

National Peanut Board Check-Off Research
Proposal- 2007

- I. Title: Role of Calcium in Peanut Seed Development
 - II. Investigators: Project Leaders: B.L. Tillman (btillman@ufl.edu)
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 - III. Objectives:
 - a. Field Studies: Calcium is the most important element for peanut seed development and viability. Research shows that optimum seed development of peanut varieties with large seed requires more calcium than those with smaller seed. Limited research has shown genetic differences in calcium uptake. However, we do not know if this is one of the problems with late-maturing, disease resistant cultivars, that have a tendency for poor seed germination. As part of an ongoing project to explore the cause of poor seed viability of late maturing, disease resistance peanut varieties, in 2005, we began a variety and calcium rate study. Preliminary results show that even in soils with adequate calcium content based on soil tests, germination can be increased with the addition of up to 1400 lbs./acre of gypsum. We propose to continue this work in 2007 and test seed for calcium content in addition to standard germination tests. We will use AP-3, C-99R, DP-1, and Georgia Green varieties and gypsum rates of 0, 700, 1400, and 2100 lbs./acre.
- Report- Part A:** The third year field study was conducted in Marianna, Florida. In the 1st quarter, seeds were prepared for planting and were planted during the 2nd quarter. The various calcium treatments were applied and plots were rated for disease and harvested during the 3rd quarter. Similarly, a small field study was initiated in Citra, Florida in 2007. During the 4th quarter 2007 and the 1st quarter 2008, seeds will be evaluated for germination and calcium content.
- b. Lab Studies: It has been well established that Ca^{2+} is an important second messenger in plant signal transduction pathways during growth and development. Consequently, there are calcium sensors that can detect particular calcium signatures and influence downstream effects, such as changes in protein phosphorylation and gene expression. In plants, the most widely investigated Ca^{2+} -binding sensory proteins are calcium-dependent protein kinases (CDPKs). Genome-wide identification of the CDPKs has been conducted in *Arabidopsis* and rice, and there is growing evidence that CDPKs are vital for normal seed development and production. The importance of Ca^{2+} in peanut seed development suggests that CDPKs are logical targets to explore as candidate sensors. Using AP-3, and DP-1, we will determine the levels of CDPKs during peanut seed development under the calcium rates described above through western blot analysis using CDPK antibodies already in-hand.

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Report- Part B: From the field plot in Citra, peanut pods were collected and evaluated for seed development and subjected to chemical tests. In addition, studies were conducted in the growth chamber and greenhouse to evaluate the response of the developing peg to calcium. These tests are part of an on-going graduate student program and will continue for 2-3 years.