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Southeastern Peanut Research Initiative 2013
FINAL REPORT

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Project Title: Integrated Management of Tomato Spotted Wilt, Fungal Diseases, and Insect Pests of Peanut

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1. Abstract

Tomato spotted wilt virus and fungal disease are significant profit-limiting components for peanut production in Florida and the southeastern U.S. Current management strategies can be effective for most diseases, but improved strategies and continued disease monitoring is needed for optimal peanut production. The integration of cultural and chemical disease management strategies is critical for determining optimal pathogen management system for producers. Disease resistant cultivars, seeding rates and fungicide spray frequencies have been found to affect losses from tomato spotted wilt, early leaf spot, late leaf spot and stem rot/white mold (*Sclerotium rolfsii*). Results from this study indicate the importance of cultivar selection in determining chemical management strategies. The data from this research will be combined with previous years to examine the effects cultivar, seeding rate and fungicide timing have on disease development and yield.

2. Introduction

The objectives of this study were to determine the effects that cultivar, seeding rate and fungicide frequency have on the development of the diseases tomato spotted wilt, early leaf spot, late leaf spot and white mold/stem rot. This is the last year of a continuing study examining these effects. Further analysis will be conducted to determine the overall effect these treatments have on peanut production over time in 2014.

3. Methods

Peanut experimental plots were planted at the University of Florida's Plant Science Research and Education Unit in Citra, FL on 9 May 2013 in a Myakka fine sand soil that had been planted with a winter cover crop of Bahiagrass (*Paspalum notatum*). The varieties were planted at a density of six seeds per foot of row on 36-in. row centers, except for the plots examining varying seeding rates described below. Plots consisted of paired 20-ft long treatment rows with untreated buffer rows between each treatment arranged in a split-plot design with 4 replications (0.77 A). Fungicide applications were made throughout the season on the dates 13 Jun (Headline @ 9 fl oz/A), 3 Jul (Provost 433 SC @ 10.7 fl oz/A), 18 Jul (Provost 433 SC @ 10.7 fl oz/A), 5 Aug (Provost 433 SC @ 10.7 fl oz/A), 20 Aug (Provost 433 SC @ 10.7 fl oz/A) and 5 Sep (BravoWS @ 1.5 pt/A), and reduced sprays were based on removal of the selected dates as described below. Foliar treatments were applied with a CO_2 backpack sprayer calibrated to deliver 25 gal/A at 30 psi with TeeJetXR 8004VF nozzles at 36-in. spacing.

Percent disease severity was estimated from sampling 20 trifoliate leaves from each test plot, which were collected on a bi-weekly basis starting on 26 Jul and ending 18 Sep. Yields were obtained by weighing harvested peanuts from the two treatment rows on a scale. All data was analyzed with ANOVA using R.

The varieties tested in both studies were Georgia-06G, Florida-07, Tifguard, York and Georgia Greener. Three of these varieties are commonly used in peanut production today and one variety (York) has documented resistance to leaf spots and stem rot/white mold.

Peanut Fungicide Rate by Variety
Each peanut variety was treated with a fungicide program of 3, 4 or 6 sprays. The 6 spray program consisted of sprays on 13 Jun (Headline @ 9 fl oz/A), 3 Jul (Provost 433 SC @ 10.7 fl oz/A), 18 Jul (Provost 433 SC @ 10.7 fl oz/A), 5 Aug (Provost 433 SC @ 10.7 fl oz/A), 20 Aug (Provost 433 SC @ 10.7 fl oz/A) and 5 Sep (BravoWS @ 1.5 pt/A). The 4 spray program consisted of sprays on 13 Jun (Headline @ 9 fl oz/A), 3 Jul (Provost 433 SC @ 10.7 fl oz/A), 5 Aug (Provost 433 SC @ 10.7 fl oz/A), and 5 Sep (BravoWS @ 1.5 pt/A). The 3 spray program consisted of sprays on 13 Jun (Headline @ 9 fl oz/A), 18 Jul (Provost 433 SC @ 10.7 fl oz/A), and 5 Sep (BravoWS @ 1.5 pt/A).

Peanut Seeding Rate by Variety
Each peanut variety was at the 3 seeding rates of 3, 4 and 6 seeds per foot of row. Seeding rate was validated by examining three 1 foot sections in each plot and counting the total number of seeds present.

4. Results

Peanut Fungicide Rate by Variety
Analysis of variance indicated that there was a significant ($p < 0.05$) interaction between variety and fungicide spray number in relation to yield and the disease variable Area Under the Disease Progress Curve (AUDPC) for early leaf spot. AUDPC is used to assess the development of disease over time by summing the differences between disease rating dates and dividing by the difference in time (days).

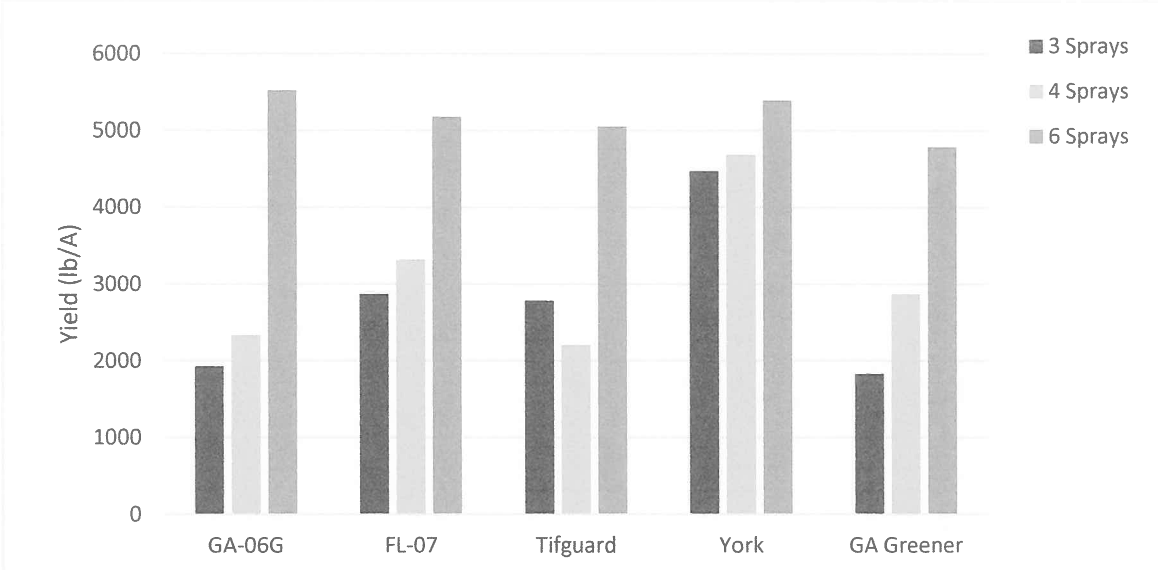

Figure 1: Yield data (pounds per acre) from plots harvested on 10/7/13, 151 days after planting. Data was based on 4 replications of 2 row plots that were 20 feet long. The bars represent the 3 different spray programs tested in this trial of 3, 4 and 6 fungicides sprays during the growing season. The varieties tested in this trial were Georgia-06G (GA-06G), Florida-07 (FL-07), Tifguard, York and Georgia Greener (GA Greener).

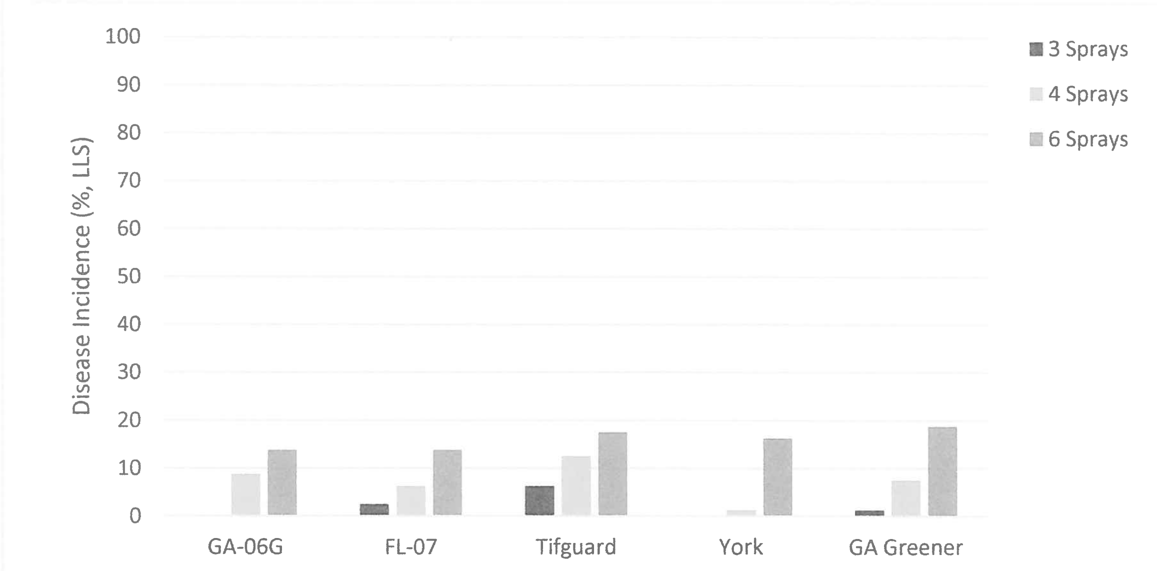

Figure 2: The percent incidence of late leaf spot (LLS) recorded on 09/18/13. Data was based on 20 leaf samples collected from the 2 treatment rows. The bars represent the 3, 4 and 6 fungicide spray programs tested in this trial. The varieties tested in this trial were Georgia-06G (GA-06G), Florida-07 (FL-07), Tifguard, York and Georgia Greener (GA Greener).

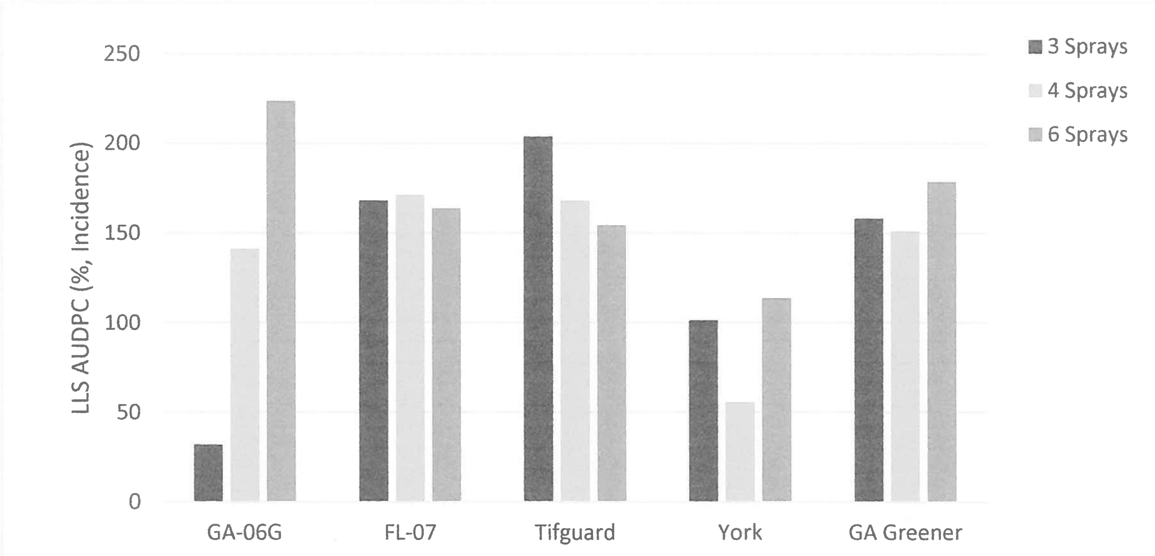

Figure 3: The area under the disease progress curve (AUDPC) for late leaf spot (LLS). AUDPC is calculated by summing the disease incidence difference between consecutive rating dates and dividing it by the time difference between the dates. Data was based on 20 leaf samples collected from the 2 treatment rows. The bars represent the 3, 4 and 6 fungicide spray programs tested in this trial. The varieties tested in this trial were Georgia-06G (GA-06G), Florida-07 (FL-07), Tifguard, York and Georgia Greener (GA Greener).

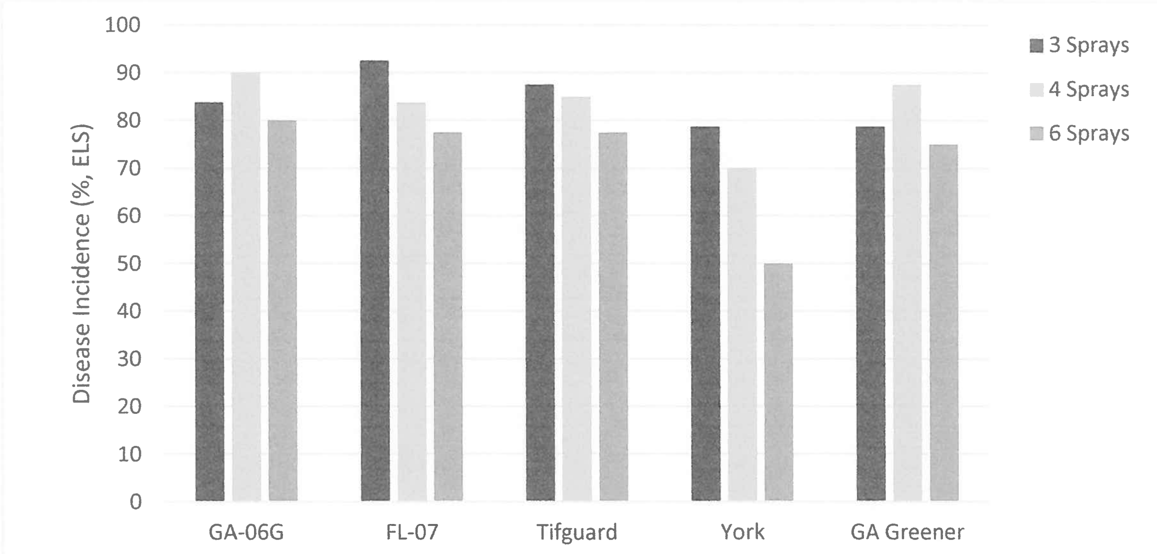

Figure 4: The percent incidence of early leaf spot (ELS) recorded on 09/18/13. Data was based on 20 leaf samples collected from the 2 treatment rows. The bars represent the 3, 4 and 6 fungicide spray programs tested in this trial. The varieties tested in this trial were Georgia-06G (GA-06G), Florida-07 (FL-07), Tifguard, York and Georgia Greener (GA Greener).

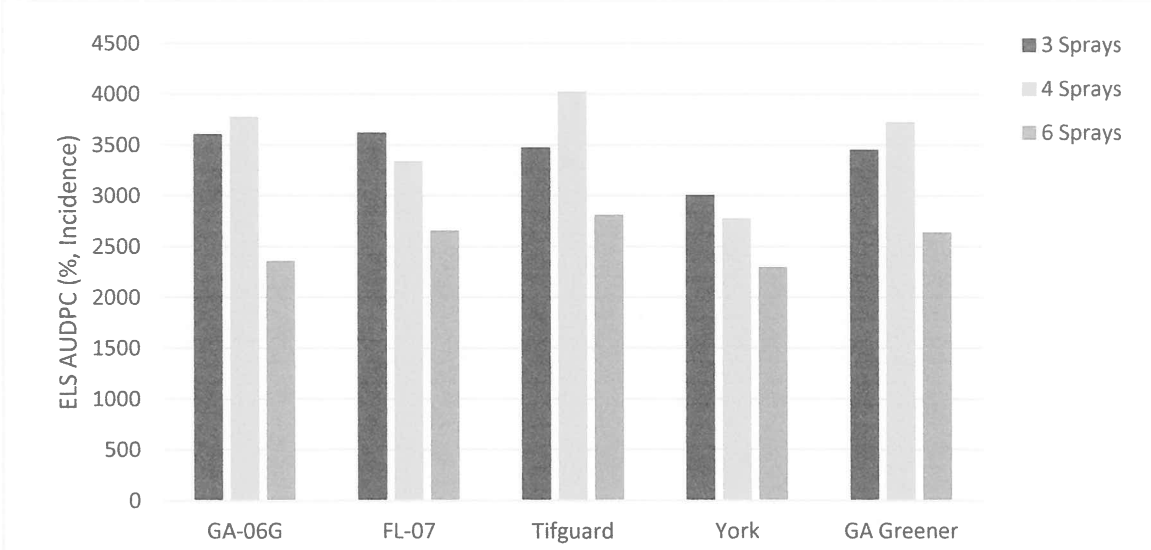

Figure 5: The area under the disease progress curve (AUDPC) for early leaf spot (ELS). AUDPC is calculated by summing the disease incidence difference between consecutive rating dates and dividing it by the time difference between the dates. Data was based on 20 leaf samples collected from the 2 treatment rows. The bars represent the 3, 4 and 6 fungicide spray programs tested in this trial. The varieties tested in this trial were Georgia-06G (GA-06G), Florida-07 (FL-07), Tifguard, York and Georgia Greener (GA Greener).

Peanut Seeding Rate by Variety:

Analysis of variance indicated that there was no significant ($p > 0.05$) seeding rate by variety interaction was observed in this experiment.

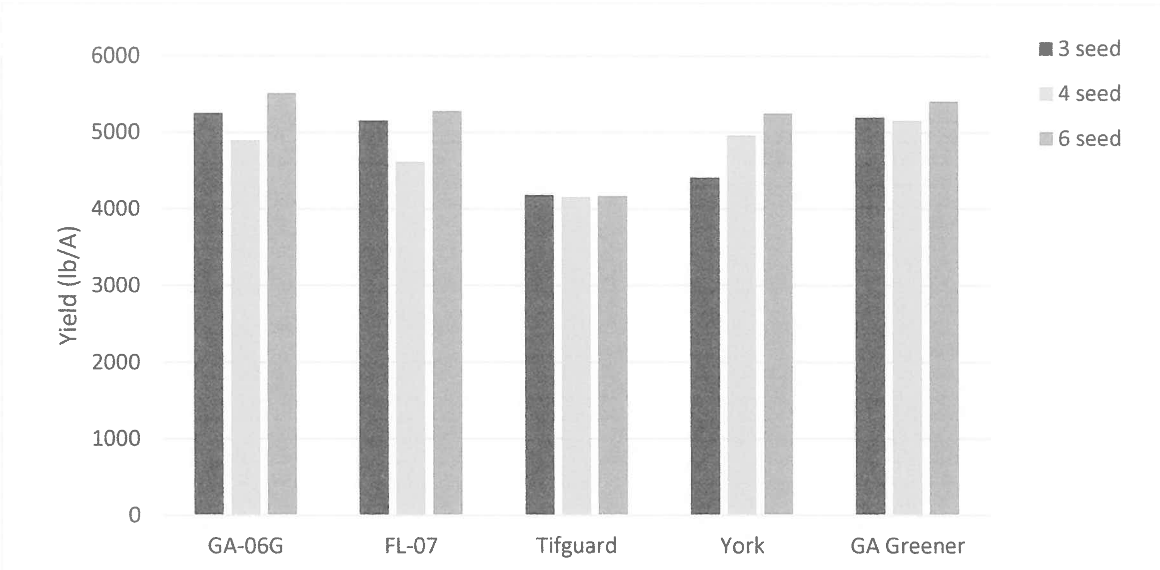

Figure 6: Yield data (pounds per acre) from plots harvested on 10/07/13, 151 days after planting. Data was based on 4 replications of 2 row plots that were 20 feet long. The bars represent the three seeding rates of 3, 4 and 6 seed per foot of row. The varieties tested in this trial were Georgia-06G (GA-06G), Florida-07 (FL-07), Tifguard, York and Georgia Greener (GA Greener).

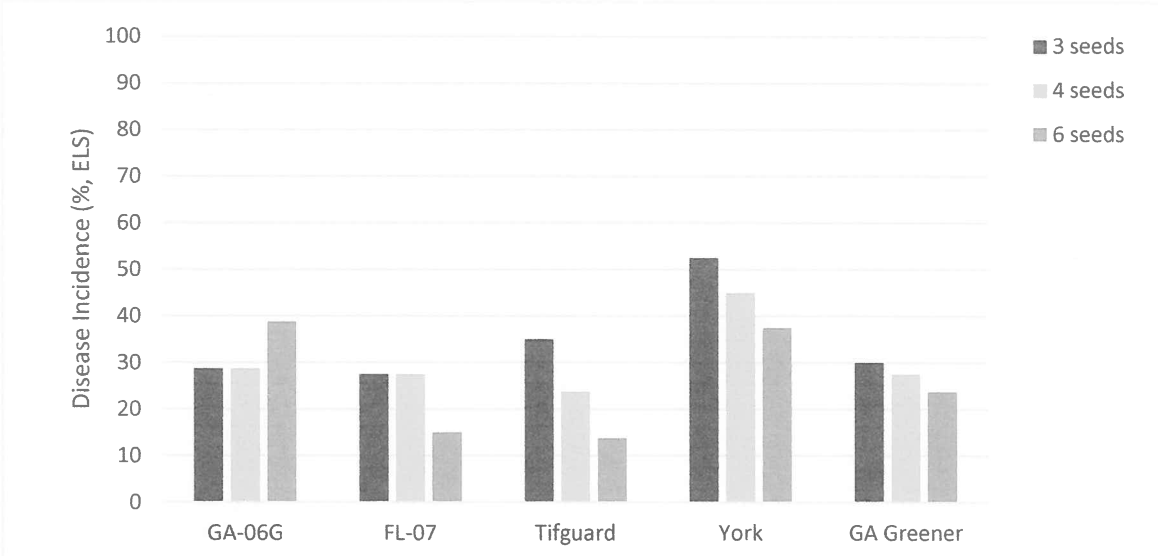

Figure 7: The percent incidence of early leaf spot (ELS) recorded on 09/18/13. Data was based on 20 leaf samples collected from the 2 treatment rows. The bars represent the three seeding rates of 3, 4 and 6 seed per foot of row. The varieties tested in this trial were Georgia-06G (GA-06G), Florida-07 (FL-07), Tifguard, York and Georgia Greener (GA Greener).

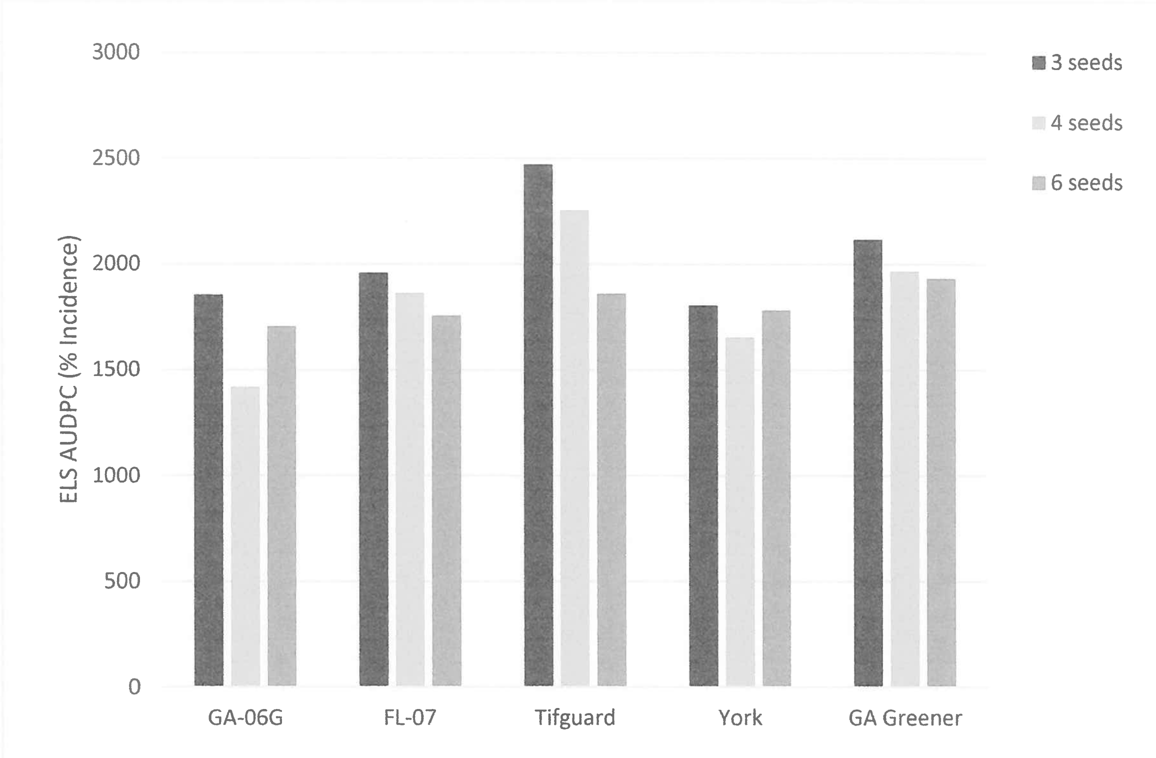

Figure 8: The area under the disease progress curve (AUDPC) for early leaf spot (ELS). AUDPC is calculated by summing the disease severity difference between consecutive rating dates and dividing it by the time difference between the dates. Data was based on 20 leaf samples collected from the 2 treatment rows. The bars represent the three seeding rates of 3, 4 and 6 seed per foot of row. The varieties tested in this trial were Georgia-06G (GA-06G), Florida-07 (FL-07), Tifguard, York and Georgia Greener (GA Greener).

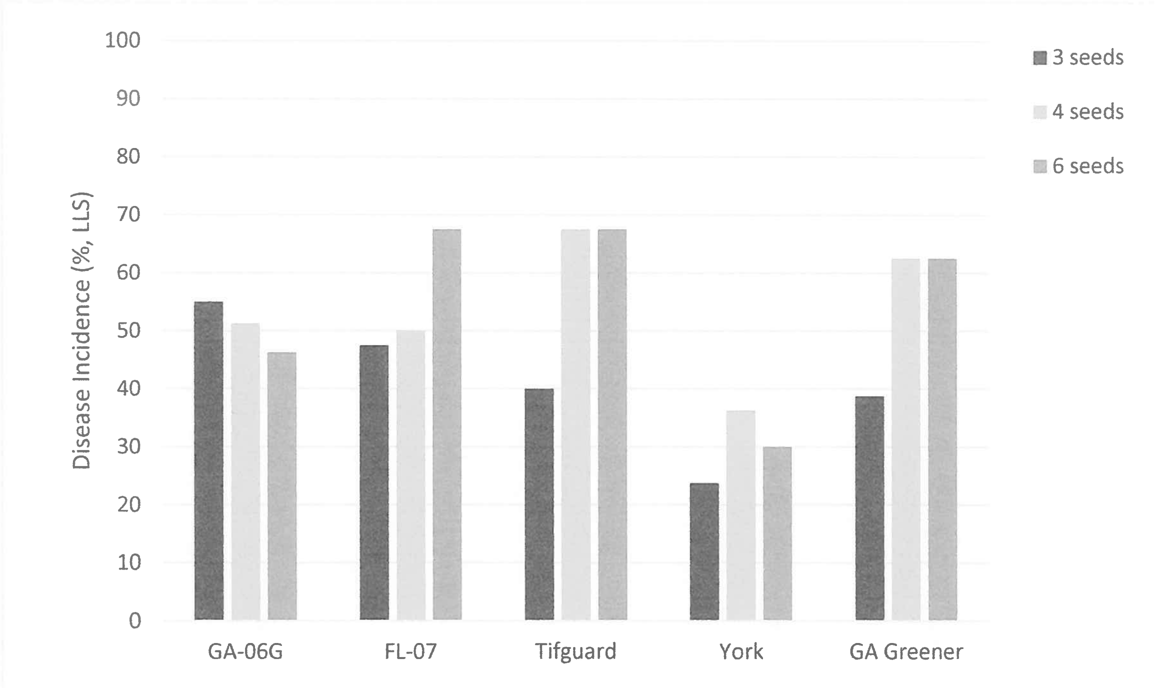

Figure 9: The percent incidence of late leaf spot (LLS) recorded on 09/18/13. Data was based on 20 leaf samples collected from the 2 treatment rows. The bars represent the three seeding rates of 3, 4 and 6 seed per foot of row. The varieties tested in this trial were Georgia-06G (GA-06G), Florida-07 (FL-07), Tifguard, York and Georgia Greener (GA Greener).

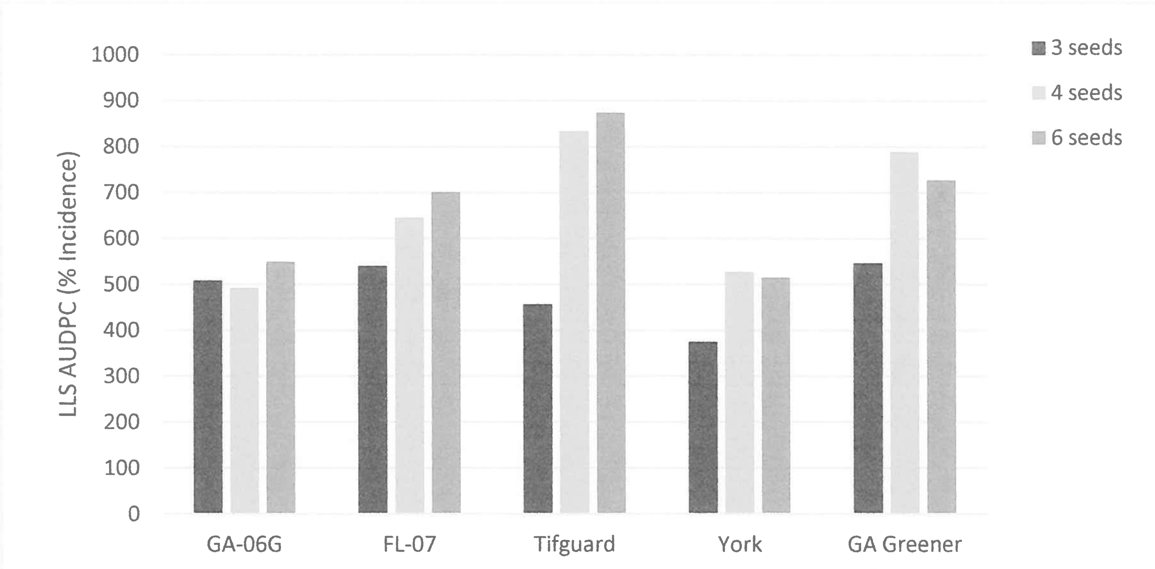

Figure 10: The area under the disease progress curve (AUDPC) for late leaf spot (LLS). AUDPC is calculated by summing the disease severity difference between consecutive rating dates and dividing it by the time difference between the dates. Data was based on 20 leaf samples collected from the 2 treatment rows. The bars represent the three seeding rates of 3, 4 and 6 seed per foot of row. The varieties tested in this trial were Georgia-06G (GA-06G), Florida-07 (FL-07), Tifguard, York and Georgia Greener (GA Greener).

5. Summary

Only varying the fungicide spray number had impacts on peanut yields and disease severity during the 2013 peanut season at Citra, FL. A 6 spray fungicide schedule provided the best disease control for early leaf spot in 2013. These resistant variety york produced similar yields in the reduce 3 and 4 spray programs when compared to the 6 spray program. More susceptible varieties such as Georgia-06G and Florida-07, however, yield at least 2,000 lb/A more in the 6 spray program compared to the 3 and 4 spray programs. These results are also different from 2012 in which late leaf spot incidence was higher and the resistant varieties (Tifguard and York) performed better in yield and disease intensity. These findings indicate the importance of understanding varietal resistance in determining seasonal fungicide spray frequency, especially in Florida. As new resistant and tolerant varieties are developed, it will be critical to determine the proper fungicide input needed to control peanut diseases, such as leaf spots. More susceptible varieties often benefit from more intensive spray programs, but often optimal yields in resistant varieties can be obtained with significantly reduced spray inputs.

Seeding rate had little effect on yield and disease during the 2013 season. The effect of seeding rate on yield is well documented, however, its effect on disease development is not as well known. During the 2013 growing season, all the varieties planted at 4 and 6 seed per foot of row had significantly more late leaf spot than those planted at 3 seeds per foot. No trends were apparent in the early leaf spot disease development. These results are opposite from those recorded in 2012. Further evaluations are needed to determine the true effect of seeding rate on disease intensity, however, these results indicate the importance of plant density in management of peanut leaf spots.

Overall, the results indicate the importance of assessing disease risk early in the season in order to determine the proper management inputs (i.e. fungicides). Many factors can affect disease intensity, and continued research to understand these affects is critical to obtaining optimal peanut yields. As new resistant and tolerant varieties are developed, researchers will need to determine disease inputs carefully and over multiple seasons. This study was part of a multi-year study looking at the effects of seeding rate and fungicide spray frequency on peanut disease management. Data will be examined in 2014 to determine the trends of each year of this study and see how seasonal variation affected the results.