REACHING THE OBJECTIVES OF ULTRA-NARROW-ROW COTTON

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Abstract

A number of producers are trying ultra-narrow-row (UNR) cotton in an effort to improve profits. The University of Tennessee is conducting research to assess the potential of UNR production systems for Tennessee. The UNR strategy has four components: production cost control, soil resource maintenance, lint yield enhancement, and fiber quality optimization. Research results since 1994 indicate that UNR cotton is compatible with no-till methods and can enhance lint yields in Tennessee. However, fiber quality of finger-stripped UNR cotton is reduced by leaf and bark fragments in the lint, relative to spindle-picked cotton, using current harvest equipment. An economic analysis is needed to determine the costs and benefits of UNR relative to conventional cotton.

Introduction

Growing cotton in ultra-narrow rows is not a new idea, but it has been revisited in recent years by Tennessee producers and researchers with a new perspective and new production technologies. The objective of most producers currently trying UNR cotton is to improve profit margins by production cost control and yield enhancement. Most of these producers are incorporating new technologies including no-till production methods, earlier-maturing cultivars, improved over-the-top herbicide systems, and growth regulators such as mepiquat chloride (Pix) and ethephon (Prep). Proper use of these growth regulators can control plant height and set up the crop for an early and efficient once-over harvest.

In this light, University of Tennessee researchers have been evaluating UNR systems of no-till cotton production since 1994. The broad objective of this research is to assess the potential role of UNR production systems in the context of higher production costs in conventional wide-row systems. Maintenance of the soil productivity is also a concern, as traditional wide-row cotton may not provide sufficient leaf canopy and crop residue to protect sloping upland fields from erosion, even with no tillage. Therefore current U.T. research builds on no-till cotton production methods, and includes studies of row spacing, Pix, harvest method, plant population density, weed management, and varietal adaptation to UNR. The role of research in attaining the broad objectives of UNR is illustrated by results from the following study.

Materials and Methods

A 4-year study was conducted at the Milan (TN) Experiment Station to evaluate row spacing, Pix, and harvest method effects on lint yield and fiber quality. For this study, 'Deltapine 20' cotton was planted with no tillage in 10-, 20-, and 40-inch rows as main plots. Multiple applications of Pix totalling 0 and 28 oz (0.077 lb a.i.)/acre were the subplot treatments in a split-plot arrangement. A defoliant and boll opener were applied at 50% open bolls, followed by a desiccant about 10 days later. An Allis-Chalmers finger stripper (equipped with a bur extractor) harvested the 10- and 20-inch rows, while a John Deere spindle picker harvested 20- and 40-inch rows once each year. Harvest was completed under dry conditions in October each year except in 1994, when replanting in June led to a November harvest. Seed cotton samples were ginned with a 20-saw gin equipped with a stick machine, dual inclined cleaners and dual lint cleaners to determine lint yields and produce samples for fiber quality analysis. These samples were analyzed by the USDA-AMS Classing Office in Memphis TN.

Results and Discussion

Across Pix levels and years, gin turnouts averaged 29.6% from stripped plots and 35.7% from picked plots. Across Pix levels, yields in stripped 10- and 20-inch rows averaged 912 lb lint/acre, significantly more than in picked 20-inch and 40-inch rows which averaged 788 lb/acre. Yields did not differ significantly between 10- and 20-inch rows that were stripped, nor between 20- and 40-inch rows that were picked. The contrast between picked and stripped 20-inch rows indicates that the higher yields with UNR may be attributed to higher harvesting efficiency of the finger stripper. Average lint yields from 10- and 20-inch rows treated with Pix were 7% higher than without Pix, but yield was not influenced by Pix in 40-inch rows.

Row spacing did not significantly influence HVI fiber properties, but stripper harvesting significantly increased trash content and extraneous matter in lint. Contrasts between picked and stripped 20-inch rows indicate that trash percentage was significantly higher in stripped (1.1%) than in picked (0.4%) samples, averaged across years and Pix levels. These differences in trash content due to stripper harvesting correspond to one or two steps of leaf grade loss. Hand classing also detected light bark fragments in the lint of most (but not all) samples. Loss of leaf grade and presence of extraneous matter in stripped cotton would probably result in discounts upon sale of the lint. This indicates the importance of developing modern harvest machinery to optimize fiber quality in UNR cotton.

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Results so far indicate that cotton grown in UNR can produce relatively high lint yields and high quality fiber in Tennessee when a package of techniques that promote earliness (such as Pix) is applied. It appears that UNR cotton production is compatible with no tillage, but more crop residue data are also needed to evaluate its conservation benefits. More analysis of experimental data and farm-level research is also needed to determine where UNR may be an economically viable option to traditional row-cropped cotton. More research is especially needed on planting and harvesting technology, weed management, grade optimization, production economics, and marketing. Lack of modern harvesting machinery and economical over-top herbicides for broadleaf weed control remain major production constraints.

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