days after both the first and second irrigations, irrigated for 8 days after the third, and no water after the fourth. The average intake rate, obtained by metering water onto the plot, for the extended periods of irrigation was 0.385 ft./day (total depth of water applied/days of application).

For yield purposes, 2 strips of 4 rows were harvested 2 rows in from either edge of the plot. For comparison a strip of four rows on either side of the plots was harvested. The off-plot strips were 5 or more rows away and were not influenced by treatment of the plot. Thus 2 samplings for yield were obtained from the plot area and 2 from the adjacent field area.

**Yield and quality**—Table 1 shows the yield of seed cotton for the two samples from each location. The data indicates slightly lower total yields on-plot as compared to off-plot, but the differences are not statistically significant.

Both on- and off-plot samples graded Middling with staple lengths of 1-3/32 inches.

**Growth and maturity**—A depression in the growth was also noticed in the solid-block cotton under prolonged irrigation at the beginning of the season. This may have been caused by the lack of nitrogen or a lack of soil aeration as evidenced by yellowing of the leaves; however, the cotton plants recovered during the period between the first and second excessive irrigations and the yellowing of the leaves was barely perceptible in comparison to the off-plot cotton. Ten days after the first 15-day irrigation the number of blooms per plant were approximately the same for both the on- and off-plot plants. Yellowing of the leaves occurred again during the second 15-day irrigation and recovery of green color was not complete when the last 8-day replenishment irrigation was applied.

After this last prolonged irrigation the on-plot cotton leaves were very yellow and no bolls were open. The off-plot cotton had 3 to 4 open bolls per plant. Ten days later the on-plot cotton showed a few open bolls.

Root development of the plants receiving no extra water was similar to the plants receiving 38 days of extra water (as shown in Figure 2). The whitened areas (on-plot cotton root) are enlarged lenticels and were found predominantly on roots of plants subjected to prolonged irrigation.

**Conclusions**

Prolonged irrigations produced no significant differences in crop yields of Acala 4-42 cotton compared to the normal irrigations practiced by the farmer, even though growth depression occurred and may persist. Therefore, cotton may lend itself to a replenishment irrigation program. However, further studies of other crops over more than one season are needed to determine if replenishment irrigation is to become an important means of increasing crop yields of Acala 442 cotton compared to the usual type of ground water recharge.—E. E. HASKELL, BIANCHI, Geologist and Research Soil Scientist, Soil and Water Conservation Research Division, ARS, USDA, Fresno, Calif.

**DISTRIBUTION OF NET RADIATION WITHIN SORGHUM PLOTS**

The amount of evapotranspiration from any locality is governed primarily by those factors affecting the heat supply to soil and plant surfaces. The difference between incoming and outgoing radiant energy, is the principle source of heat. This experiment was initiated to determine if row width and plant population influence the total net radiation and its distribution between the grain sorghum crop and the soil.

Four RS 610 grain sorghum plots with 40 false rows were selected for this experiment. The plots were as follows:

1. 20-inch rows with 105,000 plants
2. 20-inch rows with 13,000 plants
3. 40-inch rows with 105,000 plants
4. 40-inch rows with 13,000 plants

“Economical” net radiometers, as described by Suomi and Kuhn, were used to measure the net radiation. One plot 1 radiometer was placed approximately midway through the crop. In the row beneath the foliage 3 radiometers were connected in parallel; 1 was situated in the center of the row and 1 was placed to each side of the sorghum stalks. The bottom windows of the radiometers were 1 foot above the soil surface. All radiometers were connected to a recorder and radiation was recorded 24 hours per day.

The upper radiometers measured the total radiation absorbed by both crop and soil; the lower radiometers measured that net radiation absorbed by the crop. Similar procedures were used by Aubertin and Peters and Tanner and associates to measure the net radiation in cornfields. Aubertin and Peters suggested that separate measurements of the net radiation absorbed by the crop and by the soil made...