

Adjusting In-Season Trigger Levels for Maximizing Peanut Growth, Yield, and Managing Aflatoxin

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Objectives: The main objective of this study was to use soil water tension information to determine optimal in-season trigger levels for irrigation and quality management in peanut. This objective was accomplished by the following sub-objectives: Use commonly planted peanut varieties in Georgia such as GA-06G and GA-18RU to determine optimum trigger points during the season, determine optimal crop physiological stages for adjusting in-season soil moisture levels, the collection of agronomic and physiological samples during critical crop growth stages to determine the effects of varied trigger levels on peanut growth and development, and the evaluation of the varied irrigation trigger level effects on final crop yield, water use efficiency (WUE), seed quality, and aflatoxin development. **Methods:** The trial was completed under a VRI lateral system at UGA’s Stripling Irrigation Research Park, planted on May 3, 2023, dug on October 2, 2023, and combined on October 6, 2023. Crop growth stages of 0-40, 40-110, and 110-140 days after planting (DAP), were selected for adjusting the in-season soil water tension sensor trigger levels. Three different trigger levels were selected based on their effect on soil condition. The levels were 20 kPa (wet), 45 kPa (optimal) and 70 kPa (dry). Soil water tension sensors at depths of 4, 8, and 16 inches deep were installed in two of the three replicatons of each treatment. An Excel spreadsheet was used to average soil moisture data by treatment and make an irrigation scheduling decision each day. If the treatment triggered 0.75 inches of irrigation was applied to all plots in the treatment. Leaf area index and leaf stomatal conductance were assessed four times throughout the season. The center two rows of each plot were harvested at the end of the season and weighed. Sub-samples were collected from each of the plots at the time of digging to evaluate seed quality and aflatoxin results based on soil moisture treatment. **Results:** The table below shows the treatments, irrigation applied, yield and IWUE for both 06-G and 18-RU for the 2023 season. The peanut yields were average in 2023. It is important to note that 21 inches of rain were received in 2023, but it was wet early during the season and dry during the end of the season. There was a benefit for irrigating above dryland yields, but overall, very little difference in the other treatments. Seed physiological quality assessment is currently being performed in the lab. Aflatoxin varied with the treatments, with dryland promoting the greatest levels in GA-06G and 45/45/70 kPa (drought at late season) resulting in greatest aflatoxin levels in GA-18RU. However, aflatoxin levels were always lower than 2 ppb. These data from this study have shown that in-season trigger level does have an effect on both end of season yield and IWUE and can also have an effect on seed quality. Thus, more research is needed in this area.

Soil Water Tension	Irrigation Amount (in)	Total Water (in)	06-G Yield (lb/ac)	06-G IWUE (lb/in)	18-RU Yield (lb/ac)	18-RU IWUE (lb/in)
Dryland	2.5	23.7	2910	N/A	2939	N/A
45 / 45 / 45 kPa	11.0	32.1	4754	433	5330	485
70 / 45 / 70 kPa	7.2	28.3	4638	648	5042	704
70 / 45 / 45 kPa	11.8	32.9	4523	384	5531	470
70 / 45 / 20 kPa	10.2	31.4	4898	479	4523	443
45 / 45 / 70 kPa	6.4	27.5	4437	696	4811	755
70 / 20 / 45 kPa	15.6	36.8	4638	297	5618	360
20 / 70 / 45 kPa	11.0	32.1	5013	456	5531	503
45 / 70 / 70 kPa	7.9	29.1	4321	546	5099	645