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National Peanut Board Proposal for 2017 Funding Cycle

I. Identification

Title: Fertilization and Nutrient Management Trials in Peanut
Funding Year: 2017

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II. Final Report Summary/Abstract

Peanut response to fertilization with manganese, boron, and calcium is being evaluated in 2017 is a continuation of research from past years. All treatments applied in 2016 were applied in 2017. Manganese studies included an untreated control, Ag-Mn (Mn sulfate, 30% Mn, 15% S) at 0.25 and 0.5 lb Mn acre^{-1}, 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 acre^{-1}. Products used in the boron study included Borosol-10 (boric acid), Solubor (sodium borate), and Boron Xtra (Custom Ag Formulations, Fresno, CA). Treatments included single applications of Borosol-10 at rates of 0.25, 0.50, and 1.00 lb B acre^{-1} (0.28, 0.56, and 1.12 kg B ha^{-1}); Borosol-10 split applied at overall rates of 0.50 and 1.00 lb B acre^{-1} (0.56 and 1.12 kg B ha^{-1}); Solubor applied at 1.00 and 2.00 lb B acre^{-1} (1.12 and 2.24 kg B ha^{-1}); Boron Xtra applied at 0.02 lb B acre^{-1} (0.02 kg B ha^{-1}); and an untreated control. Various sources of calcium were evaluated alone or as supplemental treatments. Calcium studies included an untreated control, gypsum (1000 lb acre^{-1} and 500 lb acre^{-1}), lime (1000 lb acre^{-1}), Black Gypsum (1000 lb acre^{-1}; The Andersons, Inc., Maumee, OH), AgriMend gypsum (1000 lb acre^{-1}; AgriFarm Group, Colorado Springs, CO), and Full Measure Cal (3 gal acre^{-1}; Full Measure LLC, Bristol, RI).

III. Final Report

Manganese, boron, and calcium studies on runner peanuts are in progress at the Wiregrass Research and Extension Center in Headland, AL. Studies are being 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, are being conducted as recommended by Alabama Cooperative Extension; except when related to the nutrients Mn, B, and Ca. Peanuts were planted at the end of May 2017. Soils of the Mn study were limed prior to planting. Soil samples were taken prior to planting for all plots and for the calcium study plots at 30, 50, and 70 days after planting. Soils have been analyzed for pH and nutrient content by inductively coupled plasma spectroscopy. Initial pH of all plots was in the range suitable for plant growth with an average pH of 6.2. Leaf tissue samples were collected from B and Mn study plots at 30, 50, and 70 days after planting and have been analyzed for nutrient content in a similar manner. Additional soil samples and seed samples were collected at harvest and analyzed for nutrient content. Seed from the B study are being evaluated for the presence of hollow heart. Currently, statistical analysis for B and Mn concentration in leaf tissue and Ca and B concentration in seed is being conducted to assess differences is nutrient uptake by peanuts between treatments. Yield data has also been collected and is being analyzed for differences between treatments for Mn, B, and Ca studies.

Differences in yield and grade of peanuts have not been observed in the Mn study. Leaf Mn is considered sufficient at >20 mg kg^{-1}, and all leaf samples have been >60 mg kg^{-1}. 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. Yield and grade have not been affected by B applications. Leaf B was used to evaluate foliar absorption of B about 2 weeks following applications at 35, 50, and 70 days after planting (DAP). Leaf B data from the 2016 trial shows that Solubor applied at a rate of 2.00 lb B $acre^{-1}$ supplied more B to the leaf compared to the other treatments in the B study. 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 split applied at an overall rate of 1.00 lb B $acre^{-1}$ and Solubor applied at a rate of 1.00 lb B $acre^{-1}$ were the top performers. No differences in yield and grade were observed among the products in the Ca study. In 2015, Black Gypsum provided significantly more Ca to the seed (540 mg kg^{-1}) than the control (440 mg kg^{-1}) 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^{-1}) and gypsum (520 mg kg^{-1}) treatments was similar to that of the seed treated with Black Gypsum. Previous research has demonstrated that 500 mg kg^{-1} Ca is a critical value for peanut germination. Only gypsum and Black Gypsum treatments resulted in seed with calcium concentrations above this critical value.