

Fruit Initiation Response to Early Season Water Stress.

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Daily plant water needs change in response to crop growth stage and water availability. Peanut uses very little water during the early vegetative growth and consequently requires very little supplemental irrigation. The irrigation scheduling tool, Irrigator Pro, does not recommend irrigation during the first 30 d after planting except to promote uniform emergence. Irrigator Pro uses daily water use to forecast irrigation events in association with maximum soil temperature at a 5-cm depth. The developers of Irrigator Pro define the fruit initiation date (FID) as the date that the plants initiated an average of 6 fruit indicators (pins + pegs + pods) per plant. Research indicates that mid-season drought stress may suspend flowering. Therefore, does early season drought affect flowering and the resultant FID?

AU-NPL 17 was planted in two rainout shelters at the National Peanut Research Laboratory in Dawson, GA into a well-watered sandy loam soil at 20 seed/m in rows spaced 0.91 m apart. Each 12-m rainout shelter was divided into two 6-m plots and irrigated based on the average soil water potential measured at 20 and 41 cm. Treatment 1 or control plot applied water when the average soil water potential reached -40 kPa. Treatment 2 (Trt 2) was irrigated when the average soil water potential reached -100 kPa. In irrigation treatment 3 (Trt 3), the first two irrigation events were triggered when the soil water potential reached -100 kPa then irrigated at -40 kPa thereafter. Treatment 4 (Trt 4) triggered the first two irrigation events when the average soil water potential reached -200 kPa then -40 kPa thereafter. Each irrigation event applied enough water to bring water potential to field capacity (-10 kPa).

Between 32 and 55 days after planting (DAP), six plants were removed daily from each plot and the number of flowers, pins, pegs, and pods were counted and the above ground biomass was dried and weighed. The FID was calculated daily using the formula presented in Irrigator Pro. Remaining peanut plants in each plot were taken to yield and harvested by hand.

The average FID for all irrigation treatments occurred 41 DAP (July 01). However, the standard deviation of the FID tended to decrease as the soil water potential to trigger irrigation decreased. The standard deviation of the FID in Trt 1 was ± 3.1 d, Trt 2 was ± 1.8 d, Trt 3 was ± 2.2 d, and Trt 4 was ± 0.8 d. The above-ground dry biomass (g/plant) on the FID decreased with increasing water stress and was 17.62, 13.05, 7.95, and 5.48 for Trt 1 to 4, respectively. The final yield for Trt 1, 2, and 3 were similar at 5320, 5099, and 5233 kg/ha, respectively. The final yield for Trt 4 was 4423 kg/ha. The trends in this data are inconclusive and this research should be repeated for multiple years and with current commercial peanut cultivars to verify results.