Manganese Foliar Treatments Did Not Increase Peanut Yield in Central Florida

Lauren Geiss (University of Florida)

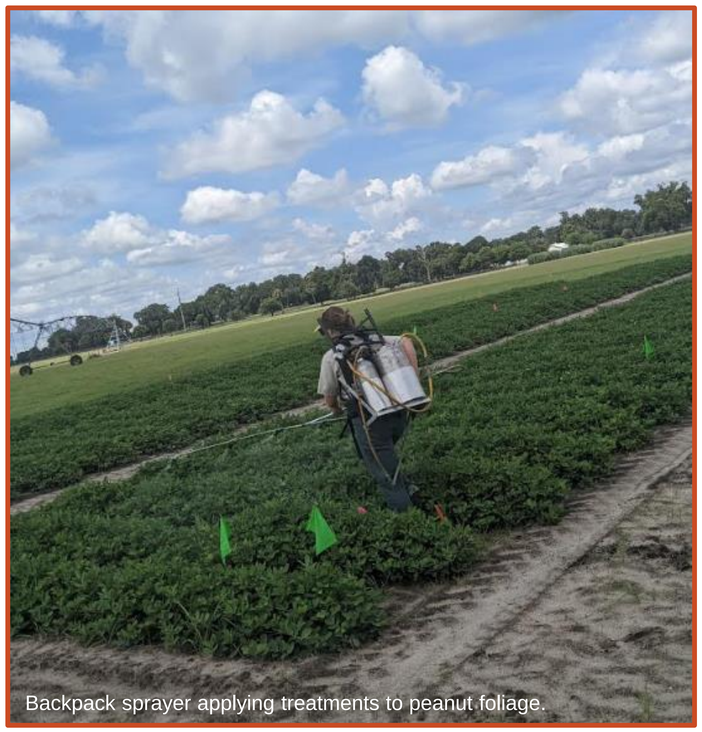
Dr. Emma Grace Matcham (Agronomy Department)

INTRODUCTION

- The United States contains about 2% of the world's peanut acreage but produces about 5% due to higher yields per acre.[5]
- Florida produced 13% of the country's peanuts in 2017.[3]
- Manganese is an important nutrient for photosynthesis due to its role in the oxygen-evolving complex and in the water-splitting reaction of the first stage of photosynthesis.[1]
- Manganese deficiency in peanuts is a problem usually observed in high pH soils. This causes the leaves to turn yellow due to interveinal chlorosis.[4]
- Manganese and iron can often become biologically unavailable in alkaline soils, preventing plants from being able to absorb through their roots. Foliar treatments can alleviate this problem.[2]
- One consequence of manganese deficiency is impaired growth.[4]
- Foliar treatments apply liquid fertilizer directly to plant leaves, allowing easy absorption.[2]

OBJECTIVES

The goal of the trial was to see how peanut plants would respond to varying manganese treatments. The treatments included a control, a water only control, high (1 lb) and low (0.5 lb) rates of one pass manganese sulfate applications, high (1 lb) and low (0.5 lb) rates of two pass manganese sulfate applications, high (0.5 lb) and low (0.25 lb) rates of one pass EDTA applications, and high (0.5 lb) and low (0.25 lb) rates of two pass EDTA applications.



Backpack sprayer applying treatments to peanut foliage.

METHODS

- Trials took place in the summer of 2022 in Citra, Florida.
- Peanuts were planted on May 5th in small plots which were 4, 36" rows wide and 15' long.
- Irrigation, macronutrient fertility, and pest management were kept consistent across all plots and matched recommended practices for peanut production in the region.
- Foliar treatments were applied using a backpack sprayer with a 10' boom with 20" nozzle spacing on June 19th and July 3rd. Carrier volume was 20 GPA.
- Tissue samples were collected on August 8th. Within each plot, 20 of the most recently expanded, youngest tetrafoliate leaves were collected.
- Samples were dried in a 120 F dryer until bags reached a constant weight.
- Yield was collected only from the center 2 rows and was measured in grams for each plot.
- Shelled peanut sizes were determined using standard grading procedures at the North Florida Research and Education Center.

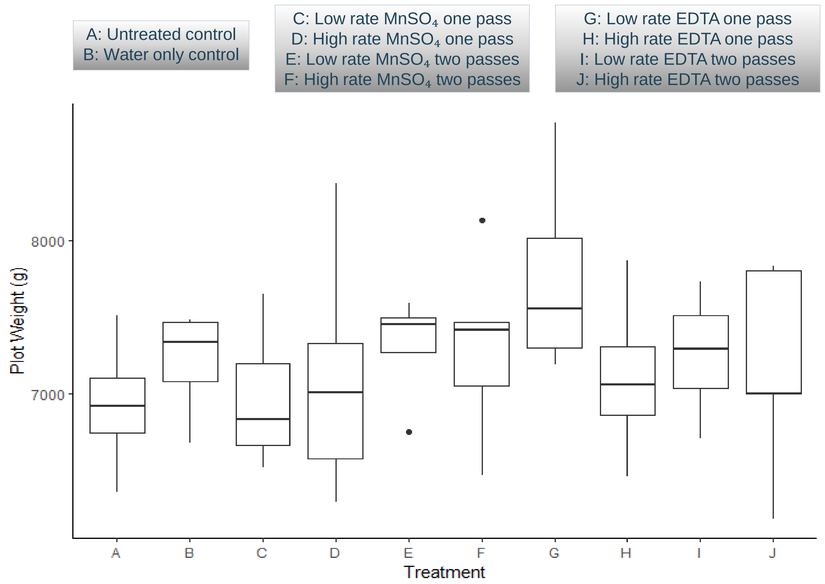


Figure 1: Little to no variation between plot weight was observed across the 10 treatments.

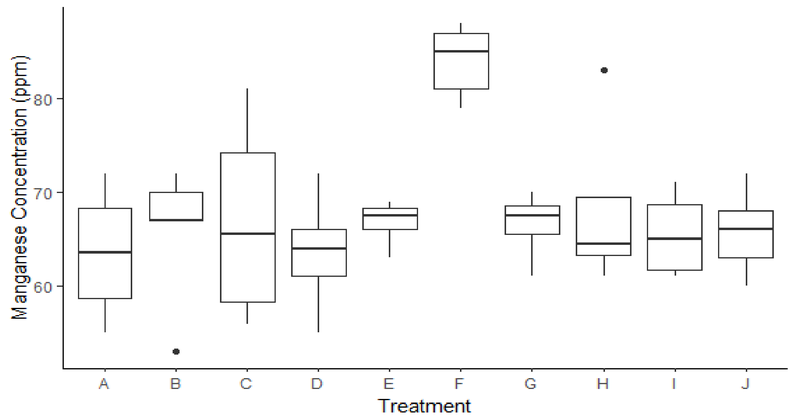


Figure 2: Variation in manganese concentrations was observed across the 10 treatments, with a high rate of manganese sulfate (two passes) showing the greatest increase.

RESULTS

Manganese concentrations were measured in the leaf tissue. Box and whisker plots were used to visually show the spread of the data. Box heights were determined based on the first and third quartiles of the variables measured. The solid line within the box is the median. The lines above and below the boxes represent the minimum and maximum values of the data. Outliers, where present, are shown with dots above or below the boxes.

ANOVA results indicate that plot weight (yield) did not vary between treatments ($p=0.664$).

ANOVA results indicate that manganese concentration did vary between treatments ($p=0.0001$).

CONCLUSIONS

- Yield did not vary between the control, manganese sulfate treatments, or EDTA treatments.
- Manganese concentrations varied between treatments.
- Due to no observed difference in yield, a decrease in profitability may occur from using manganese foliar treatments on peanut plants.
- Foliar manganese application is not recommended for peanut fields without symptoms of manganese deficiency.

REFERENCES

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