

Narrow Row Cotton Production in Vicksberg

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Abstract

Deltapine 458B/RR, Deltapine 5415RR, Deltapine 20B, and Deltapine 20 cotton varieties were planted on June 5 into narrow 15 inch wide rows. Populations ranged from 80,000 to 100,000 plants per acre. Seed cotton was stripper harvested on December 17. Although lint yields were somewhat low (1-2 bale/acre) for this late planted cotton, we learned several important practices for effective narrow row cotton production systems, based on our first years experience in western Arizona.

Introduction

Ultra narrow row cotton refers to cotton grown on rows that are ten or less inches wide producing plant populations ranging from 80,000 to 120,000 plants per acre in order to grow more cotton per acre at less cost. The narrower the row, the more columnar or slender the plant. Limbs tend to be very short and the majority of the cotton is set at the first position with a few second position bolls and almost no bolls at the third position on a fruiting branch. The optimum height for narrow row cotton is from 24 to 30 inches tall, since it must be harvested with a broadcast stripper. Production cost savings ranging from \$100 to 300 per acre have been reported across the cotton belt since once cotton is planted, tractor and machinery labor is nearly eliminated, and the crop is stripper harvested. Further production cost savings can be realized through quicker canopy closure and a short season production system which can reduce or eliminate mid- to late-season herbicide, insecticide, and irrigation water applications.

Relatively short season, herbicide resistant cotton varieties with a columnar or Asmoke stack@type growth habit are preferred for narrow row production. Cotton is planted with a precision drill, Monosem precision planter, or standard row crop planter with seed boxes staggered on two tool bars or with multiple passes. An effective pre-emergent yellow herbicide (trifluralin or Prowl) applied preplant at an effective rate, plus one over the top herbicide (Roundup, Buctril, or Staple) application may be required prior to canopy closure for season long weed control. Early season water requirements seem to be somewhat higher than that of cotton grown in conventional 30 to 40 inch rows, due to the higher plant populations. Growth regulator (Pix) applications may be required to keep the cotton plants short. Fewer insecticide and water applications may be necessary due to the short growing season. Later than optimum planting dates may also be possible. The cotton crop must be both defoliated and desiccated to facilitate harvest with a broadcast finger stripper equipped with a burr extractor and cleaner which is available from John Deere.

Narrow row production systems with high plant populations and row spacings less than 15 inches have not been examined in desert Southwest cotton production areas. With the current low prices, and a poor outlook for dramatic lint yield increases, desert cotton growers are looking at new ways to cut growing expenses. If a short season narrow row production system could be developed that would save \$200 to 300 in production costs, even a two to two and one half bale crop could be profitable, even at the current low lint prices.

Materials and Methods

A field experiment was conducted during 1998 in Vicksburg, AZ (located in southeastern La Paz County) to determine the effects of narrow row spacing and high plant populations on upland cotton growth, lint yield and quality, and production expenses. Field one was a 32 acre field planted to 30% Deltapine 458B/RR and 70% Deltapine 5415RR. Field two was adjacent to Field 1 and consisted of 70% Deltapine 20 and 30% Deltapine 20B cotton. The fields were irrigated with a linear move overhead sprinkler. Approximately 120,000 seeds per acre were planted with a John Deere 7100 Maxi-Merge planter with a 30 inch row spacing on June 5. Two staggered passes were made with the planter to create a 15 inch row spacing. Final plant populations ranged from 80,000 to 100,000 plants per acre for Field 1 and 85,000 to 90,000 plants per acre for Field 2.

Herbicide applications included 1.5 pt/acre Prowl 3.3 EC preplant and 1 qt/acre Roundup over the top of Deltapine 458 B/RR and 5415 RR at the 10-12 leaf stage, to control a severe puncturevine infestation in Field 1. No plant growth regulator applications were required to maintain optimum plant height of cotton grown on the loamy sand soil at this site. Plant growth measurements to calculate height to node ratios and fruit retention levels were taken every two weeks from June 29 (500 heat units after planting, HUAP) through October 7 (3000 HUAP). Cotton was defoliated with DEF+DROPP+PREP, and desiccated with Starfire (paraquat) applied December 1. Each field was stripper harvested with a John Deere 20 foot wide broadcast finger stripper equipped with a burr extractor and cleaner on December 17. Modules were kept separate for each field and ginned to determine lint turnout, yield and quality.

Results and Discussion

Cotton lint yields ranging from 1 to 2 bales/acre were observed under narrow row (15 inch) production of Deltapine 458B/RR + 5415RR and Deltapine 20B + 20 planted June 5 at populations ranging from 80,000 to 100,000 plants per acre (Table 1). Lint turnout from the stripper harvested cotton was approximately 30%. Lint quality HVI characteristics including micronaire of about 4.0, staple length of 35, and grade of 21 resulted from stripper harvested cotton. Deltapine 20 and 20B did fairly well, in spite of the late planting date. Cotton lint yields across the state during 1998 were disappointing due to late planting dates and a late June to early July monsoon which reduced fruit retention during peak bloom on most farms. This late planted cotton was no exception.

Plant growth measurements (Figures 1 and 2) indicated that both cotton varieties exhibited somewhat low vigor from July through August and relatively high fruit retention. We believe that the cotton was experiencing water stress during this period. Cotton plants were 28 to 32 inches tall with 22 to 24 mainstem nodes at approximately 3000 HUAP on October 7. The first fruiting branch ranged from mainstem node five to six. At harvest, cotton plants were still less than 32 inches tall.

We learned a few things from our 1998 experiences with narrow row cotton production:

First, a precision planter is required to obtain good stands and fast cotton canopy closure. Standard grain drills could not be calibrated to precisely deliver 120,000 to 150,000 cotton seed per acre in a 15 inch row spacing. The grain drill delivered too much cotton seed at its lowest setting and seed depth and distribution was a problem. Drill planting resulted in large skips between planted cotton seeds and clumps of cotton seeds in spots that were planted. Thus, the grain drill was abandoned. We opted for a row crop planter with the seed boxes spaced at 30 inches. The planter was calibrated to deliver 60,000 seed per acre and two staggered passes were made up and back, resulting in a 15 inch row spacing. Other alternatives include staggering seed boxes on two drawbars of a row crop planter to get a 7.5 to 10 inch row spacing, or Monosem's new precision planter developed for narrow row production, however its \$50,000-60,000 price tag may limit its adoption. Another planting option worth examining is to broadcast cotton seed onto a well tilled seed bed with a Valmar type air flow granular applicator, then run a cultipacker or corrugated roller over the field.

Next, early season weed control prior to cotton canopy closure is important. Canopy closure can be delayed due to weed competition. Prowl 3.3 EC applied at 2 pt/acre preplant to the loamy sand soil provided adequate control of annual

grasses, however puncturevine control was poor. A pre-emergent yellow herbicide (trifluralin or Prowl) applied preplant at the high label rate will usually be necessary for satisfactory weed control, until herbicide can be applied over the top of cotton plants. One over the top broadcast herbicide application may be necessary prior to canopy closure, thus herbicide resistant cotton varieties such as Roundup Ready or Buctril resistant are preferable for narrow row production systems. Earliness is another important feature which can help speed cotton canopy closure, and allow an early harvest, reducing the length of the growing season. Varieties such as Deltapine 425RR or 436RR, Stoneville BXN 47, and SureGrow 125R or 501B/R would fit these criteria.

Cotton grown with a narrow row spacing at high plant populations seems to have higher water use requirements from emergence to pinhead square, compared to cotton grown conventionally in 30 to 40 inch row spacings. Plant populations in narrow row production systems are two to three times higher per acre. More plants per acre and more rapid growth rates seem to contribute to higher early season irrigation water requirements. Deltapine 458 B/RR, Deltapine 20, Deltapine 5415RR, and Deltapine 20B cotton varieties grown under narrow row production on a loamy sand soil did not require growth regulator (Pix) applications to keep the plants under 30 inches tall to facilitate stripper harvest.

Cotton termination for stripper harvest is a two step process including defoliation and dessication. Dessication is required to brittle the burrs, which allows them to snap off the plant and easily be picked up by the finger header of the stripper. Application of Dropp plus Def/Folex or Ginstar defoliant followed by Starfire dessicant are effective combinations. Dropp combinations or Ginstar applied when at least 60-75% of the harvestable bolls are open provides good defoliation, plus some regrowth suppression. Ginstar should not be used in an alfalfa rotation. Starfire (paraquat) applied when at least 85% of the harvestable bolls are open provides good dessication. Some leaf sticking can occur when Starfire alone is used for defoliation and dessication. Do not treat more acreage than can be harvested in a reasonable length of time, since terminated cotton subjected to frost(s) may become so brittle that the cotton stripper will actually harvest mainstems, contributing to bark and trash content in the seed cotton.

Harvest is best achieved using a broadcast finger stripper equipped with burr extractors and cleaners to remove excess bark and leaf from seed cotton. Such stripper harvesters are available at about half the cost of spindle cotton picker, plus they require less maintenance. Cotton plants should ideally be 24 to 30 inches tall and set their lowermost bolls at least seven to twelve inches above the ground for efficient stripper harvest with a broadcast header. We suspect cotton fields with lint yields exceeding three bales per acre will be very difficult to stripper harvest. The twenty foot wide broadcast stripper finger header we used required the stripper harvester be backed in reverse to the seed cotton module builder to dump the stripper basket. An thirteen foot wide header is required if the cotton stripper is to pull up parallel to the module builder to dump, or a boll buggy could be used to transfer seed cotton from a cotton stripper with a wide header to the module builder.

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Table 1. Plant populations, lint yield, and lint quality of Deltapine 458 and Deltapine 20 cotton planted June 5 into narrow 15 inch wide rows stripper harvested December 17.

Variety	Plant Population (#/acre)	Lint Yield (bale/acre)	Lint Turnout and Quality			
			Lint %	Micronaire	Staple	Grade
Deltapine 5415 RR (70%) + Deltapine 458B/RR (30%)	93,300	1.07	29.1	3.8	35	21
Deltapine 20B (70%) + Deltapine 20 (30%)	86,500	2.17	29.9	4.1	35	21