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

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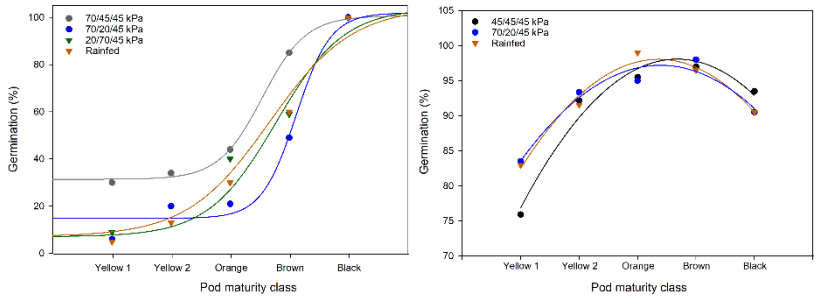
Objectives: The main objective of this study was to use soil moisture information to determine optimal in-sesason trigger levels for irrigation and quality management in peanut. This objective was acclomplished by the sub-objectives: Use commonly planted peanut varieties in Georgia to determine optimum 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 irrigaiton trigger level effects on final crop yield, water use efficiency (WUE), and seed quality. **Methods**: The trial was completed under a VRI lateral system at UGA's Stripling Irrigation Research Park. Crop growth stages of 0-40, 40-110, and 110-140 days after planting were selected for adjusting the in-season soil moisture sensor trigger levels. Three different trigger levels were selected based on their effect on soil condition, 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 averge 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 it. The center two rows of each plot were harvested at the end of the season and weighed. Sub-samples were collected from each plot at the time of digging to evaluate seed quality based on soil mositure treatment. **Results:** The table below shows the treatments, irrigation applied, yield and IWUE for both GA-06G and GA-18RU for the 2020 and 2021 seasons (2020/2021). Unfortunately, overall peanut yields were very low in 2020, but normal in 2021, conveying large differences in yield and IWUE. It is important to note that 21 and 26 inches of rain were received in 2020 and 2021, respectively. There were not differences in many of the treatments, but the main point that can be observed from this trial is that keeping peanuts too wet early season caused an end of season reduction in yield.

Soil Water Tension	Irrigation Amount (in)	Total Water (in)	GA-06G Yield (lb/ac)	GA-06G IWUE (lb/in)	GA-18RU Yield (lb/ac)	GA-18RU IWUE (lb/in)
Dryland	1.00/0.50	21.98/27.24	3054/5321	N/A	3601/5076	N/A
45 / 45 / 45 kPa	8.50/3.40	29.48/30.14	4327/5514	509/1622	4938/6058	581/1781
70 / 45 / 70 kPa	6.30/1.90	27.27/28.64	4033/4889	641/2573	4350/4958	692/2609
70 / 45 / 45 kPa	7.00/2.65	27.98/29.39	4333/5373	618/2027	4638/5283	663/1994
70 / 45 / 20 kPa	8.50/1.25	29.48/28.00	4419/5243	520/4195	4851/5537	571/4430
45 / 45 / 70 kPa	7.04/2.00	28.02/28.74	4160/5214	591/2607	4264/5197	6062598
70 / 20 / 45 kPa	12.25/5.75	33.23/32.49	4575/4572	373/795	4748/4774	388/830
20 / 70 / 45 kPa	7.00/2.75	27.98/29.49	4016/5318	574/1934	3763/5033	538/1830
20 / 45 / 45 kPa	4.75/1.25	25.7328.00	3647/5381	768/4305	3342/5373	704/4298

From the perspective of seed quality, treatments in 2020 and 2021 showed different responses. In 2020 (graph on left) shows that keeping the plots a little drier early season and using the optimal trigger during peak flowering (45 kPa) improves the germination potential of seeds during development (from yellow 1 to black), whereas keeping the plots drier early season, but over-irrigating the field during peak flowering decreases germination potential. In 2021 (graph on the right), the field received 26 inches of rainfall and treatments using 70 kPa could not be applied. Therefore, significant differences in germination cannot be observed.



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.