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Southeastern Peanut Research Initiative 2016
FINAL REPORT

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Project Title: Examining the Effects of Varying Fungicide Spray Water Volumes on the Management of Foliar Peanut Diseases.

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1. **Abstract**
Foliar peanut disease management is often best achieved through the use of nozzles that produce fine droplet sizes delivered at high (> 20 GPA) spray volumes. The objective of this research was to examine how different nozzle types and spray volumes affect the management of various fungicide classes with different plant mobilities. Leaf spot started early at 41 DAP with final scale ratings ranging 5 to 9 across all plots by 125 DAP. No significant differences were observed in leaf spot (LS) AUDPC or yield among nozzle types ($p = 0.89$, 0.39; respectively) or spray volumes ($p = 0.97$, 0.52; respectively). Differences were observed among fungicide treatments for LS AUDPC ($p < 0.01$) and yield ($p < 0.01$), however, no interactions were observed for nozzle type or spray volume with the fungicide treatments ($p > 0.10$). These results indicate that fungicide chemistry is more important in disease control than nozzle type and/or spray volume. Further research is needed to confirm this trend over multiple years as well as further comparisons with nozzle types and spray volumes recommended for disease management in peanut.

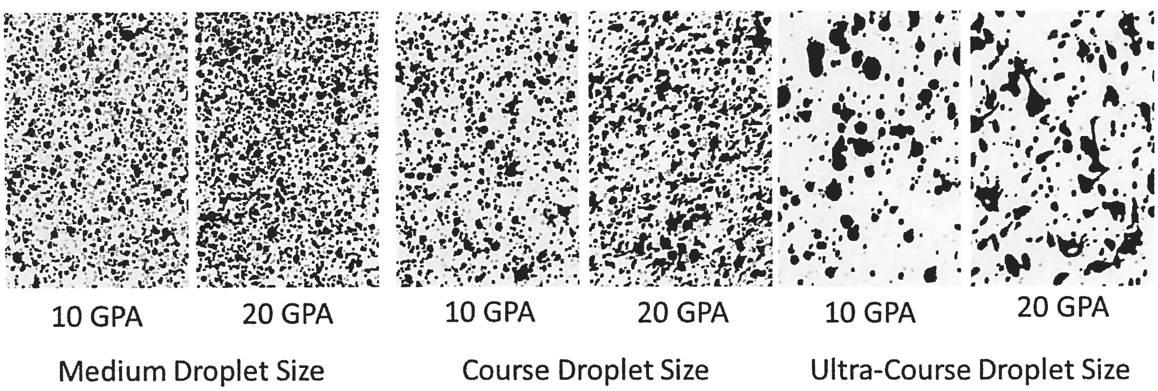
2. **Introduction**
A significant proportion of a fungicide program's cost is related to the amount of water needed to apply that product to the crop. The proper application of many fungicidal products (e.g. chlorothalonil) requires a high volume of water for the product to provide effective control. However, many growers are reducing their spray volumes to save on time and fuel costs related to fungicide applications. The effect this volume reduction has on fungicide efficacy has not been explored extensively in peanut production systems. Many new fungicidal products are available that can penetrate and are mobile within the plant to varying degrees. It is possible that this activity of these fungicides can allow them to still be effective management tools even at low spray volumes and increased droplet sizes. The goal of this research is to examine the effects reduced spray volumes and extra course droplets have on the efficacy of various fungicide products. This information will then be used to provide spraying recommendations for the various classes of fungicides in relation to achieving optimal foliar disease control.

3. **Methods**
Peanut experimental plots of the peanut cultivar 'Georgia 06G' were planted at the University of Florida's Plant Science Research and Education Unit in Citra, FL on 22 June 2016 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 25-ft long treatment rows with untreated buffer rows between each treatment arranged in a split-plot design with 4 replications.

A split-split plot randomized complete block design was used in this study. The main plot effect was nozzle type (medium, course, or ultra-course), the sub-plot effect was spray volume (10 or 20 GPA), and the sub-sub-plot effect was fungicide treatment (untreated, chlorothalonil, tebuconazole, or pyraclostrobin). Three nozzles were used to obtain the desired droplet size with a TeeJet® XR8002 for medium, TTJ601002 for course and TTI11002 for ultra-course. Treatments were applied 63, 77, 91, 110, 121 days after planting (DAP). Early and late leaf spot and rust were rated using the Florida 1 to 10 scale approximately every two weeks from 41 to 125 days after planting (DAP). Fungicide applications were made with a CO_2 backpack sprayer calibrated to deliver 25 gal/A at 30 psi.

Foliar disease was recorded on a bi-weekly basis using the Florida 1 to 10 scale and white mold incidence was recorded as hits and % necrosis after the peanuts were dug. Spray coverage was evaluated using water sensitive cards placed at the top of the canopy on 8/24, 9/21 and 10/10 (see below). Yields were obtained by weighing harvested peanuts from the two treatment rows on a scale. All data was analyzed with ANOVA using R.



4. **Results**

No significant differences were observed in leaf spot (LS) AUDPC or yield among nozzle types (Log-likelihood $\chi2=0.22$, 1.9; $p=0.89$, 0.39; respectively) or spray volumes (Log-likelihood $\chi2<0.01$, 0.40; $p=0.97$, 0.52; respectively). Differences were observed among fungicide treatments for LS AUDPC (Log-likelihood $\chi2=90.6$, $p<0.01$) and yield (Log-likelihood $\chi2=33.1$, $p<0.01$) (Figure 1 and 2), however, no interactions were observed for nozzle type or spray volume) with the fungicide treatments ($p > 0.10$). Droplet data indicated that dots per count area increased for the medium droplet size, varied for the course and were the same for the ultra-course throughout the season (Figure 3). Medium droplets tended provide better disease control when the fungicides were effective for the leaf spot pathogen (great than 50% early leaf spot) (Figure 4).

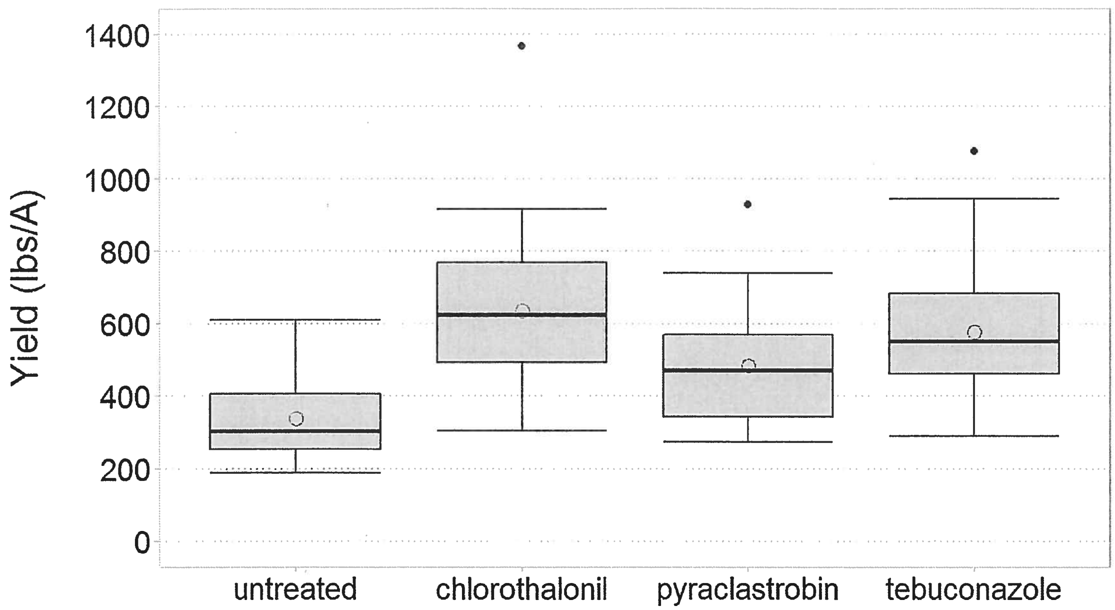


Figure 1: Yield data (pounds per acre) from plots harvested on 11/09/16, 140 days after planting. Data was based on 4 replications of 2 row plots that were 25 feet long. The boxplots show the distribution of the yields with the solid black line indicating the median and the open circle the mean. The spray applications tested in this trial were no sprays (untreated) and 5 applications of the fungicides chlorothalonil, tebuconazole and pyraclostrobin.

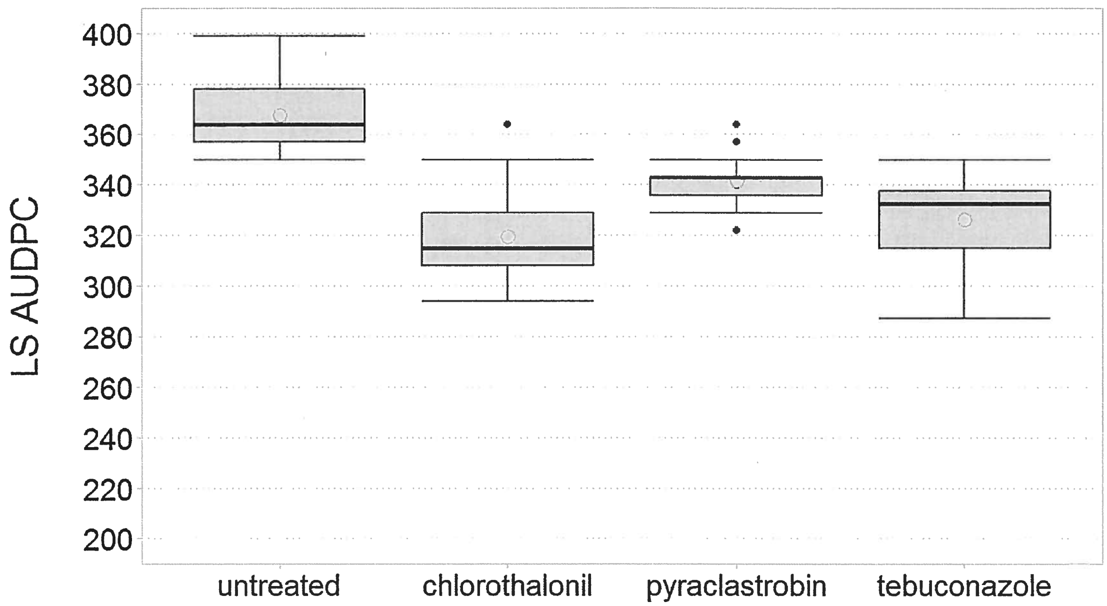


Figure 2: Boxplots of the Florida 1 to 10 leaf spot (LS) scale ratings area under the disease progress curve (AUDPC). AUDPC calculates the amount of disease present over time. Data was based on 4 replications of 2 row plots that were 25 feet long. The boxplots show the AUDPC data distributions with the solid black line indicating the median and the open circle the mean. The spray applications tested in this trial were no sprays (untreated) and 5 applications of the fungicides chlorothalonil, tebuconazole and pyraclostrobin.

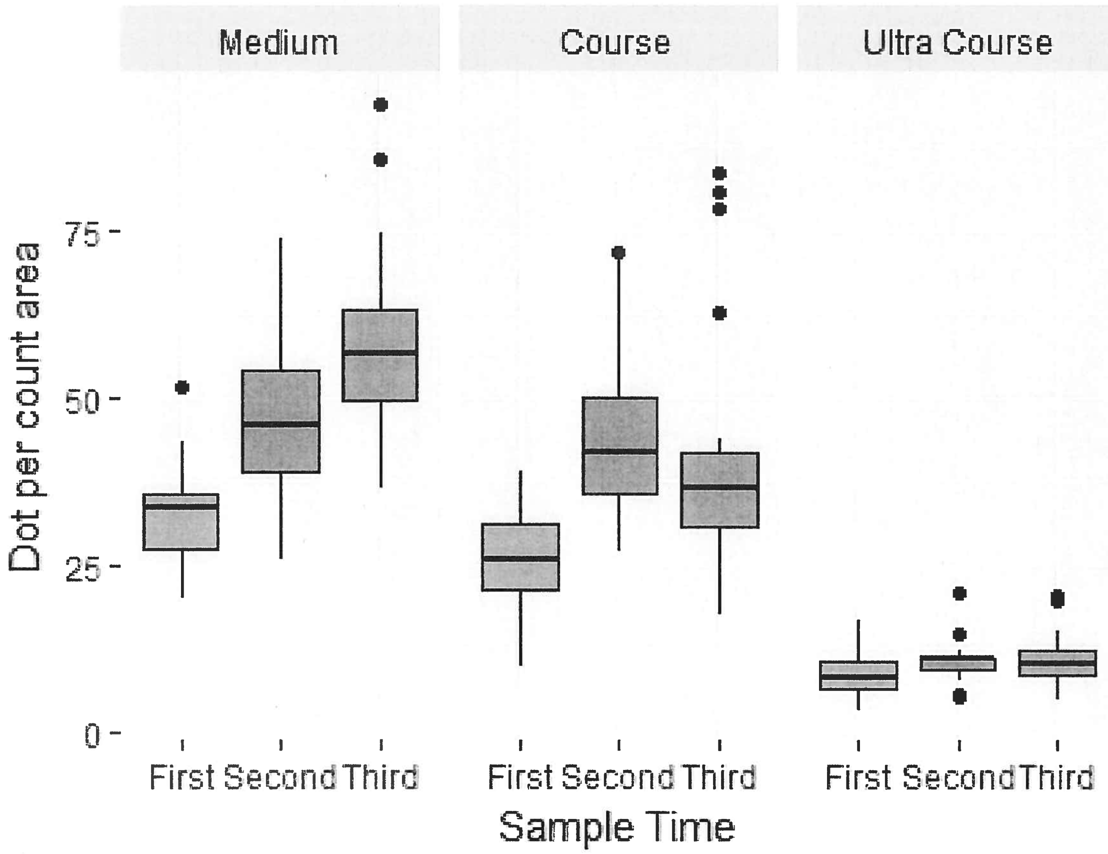


Figure 3: Boxplot of water sensitive card dot counts for the various nozzle droplet sizes. Samples were collected at the top of the canopy at 3 different spray dates of 8/24 (First), 9/21 (Second), and 10/10 (Third).

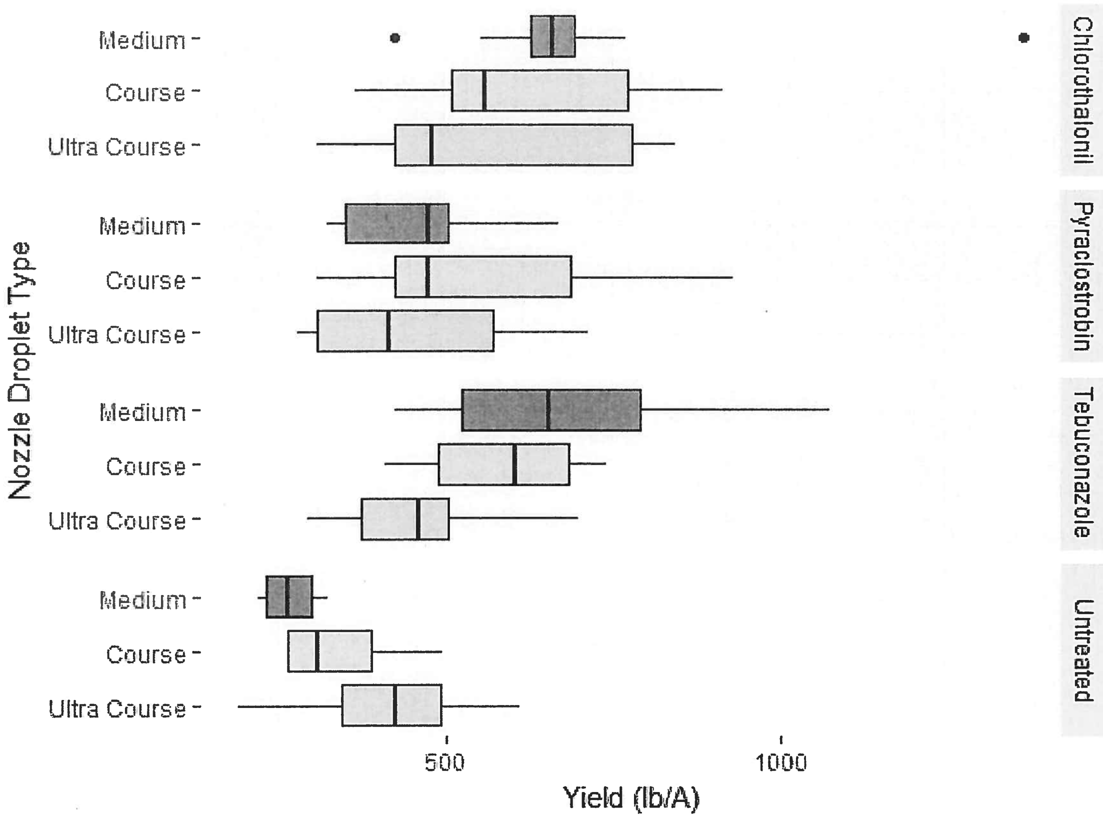


Figure 4: Boxplots of yield data (pounds per acre) across the various treatments The boxplots show the distribution of the yields with the solid black line indicating the median. Spray treatments consisted of no sprays (untreated) and 5 applications of the fungicides chlorothalonil, tebuconazole and pyraclostrobin. Droplet size treatments consisted of Medium, Course and Ultra-Course droplets form the TeeJet® XR8002 um, TTJ601002 and TTI11002 nozzles, respectively.

5. Summary

Overall, these results indicate that fungicide selection is the most important component of a spray program. If the fungicide cannot manage the disease in question, other management factors will not affect disease control. Small droplets (medium) tended to control disease better and increase yields numerically compared to large droplets (course and ultra-course) even for the penetrant fungicide tebuconazole. However, course nozzles did provide adequate coverage for disease control with both chlorothalonil and tebuconazole. Further research is needed to better understand the impacts of nozzle selection on disease control and the impacts of application speed.