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Starters Boost Yields Of Corn Rotated With Cotton

Louisiana three-year study shows that planting date and hybrid selection can affect corn reponse to fluid starters.

Summary: *Yield response to planting date was not consistent across years. In two of three years, planting later than early April decreased corn yield. Similarly, yield response to fluid starters was not consistent across years or hybrids. Starters increased grain yield in two of three years. Planting date by starter interaction for yield was significant in each of these years. Hybrid by starter interaction for yield was significant in one of three years. Starter fertilizer increased early-season plant height by 2 to 36 percent and increased grain yield across planting dates from 8 to 21 bu/A in 1991, and to 15 bu/A in 1993. There was no yield response to starter in 1992.*

Corn acreage has increased recently in the mid-South, partly because it is an ideal crop for rotating with cotton. Corn is planted earlier than cotton and is harvested before cotton, so it does not interfere with cotton production, the primary cash crop of this region.

Early planting dates required for optimal corn production in the southern U.S. (early March to mid-April) often expose seedlings to lower than optimal soil temperatures, especially on coarse-textured soils. The cool soils may result in poor root growth and reduced availability of soil P, even though soil test P levels are considered adequate for plant growth. Studies show that under these conditions starters are most effective when placed close to the seed.

In the corn/cotton production system of the South, placement of fluids such as 11-37-0 in the seed furrow is practical and economical, since cotton producers typically use in-furrow equipment for insecticide applications. Potential for seed injury via direct contact between fertilizer and seed makes rate of fertilizer application very important.

Since there has been little research on cultural practices in southern corn/cotton rotation systems, our objective in this study was to determine the influence of planting date and starter fertilizer on the performance of six corn hybrids in a corn/cotton cropping system.

Climate

Mean air temperatures during the three-year study were normal except for

1993 when March and April temperatures were below the long-term mean (Table 1). In 1991, April rainfall was three times higher than the long-term mean.

Planting date

Since planting dates differed each year, data are shown for each year. Additionally, the significant planting date by year interaction indicated that planting date was an important factor affecting grain yield, with optimal planting date varying across years. Starter effect on yields was significant in two of three years-1991 and 1993. Averaged across planting dates and hybrids, starters increased yield 9.5 percent in 1991 and 5.4 percent in 1993. Higher yield occurred at the

Table 1. Monthly mean air temperatures and rainfall during 1991-1993 growing seasons at St. Joseph, LA.

Month	Long Term mean*	1991	1992	1993
Temperature °F				
March	57.6	60.3	58.1	55.2
April	65.8	69.4	66.2	61.2
May	73.0	76.3	73.4	71.4
June	76.3	81.3	77.4	82.4
July	82.0	77.4	78.4	79.3
August	81.3	74.3	72.3	78.4
Rainfall — Inches				
March	6.2	6.6	3.5	4.4
April	5.4	15.9	2.2	5.4
May	5.0	6.1	1.5	3.7
June	3.4	1.5	6.1	4.0
July	4.5	3.6	3.1	2.9
August	3.3	3.2	7.4	0.5

*50-year mean, 1941-1990

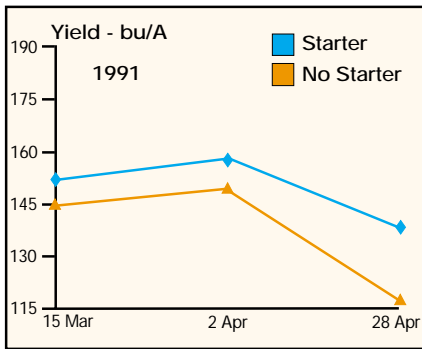


Figure 1. Starter and planting date influence on corn yield. Data averaged across six hybrids. Mascagni and Boquet, LSU, 1991.

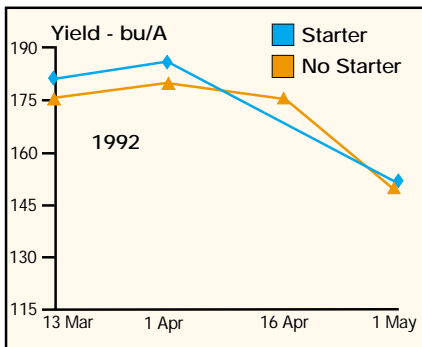


Figure 2. Starter and planting date influence on corn yield. Data averaged across six hybrids. Mascagni and Boquet, LSU, 1992.

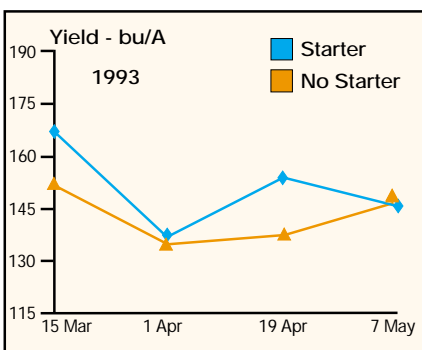


Figure 3. Starter and planting date influence on corn yield. Data averaged across six hybrids. Mascagni and Boquet, LSU, 1993.

March 15 and April 2 plantings, with starters increasing yield by about 8 bu/A at each of these planting dates (Figure 1). Although grain yield was lowest at the April 28 planting, yield response to starters compared to the check was much larger than the responses at the earlier dates. This larger response for the late planting date

was unexpected, but may have been due to higher than normal rainfall in April. More importantly, a 3.2-inch rainfall occurred soon after April 28, which may have resulted in cooler soil temperatures and compact soil.

1992. Optimal planting dates were mid-March through mid-April (Figure 2). Although mid-April to early-May was considered late, yields were higher than expected. As mentioned above, main effect of starter was not significant.

1993. Starter increased yield at two of four planting dates (Figure 3), resulting in a planting-date-by-starter interaction. March and April temperatures were below normal, which was conducive to yield responses from a P starter. Highest overall yield occurred at the March 15 planting. The low yield and lack of starter response at the April 1 planting may have been related to a southern green stinkbug infestation

Hybrid

Hybrid by starter by year interaction for grain yield was significant, indicating that the hybrid by starter interaction was not consistent across years. However, there were no negative responses to starters among the hybrids evaluated in this study.

1991. The hybrid by starter interaction was significant. Four of the six hybrids showed an increase in grain yield from application of starter fertilizer (Figure 4).

1992. Neither the starter main effect nor hybrid by starter interaction was significant (Figure 5). However, the highest yields of the study were produced in this year. Climatic conditions were most favorable for corn plant development, with yields averaging 170.5 bu/A. While our findings suggest that yield increase from starters is least likely in years with good growing conditions, climatic conditions

may not entirely account for differences in responses to starters, especially in 1991 where large yield responses were noted at late planting dates.

1993. The starter effect was significant and the hybrid by starter interaction was not. However, three of the six hybrids showed a trend toward higher yields when starter was applied (Figure 6).

Conclusion

Although yield responses to starters were inconsistent across years and planting dates, corn responded to starter in two of three years, with significant yield responses in 5 of 11 year-planting date comparisons. Optimal yield occurred when corn was planted early (from mid-March through early April). Planting from early to mid-March and using starters help ensure consistent maximum yield and minimal conflict with cotton production practices in both spring and fall.

Methodology

Site. Dryland field study was conducted at the Northeast Research Station near St. Joseph, Louisiana.

Soil was a Commerce silt loam (fine silty, mixed, thermic, nonacid, Aeric Fluvaquent).

Hybrids were Delta and Pineland G-4666 and 5750, Terral SB 1802 and SB 1876, Pioneer 3165, and Asgrow RX947.

Starter treatments consisted of ammonium polyphosphate (11-37-0) applied in-furrow, and no starter (or check). It was not obvious and could not be determined if growth and yield responses to starter were due to the N or P component of the ammonium polyphosphate applied.

Application. Rate of starter application was 3 gal/A in 1991, 4 gal/A in 1992 and 1993. In 1991, the planter

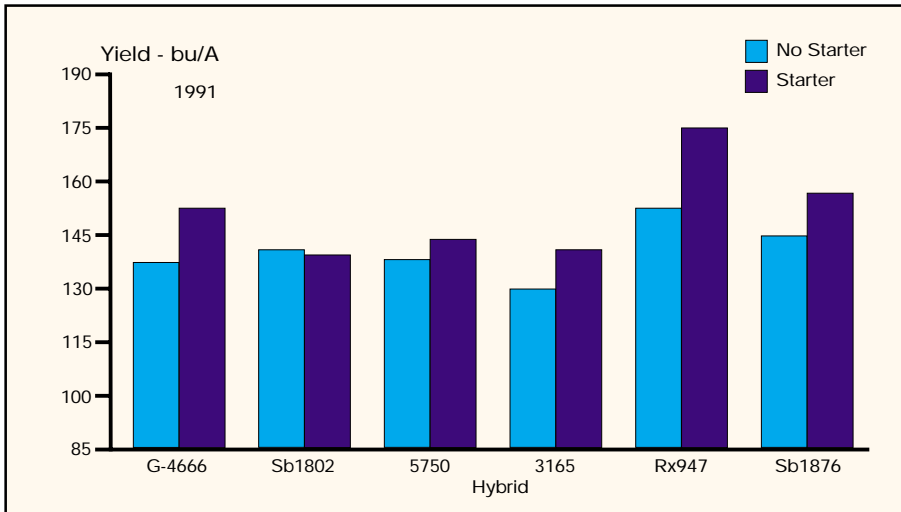


Figure 4. Starter and hybrid influence on corn yield. Data averaged across planting dates. Mascagni and Boquet, LSU, 1991.

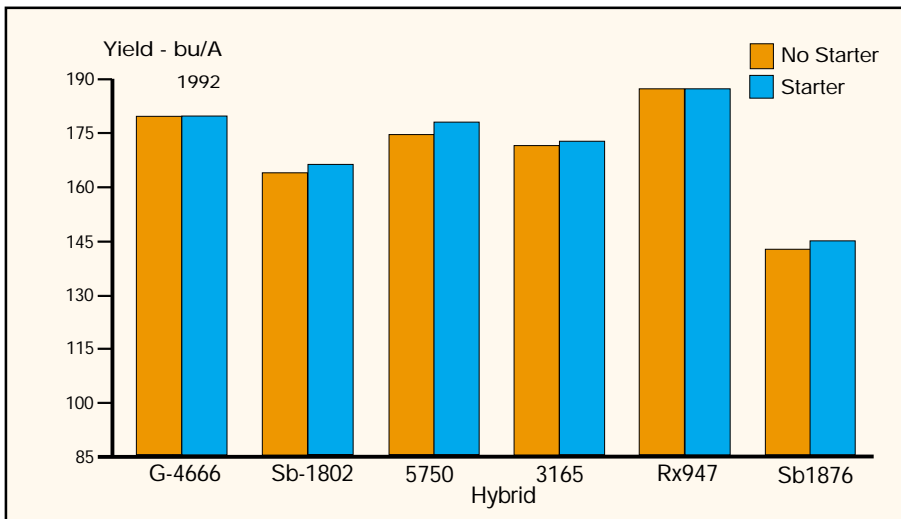


Figure 5. Starter and hybrid influence on corn yield. Data averaged across planting dates. Mascagni and Boquet, LSU, 1992.

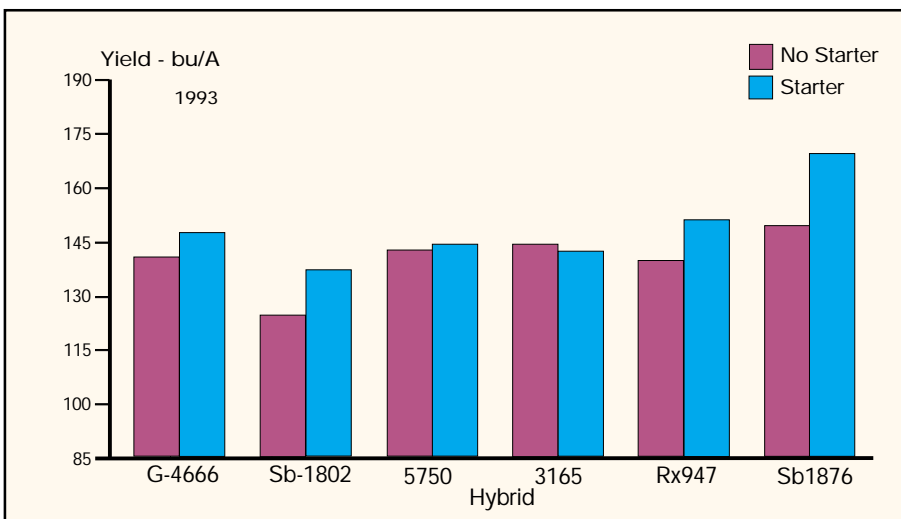


Figure 6. Starter and hybrid influence on corn yield. Data averaged across planting dates. Mascagni and Boquet, LSU, 1993.

was calibrated to apply 4 gal/A but only 3 gal/A was actually applied. This supplied N and P at a rate of 3.9 and 5.7 lbs/A, respectively, in 1991, and 5.2 and 7.6 lbs/A in 1992 and 1993. NF_4NO_3 was broadcast before planting or shortly after planting at a rate of 180 lbs/A. This probably minimized a yield response to the N component of the starter fertilizer. No other fertilizer was applied.

Pesticides. Insecticide carbofuran was applied in a tank mix with the starter or applied alone in the check treatment. Weeds were controlled with labeled preemergent and postemergent herbicides, and with cultivation.

Sampling. Soil P levels in the test area were considered high (130 to 150 ppm) each year, according to analyses conducted by the Louisiana State University Agronomy Department Soil Testing Laboratory. In each year, typical P-deficiency symptoms were noted on corn leaves in the check plots, indicating that P was the more important component.

Plot design. Experimental design was a randomized complete block with a split-plot arrangement of treatments. Planting dates were assigned to main plots. Hybrid/starter combinations were split plots. There were six replications of the hybrid/starter treatments in 1991 and 1992, and four replications in 1993. Split plots consisted of four rows approximately 35 feet long, with 40 inches between rows.

Grain yield was determined by combine harvesting two center rows of each plot when the hybrids within a planting date reached approximately 20 percent grain moisture.

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