Physiological Quality of Peanut Seeds Impacted By Drought During the Reproductive Development.

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Sub-optimal water availability during crop development, especially during peak flowering and pod filling, affects the quality of the seeds produced, and generally results in poor seed quality. More frequent drought periods have increased the concern of peanut (*Arachis hypogaea* L.) seed quality in the United States. Identifying the acquisition pattern of the physiological components to determine the timing peanut seeds achieve maximum physiological seed quality as well as understanding the impact of drought stress during seed development are fundamental for harvest decision making and high-quality peanut seed production. The goal of this study was to identify the acquisition of physiological quality components in peanut seed during seed development under well-watered and drought conditions. The field research was conducted in a 6.1 x 12.2 m rainout shelter in Dawson, GA using the cultivar Georgia-06G. Seeds were planted on May 21, 2020. The field was divided in two water regimes: well-watered control and drought stress. The rainout shelter was used to prevent rain/irrigation in the drought stressed plot for 30 days beginning 80 days after planting (DAP). Well-watered plots received supplemental irrigation when soil water potential reached -40 kPa. Plants were harvested at 119 DAP corresponding to 2500 growing degree days. Harvested pods were separated into eight classes using the peanut maturity profile board (‘white’, ‘yellow 1’, ‘yellow 2’, ‘orange’, ‘brown 1’, ‘brown 2’, ‘black 1’, and ‘black 2’). Germination, vigor and desiccation tolerance tests were performed in each maturity class. In addition, to identify potential dormancy in the seeds, a sample was treated with ethephon to release dormancy and the three physiological tests were performed on the treated seeds. Dormancy was observed in peanut seeds and was likely acquired between ‘orange’ and ‘brown 1’ classes. Seeds developed under drought condition presented greater germination for classes ‘yellow 2’ and ‘orange’ than well-watered conditions, whereas germination was similar for both water regimes for the other classes. Speed of germination was higher in seeds from the drought treatment for the classes ‘yellow 2’, ‘brown 1’, ‘black 1’, and ‘black 2’, indicating superior vigor on seeds of these classes developed under stress. In general, drought stress promoted a similar or in some instances, superior physiological quality in peanut seeds than the well-watered treatment. Furthermore, the acquisition of physiological quality was accelerated in seeds under drought conditions, indicating that during development, these seeds can reach their maximum physiological quality sooner than the seeds from well-watered conditions.