ULTRA-NARROW ROW COTTON: TILLAGE, COVER CROPS AND NITROGEN

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Abstract

Recent research has shown that ultra-narrow row cotton (*Gossypium hirsutum* L.) production on marginal lands may be an economically feasible production scheme. No-tillage ultra-narrow row cotton would reduce soil erosion and enable growers to meet USDA-NRCS conservation compliance guidelines. Growers could expand cotton production with less capital. Recent advances in weed control, e.g., cotton varieties tolerant to glyphosate and bromoxynil, and new options for over-the-top weed control like pyrithiobac and sethoxydim, have eliminated one of the major constraints to ultra-narrow row or drilled cotton. Short season varieties and PIX® plant growth regulator have also increased the feasibility of this system.

There is grower interest in this system but there are many knowledge gaps in the management scheme for ultra-narrow row cotton. One of the major questions to be answered by research is defining fertility requirements of this type system, especially in regards to nitrogen management. Nitrogen management is further complicated by tillage and cover crop systems and no work has been done on cover crop effects on ultra-narrow row cotton. The objective of this research was to determine the optimum nitrogen rate under different winter covers and tillage systems for ultra-narrow row cotton grown on marginal Coastal Plain soils.

This experiment was conducted during 1996-97 on a Wagram loamy sand (loamy, siliceous, thermic Arenic Paleudults) in eastern SC and a Norfolk loamy sand (fine-loamy, siliceous, thermic Typic Kandiudults) in east-central AL. In AL, cotton varieties were Stoneville 132 in 1996 and Paymaster 1330 BG/RR in 1997. In SC, Stoneville 474 was used in 1996 and 1997. A no-till drill with 8-inch drill spacings was used to plant the cotton. Seeding rates were 250,000 and 210,000 seed/A in 1996 and 1997, respectively, in AL and 150,000 seed/A in SC. Planting dates ranged from 27 May to 4 June. Cover crops were killed 14-21 days prior to planting using burndown herbicides and a mechanical roller. Preemergence applications of fluometuron and pendimethalin were used for weed control at all sites both years. In 1997 in AL, glyphosate was also applied over-the-top at 4-true leaves. In AL, four 8 oz./A applications of PIX® were applied at approximately 10-day intervals; in SC only one 8 oz./A application was made to the cotton. Cotton in AL was harvested with a stripper fitted with a finger harvester while in SC it was hand picked.

At both locations, the experimental design was a split-split plot design of four replications. Main plots were cover crops, sub-plots were tillage systems, and sub-sub plots were N rates. Cover crops were 1) winter fallow, 2) black oat (*Avena strigosa* Schreb.) and 3) winter legume [white lupin - *Lupinus albus* (L.) in AL and Austrian winter pea - *Pisum sativum* (L.) in SC]. Tillage treatments were 1) conventional (disk, chisel plow, disk and field cultivate) and 2) no-tillage. Nitrogen rates were 0, 40, 80, and 120 lb N/A.

Yield response varied with location and year, as a result of rainfall, cover crop biomass, and thrip (*Frankliniella* spp.) and weed pressure. The AL site, with a higher plant population (averaging about 200,000 plants/A) and somewhat more productive soil, demonstrated a greater response to treatments. Final plant stands (plants/A) ranged from 190,000 to 220,000 in AL and from 83,000 to 126,000 plants in SC. Seed depth control and thrips were factors in stand losses in SC. Stands were reduced from 8 to 21% (dependent on location and year) with legume covers and no-tillage but within a location and chosen plant density, stands did not affect lint yield. In 3 of 4 site-years, highest lint yields (mean of 1330 lb/A) were obtained with a legume cover crop and 60 to 80 lb N/A (determined from regression analysis). Eighty (80) lb N/A was generally required for maximum yield following winter fallow or black oat cover crops, but the yield potential was less with these covers compared to winter legumes. An exception occurred in SC in 1997 when yields were reduced following Austrian winter pea, due to delayed maturity and unusually cool and wet weather in early fall. Cover crop effect on yield potential generally followed the order legume>black oat>winter fallow and was related to biomass production of the winter cover, as well as to type of cover. Tillage effects and interactions varied with cover crop, location, and year. No-tillage into a white lupin cover crop that produced 6800 lb dry matter/A resulted in the greatest lint yield (1390 lb/A) in the study. Our results suggest that ultra-narrow row cotton is a viable option for Coastal Plain soils with low productive potential. Further research on ultra-narrow row cotton is needed on PIX® rates, planting dates, plant populations, variety selection, fertility maintenance, and lint quality.

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