

NO-TILL COTTON RESPONSE TO PLANTING DATE

D.J. Boquet, J. Caylor, and C. Shivers

Louisiana State University Agricultural Center

Macon Ridge Research Station

Winnsboro, LA

Abstract

The introduction of new cultivars and changes in technology and production practices may have altered the optimal planting time for cotton (*Gossypium hirsutum*, L) in the mid-South U.S.A. A field experiment was conducted in 2002 on Gigger silt loam to define planting date (PD) effects on selected cotton cultivars. Six cultivars (Deltapine DP555BR, Deltapine Pearl, PSC 355, SureGrow SG215BR, SureGrow 821, Stoneville ST4892BR) were no-till planted at eight PD (25 March; 4, 15, and 24 April; 2, 13, and 23 May; 3 June). Data were collected on seedling emergence, plant height, main stem node number, nodes above white flower, boll size, lint percentage, lint yield, soil and air temperature and rainfall. Although cultivars affected most plant variables and yield, there was little or no interaction between PD date and cultivar. Seedling emergence averaged 11% at the 25 March and 4 April PD; 34 percent at the 15 April PD and greater than 50 percent at all other PD. Low soil temperature, minimal DD60s and high rainfall combined to reduce seedling emergence and survival at early PD. Plants were shortest at the 25 March PD (29 inches) and increased to a maximum of 67 inches at the 23 May PD. Boll weight averaged 5.3 g and was not affected by PD. Lint percentage was higher at early PD (43.4) and decreased at later PD (41.7). Highest lint yield (1526 lb/acre) was produced from PD between 15 April and 2 May. Cotton planted at the 13 May PD had significantly lower yields than cotton planted at the 2 May PD. Planting dates later than 13 May had lower yields due in part to adverse weather from two tropical systems that caused prolonged cloudy, rainy periods and high winds. In this study, the optimal PD was earlier than in previous studies and cotton planted later than the optimal date was at risk from adverse weather.

Introduction

Comprehensive cotton planting date studies have not been conducted in Louisiana since 1972. This earlier research established that the optimal planting dates for cotton were between 20 April and 10 May (Aguillard et al., 1980). Cultivars, cultural practices and technology have changed greatly in the last 20 years and optimal planting dates may also have changed. Cultivars are earlier maturing and insecticides more effective than in the 1970s. Transgenic traits for insect and herbicide resistance have been placed into many cultivars. Conservation tillage practices have changed early season soil ecology and allow for early entry into fields for planting when soil temperatures are lower. Irrigation has become essential for some soil types and more than 50% of cotton is now irrigated. The objective of the present research was to define the effects of planting date on six modern cultivars planted into a no till seed bed to determine if the optimal planting period has changed with the changes in technology and management practices.

Procedures

A Planting date (PD) field experiment was conducted in 2002 at the Macon Ridge Research Station in Winnsboro on Gigger silt loam. Six cotton cultivars (Deltapine DP555BR, Deltapine Pearl, PSC 355, SureGrow SG215BR, SureGrow 821, Stoneville ST4892BR) were no-till planted at eight PD (25 March; 4, 15, and 24 April; 2, 13, and 23 May; 3 June). A seeding rate of 5 seed per row foot (65,000/acre) was planted in rows spaced 40 inches apart. Plots were four rows 45 feet long. Data for plant and yield variables were collected from the two center rows. Data were collected on seedling emergence, plant height, main stem node number, number of nodes above white flower (NAWF), boll size, lint percentage, lint yield, soil and air temperature and rainfall. Seedling emergence was determined by counting all emerged surviving seedlings 20 days after planting. Plant height, main stem node number, and NAWF were determined from 10 random plants per plot. Plant height and node number were recorded weekly during the growing season and NAWF was recorded weekly from bloom initiation through cutout (NAWF=4). Lint percentage and boll weight were determined by hand harvesting and ginning 50-boll samples per plot. Lint yield was determined by mechanically picking the two center rows of each plot and multiplying the seedcotton yield by lint percentage.

Results and Discussion

Seedling Emergence and Survival

The percentage seedling emergence and survival varied across planting date. Averaged across cultivars, seedling survival was very low—less than 11 percent - at the 25 March and 4 April PD and only 34% at the 15 April PD. At the 24 April and later PD, seedling survival was greater than 50%. Low survival at early PD was related to low soil temperatures, low DD60s and rainfall within five days of planting. A combination of low soil and air temperatures and rainfall within five days of planting not only reduced seedling survival but had season long effects that reduced lint yield.

Plant Height and Main Stem Node Number

Planting date had a significant effect on plant height. Plants were shortest at the 25 March PD (29 inches) and increased to a maximum of 67 inches at the 23 May PD. The excessive plant height at late PD was partly responsible for lower yield as the crop used a larger portion of its energy budget for vegetative growth and the excess plant height caused lodging. Main stem node number was not affected as much by PD, ranging from a low of 18 (25 March and 2 April) to a high of 22 (4 April and 23 May) nodes per plant. Increased plant height was related more to increase in internode length rather than to increase in node number.

Nodes Above White Flower

The number of days to cutout (NAWF=4) was affected by PD. At the 25 March PD, the average number of days to cutout was 115. At early PD from 25 March to 24 April, the number of days planting delay was about equal to the reduction in number of days to cutout; thus the growing season was not extended by planting delay. For example, the number of days to cutout at the 25 March was 115 and the number of days to cutout at the 24 April PD was 89. Thus a 30-day planting delay resulted in a 25 fewer days in time to cutout, delaying maturity by only five days. Later planting than 24 April did not advance the days to cutout, and therefore delayed maturity by the number of days planting was delayed. Later PD than 2 May delayed maturity and increased production risk. In 2002, this was of particular significance because of the tropical systems that affected the weather after mid September causing many cloudy days and wet field conditions.

Lint Percentage and Boll Size

Lint percentage was highest at the earliest PD – averaging 43.7 percent at the three earliest dates and 41.7 percent at the three latest dates. Boll size averaged 5.3 g and was not affected by PD. However this does not account for many bolls at the 2 May and 3 June PD that did not mature enough to open because of the cloudy weather in September and October.

Lint Yield

Yield was affected by PD and cultivar and the PD x cultivar interaction was significant. Yield differences among cultivars was larger at early through optimal PD, averaging 200 lb lint or more per acre. At later than optimal PD, yield differences among cultivars were not as large, averaging about 100 lb lint per acre. The optimal PD for all cultivars was between 15 April and 2 May, where lint yield averaged almost three bales per acre (Figure 1). Deltapine DP555BR and SureGrow 821, however, had significant yield declines when planting was delayed from 24 April to 2 May. The optimal PD in this study were earlier than in previous research conducted 30 years ago, where the optimal PD were between 20 April and 10 May.

Summary

Planting date affected seedling survival, plant growth and yield. Seedling emergence and survival at early planting dates were low due to low soil temperature, few DD60s and high rainfall, resulting in poor and inconsistent stands. The optimal planting date for yield was between 15 April and 2 May with highest average yield of 1526 lb per acre at the 24 April planting date. Lint yield at all planting dates except for 4 April and 3 June averaged more than 1000 lb per acre. A moderately early planting date around mid April was better for yield than a moderately late planting date of mid-May.

References

Aguillard, W., D.J. Boquet, and P.E. Schilling. 1980. Effects of planting dates and cultivars on cotton yield, lint percentage, and fiber quality. Louisiana Agric. Exp. Stn. Bull. No. 727.

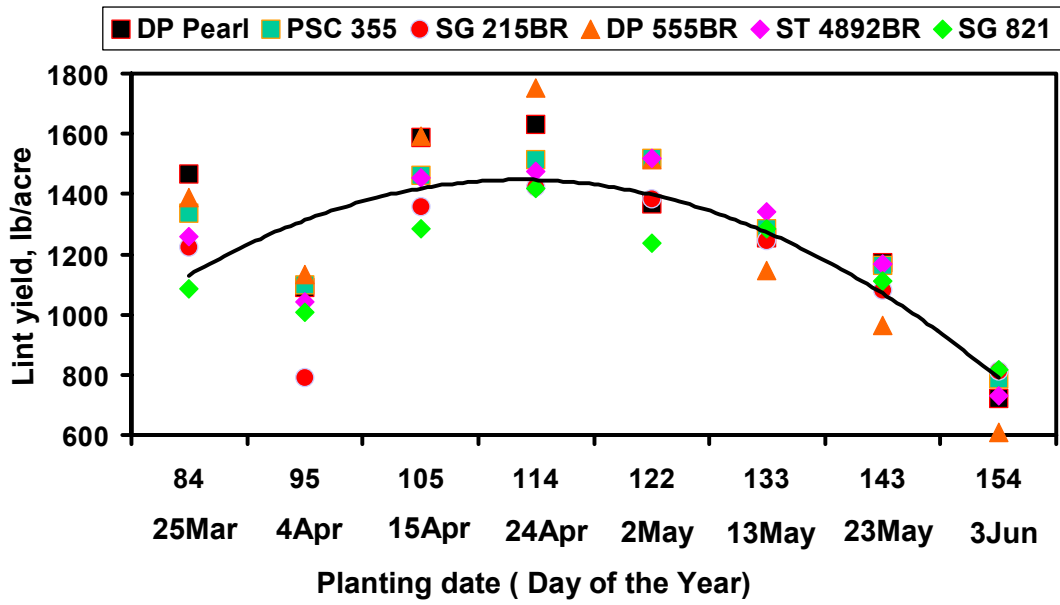


Figure 1. Yield response of six cotton varieties to planting date, Macon Ridge Research Station, Winnsboro LA, 2002.