Performance of Two Stripper Cotton Cultivars Planted at Three Ultra-narrow Row Spacings

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ABSTRACT

Ultra-narrow cotton creates new possibilities for shortening the growing season of cotton thus decreasing costs of production inputs, but the optimum row spacing for ultra-narrow planting is still under investigation. The experiment was conducted at the Texas A&M University Agricultural Research and Extension Centre in Uvalde, Texas, during the 1997 season. The soil at the experimental site is a Uvalde silty clay loam. Transgenic RoundUp-Ready cultivars Paymaster 2200 and Paymaster 2326 were planted to a plant population of about 245,000 plants per ha in 20-, 30-, and 40-cm spaced rows. A linear-move, low-pressure overhead sprinkler system was used for in-season irrigation of the plots. There were significant differences in yield between the two cultivars across row spacing treatments. Seedcotton yield of Paymaster 2200 averaged 3089 kg/ha, while that of Paymaster 2326 averaged 2259 kg/ha. There were no significant differences among row-distance treatments. The interaction cultivar x row spacing was not significant. Our data indicates (1) there is no advantage in planting at row-distances less than 16 inches and (2) the selection of best adapted and high yielding varieties is an important consideration for a successful crop.

Introduction

New developments in herbicide-tolerant transgenic cotton cultivars are giving ultra-narrow cotton planting a new, stronger chance to become a cost-effective way to raise cotton. Ultra-narrow cotton production was introduced in the 1960's as a better method to improve plant spacing to increase the use efficiency of light, water, and nutrients. At this time the technology did not succeed because the technology to control weeds was then lacking. The optimum spacing for ultra-narrow planting of cotton is still under investigation and most likely will depend on the particular growing conditions of each cotton-growing region.

The objective of this study was to evaluate the yield performance of two transgenic, stripper-type, RoundUp-Ready upland cultivars planted at three ultra-narrow row spacings.

Materials and Methods

The experiment was conducted at the Texas A&M University Agricultural Research and Extension Center in Uvalde, TX., during the 1997 season. The soil at the experimental site is a Uvalde silty clay loam. Triple superphosphate at a rate of 60 units of P_2O_5 per ha was applied broadcast after deep chiselling and before bedding. Herbicide Treflan was broadcast and incorporated before bedding. A deep furrow irrigation of 380 mm was applied three weeks before planting to provide adequate soil moisture content for germination determination. Before proceeding to individual plot harvest, 7 m from each end of the plots were stripped clean to eliminate border effects.

and growth during early season. Nitrogen fertilizer in the form of urea was broadcast at a rate of 100 kg/ha and incorporated to the beds with a rodweeder. Disking twice then flattened beds. Transgenic RoundUp-Ready cultivars Paymaster 2200 and Paymaster 2326 were planted to a plant population of about 245,000 plants per ha in 20-, 30-, and 40-cm spaced rows using a Stanhill vegetable precision planter. Plots were 60 m long and 8-, 6-, or 4-rows wide, depending on row spacing. Experimental treatments (two cultivars and 3 row spacings) were arranged in a randomized complete block design with four replications. Insect pests were controlled by aerial applications of insecticides as needed. No plant growth regulators were used to control growth.

A linear-move, low-pressure overhead sprinkler system was used for in-season irrigation of the plots. Immediately after planting, three 12-mm irrigations were applied at 3-day intervals to secure emergence. Because of sufficient rainfall during early stages of growth, in-season irrigation did not start until July. Five in-season irrigations at rates of 13, 20, 19, 23, and 16 mm were applied on Jul 10, Jul 14, Jul 21, July 31, and Aug 5, respectively.

Plots were machine-harvested wholly on Sep 13 with a Allis Chalmers 860 stripper with a finger-type broadcast header. Each plot's harvested seedcotton was dumped into a portable weigh basket for yield

The growing season was characterized by rainfall during the vegetative and square formation phase. A high proportion of early squares were lost to fleahoppers. Good soil moisture conditions and warm temperatures during late June and July favoured plant growth and fruit set.

Results and Discussion

There were significant differences in yield between the two cultivars across row spacing treatments (Figure 1). Seedcotton yield of Paymaster 2200 averaged 3089 kg/ha, while that of Paymaster 2326 averaged 2259 kg/ha. There were no significant differences among row-distance treatments. The interaction cultivar x row spacing was not significant. Plants sustained early loss of squares that curtailed their potential for production. Plants cut-out early and did not compensate for this loss.

Ultra-narrow cotton appears to be a feasible cropping alternative in the Winter Garden and deserves further evaluation. Our data indicates that 1) there is no advantage in planting at row-distances less than 40 cm and 2) the selection of best adapted and high yielding varieties is an important consideration for a successful crop.

A shorter growing season is an important aspect of this crop technology leading to reduced inputs, particularly irrigation (very important for this region) and pest control. Early-season management to control plant growth and insect damage are of critical importance. Because of high plant population, plants are exposed to intense interplant competition and, therefore, early fruit loss may not be compensated later by prolonged growth.

Figure 1. Seedcotton yield of two RoundUp-Ready-transgenic cotton cultivars planted at three ultra-narrow row spacings Uvalde, TX. 1997.