NARROW AND CONVENTIONAL ROW PATTERN YIELD RESPONSE TO LIMITED SUBSURFACE DRIP IRRIGATION

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Abstract

Water is a critical factor in successful West Texas cotton (Gossypium spp.) production. Skip-row planting has been used to the farmer's advantage, mainly through previous legislation and crop insurance programs, but also to alter the crop's water use requirement. In 1997 a 3-year study was initiated to evaluate seven row-width planting pattern combinations to determine the optimum configuration for limited irrigation. Subsurface driplines were installed 12 inches below each planted row for solid, 2x1, and 1x1 skip-row patterns (e.g., 2 planted, 1 skip-row, etc.) planted in either 30 or 40-inch rows. Ultra-narrow rows (UNR, 15 in.) were planted over 30-inch driplines. Four water levels were replicated within each width and pattern combination. Seasonal rainfall varied from 2.5 to 7.6 inches over the duration of the study, which affected stand establishment and plant population. Row widths and patterns were differentially affected; populations decreased as seasonal rainfall decreased, more so for the ultra-narrow and the 30-inch solid-plantings, less so for the 40-inch rows. The skip-row patterns were affected very little with changes in seasonal rainfall. Within a given row width, yield per acre increased as skip-rows were minimized. Yield generally increased as row width decreased and as seasonal irrigation and rainfall increased. This was true for the UNR and 40-inch row patterns. However, the 30-inch solid yield was greater than the UNR yield during the driest year at the highest irrigation levels (6.4 and 11.4 inches, in-season). Across years at the highest irrigation levels, the yield of the 30-inch solid rows was inversely related to seasonal rainfall. In addition to the plant population increase in the 30-inch solid plantings, as rainfall and irrigation increased, plant height also increased, lowering the yield potential due to rank growth. As row width decreases and seasonal irrigation and rainfall increases, height control becomes critical to maintain yield potential.

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