I. Abstract

**Title:** Integrated management of tomato spotted wilt, leaf spot rust, white mold, and CBR in peanut

**Principal Investigator:** Austin Hagan, Department of Entomology and Plant Pathology, Auburn University

**Cooperating Personnel:** Howard Campbell, Department of Entomology and Plant Pathology, Auburn University; Kira Bowen, Department of Entomology and Plant Pathology, Auburn University

**Summary**

Peanut plant pathology and nematology field trials were conducted in 2017 at the Brewton Agricultural Research Unit (2), Gulf Coast Research and Extension Center [GCREC] (10), Plant Breeding Unit [PBU] (2), and Wiregrass Research and Extension Center [WREC] (14) along with nematicide (2), seed treatment (2), winter cover crop (1), nematicide efficacy (2) and thrips management studies (2) at the latter location as well as additional peanut variety trials at Chilton Horticulture Research Center (1) and Sand Mountain Research and Extension Center in North Alabama (1). The project PI and cooperating personnel also collected disease data from the irrigated and rainfed PVT (2) and UPPT (1) advanced breeding line studies at the WREC as well as provided assistance to peanut breeder in assessing the reaction of peanut breeding material to foliar and soil diseases. A total of 42 peanut research studies were conducted in 2017 under this project.

II. Main Body of Report

**Title:** Integrated management of tomato spotted wilt, leaf spot rust, white mold, and CBR in peanut

**Principal Investigator:** Austin Hagan, Department of Entomology and Plant Pathology, Auburn University

**Cooperating Personnel:** Howard Campbell, Department of Entomology and Plant Pathology, Auburn University; Kira Bowen, Department of Entomology and Plant Pathology, Auburn University

**Objectives:**

1) Integrate new genotypes into disease management regimes for managing thrips, TSW, leaf spot, rust, white mold, and CBR in peanut, and determine effects of management inputs, i.e. seeding rates, planting date, and row spacing, on the economics of peanut production.

2) Integrate new genotypes into Peanut RX disease indices and continue Peanut RX validation.
3) Performance and economics of reduced-input or generic fungicide programs on disease resistant peanut cultivars.

4) Efficacy of early-season fungicide applications as influenced by application technology and placement on leaf spot, white mold, and CBR.

5) Influence of insecticides and production inputs on thrips control, damage, and TSW severity in peanut.

**Procedures:** Study sites were prepared for planting and rows laid off with a KMC strip till rig. For general fungicide screening trials, a leaf spot susceptible variety such as Georgia-09B or TUFRunner 511 was used, Georgia-06G and Flavorunner 458 were used for thrips management and TSW trials. Either the susceptible Georgia-06G or resistant Georgia-14N or Tifguard were sown for nematicide trials. Weed control was according to the recommendations of the Alabama Cooperative Extension System. Each study site was irrigated with an overhead pivot as needed. The experimental design was either a randomized complete block or factorial arranged as a split-plot with individual experimental units consisting of four 30 ft rows on a 3- or 3.2 ft row spacing depending on the study site. Fungicides treatments, which varied considerably from study to study, were applied with a tractor- or ATV-mounted boom sprayer with three TX-8 nozzles per row calibrated to deliver 15 gal/A of spray volume at 45 psi. Seedling vigor and stand density were monitored as needed. Tomato spotted wilt (TSW) hit counts (1 hit was defined as < 1 feet of consecutive severely TSW-damaged plants per row) were made several weeks prior to plot inversion. Early and late leaf spot (LS) were rated together two weeks and just prior to plot inversion, using the Florida 1 to 10 rating scale. Leaf spot ratings were converted and reported as % defoliation values. White mold loci counts (1 locus was defined as < 1 ft of consecutive stem rot damaged plants per row) were made immediately after plot inversion. For nematicide trials, soil samples for a nematode assay taken within 30 days of planting and again just before plot inversion and processed using the sugar flotation method. The root-knot nematode reproduction index was calculated by dividing \( \frac{p_{\text{final}}}{p_{\text{initial}}} \). Root knot ratings of the pods and roots were made at plot inversion, where 1 = no visible damage; 2 = \( \leq 25\% \) of roots and/or pods damaged; 3 = \( \leq 50\% \), 4 = \( \leq 75\% \), 5 = 75-100% damage. Yields are reported at 7% moisture. Significance of factor effects and interactions was evaluated using PROC GLIMMIX in SAS. Statistical analysis on measured variables was done on rank transformations of data, but back transformed data are presented. Means were separated using Fisher’s protected least significant difference (LSD) test \( (P \leq 0.05) \) unless otherwise indicated.

**Results and Discussion:**

Multiple fungicide efficacy trials were conducted at the GCRC and WREC to assess the effectiveness of registered and experimental fungicides for the control of leaf spot diseases and white mold in peanut. Summaries of many (9) of those studies have been submitted for publication in the on-line publication Plant Disease Management Reports.

For the annual fungicide standards study conducted at WREC, late leaf spot was the dominant foliar disease at plot inversion. The significant cultivar \( \times \) fungicide program interaction highlighted differences in fungicide program efficacy on Georgia-09B and Georgia-06G. Since there were no significant cultivar \( \times \) fungicide program interactions for white mold incidence or yield, data for each of these variables were pooled. Regardless of the fungicide program,
including the non-fungicide treated control, % defoliation ratings were lower for Georgia-06G than Georgia-09B. Considerably higher % defoliation values were noted for the non-fungicide treated control than any of the recommended fungicide programs on either cultivar. In contrast to Georgia-06G, where no differences in % defoliation were noted between any recommended fungicide programs, Alto + Echo 720/Echo/Elatus gave significantly better leaf spot control on Georgia-09B than Priaxor/Muscle ADV/Priaxor/Echo 720, Echo 720/Echo 720 + Convoy, and the season-long Echo 720 standard. White mold incidence was higher for the non-fungicide treated control than any of the recommended fungicide programs. The season-long Echo 720 standard had significantly higher white mold ratings than the remaining recommended fungicide programs. While similar yields were recorded for Georgia-06G and Georgia-09B, significant differences in yield were noted between the fungicide programs with the non-fungicide treated control having the lowest yield. Among the remaining recommended fungicide programs, significant yield gains were obtained with Echo 720/Fontelis and Echo 720/Abound + Alto compared with the season-long Echo 720 standard.

Standard and intensive fungicide program were compared for disease control and yield response on commercial peanut cultivars at the WREC. Late leaf spot was the dominant foliar disease at plot inversion. Since the cultivar × fungicide program interactions were not significant for % defoliation, white mold incidence and yield, data for each of these variables were pooled. While significant differences in TSW incidence were noted between cultivars, overall disease levels were low. Incidence of TSW was higher in FloRun 157 than all other varieties except for Florida 07, while equally low disease levels were recorded for AU-NPL 17, FloRun 331, Georgia-13M, Georgia-16HO, TUFRunner 297, Georgia-09B, and Georgia-14N. Leaf spot defoliation, which significantly differed across varieties, did not exceed 10% for any of the 12 cultivars screened. Georgia-13M and FloRun 157 had greater % defoliation values than all cultivars except for Georgia-09B and Georgia-16HO. The defoliation value recorded for AU-NPL 17 was below those of the latter four and similar to the remaining seven cultivars. Differences in white mold incidence were not observed, due to low disease pressure, between peanut cultivars. Yield response for FloRun 157, the cultivar with the highest TSW, leaf spot defoliation, and white mold ratings, was significantly lower than TUFRunner 511, Georgia-16HO, TUFRunner 297, FloRun 331, and AU-NPL 17 with all the latter cultivars having similarly high yields. Fungicide program significantly impacted white mold but not TSW incidence, leaf spot defoliation, or yield. White mold intensity was lower for the intensive than the standard fungicide program.

At GCREC, recommended fungicides were compared on TUFRunner 511 and Georgia-06G for the control of late leaf spot and yield response on peanut. A significant cultivar × fungicide program interaction was recorded for yield but not late leaf spot defoliation or stem rot incidence. Due to the heavy and frequent rainfall through much of the growing season, late leaf spot pressure was exceptionally high. Greater late leaf spot incited defoliation and stem rot loci counts were noted for TUFRunner 511 than Georgia-06G. Differences in late leaf spot defoliation and stem rot incidence were not recorded between any fungicide programs. Yields were higher on Georgia-06G than TUFRunner 511 for the season-long Echo 720 standard along with Echo 720/Muscle ADV, Echo 720/Abound + Alto, and Alto + Echo 720/Echo 720/Elatus programs, while similar yields were recorded for the remaining fungicide programs on both cultivars. On Georgia-06G, the season-long Echo 720 standard produced higher yields than Echo 720/Fontelis, Echo 720/Abound + Alto, and Echo/Provost Opti with Echo 720/Muscle ADV
having higher yields than the latter two fungicide programs. For TUFRunner 511, yields were higher for Echo 720/Provost Opti than Echo 720/Abound + Alto. Similar yields were noted for the latter two and remaining fungicide programs on TUFRunner 511.

Standard and intensive fungicide program were also evaluated for late leaf spot control and yield response on commercial peanut cultivars at the GCREC. Since the cultivar × fungicide program interaction was not significant for % defoliation, TSW and white mold incidence as well as yield, data for each of these variables were pooled. While TSW incidence was low across all cultivars, higher ratings for this disease were recorded for Florida 07, FloRun 157, and TUFRunner 511 than the remaining cultivars except for FloRun 107 and AU-NPL 17. As a result of frequent and often heavy rain events throughout much of the production season, late leaf spot defoliation levels were unusually high. The equally low % defoliation levels observed for Georgia-14N and Georgia-09B were matched by Georgia-06G, FloRun 157, AU-NPL 17, Florida 07, FloRun 107, and FloRun 331. In contrast, Georgia-13M and TUFRunner 297 suffered equally high levels of late leaf spot-incited premature defoliation. Georgia-06G, FloRun 331, and Georgia-09B outyielded FloRun 157 and TUFRunner 297. The former cultivar had lower yields than eight of the eleven cultivars. Fungicide programs had no impact on TSW incidence. While less % defoliation and higher white mold incidence was reported for the standard than intensive fungicide program, yield response for the two fungicide programs was similar.

For the nematicide efficacy trial conducted at WREC, a significant cultivar × nematicide interaction for root knot reproductive index but not plant vigor, leaf spot defoliation, white mold, or yield was observed. Plant vigor was significantly influenced by cultivar but not nematicide treatment. The root-knot susceptible Georgia-06G had a significantly lower vigor rating than the root-knot resistant Georgia-14N and TIF NV High O/L with the highest rating recorded for the latter cultivar. While leaf spot defoliation levels were similarly low for all cultivars, a reduction in defoliation was obtained with Velum Total compared with the non-nematicide treated control (P<0.10). White mold incidence was higher in Georgia-06G than TIF NV High O/L and Georgia-14N with the latter cultivar having the least damage. Similarly low white mold indices were recorded for all three nematicide treatments. With the exception of the Velum Total on TIF NV High O/L, root-knot reproduction rate was higher for all nematicide treatments on Georgia-06G. The root knot reproduction index for the Velum Total was lower on Georgia-14N than TIF NV High O/L; otherwise, the reproductive index for the non-nematicide treated control and AgLogic 15G were similar on the two root-knot resistant cultivars. Yield for TIF NV High O/L was high than Georgia-14N, while intermediate yield was recorded for the root-knot susceptible Georgia-06G. Similar yields were obtained for both nematicidal treatments and the non-nematicide-treated control.

The thrips control, seedling fungicide screening, and rotation study have been harvested and the data collated but not summarized.

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