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15-INCH ROW COTTON PRODUCTION UNDER IRRIGATED AND NON-IRRIGATED ENVIRONMENT: PLANT POPULATION, LINT YIELD, AND PICKER HARVEST EFFICIENCY

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Abstract

Narrow row cotton production systems are not new. Introduction of a finger stripper harvester in the 1990's fueled interest in stripper cotton among researchers whose goal was to reduce inputs and increase net returns. Stripper cotton was grown in ultra-narrow rows (7.5 or 10 inch rows) and was never widely adopted for economic reasons (high seed cost and ginning penalties) and predominance of wide row cotton production system. The recent development of Vari-Row System spindle picker capable of picking 15-inch row cotton has rejuvenated interest in narrow row cotton production. Narrow row cotton can reduce weed control costs through early canopy closure. This study examines the weed control benefit, lint yield, and picker harvest efficiency of 15-inch row cotton under irrigated and non-irrigated environment in the Mississippi delta region.

Field experiments were conducted in 2006 at the USDA-ARS Southern Weed Science Research farm, Stoneville, MS. Roundup Ready Flex (DP164 B2RF) cotton at five plant populations (targeted 30 000, 40 000, 50 000, 60 000, 80 000 plants/A) in 15-inch rows were compared to a targeted 40,000 plants/A in 40-inch rows under irrigated (Dundee silt loam soil) and non-irrigated (Dundee silty clay loam soil) environment. Each plot consisted of 10 rows spaced 15-inches apart or 4 rows spaced 40-inches apart that were 50 or 80 feet long. The experiment was conducted in a randomized complete block design with four replications. Cotton was planted on 19 April 2006. Plots were kept weed-free using an herbicide program of Cotoran + Dual applied PRE fb 2 to 3 applications of Roundup OriginalMax applied POST. Cotton was furrow irrigated as needed in the irrigated study. Seed cotton was hand picked from the two center rows of 1-m length at three randomly selected locations in each plot. Number of cotton plants, open bolls per plant, and plant height were recorded at harvest. Seed cotton was ginned and the lint yield was calculated on a land area basis. In 15-inch row cotton, lint yield was corrected for 80% of land area as 2 of 10 rows were skipped to allow equipment traffic. In a third study, 15-inch cotton was harvested using a John Deere 9930 picker and 40-inch cotton was harvested using a John Deere 699 picker. Four rows of the 15-inch and two rows of 40-inch from each plot were harvested for yield. There were twelve plots 100 feet long for each row spacing. After picker harvest, seed cotton was gleaned from the stalks from the entire 100 feet of the harvested rows in each plot. Picker harvest efficiency was calculated as percent of total seed cotton (picker plus gleaned). Seed cotton was ginned and the lint yield was calculated as described above.

Plant population at harvest ranged from 30 000 to 70 000 plants/A in 15-inch row compared to about 50 000 plants/A in 40-inch row under both irrigated and non-irrigated conditions. There were no differences in plant heights and percent lint between 15-inch and 40-inch row cotton, regardless of irrigation. Lint yields in 15-inch row cotton ranged from 1526 to 1707 lb/A under irrigated and 1155 to 1259 lb/A under non-irrigated condition with 30 000 to 55 000 plants/A density. Lint yield in 40-inch row cotton was 1485 and 1176 lb/A for irrigated and non-irrigated cotton, respectively. Lint yield tended to decline in 15-inch row at the highest plant population (70 000 plants/A) compared to 40-inch row cotton suggesting no yield advantage above 55 000 plants/A in 15-inch row system. Modest increased lint yield was mainly due to higher number of open bolls per plant in 15-inch row compared to 40-inch row (8.3 to 16.1 vs. 8.0 bolls/plant for irrigated and 9.8 to 11.4 vs. 7.1 bolls/plant for non-irrigated cotton,

respectively). Plant canopy closed 4 weeks earlier in 15-inch row cotton than in 40-inch row cotton which eliminated the need for at least one POST herbicide application, although it was made for experimental consistency. Picker harvest efficiency was slightly lower in 15-inch row (88%) compared to 40-inch row (93%) and percent lint was similar from both pickers. Results of this one year study indicate that 15-inch row system with a plant population of 40 000 plants/A can produce lint yield equal or better than 40-inch row system under both irrigated and non-irrigated conditions. It should be stressed that in 15-inch row system, lint yield was corrected for 80% of land area as 2 of 10 rows were skipped under tire tracks. Lint yields will increase as the number of rows planted per trip increase, for example, correction factor will be 90% for 2 of 20 and 93% for 2 of 30 rows skipped.