Report to the
Southeastern Peanut Research Initiative
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On Progress on Research Supported by the Grant

"Integrated Disease Management of Peanut"

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Update:

A. Field tests were conducted in which the effects of cultivars Georgia Green, Georgia-03L, York, Tifguard, and breeding lines CRSP 983 and C724-19-25 on incidence of spotted wilt and leaf spot were evaluated. Tifguard has been released as a cultivar with high levels of resistance to TSWV, and good resistance to root-knot nematode, but also has some leaf spot resistance. Leaf spot epidemics were severe, but differences in leaf spot severity are noticeable among genotypes in the non-sprayed treatments. Defoliation in Georgia-03L, Tifguard, and C724-19-25 was lower than in Georgia Green. Leaf spot ratings in York and CRSP 983 are lower than in the other entries. In addition, the test is examined the performance of each of these lines under varying levels of fungicide inputs (0, 3, 4, and 6 applications of fungicides that include chlorothalonil, tebuconazole, and prothioconazole). Yields in nonsprayed plots of Georgia-03L, Tifguard, C-724-19-25, York, and CRSP 983 were greater than nonsprayed Georgia Green. Grade data and fungicide cost estimates are now being analyzed and will be used to make economic comparisons of different fungicide inputs on the new cultivars and breeding lines. Preparations are being made for planting a similar test for the 2009 season.

B. Field tests were conducted at the UGA-CPES Lang Farm the effect of seeding rate (3,4,5, and 6 seed/ft of row) on tomato spotted wilt and yield was examined in Georgia Green, Georgia-06G, Florida-07 and 3 vs 6 seed/ft of row in several advanced breeding lines. For the final spotted wilt ratings, seeding rate in the range tested shows very little effect on incidence of spotted wilt in Tifguard, Florida-07, or Georgia-06G. Tomato spotted wilt ratings were lower and yields were higher for the 3 seed/ft of row treatment in Georgia-06G, Florida-07 or Tifguard than in the 6 seed/ft treatment for Georgia Green. There were not seeding rate effects on grade (% TSMK's), but grade was significantly lower for
FLorida-07 than the other three cultivars. Treatment comparisons for value/A comparisons based on yield + grade, and benefits, if any from increased seed costs are being examined, and economic analysis of the results is now in progress. Results indicate seeding rates can be reduced with any of these three new cultivars without greatly increasing the risk of spotted wilt. An identical trial has been planted for the 2009 season.

C. Two tests were conducted in which response of a total of 18 cultivars and genotypes to Thimet insecticide for management of tomato spotted wilt was examined. The test included new cultivars Florida-07, McCloud, York, AP-4, Georgia-03L, Tifguard, AT-215, AT-3085A, Georgia-06G, Georgia Greener, Georgia-07W, Georgia Green and AP-3. Final ratings for spotted wilt indicate that most of the entries show better field resistance to TSWV than Georgia Green. Florida Fancy appears to be similar to Georgia Green, and AT-215 has higher incidence of spotted wilt than Georgia Green in plots without Thimet. Several of the more resistant genotypes showed very little difference in spotted wilt ratings in Thimet vs. No Thimet treatments. These show promise for providing more flexibility in managing spotted wilt. In spite of low incidence of spotted wilt in even nontreated plots of several new cultivars and exceptional yields of some entries (especially Georgia-06G, AT-3085A, Florida-07, Tifguard, and Georgia-07W), there was still an average increase in yield of ~500 lb/A across all cultivars. However, the range of yield response went from little or no response in C 724-19-25 and Georgia-07W to over 1000 lb/A in Georgia Greener and AT-3085. A similar trial has been planted for the 2009 season examining 16 cultivars and breeding lines for response to Thimet.

D. Three experiments were conducted by Tubbs to evaluate yield, grade, and disease incidence as affected by seeding rate of multiple varieties. At the Southwest Georgia Research and Education Center in Plains, GA, a split-split-plot design experiment was planted on May 20, dug on October 7, and harvested on October 16, 2008. The trial was planted in single and twin rows (main-plot effect) with seven cultivars represented (‘Georgia Green’, ‘Georgia-06G’, ‘AT 3085RO’, ‘Florida-07’, ‘Tifguard’, ‘AP-3’, and ‘Georgia-03L’) as the sub-plot effect. Three seeding rates (single row equivalent of 5.3, 6.0, and 7.0 seed per foot of row [SPF]) were the sub-sub-effect of this trial. Ratings for tomato spotted wilt Tospovirus (TSW) were made on October 1 and for white mold (Sclerotium rolfsii) within 8 hours after digging on October 7.

Pod yields were higher for twin rows (5504 lb/ac) over single rows (5020 lb/ac), regardless of seeding rate or variety. An interaction occurred between seeding rate and variety for yield and final plant stand (Figs. 1 and 2). The only variety displaying a statistical yield difference between seeding rates was Florida-07, in which the 7.0 SPF rate yielded more than the 5.3 SPF rate (Fig. 1). Differences in plant stand were more abundant. The trend shows higher plant stands at the 6.0 or 7.0 SPF seeding rates for all varieties, and lowest plant stands at the 5.3 SPF rate (Fig. 2). However, in only a few instances did the final plant stand drop below the University of Georgia Cooperative Extension Service’s recommendation of 4.0 plants per foot of row (most often at the 5.3 SPF seeding rate), and never below 3.5 plants per foot. Also, this did not equate to yield losses for any variety that had differences in final plant stand.
Fig. 1. Pod yield of peanuts - seeding rate x variety interaction; Plains, GA - 2008.

- Differences among varieties within a given seeding rate are indicated by alphabetical notation, where a different letter indicates a statistical difference.
- Differences among seeding rates within a given variety are indicated by error bars (least significant differences), where bars that do not overlap indicate a statistical difference.

Fig. 2. Final stand of peanuts - seeding rate x variety interaction; Plains, GA - 2008.

- Differences among varieties within a given seeding rate are indicated by alphabetical notation, where a different letter indicates a statistical difference.
- Differences among seeding rates within a given variety are indicated by error bars (least significant differences), where bars that do not overlap indicate a statistical difference.

There was also an interaction between row pattern and variety for plant stand (data not shown). All varieties had more than 4.0 plants per foot of row in the twin row pattern, and had statistically higher stands in twin rows than in single rows with the exception of AP-3 and Georgia-03L varieties which had no statistical difference. Both of those varieties were among the highest in final plant stand in single rows (4.2 and 3.8 plants per foot of row, respectively), but among the lowest in
final plant stand in twin rows (4.5 and 4.3 plants per foot of row, respectively). The other varieties did respond to row pattern in final plant stand, suggesting that plants will compete with each other more heavily in single rows compared to twin rows, eliminating unnecessary plants from the row. The only varieties to stay above the 4.0 plants per foot of row threshold in single rows were AP-3 and Georgia Green when averaged over all seeding rates. Also, AT 3085RO was among the highest in plant stand in twin rows, but among the lowest in plant stand in single rows. This would suggest that AT 3085RO has a favorable response to twin rows over single rows in terms of final plant stand, and all varieties had nearly a 500 lb/ac response in yield for twins over singles.

In regards to disease incidence, TSW differences occurred between row patterns (7.9% in single rows; 4.2% in twin rows) and among varieties (Fig. 3). There were no differences in TSW incidence among seeding rates. For white mold, only differences among varieties were observed (Fig. 3). The most recently released varieties (Tifguard, Florida-07, Georgia-06G, and AT 3085RO) all had the lowest incidence of both TSW and white mold, while older varieties that have been around for several years (Georgia Green and Georgia-03L) had the highest incidence of both TSW and white mold. It should also be noted that there were no differences in grade for any of the measured variables at Plains.

![Fig. 3. Incidence of Tomato Spotted Wilt (TSW) and White Mold for seven varieties averaged over four reps, two row patterns, and three seed rates; Plains, GA - 2008.](image)

- Differences among varieties for TSW incidence are indicated by lowercase alphabetical notation, where a different letter indicates a statistical difference.
- Differences among varieties for White Mold incidence are indicated by uppercase alphabetical notation, where a different letter indicates a statistical difference.

2) In Attapulgus, GA, a twin-row cultivar x seeding rate test with four mid-maturing (Georgia Green, Georgia-06G, Tifguard, and Florida-07) and four late-maturing ('York', 'Georgia-02C', 'C-99R', and 'Georgia-01R') varieties were planted in a split-plot design with sub-treatment factor of five seeding rates (5.2, 6.2, 7.0, 8.2, and 8.8 SPF in single row equivalent – half per twin row). This experiment was planted on May 14, 2008. Mid-maturity varieties were dug on October 2 and harvested on October 6, 2008. Late-maturing varieties were dug on October 15 and harvested on October 20, 2008. Ratings for TSW were made on Sept. 29 and October 13, and white mold ratings were made within 8 hours after respective digging events.

The mid-maturing varieties yielded more than the late-maturing varieties (Fig. 4), and had higher final plant stands with the exception of Georgia-02C, which was statistically equal to three of the mid-maturing varieties (Fig. 5). No differences in yield were observed among the seeding rates (Fig. 4). However, there were differences in final plant stand (Fig. 5), although all seeding rates resulted in plant stands above the recommended 4.0 plants per foot of row. There was also a difference in total sound mature kernels (TSMK) among varieties. Highest grades were observed from Georgia-06G (77.4% TSMK) and Georgia-02C (76.3%), while lowest grades were observed from Florida-07 (71.9%) and York (71.1%).
With the exception of C-99R (73.9%), all other varieties graded between 75.4% and 75.9%.

![Graph showing Pod Yield for eight varieties and five seeding rates](image1)

**Fig. 4. Pod yield of peanuts for eight varieties and five seeding rates; Attapulgus, GA - 2008.**

- Differences among varieties or seeding rates are indicated by alphabetical notation, where a different letter indicates a statistical difference.

![Graph showing Plant Stand for eight varieties and five seeding rates](image2)

**Fig. 5. Final stand of peanuts for eight varieties and five seeding rates; Attapulgus, GA - 2008.**

- Differences among varieties or seeding rates are indicated by alphabetical notation, where a different letter indicates a statistical difference.

Similar to results at Plains, there were significant differences among varieties for TSW, with the late maturing varieties having higher TSW incidence than the mid-maturing varieties in most comparisons, with the exception of Georgia Green (Fig. 6). With respect to white mold, the trends were similar among varieties as they were with TSW, but the division among mid- and late-maturing varieties was not as clear (Fig. 6). Only C-99R was statistically higher in white mold incidence than all of the mid-maturing varieties. There were no differences in TSW or white mold among seeding rates.
Fig. 6. Incidence of tomato spotted wilt (TSW) and white mold, eight varieties averaged over four reps and five seeding rates; Atapulgus, GA -2008.

- Differences among varieties for TSW incidence are indicated by lowercase alphabetical notation, where a different letter indicates a statistical difference.
- Differences among varieties for White Mold incidence are indicated by uppercase alphabetical notation, where a different letter indicates a statistical difference.

3) At Midville, GA a twin-row cultivar x seeding rate test with Georgia Green, AT 3085RO, Tifguard, and Georgia-06G was planted in a split-plot design with sub-treatment factor of four seeding rates (4.4, 5.2, 6.2, and 7.0 SPF in single row equivalent – half per twin row). This trial was planted on May 28, 2008, dug on October 15, 2008, and harvested October 29, 2008. Very little disease pressure was noted and ratings were not evaluated at this location.

Variety Georgia-06G had the highest yield, and there were no statistical differences among the other three varieties (Fig. 7). Georgia-06G also graded higher (79.7% TSMK) than the other varieties (76.8% to 77.3%). When averaged over all seeding rates, Georgia Green had the lowest final plant stand, and there were no statistical differences among the other three varieties (Fig. 8). No differences in yield were observed among the seeding rates (Fig. 7). However, there were differences in final plant stand (Fig. 8), with the two lower seeding rates resulting in lower plant stands than the two higher seeding rates.
- Differences among varieties or seeding rates are indicated by alphabetical notation, where a different letter indicates a statistical difference.

Fig. 8. Final stand of peanuts for four varieties and four seeding rates; Midville, GA - 2008.

- Differences among varieties or seeding rates are indicated by alphabetical notation, where a different letter indicates a statistical difference.

Summary
There were yield and stand differences among varieties at all locations. New varieties like Georgia-06G, Florida-07, Tifguard, and AT 3085RO were consistently among or near the highest in yields and stands and lowest in disease incidence in all comparisons. Older varieties such as Georgia Green, C-99R, and Georgia-01R did not perform as well as the newer varieties within the evaluated factors.

This shows the improvement in selection for disease resistance coming out of breeding programs recently, giving growers new options against fighting specific disease problems they may have. It also may open opportunities for expansion into new peanut markets that were not possible in the past. For example, organic peanut production has traditionally not occurred in the southeast because of the inability to suppress diseases to tolerable levels without the use of fungicides.

There were differences in plant stand among the various seeding rates used in these trials, and higher seeding rates resulted in higher plant stands. However, final plant stands remained above the recommended 4 plants per foot at seeding rates of 5.2 SPF or higher in most instances, with the exception of several specific varieties at Plains. Seeding rate also had no effect on yield for any location, except for one interaction effect with Florida-07 peanut in which higher yields occurred at 7.0 SPF compared to 5.3 SPF. Since many of the new varieties hitting the market are large seeded, they cost more to plant on a per acre basis based on the recommended seeding rate of 6.0 SPF. These results show that a reduction in seeding rate to 5.2 SPF will not adversely affect yield potential because of the improvements in disease resistance, which will in turn keep seed costs equivalent to planting older, smaller seeded varieties that have less disease resistance.

Despite there being no differences in TSW among seeding rates in any of these studies, there were reductions in plant stand at lower seeding rates. Reduced plant stands are at a greater risk of severe TSW infection than higher plant stands when stands drop below 4.0 plants per foot of row. This should be considered when planting varieties that are more susceptible to TSW such as Georgia Green. Severity of TSW has been low in the southeast the last few years, but a more severe outbreak could potentially be devastating to susceptible varieties if they have a less than optimal stand resulting from planting a lower seeding rate. Since Georgia Green is a smaller seeded variety, planting a reduced seeding rate will not be a large savings in seed costs, and is not worth the risk. However, larger seeded varieties like Florida-07, Georgia-06G, and Tifguard which have strong resistance to TSW could result in a significant savings in seed cost without a major increased risk to TSW incidence by reducing seeding rate from 6.0 SPF to 5.2 SPF. The key result is achieving 4.0 plants per foot of row at final stand, which should be possible when planting high quality seed with good germination at an appropriate
seeding rate.