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Summary Report

FINAL REPORT FOR UNIVERSITY OF FLORIDA PARTNER

I. Title: Fertilization and Nutrient Management Trials in Peanut

II. Principal Investigators:

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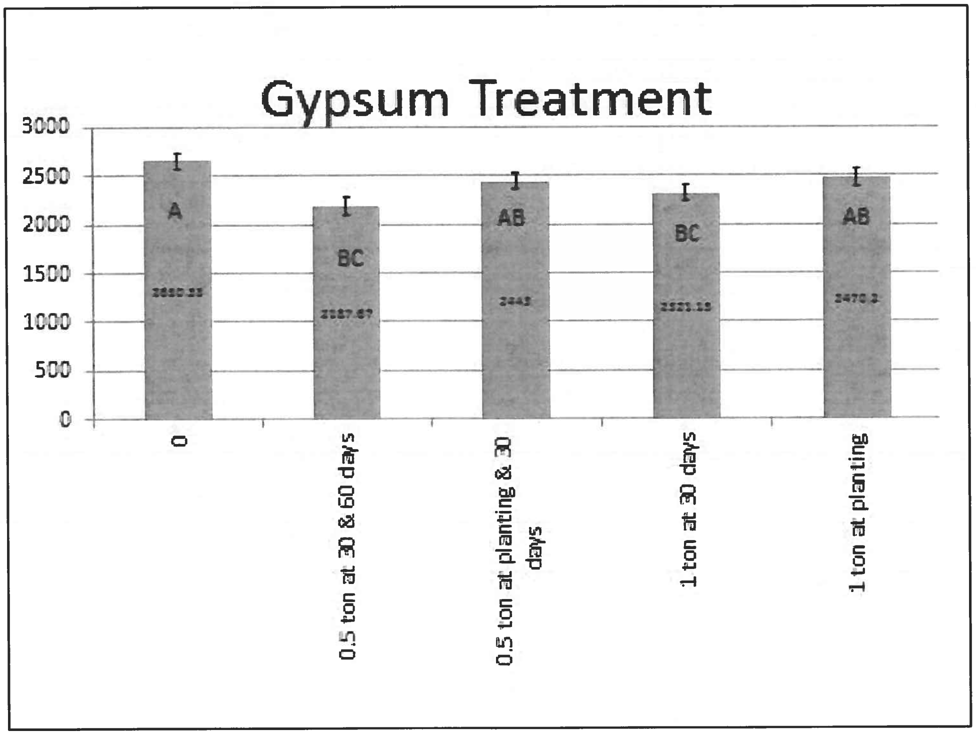
Cooperators: **John P. Beasley, Jr.,** Extension Peanut Agronomist, Univ. of Georgia
James Bostick, Alabama Crop Improvement Association

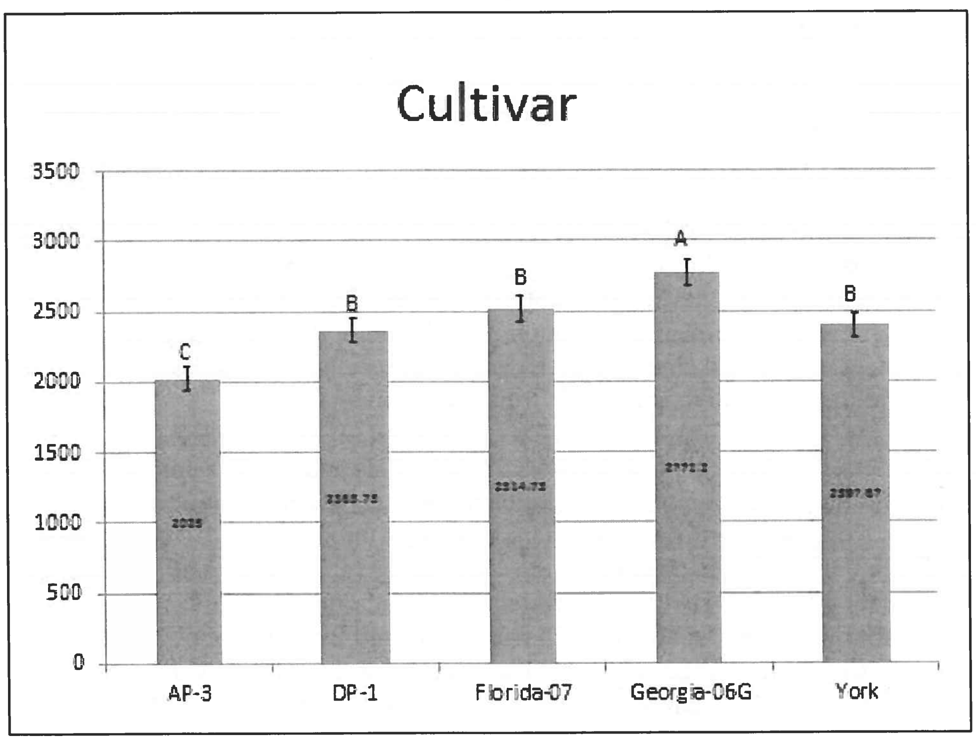
III. Objectives and Research Approach:

Despite the fact that calcium is critical for peanut fruit development, and that calcium absorption has been studied since the 1940s and earlier, there remain several gaps in our knowledge of calcium uptake in peanut. One area that has not been extensively researched is calcium absorption by the peg prior to entering the soil. Previous studies indicate that the accumulation by the pegs of calcium absorbed from the roots may be important for the early development of the fruit and may enhance the calcium absorbed directly by the seed. Therefore, pre-plant applications of calcium may increase the calcium in the peg and lead to improved yield, grade, and emergence. However no recent studies have addressed the issue of calcium accumulation in the pegs and its impact on fruit development.

Aproach: Five commercial varieties (Florida 07, Georgia 06G, York, DP-1, and AP-3) were planted at the Plant Science Research and Eduction Center in Citra, Florida under 5 different gypsum treatments in 2011. The 5 gypsum treaments were: no gypsum, 2000 lb/acre at plant, 2000 lb/acre at 30 days after planting (DAP), a split application of 1000 lb/acre at plant and 1000 lb/acre at 30 DAP, and a second split application of 1000 lb/acre each at 30 and 60 DAP. Each variety/treamtent combination were replicated 3 times. From each plot, pegs and early seeds ("matchheads") were harvested from the following three categories: 1) pegs that had not reached the soil; 2) pegs that had penetrated the soil but had not formed a matchhead; and 3) early matchhead size. These tissues were analyzed for calcium content. Plots were also harvested when mature and yield and grade were determined. A second year of the study is being conducted and tissue analysis is ongoing at this time. Yield results indicated no benefit of calcium application for the cultivars tested. Overall yields were greatest for GA-06G.

Yield Results for 2011:





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Annual | Summary

~~FINAL~~ REPORT FOR UNIVERSITY OF FLORIDA PARTNER
09/22/2012

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III. Objectives and Research Approach:

Despite the fact that calcium is critical for peanut fruit development, and that calcium absorption has been studied since the 1940s and earlier, there remain several gaps in our knowledge of calcium uptake in peanut. One area that has not been extensively researched is calcium absorption by the peg prior to entering the soil. Early studies of calcium absorption showed that water and calcium absorbed by the roots was found in the pegs prior to entering the soil (Wiersum 1951; Bledsoe et al. 1949), which may be caused by transpiration by above ground pegs, which are known to have stomata (Webb and Hansen 1989). In addition, field studies showed that the highest yields were obtained with calcium in the root zone (pre-plant incorporated lime), in addition to gypsum application during early bloom (Colwell and Brady 1945; Gascho et al. 1993). These results suggest the accumulation by the pegs of calcium absorbed from the roots may be important for the development of the fruit, as well as calcium absorbed by the seed, and that pre-plant applications of calcium may increase the calcium in the peg and lead to improved yield, grade, and emergence. However no recent studies have addressed the issue of calcium accumulation in the pegs and its impact on fruit development.

Aproach: Five commercial varieties (Florida 07, Georgia 06G, York, DP-1, and AP-3) were planted at the Plant Science Research and Eduction Center in Citra, Florida under 5 different gypsum treatments in 2011. The 5 gypsum treaments were: no gypsum, 2000 lb/acre at plant, 2000 lb/acre at 30 days after planting (DAP), a split application of 1000 lb/acre at plant and 1000 lb/acre at 30 DAP, and a second split application of 1000 lb/acre each at 30 and 60 DAP. Each variety/treamtent combination were replicated 3 times.

From each plot, pegs and early seeds ("matchheads") were harvested at several timepoints. Pegs were seperated between those that have entered the soil and those have not, and were analyzed seperately. These plots were harvested and yield and grade were determined (see figures below). Data was analyzed using SAS proc CORR to determine the effect of calcium application timming on peg calcium concentraion, and of both peg calcium and application timing on yield, grade, and emergence.

Results were mixed for 2011, so an extension of the remaining funds was requested and a second year of the study was conducted in 2012. The same plot design and cultivars were planted at PSREU in 2012. The same tissue sample types (pegs not entered into the soil, pegs that had just entered the soil, and small matchheads) were collected and separated. Calcium analyses are ongoing on these tissue types and we are awaiting the results. Yield and grade will be determined as in 2011 for these plots. Data from both years will be analyzed together.

Expected results: Previous studies have shown that higher yields are obtained when calcium is applied both at plant and at bloom when compared to no calcium applied or calcium at bloom alone (Colwell and Brady 1945; Gascho et al. 1993). We expect, therefore, to find the highest yield in the treatments with both pre-plant and at bloom applications. Similarly, we expect peg calcium concentrations to be highest in plots with pre-plant calcium applications. Increased percentages of high quality fruit have been observed in peanuts grown in pots with sufficient calcium in both the root and fruit soils, which leads us to expect that the highest grades and emergence will be seen in seeds from plots with pre-plant and at bloom applications of calcium.

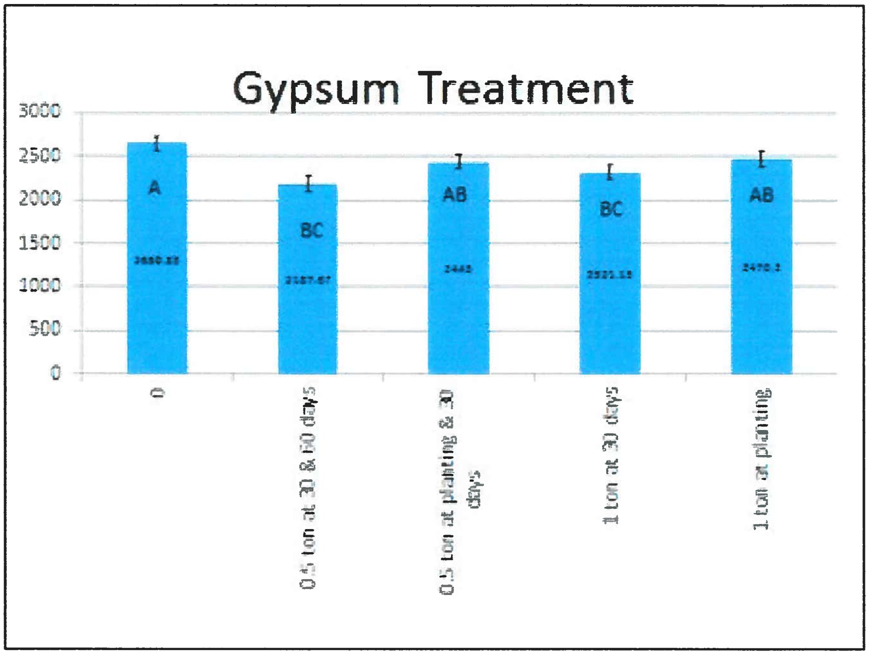
Bledsoe, R.W., C.L. Comar, and H.C. Harris. 1949. Absorption of radioactive calcium by the peanut fruit. Science 109: 329-330.

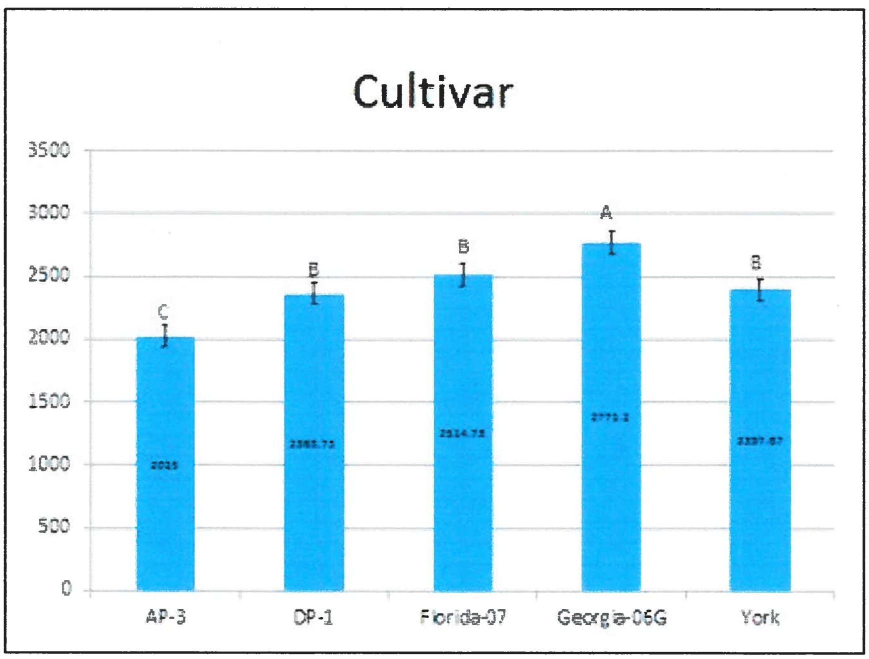
Colwell WE, Brady NC. 1945. The effect of calcium on Yield and Quality of Large-Seeded type Peanuts. J. Am. Soc. Agron. 37:414-428

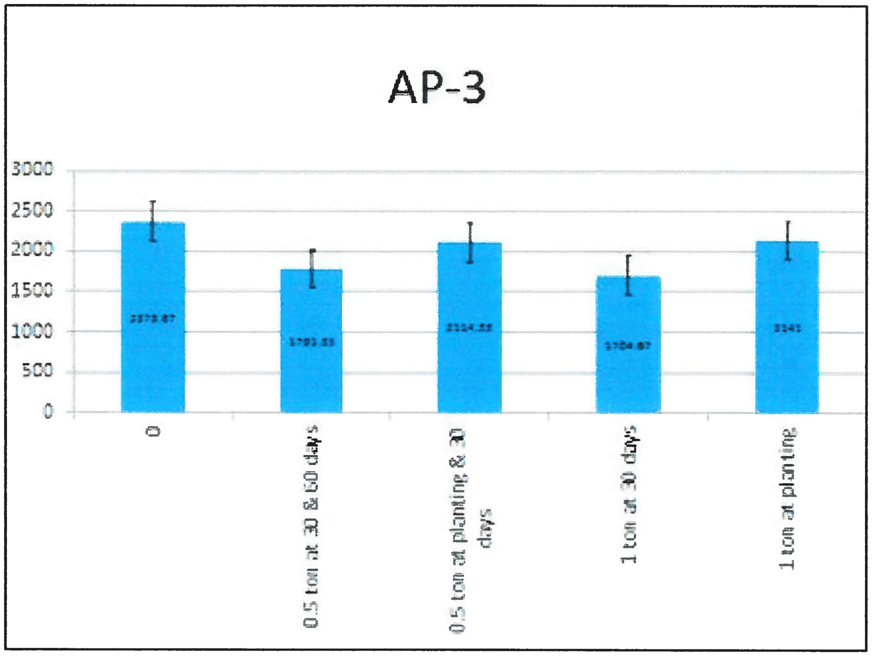
Gascho, G.J., S.C. Hodges, A.K. Alva, A.S. Csinos, and B.G. Mullinix, Jr. 1993. Calcium source and time of application for runner and Virginia peanuts. Peanut Science 20: 31-35.

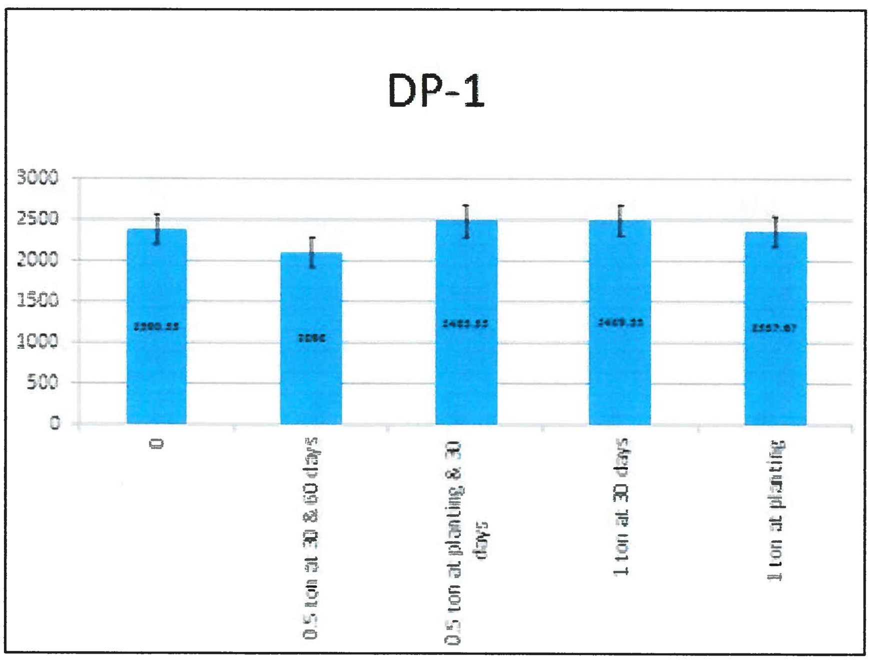
Wiersum, L.K. 1951. Water transport in the xylem as related to calcium uptake by groundnuts (*Arachis hypogaea* L.). Plant and soil 3: 160-169.

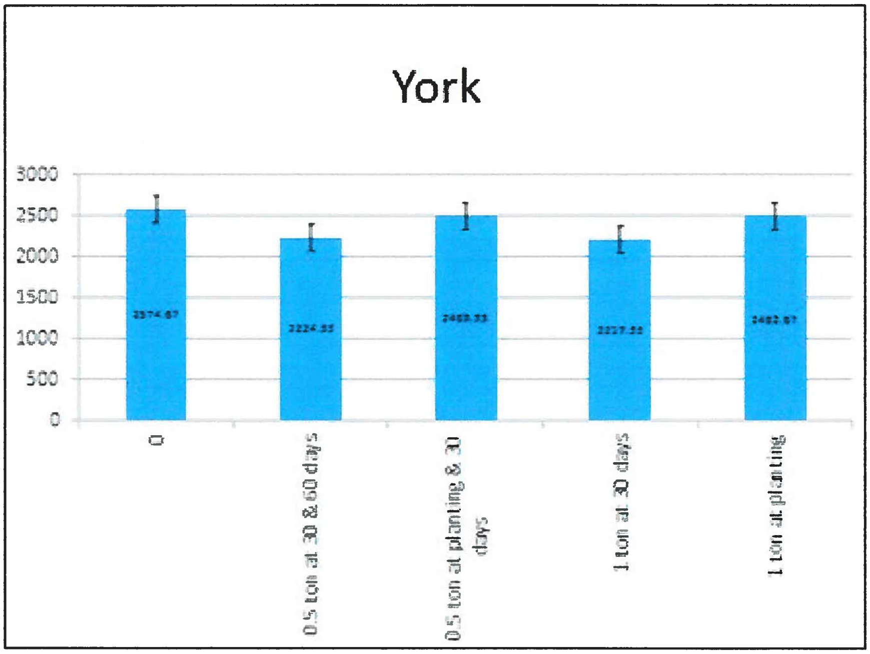
Yield Results for 2011:






AP-3
3000
2500
2000
1500
1000
500
0
0
0.5 ton at 30 & 60 days
0.5 ton at planting & 30 days
1 ton at 30 days
1 ton at planting


DP-1
3000
2500
2000
1500
1000
500
0
0
0.5 ton at 30 & 60 days
0.5 ton at planting & 30 days
1 ton at 30 days
1 ton at planting


York
3000
2500
2000
1500
1000
500
0
0
0.5 ton at 30 & 60 days
0.5 ton at planting & 30 days
1 ton at 30 days
1 ton at planting