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 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.

To this end, two different experiments were conducted in 2020 including a greenhouse trial and a field trial. For the greenhouse experiment, 62 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, length and width of the seeds and germination. The dataset is currently being analyzed. For the field experiment, the cultivars Georgia-06G and Georgia-16HO were planted in strips and harvested 139 days after planting (DAP). Seeds were divided into groups according to the mesocarp color determined using the peanut maturity profile board. ‘Brown’ and ‘Black’ classes were further divided into two subclasses: ‘Brown 1’, Brown 2’, ‘Black 1’, and ‘Black 2’. Each maturity class was subdivided into two groups, treated and untreated for dormancy. Seeds from each class were tested for germination, vigor, and desiccation tolerance. A subsample is currently being tested for longevity. Preliminary results on Georgia-06G indicate that germination performed in fresh seeds had highest potential acquired in ‘Brown 1’ and maintained in more mature seeds. After drying process, germination potential achieved maximum between ‘Yellow 2’ and ‘Orange’ classes, suggesting high desiccation tolerance. Highest vigor was acquired between ‘Orange’ and ‘Brown 1’. Primary dormancy seems to occur between ‘Brown 2’ and ‘Black 1’ classes. In untreated seeds, germination potential and vigor reached a peak in ‘Brown 2’, decreasing once the seeds got more mature. On the other hand, when seeds were treated for dormancy release, germination potential and vigor in ‘Black 1’ and ‘Black 2’ were maintained at similar levels to ‘Brown 2’. Considering the curve of maximum value for greatest seed quality standard, for the treated group, all components of quality (germination, vigor, and desiccation tolerance) were acquired between ‘Brown 2’ and ‘Black 1’. For the untreated group, components of quality were acquired between ‘Brown 1’ and ‘Brown 2’. From ‘Brown 2’ to more mature classes, germination and vigor decrease substantially, possibly due to primary dormancy. The curve for all components of physiological quality in peanut seeds, including longevity, is still in progress. Results on Georgia-16HO is being analyzed.