high rates of nutrients were broadcast, unless it

was a variable before planting (50 lbs/A of N, 100 lbs/A P_2O_2 , 150 lbs/A K_2O) and then starter fertilizer was applied in a band in or near the row. Each study was planted at 30,000 plants per acre and irrigated when soil water pressures reached 20 centibars. Two sidedress applications of N were made to bring total N application to 240 lbs/A. Minor elements and sulfur (S) were applied at planting in a band near the row and an additional S application was made to bring the total application to 25 lbs/A.

Applications of starter fertilizer to crops should be expected to result in yield increases. However, there are other benefits to using starter fertilizer besides increased yields. One that is important in the Southeast is earlier maturity of corn when grain sorghum or soybeans are to be planted as the second crop in late summer. A week to 10 days earlier planting on the second crop results in much better growing conditions than when the weather is cooler. Also, prices may be 20 or 30 C/bu higher. Table 1 shows that placement of fertilizer is helpful in decreasing grain moisture for earlier harvest.

Table 1. Band and broadcast fertilizer influence on corn grain moisture (Quincy).

lbs/A	Band (Fertilizer Placement) Broadcast		
5-10-15	% H ₂ O on July 1		
250	33.1	37 . 0	
500	33.1	36.9	
750	36.8	42.7	
1000	35.7	37.6	

Placement of ammonium polyphosphate near the seed in addition to the normal fertilization program resulted in quicker dry down and higher yields (Table 2).

In studies conducted on sandy loam soils, surface and 2" x 2" placement of starter fertilizer near the row at planting have resulted in best yields and quickest dry down of early planted corn. Similar results have been obtained with dry fertilizer when surface banded in or near the row.

Placement of	Grain H ₂ O	Yield
Starter (10-34-0)	7-20-84	bu/A
Control	97.0	141.8
In furrow	67.0	107.1
2" x 2"	44.3	171.1
Surface	44.9	169.5
2" below seed	66.9	122.1
5" below seed	90.9	115.4
8" below seed	87.7	138.7

Table 2. Starter placement influence on corn no-tilled into clover under irrigation (Quincy, 1984).

Stalk rot developed prior to maturity.

Early dry down and higher yields by proper placement are advantages of using starter fertilizer. Other factors that result from using starter fertilizer are increased early season growth (Table 3), 7 to 10 days earlier silking and tasseling and less time in the vegetative growth stage which results in lower ear and plant heights at harvest in most cases (Tables 3 and 4).

Table 3. Starter placement influence on corn no-tilled into clover under irrigation (Quincy, 1984).

Placement of Starte (10-34-0)	r plant (4-1	H (in.) L9-84)	eight plant (ft 7-20-8	.) ear 34	<u>Yield</u> bu/A
Control		5.2	9.7	3.7	141.8
In furrow		5.3	9.5	3.4	107.1
2" x 2"		7.0	10.0	4.0	171.7
Surface		5.2	9.7	3.4	169.5
2" below		5.3	9.6	3.6	122.1
5" below		5.0	9.7	3.8	115.4
8 " below		4.5	9.8	3.7	138.7

stalk rot developed prior to maturity.

Where monoammonium phosphate was used as a starter fertilizer banded on the surface of the row after an initial broadcast application of 1000 lbs/A of 5-10-15, grain yields were increased by 14 bu/A and final ear and plant heights were lower.

	MAP (11-53-0)	No starter
Grain bu/A	219.7 a	205.7 b
Ear ht. ft.	4.1 a	4.5 b
Plant ht. ft.	9.8 a	10.3 b

Table 4. Influence of starter fertilizer on irrigated corn yields (Quincy, 1981).

Starter fertilizer has been shown to be beneficial to no-till corn on soils that vary from medium to high in P even if an initial broadcast application is made. Benefits may not only be increased yields, but earlier maturity, lower ear placement, less time needed for irrigation, and a better chance for successful double cropping.

Literature Cited

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