TILLAGE AND NITROGEN INFLUENCE ON ULTRA NARROW ROW AND CONVENTIONAL ROW COTTON

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ABSTRACT

The study was conducted in 1998 on a Dothan sandy loam (fine, loamy siliceous, thermic Plinthic Kandiudults) located at the North Florida Res. and Educ. Center (NFREC), Quincy, FL. The objectives of this research were to compare cotton planted in 36-inch (conventional rows) and 7-inch (UNR - Ultra Narrow Row) row spacing with different tillage practices (no paraplow, fall paraplow, spring paraplow, and fall plus spring paraplow) and nitrogen (N) rates (0, 60, 120, and 180 lb N/A) on cotton. Plants were significantly taller for UNR than conventional row width planted cotton for all N treatments. Increasing N rates increased plant height for UNR cotton. Similar to the plant height, the height to node ratio (HNR) was higher for UNR than conventional rows. There was not a significant influence of paraplowing on either plant height or HNR. Yields of cotton were significantly higher from UNR than conventional row spacing and generally low due to hard locks (not fully developed and matured bolls). For both UNR and 36-inch row spacing, cotton yields obtained from the fall paraplow treatment were higher than with no paraplow, but the yields decreased with higher applications of N. Fall and fall plus spring paraplowing gave very similar cotton yields. Obtaining lower lint yields with higher N rates could be due to hard locks. Generally higher application of N increased the percent of hard locks and at the same time decreased the lint yields of cotton.

INTRODUCTION

In recent years, cotton production has increased rapidly in Florida. In the U.S.A., minimum tillage for cotton crop production is used in order to prevent soil erosion. Minimum tillage also increases soil organic matter, soil moisture, and improves soil texture that usually results in increased yield of plants (Hargrove, 1990). According to Nabors and Jones (1991), using minimum tillage protects cotton during emergence against injury from wind and sand. Accordmg to Heitholt et al. (1993), row spacing did not influence seed cotton yields. The results suggest that some agronomic traits of cotton might be expected to be similar, regardless of row spacing. Torbert and Reeves (1994) showed that tillage had no significant effects on cotton yield components in a dry year and increasing N application increased cotton biomass and decreased lint percentage. Their results also indicate that higher fertilizer N application rates may not be needed for conservation tillage practices such as strip-till in Coastal Plain soils. In years of below-normal rainfall during the growing season, strip tillage (no-till plus in row subsoiling) was found to maintain the highest seed cotton yield (Torbert and Reeves, 1991). The objectives of this research were to compare cotton planted in 36- and 7-inch row spacing with different tillage practices and N rates on cotton.

MATERIALS AND METHODS

These studies were conducted on a Dothan sandy loam (fine, loamy siliceous, thermic Plinthic Kandiudults) located on the NFREC, Quincy, FL in 1998. The following factors were: row spacing (7-inch - UNR cotton and 36-inch row spacing), tillage treatment (no paraplow, spring paraplow, fall paraplow, and spring + fall paraplow), and N rates (0, 60, 120, and 180 lb N/A). The entire study was sprayed with Roundup Ultra at 1 qt/A on April 15 and irrigated with 1 inch H_2O on April 22. On May 15, Paymaster 1220 RR/Bt cotton was planted at 4 seeds/ft of 36-inch wide rows with a Brown Ro-till planter on May 15. The same day, Paymaster 1220 RR/Bt cotton at *2.5* seeds/ft of 7-inch wide rows was planted with a Great Plains No-till drill in the Ultra Narrow Rows (UNR). The entire study was irrigated with 1 inch H_2O on May 20 and June 4. On June 10, cotton was broadcast sprayed with Roundup at 1.2 pt/A + Orthene 75 S at 4 oz/A + Induce at 2.0 qt/100 gal H_2O Nitrogen was applied to the cotton on June 15. On July 21, cotton was broadcast sprayed with Roundup at 1 qt/A + Induce at 2 qt/100 gal H_2O and broadcast sprayed with Pix at 12 oz/A. Cotton was broadcast sprayed with Ambush at 6.4 oz/A on August 5. On August 17, cotton was broadcast sprayed with Confirm 2 F at 8 oz/A + Lutron CS-7 spreader at 12pt/100 gal H_2O Cotton was defoliated with Dropp at 0.1 lb/A + Finish at 1 qt/A on September 24, defoliated with Cotton Quick at 2 qt/A + Dropp at 0.1 lb/A on October 9 and defoliated with Finish at 1 qt/A on October 16. On November 5, wide rows (36-inch wide) of cotton were picked with an International Spindlepicker, and *UNR* cotton was harvested with a Ben Pearson stripper on November 13 and 14. The lint cotton yield from the spindle picker was calculated as 38% of seed cotton yield, and lint cotton yield from the stripper was calculated as 30% of seed cotton yield. Data were analyzed using SAS (1989) by analysis of a variance and means were separated using Fisher's Least Significant Difference Test at the 5% probability level.

RESULTS AND DISCUSSION

Figure 1 presents the influence of row width and N rates on plant height of cotton. Plants were significantly higher for UNR than conventional row width planted cotton for all N treatments. Increasing N rates increased plant height for UNR cotton with the maximum values for the highest N rate. The maximum plant height for 36-inch wide rows occurred with the application of 84 lb N/A. The height to node ratio (HNR) was higher for UNR than conventional rows, with highest HNR values obtained at the application of 180 lb N/A for both row widths (Fig. 2). There was not a significant influence of paraplow on either plant height or HNR.

Figures 3 and 4 present the influence of paraplow and N rates on cotton planted in 36-inch row spacing. Generally, yields were low due to hard locks. Yields obtained from treatment with fall paraplow were higher than with no paraplow, but they decreased with higher application of N. Fall and fall plus spring paraplow gave very similar yields of cotton planted in 36-inch row width. Maximum lint yields were obtained at the application of 44 lb N/A for both tillage applications.

Yields of cotton were significantly higher from UNR than conventional row spacing. Figures 5 and 6 show the influence of paraplow on cotton yields planted in 7-inch row width. Lint yields were higher from the treatment with fall paraplow than with no paraplow, but for both treatments, the yields were decreasing with increasing N rates on cotton (Fig. 5). Similar to the previous results, the yields from treatments with spring paraplow and fall plus spring paraplow were decreasing with increasing N rates (Fig. 6). Treatments with spring paraplow and fall plus spring paraplow gave very similar yields of cotton. Obtaining lower lint yields with higher

N rates could be due to hard locks. Generally, higher application of N increased the percent of hard locks and at the same time decreased the lint yields of cotton.

CONCLUSIONS

Plant height and HNR were higher from 7-inch UNR than 36-inch row spacing and also increased with higher N rates on cotton. Lint yields were significantly higher on UNR as compared with conventional row widths and higher after application of fall paraplow than other tillage practices. Higher N rates increased the percent of hard locks and decreased the lint yields of cotton.

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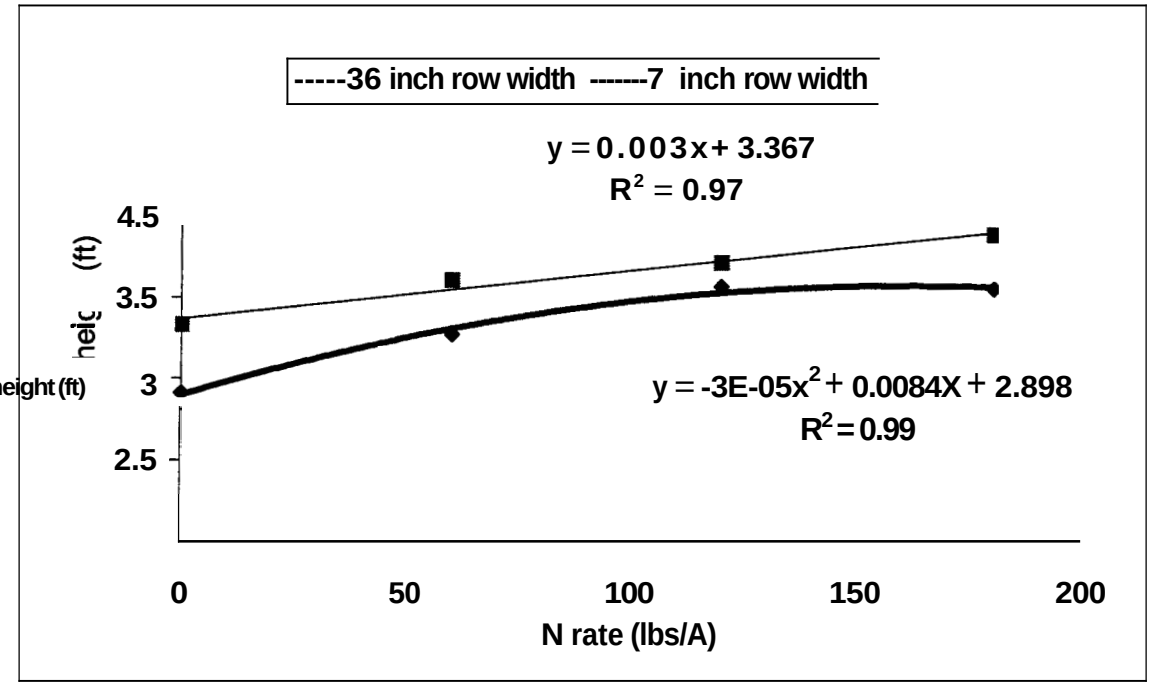

Fig. 1. Influence of row width and N rate on plant height of cotton.

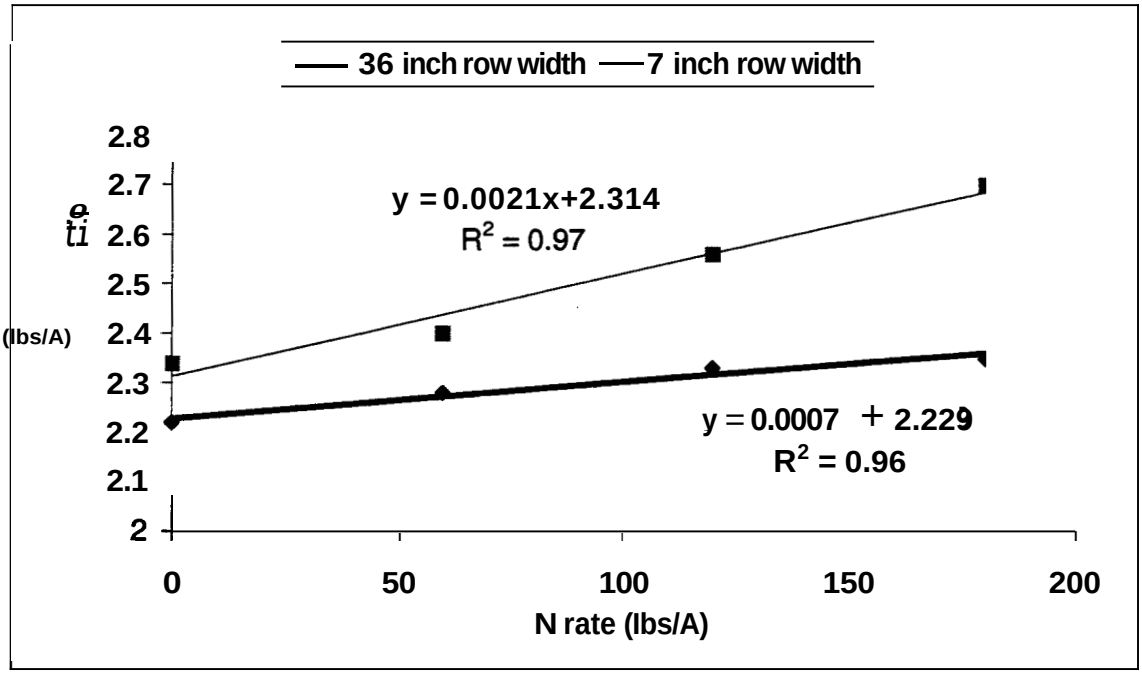

Fig. 2. Influence of row width and N rate on height to node ratio of cotton.

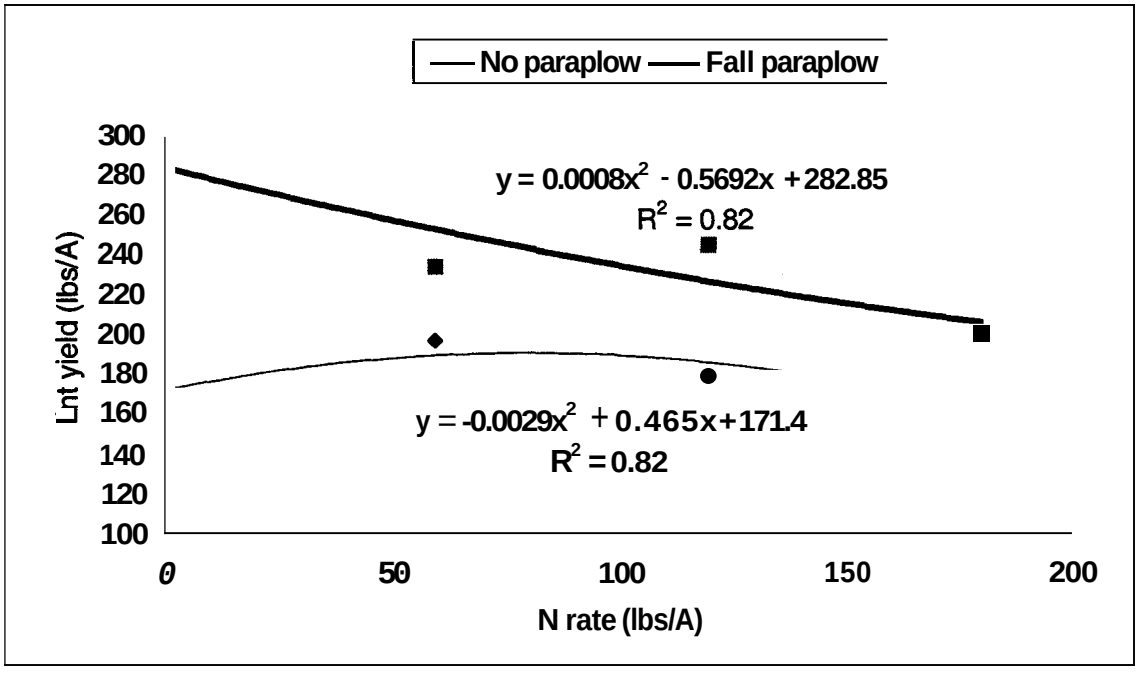

Fig. 3. Influence of tillage and N rate on lint yield of cotton (36 inch wide rows).

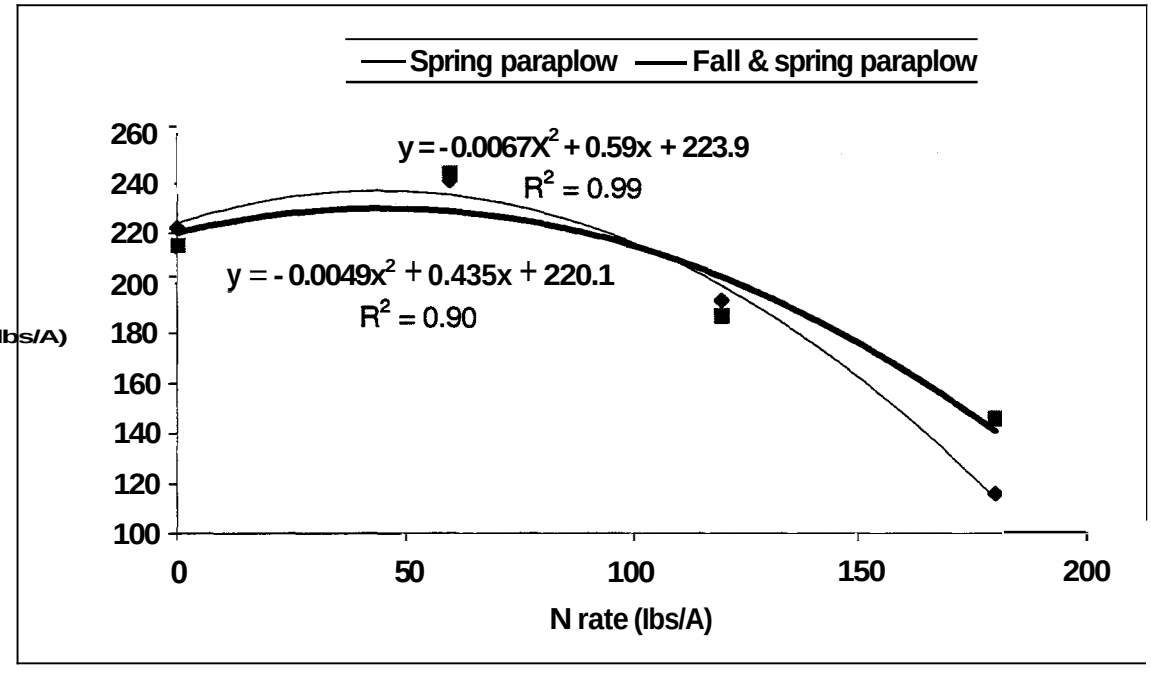

Fig. 4. Influence of tillage and N rate on lint yield of cotton (36 inch wide rows).

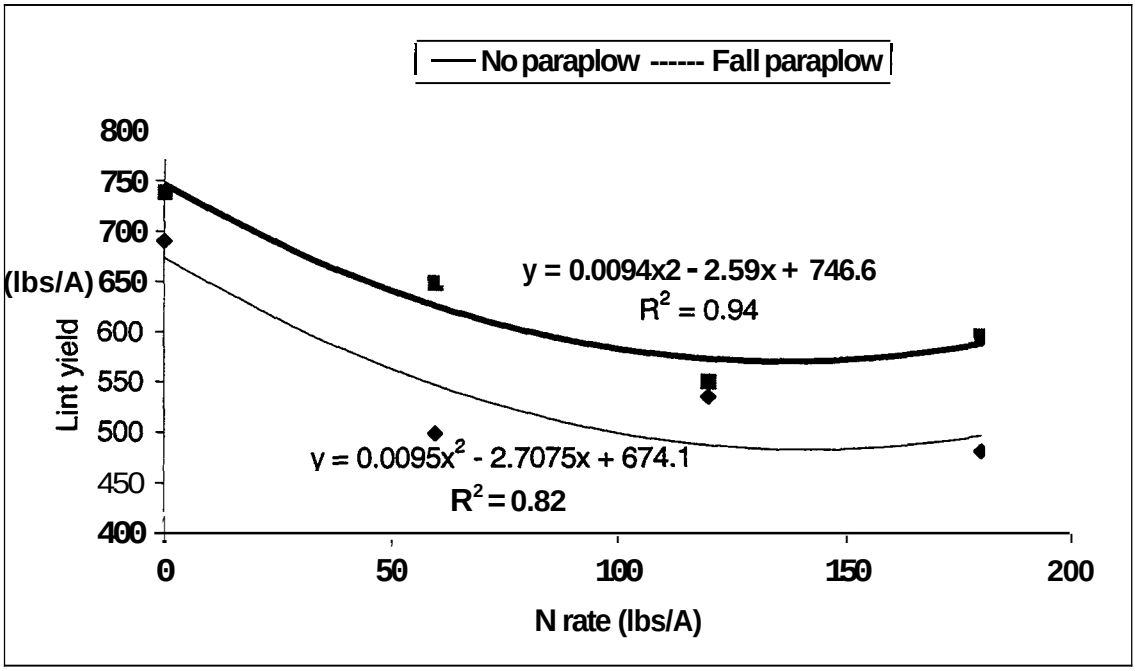

Fig. 5. Influence of tillage and N rate on lint yield of cotton (7 inch wide rows).

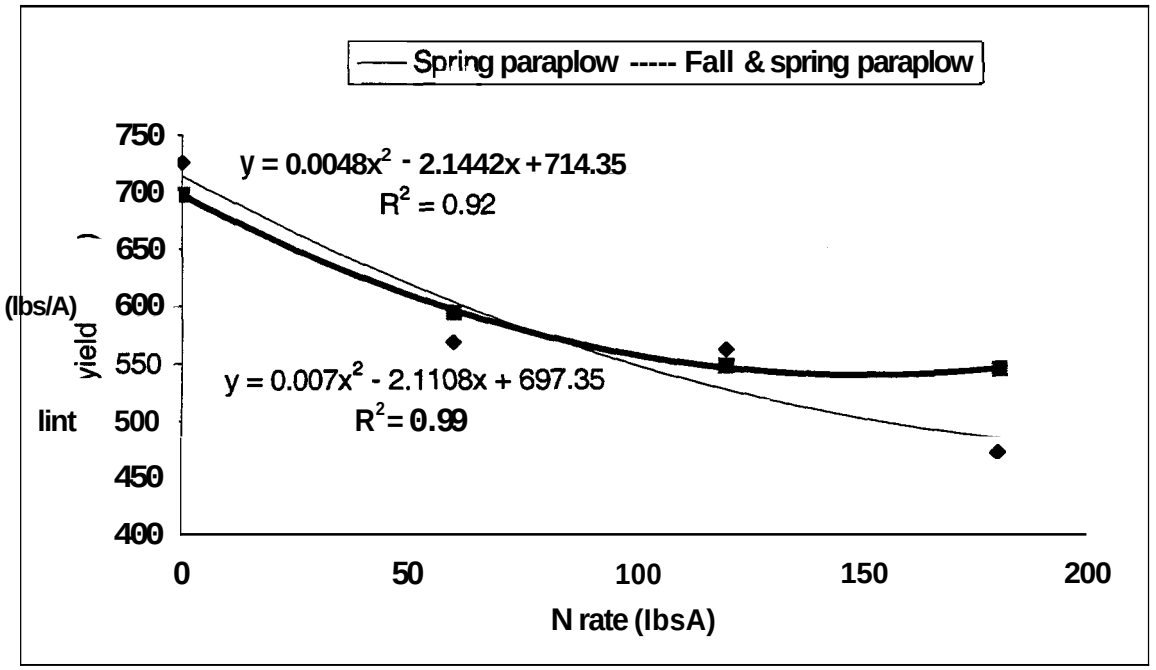

Fig. 6. Influence of tillage and N rate on lint yield of cotton (7 inch wide rows).