

# Influence of Starter Fertilizer on Corn Yield and Plant Development on Mississippi River Alluvial Soils

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Application of in-furrow N-P fertilizers on sandy loam and silt loam soils in Louisiana increased corn yield in 5 of 15 trials. Starter fertilizer consistently increased early-season plant growth, advanced silking date, and decreased harvest grain moisture.

Mid-March to early April planting dates required for optimal corn production in Louisiana often result in exposure of seedlings to lower than optimal soil temperatures. Low soil temperatures may result in slow plant growth and temporary P deficiency, even though levels of extractable soil P may be considered adequate for plant growth.

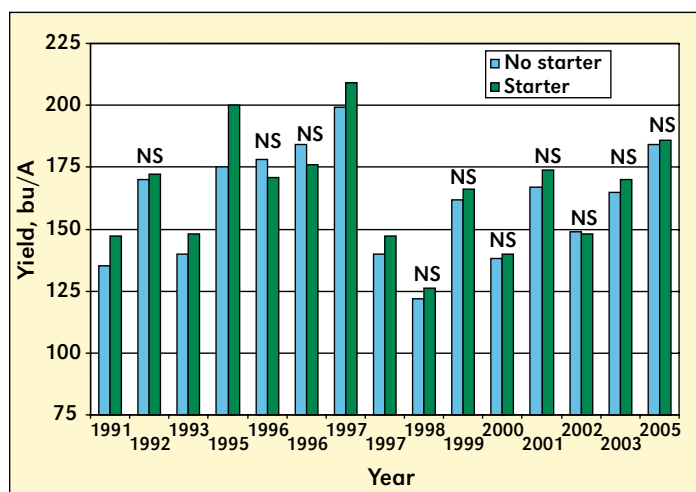
Phosphorus deficiency symptoms on corn seedlings are commonly seen and are most pronounced on sandy loam and silt loam Mississippi River alluvial soils with organic matter content less than 1%. Often, soil temperature at the 2 in. depth in early March on the productive Commerce silt loam soils (thermic Fluvaquentic Endoaquepts) may be as much as 5 °F lower than on clayey soils (e.g. Sharkey clay – thermic Chromic Epiaquepts).

Symptoms of P deficiency common on sandy and silt loam soils rarely occur on the finer-textured silty clay and clay soils. Placing small amounts of starter fertilizer in close proximity to the seed at planting could alleviate the effects of cold soil temperature on P uptake and early corn growth. A 2x2 placement (2 in. below and to the side of seed) has been thoroughly evaluated, and some research has been conducted on placement of the starter directly with the seed. Direct placement is practical and economic in a corn-cotton production system, since cotton producers typically use in-furrow equipment for insecticide and/or fungicide applications. Excessively high starter fertilizer rates applied in-furrow can injure plants.

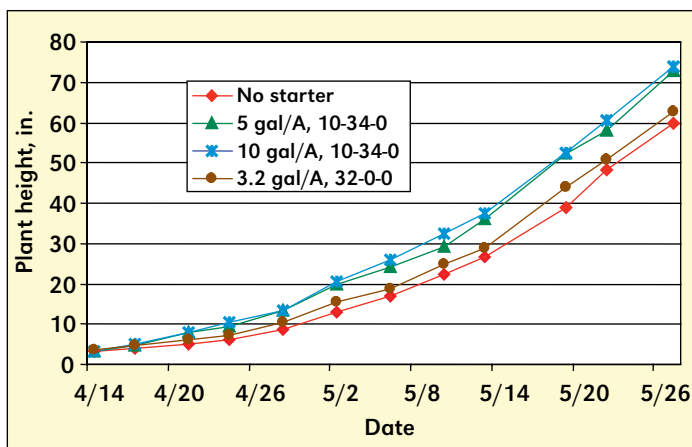


**In-furrow** N-P starter fertilizers offer several advantages for corn on sandy loam and silt loam soils in Louisiana.

Fifteen trials were conducted between 1991 and 2005 at the Northeast Research Station near St. Joseph, Louisiana, to evaluate the effectiveness of in-furrow starter fertilizers. Some of these experiments included variables other than starter fertilizer. However, for this summary, only the main effects of starter fertilizer are reported.



**Figure 1.** Influence of starter fertilizer on corn yield on Mississippi River alluvial sandy loam/silt soils at the Northeast Research Station at St. Joseph, Louisiana. NS= Non-significant at the 0.05 probability level.



**Figure 2.** Influence of in-furrow starter fertilizer treatments on plant height during the growing season on Commerce silt loam at St. Joseph, 2003.

**Abbreviations and notes for this article:** N = nitrogen; P = phosphorus.

Corn was planted following cotton from early March to early April at about 28,000 seed/A. Ammonium polyphosphate (11-37-0 or 10-34-0) was applied at 2.5 to 10 gal/A. In most trials, the recommended rate of 4 to 5 gal/A was compared to a no-starter control. Grain yield, silking date, and harvest grain moisture were determined, and plant development was monitored during the growing season (plant dry weight and/or plant height). Extractable soil P levels in the test area were considered high each year, according to analyses conducted by the LSU Agricultural Center Soil Testing Laboratory.

Average corn grain yields ranged from 124 to 204 bu/A. The in-furrow N-P starter fertilizer application significantly increased yield in 5 of the 15 trials and responses in these trials ranged from 8 to 25 bu/A, with an average starter response of 12.5 bu/A (**Figure 1**). No grain yield response to starter occurred in 9 of the 13 years evaluated. Phosphorus deficiency symptoms and starter responses were most common on the more coarse-textured soils. The largest yield response (25 bu/A) occurred on a sandy loam soil. These sandy, low organic matter, light colored soils are cold-natured. Plants on these soils are more susceptible to reduced early season P availability than on finer-textured soils. This probably accounts, to a large extent, for the low incidence of early season P deficiency symptoms and smaller yield responses to starter on clayey soils.

Although starter fertilizer increased yield in only one third of the trials, early season plant growth was increased in all trials. A typical plant growth response to starter is shown in **Figure 2**. Two rates of starter increased plant height from the early seedling to tassel growth stages, while starter N alone had little effect on plant growth. This confirmed that growth responses on sandy loam and silt soils are primarily due to the P in the starter, probably because of reduced P availability on the cold-natured soils.

Enhanced plant growth with starter hastened maturity, which was reflected in advanced mid-silk dates and lower harvest grain moistures. Starter fertilizer reduced mid-silk dates by 4 days when yield responses occurred and by 3 days when no yield response occurred (**Table 1**). Harvest grain moisture was 1% lower in trials with starter yield responses

**Table 1.** Influence of starter fertilizer on average mid-silk date and harvest grain moisture in 15 trials on Commerce silt loam at the Northeast Research Station at St. Joseph, 1991 through 2005.

Starter yield response	Number of trials	Mid-silk date		Harvest grain moisture, %	
		No starter ----- DAP <sup>1</sup> -----	Starter	No starter	Starter
Yes	5	73	69	17.1	16.1
No	10	72	69	18.7	18.2

<sup>1</sup>DAP = days after planting

and 0.5% lower in trials with no yield response to starter. This could result in earlier harvest and lower drying costs, which may lead to higher net profit.

Early rapid plant growth also hastens canopy closure, reducing weed development and the need for herbicides.

Planting from mid-March to early April and using starter fertilizer would help ensure consistent maximum corn yield production and minimal conflict with cotton production practices in both spring and fall. Since starter fertilizer such as ammonium polyphosphate can be applied with the same in-furrow application equipment currently used to apply fungicide and insecticides at planting, the only additional cost is the fertilizer expense. At current starter fertilizer prices of \$1.65/gal, the application of 4 to 5 gal/A is relatively inexpensive insurance, especially on cold-natured, coarse-textured soils. **BC**

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