

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

PIs: Wesley Porter, Cristiane Pilon

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 peanuts. 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 in-season irrigation trigger points, determine optimal crop physiological stages for adjusting in-season soil moisture levels, the collection of agronomic and physiological samples 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), and profitability. **Methods:** The trial was completed under a VRI lateral system at UGA's Stripling Irrigation Research Park, planted on May 9, 2024, and combined on October 7, 2024. 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. 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 replications 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, above-ground biomass accumulation, and photosynthetically active radiation were measured bi-weekly throughout the season beginning on June 11, 2024. 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 2024 season. It is important to note that 27.72 inches of rain were received in 2024 due to two hurricanes occurring during the growing season. Seed physiological quality assessment is currently being performed in the lab. The data from this study has shown that variable in-season irrigation trigger levels do not have any statistically significant difference except when compared to rainfed. However, it can be assumed that because of the excessive rainfall received during growth, full soil water tension variability was not observed. Thus, more research is needed in this area.

Treatment	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)
Rainfed	0.50	28.22	4631	N/A	4794	N/A
45/45/45 kPa	12.50	40.22	6426	143	6374	126
70/45/70 kPa	12.50	40.22	5944	105	5601	64
70/45/45 kPa	13.25	40.97	6496	140	6577	134
70/45/20 kPa	13.25	40.97	6490	140	6310	114
45/45/70 kPa	11.00	38.72	5979	122	6304	137
70/20/45 kPa	13.25	40.97	6083	109	5758	72
20/70/45 kPa	11.75	39.47	6078	123	6205	120
45/70/70 kPa	10.25	37.97	6322	164	6548	171