

INFLUENCE OF ULTRA NARROW ROW ON COTTON GROWTH AND DEVELOPMENT

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Abstract

Ultra narrow row cotton (UNRC) production (10" or less) is now a possible management option for growers across the cotton belt. Decreasing the distance between plants will reduce lateral branch length while Pix plant regulator will reduce vertical growth making broadcast stripper harvest feasible. Our objective was to build an economical system to grow higher yielding, high quality, short season cotton across a wide variation of soils, topography, and tillage conditions. Plants were grown in row spacings from 10 to 40 inches. As row spacing decreased cotton plants changed from a conical to a columnar structure. When Pix plant regulator was applied plant height was significantly reduced. When UNRC was treated with Pix there was a dramatic increase in the number of first fruiting positions per acre, and a decrease in second and other positions. This resulted in a yield increase of high quality cotton.

Introduction

Determining the optimum row width and spacing of cotton has been of interest to producers and agronomist since it was introduced to this country. Brown (1937) reported that the length of the stem is determined mainly by soil and water conditions, but variety does play a part. Cook and Meade (1911) reported that rainy weather and rich land may cause a higher percentage of vegetative branches to develop and thus produce extra vegetative growth at the expense of fruit branches. Close spacing is conducive to earlier maturity because there is a higher percentage of primary bolls (Brown, 1927). Heitholt (et al., 1995) reported that an increased flower production rather than increased boll retention was responsible for the small narrow row yield increase. Anderson (1973) and Sappingfield (et al., 1969) reported that narrow rows produced more yield was earlier, and resulted in shorter plants than wide rows.

Materials and Methods

In 1992 a four year study was initiated on a waverly silt loam soil at Shelby Farms Agri Center Int. at Memphis, TN. Stoneville 132 was planted with a kinze planter in 10, 15, 20, 30, and 40 inch rows as main plots. Intra row plant spacing was held fairly constant with 3 to 4 plants/ft for the

wide rows and 2 to 3/ft for the UNRC or 40,000 plants/ac. and 120,000 plants/ac. respectively.

Two Pix applications (totaling 0 and 24 oz./ac.) were subplot treatments.

Ten plants per rep (30 total) were mapped for height, number of main stem nodes, first fruiting branch node, number of vegetative branches, length and diameter, and the percent fruit retention at positions 1,2 and other. The wide rows were harvested with a Case Spindle Picker and the UNRC were harvested with an Allis-Chalmers Finger Stripper. Yields were measured from each treatment while percent gin turnout was recorded for the picker vs. the stripper.

Results and Discussion

Pix and row spacing had little effect on number of mainstem nodes (21), and first fruiting branch node (6).

Height

Pix reduced plant height by 30 percent across all row spacings, while 10 inch rows showed only a slight trend for shorter plants. The optimum height for UNRC is 32".

Branches

The number (3 to 0), length (30 inches to 2 inches), and diameter (6/16 inch to 1/16 inch) of vegetative branches decreased as row spacing decreased. While Pix had no effect on the number of vegetative branches, it reduced the length and diameter size. Pix and UNR reduced all branch length and size to form a very columnar plant structure. This caused a delay in canopy closure with the wide row spacings.

Fruit Set

As the row spacing decreased from 40 inches to 10 inches the percent first position fruit increased from 69 to 89 for the Pix treated and 61 to 87 for the untreated. As the row spacing decreased from 40 inches to 10 inches the percent second and other fruit decreased from 24 to 11 and 9 to 0 for Pix and 27 to 13 and 12 to 0 for the untreated.

Yields

Pix increased lint yields across all row spacings from 13 percent on 40 inch rows to 41 percent on 10 inch rows. Without Pix the plants became rank and the yields decreased for the 15 and 10 inch rows. The treatment with the greatest yield was Pix and 10 inch rows. The lowest yield occurred with the untreated 10 inch rows.

Conclusions

- UNRC - Keeps cotton plants from branching out.
(Columnar)
- Pix - Keeps cotton plants from growing too tall. (32” optimum)
- Pix and UNRC - Both contribute to a greater fruit set at the money positions.
- Pix and UNRC - Combine to structure the plants for high quality, high yield and a short season.
- Pix and UNRC - Combine to shape the plants for fast efficient broadcast stripper harvest.
- Pix and UNRC - Result in quality cotton that gins & grades favorably to WRC.
- Pix and UNRC - Provides the grower with a profitable alternate cropping system.
- Pix and UNRC - Allows the grower the flexibility to tailor his farming system to fit a wide variation of soils, topography and tillage conditions.

References

1. Anderson, K. L. 1973. “Effects of Nitrogen Rate, Method of Application, Leaf Type and Row Width on Certain Characteristics of Cotton,” Ph. D. Dissertation Mississippi State University, Mississippi State, Mississippi.
2. Brown, H. B. “Cotton,” McGraw Hill Co. New York, NY. 1938.
3. Brown, H. B. “Cotton Spacing,” Miss. Agr. Exp. Sta. Bull. 212, 1923.
4. Cook, A. F. and R. M. Meade. “Arrangements of Parts in the Cotton Plant,” U. S. Dept. Agr. Bur. Plant Ind.. Bull. 222, 1911.
5. Heitholt, J. J., W. T. Pettigrew, and W. R. Meredith, Jr. 1992. “Light Interception and Lint Yield of Narrow-Row,” Crop Sci. 32; 728-733.
6. Sappingfield, W. and S. D. Atwell. 1970. “The Influences of Very Narrow Rows on Cotton Structure and Yield on Sandy Loam and Clay Soils,” Univ. of MO Bull.