A Comparative Agronomic Analysis of Subsurface Drip and Overhead Irrigation of Georgia Cotton

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**Introduction**

The success of subsurface drip systems in other crop systems has led researchers and producers to consider it as an alternative to overhead irrigation in cotton (Gossypium hirsutum). However, the profitability of subsurface drip compared to overhead irrigation has not been widely assessed. Drip irrigation can reduce water loss through soil evaporation, and advantages of drip include more efficient water use, quicker application to crops approaching water deficit, and the ability to farm square fields efficiently without the loss of land at the corners. We compared overhead irrigation and drip irrigation for efficiency and cost.

**Irrigation of the Treatments**

The overhead irrigated plots were watered by a linear sprinkler system. Both SSD treatments were watered by a drip irrigation system that consisted of 30.5 cm deep drip line in the center of every other row pictured to the lower left. The drip irrigation system was controlled by inputs from the Adcon telemetry units. When watermark reading triggered the irrigation, the automatic irrigation system watered the plots. The treatments were watered independently of each other by the station pictured to the lower right.

**Monitoring Soil Water Status**

Watermark sensors were installed in two replicates of each treatment. The sensors were placed between the center two rows of the plot. One set was placed in the row center at the depths of 15, 60, and 90 cm. Another set was placed 10 cm away from the cotton at depths of 20, 40, and 60 cm. Irrigation was triggered in a treatment when any of the watermarks read above 40 kPa. Adcon telemetry equipment was also installed in one replicate of the four treatments to continuously monitor soil water status.

**Results**

Lint quality is influenced by boll location on the plant and the location of a boll on a cotton plant is characterized by node and fruit position in the illustration at the right. The highest and heaviest bolls grow in the center of the plant. The graph below shows how irrigation treatment affected the distribution of bolls on the plant. Yield was concentrated lower and more in the center in the SSD treatments than the Overhead treatment.

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