

Determination and comparison of timing for acquisition of physiological quality of seeds from Georgia-06G and Georgia-16HO

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One of the major costs in peanut production is the seed. The quality of a seed lot is represented by a combination of genetic, physical, physiological and sanitary factors. The physiological quality consists of the components: germination, desiccation tolerance, vigor, and longevity. Different species acquire these components at different timings, which makes it difficult to determine the ideal harvest time. Moreover, the indeterminate growth habit of peanut plants makes seed production challenging with regards to identifying when the highest percentage of completely mature seeds is obtained. Information is still scant on the identification of acquisition of each physiological component of seed maturity and quality. The knowledge and determination of timing of acquisition of each physiological quality components can greatly assist in adjusting the optimal harvest time in which seeds will have maximum physiological quality.

Our objectives with this research are to determine the timing for acquisition of physiological quality components of peanut seeds from the cultivars Georgia-06G and Georgia-16HO during seed development under different environmental conditions (e.g. drought).

To this end, three different experiments were conducted in 2019 including a greenhouse trial and two field trials. For the greenhouse experiment, 130 plants of the cultivar Georgia-06G was planted in pots. During the reproductive stage, flowers were tagged daily and seeds were sampled at different developmental stages for physiological tests. Samples from all seed developmental stages were tested for fresh weight, dry weight, water content, germination, vigor, desiccation tolerance, and longevity. The dataset is currently being analyzed and a curve indicating the main components of physiological quality of peanut seeds will be created including the time seeds acquire each quality component.

For the field experiment in Tifton, the cultivars Georgia-06G and Georgia-16HO were planted in strips and harvested at three different times, 148, 155, and 160 days after planting (DAP). Seeds were divided into groups according to the mesocarp color determined using the peanut maturity profile board. Seeds from each class were tested for germination and vigor. In addition, length, width, and weight the seeds were measured. A subsample is currently being tested for desiccation tolerance and longevity. The dataset will be further analyzed.

For the field experiment in Dawson, the cultivar Georgia-06G was planted under two water regimes, well-watered and water-stressed. A rainout shelter was used to prevent rainfall in the water-stressed plants. At flowering (80 DAP), water stress was imposed in half of the field for 30 consecutive days. Seeds were harvested at 140 DAP and tested for germination, vigor, desiccation tolerance, and longevity. A subsample was treated with ethephon to release dormancy and seeds were subsequently tested for the physiological components of quality. For treated seeds, germination and vigor reached maximum potential at brown class regardless of water regime. Preliminary results indicate that in non-treated seeds, germination and vigor were substantially lower than that in treated seeds, with maximum germination potential reached at yellow 2 class and maximum vigor potential at brown class regardless of water regime. The curve for all components of physiological quality in peanut seeds is still in progress.