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2015

Final Report + Summary

National Peanut Board ~~Proposal~~ for 2016 Funding Cycle

I. Identification

a. **Title:** Fertilization and Nutrient Management Trials in Peanut
b. **Funding Year:** 2016
c. **Principle Investigators**
Julie A. Howe, Auburn University
Glendon H. Harris, University of Georgia
Kris Balkcom, Auburn University
Kip Balkcom, USDA-ARS National Soil Dynamics Lab
d. **Cooperating Personnel**
Scott Monfort, University of Georgia, Tifton, GA
James Bostick, Alabama Crop Improvement Association
e. **Total Funds Requested:** $52,000
f. **Location(s) where research will be performed**
Wiregrass Research and Extension Center, Headland, AL
UGA Experiment Station, Tifton, GA
g. **New or Continuing Project:** Continuing 2nd year

II. Abstract/Product Summary

The objective of the fertilization and nutrient management research is to evaluate peanut response to fertilization and determine the most cost-effective way to manage nutrients in a peanut cropping system. For 2016, we will continue our second year of research trials on calcium, manganese, boron, and nickel, as well as initiate a trial with copper. Calcium is essential for proper seed development directly affecting yield, grade, and seed quality. Various sources of calcium will be evaluated alone or as supplemental treatments. Manganese deficiency is thought to occur quite often but may be mis-diagnosed as herbicide injury, insect damage or other nutritional problems such as low pH. Later in the growing season, as peanuts 'drain' some nutrients from the leaves to the developing nuts the foliage will also often turn yellow and be misdiagnosed as manganese deficiency. Copper is typically applied as part of a fungicide, but fungicides change over time. When pH is high, copper is often limiting for plants; however, there are no clear critical values for copper in peanut. Nickel is thought to be required by some plants, such as pecan, and some growers in Georgia have tried it on peanut. No replicated field data, however, has been conducted with nickel on peanut to evaluate the need or response. Evaluating the true need for manganese, copper, or nickel fertilization could potentially save peanut growers considerable input costs. Boron deficiency is known to cause hollow heart and internal damage to peanut which can be an issue for snack peanuts. This problem does not usually show up until the peanuts are roasted. While yield responses to boron fertilization are fairly rare, the potential impact of internal damage to the end user, the peanut snack industry, is needed.

III. Final Report

Manganese, boron, and calcium studies on runner peanuts were completed at the Wiregrass Research and Extension Center in Headland, AL. Studies were conducted in randomized plots measuring 12' x 30' in the calcium study and 12' x 40' in the boron and manganese studies. Other management factors, such as fungicide regime and irrigation, were conducted as recommended by Alabama Cooperative Extension; except when related to the nutrients Mn, B, and Ca. Peanuts were planted at the beginning of May 2016 and mid-September 2016. Soil samples were taken prior to planting for all plots. Soil samples were also taken on the calcium study plots before treatment application at midbloom and before harvest. Soils were analyzed for pH and nutrient analysis. Peanuts were harvested analyzed for yield, grade, seed nutrients (i.e., Ca, Mn, B, and others). In the Mn study, leaf Mn was analyzed, and in the B study hollow heart following roasting was evaluated.

Manganese studies included control, Ag-Mn (Mn sulfate, 30% Mn, 15% S) at 0.25 and 0.5 lb Mn/a, and Mn+Micro Mix (Mn chelate, 10% Mn, 1.65% B, and <1% Co, Fe, Mo, Zn) at 0.05, 0.25, 0.50 lb Mn/a. Soils were limed at planting to ensure a high pH during the study. The pH in all plots was >7. There were no differences in yield and grade of peanuts; which is consistent with 2015, even though the peanuts were not limed in 2015 and pH was lower. Leaf Mn is considered sufficient at >20 mg/kg, and all leaf samples were > 60 mg/kg. Lack of visual Mn deficiency symptoms and adequate leaf Mn suggests the peanuts were not limited by Mn. It is likely that soil provides adequate Mn for peanuts.

Boron studies included control, Borosol-10 (boric acid), Solubor (sodium borate), and Boron Xtra (Custom Ag Formulations, Fresno, CA). Borosol-10 was applied at 1, and 2 times the recommended rate (X) at early bloom, as well as split applications of 1X and 2X at early bloom and mid-bloom. Yield and grade did not respond to B applications. Leaf B was used to evaluate foliar absorption of B about 2 weeks following B applications at 35, 50, and 65 days after planting (DAP). All non-split application treatments had higher leaf B concentration at 50 DAP than control, except Boron Xtra and Borosol-10 0.5X. At 65 DAP, all treatments, including the split applications, were higher than the control except Boron Xtra and Borosol-10 0.5X (Figure 1). Of the products and rates evaluated, Solubor 2x was the best performer based on leaf B. Oddly, the control had one of the highest seed B contents, thus, no product was statistically better. Comparing only the products reveals that Borosol-10 2x slip and Solubor 2x were the top performers. Although results from seed B do not differ from control, the top performers were similar between leaf B and seed B. Overall, Solubor 2x and Borosol-10 2x (split or single application) were able to supply the most B to the plant.

Calcium studies included control, gypsum (1000 lb/a), lime (1000 lb/a), Black Gypsum (1000 lb/a; The Andersons, Inc., Maumee, OH) and Full Measure Cal (3 gal/a; Full Measure LLC, Bristol, RI). No differences in yield and grade were observed among the products. However, Black gypsum provided significantly more Ca to the seed (540 mg Ca/kg) than the control (440 mg Ca/kg) indicating that this treatment has value for providing Ca to the nut. Full Measure, on the other hand, was consistent with the control indicating that it is not a reliable single source of Ca. Seed Ca in lime (480 mg/kg) and gypsum (520 mg/kg) treatments was similar to Black gypsum. Previous research has demonstrated that 500 mg/kg Ca is a critical value for peanut germination. Only gypsum and Black Gypsum treatments were above this critical value.

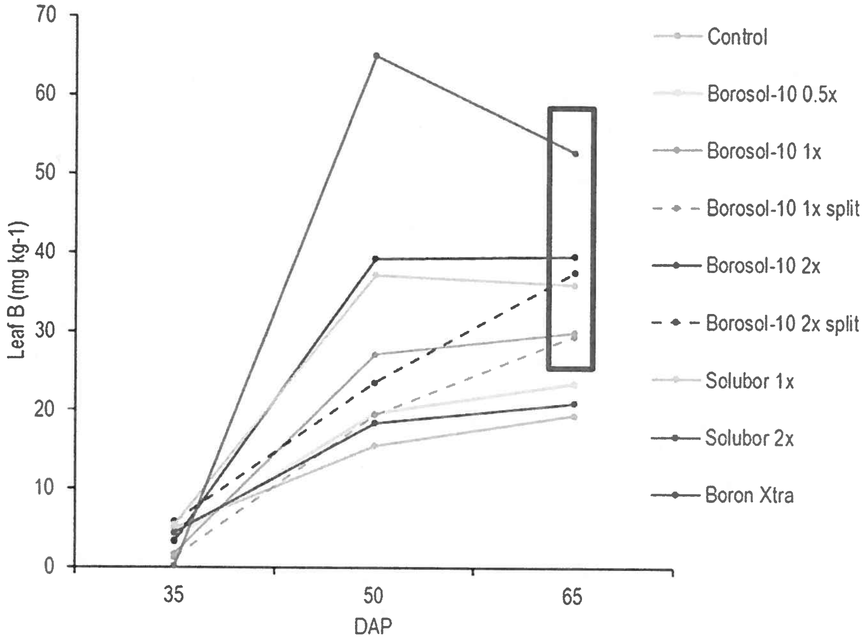

Figure 1. Leaf B content at 35, 50 and 65 days after planting. Box indicates treatments that differ from the control.