National Peanut Board Proposal for 2013 Funding Cycle

I. Identification

a. **Title:** Fertilization and Nutrient Management Trials in Peanut

b. **Funding Year:** 2013

c. **Principle Investigators**

Julie A. Howe, Auburn University
Glendon H. Harris, University of Georgia
Kris Balkcom, Auburn University
Nathan Smith, University of Georgia
Kip Balkcom, USDA-ARS National Soil Dynamics Lab

d. **Cooperating Personnel**

John P. Beasley, Jr., University of Georgia
James Bostick, Alabama Crop Improvement Association

e. **Total Funds Requested:** $52,000

f. **Location(s) where research will be performed**

One irrigated and one dryland at the Wiregrass Research and Extension Center, Headland, AL
One dryland experiment at the Gulf Coast Research and Extension Center, Fairhope, AL
Three irrigated (2 in Tifton and 1 in Camilla) and one dryland (Tifton) – GA

II. Layman's Summary

Peanut producers have numerous questions with regard to proper calcium fertilization. The majority of these research questions seek to better understand when and how to apply calcium. Frequently asked questions include: Are all gypsum sources the same and which is the most economical? When is the most effective time to apply gypsum? Would split applications of gypsum be more effective than a single application? Does gypsum release calcium fast enough during peak pod fill? Can calcium be lost from the pegging zone due to high rainfall events? Do liquid calcium applications to the soil supply adequate calcium? Are calcium applications effective when applied as a foliar spray? Can calcium applied through irrigation pivots supplement gypsum/lime applications? This research seeks to provide research data to quantitatively answer these questions for growers. The specific objectives are to evaluate sources of calcium alone or as supplemental treatments, to assess the effectiveness of gypsum applied at various growth stages. Research is organized into three year field studies for each objective. This is the third year for the calcium source and timing study. Various sources of calcium, including two types of gypsum, soluble calcium applied through a center pivot, and foliar applied calcium will be evaluated alone or as supplemental treatments. Timing will include gypsum applications at approximately 45, 75, and 105 days after planting, as well as split application. Field plots will be established with Georgia-06G and Georgia Greener at irrigated and non-irrigated sites and evaluated for yield, grade, germination, and seed calcium. Leaching of calcium from the pegging zone, use of seed Ca as pre-season indicator of seed quality and late season fertilization needs, and the economics of calcium fertilization will also be considered.

III. Progress to May 2014

Various sources of Ca, including 1) gypsum (USG 500, PCS/Wetbulk, Agrical/Smokestack), 2) soluble Ca applied through a center pivot (calcium chloride and calcium thiosulfate), and 3) foliar Ca applied at approximately 1 qt/a, were applied alone or as supplemental treatments. Timing included gypsum applications at approximately 45, 75, and 105 days after planting, as well as split application. Randomized and replicated field plots were established at irrigated and non-irrigated sites. Mid-season peanut and soil samples have been collected and are analyzed. Peanut harvest has been conducted at both sites. Peanut yield and grade is reported in Tables 1 and 2. Seed Ca is reported in Table 3 and 4. We are still waiting on the germination test results from the lab to come back before we fully analyze the data.

Table 1. Yield and grade of peanuts grown with different Ca sources at the Wiregrass and Gulf Coast Research and Extension Centers in 2013.

Ca source	Rate	Wiregrass				Gulf Coast	
		Non-irrigated		Irrigated		Non-irrigated	
		Yield	Grade	Yield	Grade	Yield	Grade
	Lb/acre	Lb/acre	% SMK	Lb/acre	% SMK	Lb/acre	% SMK
Control	0	2074	72.6	2801	68.8	3382	65.9
AgriCal	500	2110	74.7	2625	71.6	3697	64.0
AgriCal	1000	1900	73.6	2758	72.4	3607	65.2
PCS Wetbulk	1000	2002	75.0	2675	71.9	3457	66.2
USG 500	1000	2088	74.1	2175	71.2	3054	65.0
Lime	1000	2008	73.7	2658	67.3	3127	67.2

Table 2. Yield and grade of peanuts grown with different application times of gypsum and lime at the Wiregrass and Gulf Coast Research and Extension Centers in 2013.

Ca source	Rate	Timing	Wiregrass				Gulf Coast	
			Non-irrigated		Irrigated		Non-irrigated	
			Yield	Grade	Yield	Grade	Yield	Grade
	Lb/acre		Lb/acre	% SMK	Lb/acre	% SMK	Lb/acre	% SMK
Control	0	--	2074	72.6	2801	68.8	3382	65.9
AgriCal	1000	Early Bloom	1901	73.6	2847	72.4	3607	65.2
AgriCal	1000	At Plant	1814	73.5	2679	69.9	3135	63.8
AgriCal	500/500	At Plant/ Early Bloom	2247	73.3	2890	72.5	3283	63.8
AgriCal	500/500	Early Bloom/ Mid-Bloom	2196	73.4	2650	71.7	3307	64.4
Lime	1000	At Plant	2008	73.7	2658	67.3	3127	67.2
Lime/ AgriCal	1000/500	At Plant/ Early Bloom	2189	74.6	3029	70.7	3241	65.3

Table 3. Seed calcium of peanuts grown with different Ca sources at the Wiregrass and Gulf Coast Research and Extension Centers in 2013. Significance is indicated as the P value using an alpha of 0.05. Letters within a column that are dissimilar indicate differences.

		Wiregrass		Gulf Coast
Ca source	Rate	Non-irrigated	Irrigated	Non-irrigated
	Lb/acre	mg/kg		
Control	0	251 c	291 b	837
AgriCal	500	283 bc	367 a	817
AgriCal	1000	301 bc	352 a	871
PCS Wetbulk	1000	280 bc	397 a	849
USG 500	1000	331 b	407 a	853
Lime	1000	401 a	409 a	884
Significance		0.0092	0.0038	NS

Table 4. Seed calcium of peanuts grown with different application times of gypsum and lime at the Wiregrass and Gulf Coast Research and Extension Centers in 2013. Significance is indicated as the P value using an alpha of 0.05. Letters within a column that are dissimilar indicate differences.

		Wiregrass		Gulf Coast
Ca source	Rate	Non-irrigated	Irrigated	Non-irrigated
	Lb/acre	mg/kg		
Control	0	251 c	291 b	837
AgriCal	1000	301 bc	352 b	871
AgriCal	1000	315 bc	382 ab	824
AgriCal	500/500	306 bc	349 b	923
AgriCal	500/500	330 b	450 a	959
Lime	1000	401 a	409 ab	884
Lime/Agrical	1000/500	343 ab	410 ab	891
Significance		0.0092	0.0038	NS