THE EFFECTS OF STARTER FERTILIZATION, NITROGEN PLACEMENT, AND TILLAGE ON GROWTH AND LINT YIELD OF COTTON

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Abstract

Previous research has shown that starter fertilizers can enhance early season growth and vigor, promote earlier fruiting, and possibly increase yields. No one source of nitrogen has been shown to be superior to others. Limited data exists for the use of starter fertilizer and nitrogen placement in conservational tillage situations. Two different experiments were conducted during 2006 and 2007 at Upper Coastal Plains Research Station in Rocky Mount, N.C., investigating yield and growth parameters responses to starter fertilizers and nitrogen placement in different tillage situations. The objective of this study was to determine if cotton response to starter fertilizers differs between conventional till, strip-till, and no-till systems. Also, we wanted to determine which nitrogen application method optimizes nitrogen use in terms of lint yield, in strip-till and no-till systems. DP 455 BG/RR cotton seed was planted in a 38-inch row configuration on May 3, 2006 and May 14, 2007. For the first study, two different starter fertilizers 11-37-0 and 30-0-0, were banded at planting. Thirteen gallons of the 11-37-0 was applied providing 15 lbs N/A and 22 lbs P/A. The 30-0-0 was applied as a dry application by hand at the rate of 267 lbs/A providing 15 lbs N/A. The Experimental design was a split block / latin square design with four replications. Statistical analysis was performed with mixed model ANOVA and means separated with Fishers protected LSD at $P \leq 0.05$ using SAS version 9.1.3. The second study contained two different tillage methods; no-till and strip-till and eight different N placement methods; broadcast dry 30% N, knifing 8" from row, knifing 12" from row, dribbling 8" row, dribbling 12" from row, drop nozzle, hood applied, and post-directed. The dry form of N was ammonium nitrate and all the liquid forms were 30% UAN. Each N placement provided 80 lbs N/A. The experimental design was a split block design with four replications. Statistical analysis was performed with ANOVA and mean separation with Fisher's LSD at $P \leq 0.05$ using ARM 7 revision 7.0.2

In 2006, using a P based starter fertilizer (11-37-0) enhanced early season growth in all tillage systems. Additionally, the P based starter used in the conventional tillage system increased yields. In 2007 tillage had an effect on yield, with conventional having the highest yield and no-till having the lowest yield. In 2007 a yield loss occurred in strip-till and no-till systems when only the N based starter fertilizer was used. When analyzed over years, starter fertilizers did not have any effect on yield.

In 2006, the hooded placement of N in no-till systems yielded significantly lower than the other application methods. In the strip-till system, hooded placement again yielded significantly lower than other methods, while broadcast, knifing 12" from the row, dribbling 12" from the row, and post directed N placement all resulted in optimal yields. The hooded N placement also resulted in earlier maturity in both tillage systems as recorded from NAWF data. In 2007 there was not a significant difference in yield due to any nitrogen placement option.

These data suggest that tillage can influence lint yield in some years. The use of starters may be more important in conventional tillage systems in some years. Tillage may have more influence on yield when no starter fertilizer is used. A P-containing starter (11-37-0) may enhance early season growth compared to N-only starters. N placement may be more important in strip-till than in no-till systems. Lastly, hooding N may reduce NAWF and lint yield in some years.