Report: Peanut storage conditions effect on seed respiration and germination

Project Leader W. Scott Monfort UGA, Crop and Soil Sciences, Tifton, GA

Peanut germination begins once the planted seed imbibes water, kickstarting several physiological processes. During this critical period of growth, the developing peanut are susceptible to various pathogens. Prevention of pathogen damage can be achieved by applying treatments to the seed which include fungicides such as metalaxyl, carboxin, and ipconazole. These treatments are traditionally applied as a dust, but health hazards to the handler are a major concern. This hazard has led developers to formulate a new seed treatment. This treatment will include the use of polymer technology as the binding agent, while still including the fungicides. There is minimal information regarding the effects of polymer seed coatings on germination.

Cultivar GA-07w were treated with either the standard Rancona VPD dust, one of 2 different polymer types (SlipShine 6300 or SlipShine 2050) including Rancona VPD, or a non-treated control (NTC) (4 total treatments) were stored in a controlled office environment, as well as a high temperature and humidity greenhouse. Seed are stored in separate paper bags in each environment. Storage will continue for 10 weeks, with samples being collected every 2 weeks. These samples will be placed in a Petri dish lined with blotter paper to maintain proper moisture. 10 seed will be placed in each Petri dish and moistened with 10 mL of distilled water. Water will be added as needed to maintain proper moisture. Filled dishes will then be placed on a thermalgradient table with temperatures ranging from 13C to 35C. Germinated seed will be counted daily, beginning 3 days after study initiation, with seed being considered germinated once the protruded radicle reaches 5 mm or more in length. Germinated seed will be removed from the dish and disposed. Data will be analyzed using non-linear regression in SAS and graphed in SigmaPlot 14.

Initial germination data was recorded to provide a baseline germination of each seed type prior to storage conditions. Cumulative germination was indicated as: 90% for the non-treated control, 82% for Rancona VPD + SlipShine 6300, 79% for Rancona VPD alone, and 70% for Rancona VPD + SlipShine 2050. After six weeks of storage, all seed achieved less than 80% germination. The polymer treated seed stored in the variable storage condition did not fit the model, indicating that a cumulative germination level was not achieved due to low or highly variable germination among the dishes. The Rancona VPD alone achieved just over 40% maximum germination and required the highest amount of GDD's to achieve 40% germination. This totaled as a 43% reduction over six weeks of storage. The Rancona VPD + SlipShine 2050 stored in the controlled environment and the NTC variable storage condition seed achieved just over 60% germination with the Rancona + SlipShine 2050 requiring fewer GDD's. These seed indicated a 9% and 28% reduction in germination as compared to trial initiation. Next, the Rancona VPD alone stored in the controlled environment achieved nearly 65% germination, an 18% reduction in germination. Finally, the Rancona VPD + SlipShine 6300 and the NTC seed stored in a controlled setting achieved over 70% germination, indicating a 10% and 13% reduction respectively.

Additional experiments are being conducted investigating other agriculture company polymer seed treatments under various storage conditions.