

Peanut storage conditions effect on seed respiration and germination
Year 2 - For consideration by the Georgia Peanut Commission for FY 2022-2023

Project Leader

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Objectives

The objectives of this research are to determine the rate of respiration of seed in multiple storage conditions and potentially relate it to seedling vigor and germination rate. The rate of seed respiration will be collected through quantifying the release of CO₂ by sensors placed directly into storage bags and collect measurements multiple times per day.

Project Description & Summary

Peanut has become a significant oil and food source worldwide. After harvest, inshell peanut are stored and undergo a period of dormancy. Storage typically occurs in warehouses with adequate ventilation, but temperatures may vary. While dormant, cellular respiration is minimal but still occurs to maintain seed viability. Carbon dioxide (CO₂) is a byproduct of respiration and is released during glycolysis and the Krebs' cycle. A study was performed to investigate the effect of multiple storage conditions on peanut CO₂ emission. Treated peanut seed were stored in stacked paper bags with sensors capable of monitoring CO₂ concentration, temperature, and humidity within the bag. Seed were monitored in an open-air shelter, ventilated warehouse, and cold room for 24 days in 2021 and 105 days in 2022. A total of six bags were monitored at each storage location with an additional sensor in ambient conditions. The progeny of the 2021 seed were monitored in 2022 with four bags per location. Sensors were placed in the middle and uppermost bags for monitoring.

Data indicated that regardless of storage condition, CO₂ emission decreased as temperature or humidity increased, with temperature being more significant than humidity. Germination slightly decreased as storage time increased in all conditions. Although CO₂ emission decreased based on the environmental conditions, CO₂ emission was not a good predictor of seed viability (% germination). Numerous equipment malfunctions may have influenced the data collected, warranting more precise and reliable CO₂ monitoring equipment to be utilized. With this in mind, monitoring CO₂ levels of stored peanut may not be a viable method to determine the viability of stored peanut with the instruments utilized in this experiment.