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Peanut Cultivars differ in their Yield Response and Susceptibility to Damaging Diseases in Southwest Alabama

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Introduction: Resistance, which is among the most effective methods for minimizing losses to diseases, is the cornerstone for managing spotted wilt (TSWV) on peanut. While breeding programs have focused on selecting cultivars with increasing levels of TSWV resistance and high yield potential, many newly released cultivars have some resistance to leaf spot diseases, rust, and/or white mold. Although resistance levels are not good enough to cut out costly fungicide applications, it does give the producer a little additional margin for error in their leaf spot programs.

Production Methods: Peanuts were planted in mid-May using conventional tillage practices in a Malbis fine sandy loam in a field cropped to peanut once every three years. Weed control and soil fertility recommendations of the Alabama Cooperative Extension Service was followed. A randomized complete block with four replications was used. Plots consisted of four 30-foot rows spaced 3.2 feet apart. Seven applications of either 4 fluid ounces per acre of Tilt 3.6E + 1 pint per acre of Bravo Ultrex or Bravo Ultrex at 1.4 pounds per acre were made approximately 14-day intervals to control late leaf spot and rust.

Disease Ratings: Incidence of TSWV was determined before digging by counting the number of hits where 1 hit is less than or equal to 1 row foot of diseased plants. Late leaf spot was rated shortly before digging using the 1 to 10 Florida leaf spot scoring system where 1 = no disease to 10 = peanuts defoliated or dead. Rust severity was rated using the 1 to 9 ICRISAT rating scale where 1 = no disease to 9 = 80 to 100% of leaves withered just before digging. White mold hit counts, where 1 hit is less than or equal to 1 row foot of consecutive white mold-damaged plants, were made immediately after the peanuts were dug. Yields are reported at 10% moisture.

Weather Conditions: In 2004, rainfall totals for May, June, July, August, and September reached or exceeded the monthly historical average. Heavy rainfall associated with several tropical storms created a favorable environment for late leaf spot and rust. For the following year, average to above average rainfall were recorded for May, June, July, August and September but were below average for April and October. Temperatures were also below the historical average for April and early May but seasonal for the remainder of the peanut production season. For the 2006 production season, rainfall patterns were unusually dry in May, June, and much of July. Average rainfall was noted in August, September, and October. In addition, temperatures were above to well above average for much of the production season.

Results

Tomato Spotted Wilt: The level of TSWV in Baldwin Co. peanuts, which has increased since significant peanut production started six years ago, jumped to record levels in 2006 (Table 1). The AP-3 peanut has consistently had among the lowest TSWV ratings. Virus ratings were also very low in the single year that GA03L was screened. Incidence of this disease has been consistently high on late maturing (maturity group 5) peanuts Florida C-99R, GA02C and GA01R. Georgia Green had among the highest TSWV ratings in 2004 and 2005 but not in 2006.

Table 1. Peanut cultivar response to TSWV at the GCREC.

\Peanut Cultivar	TSWV Incidence (hits per 60 row feet)		
	2004	2005	2006
AP-3	4.6 bc*	0.2 c	12.4 c
Carver	10.0 a	6.6 b	23.6 b
Florida C-99R	9.8 a	11.4 a	--
GA01R	--	--	38.2 a
GA02C	6.8 abc	10.4 a	24.0 b
GA03L	--	2.2 c	--
Georgia Green	7.0 abc	9.2 ab	18.6 bc

*Means in each column that are followed by the same letters are not significantly according to Fisher's least significant difference (LSD) test (P=0.05).

Leaf Spot Diseases: Overall, late leaf spot was the most common leaf spot disease. Significant differences in late leaf spot ratings were seen in all three years (Table 2). In two of three years, Carver suffered heavier leaf spotting and premature leaf loss compared with the other peanut cultivars. While year to year differences in leaf spot ratings were seen, none of the remaining peanut cultivars was especially susceptible to late leaf spot. The cultivars GA03L and GA01R that were screened in 2004 and 2005, respectively, had the lowest leaf spot ratings in those years. Late leaf spot ratings, which were high enough to cause yield loss on Carver in 2005 and 2006, never were sufficient to significantly damage the remaining peanut cultivars.

Table 2. Leaf spot ratings for peanut cultivars screened at GCREC.

Peanut Cultivar	Late Leaf Spot Rating		
	2004	2005	2006
AP-3	4.4 a**	3.7 b	3.8 bc
Carver	4.1 ab	4.9 a	4.8 a
Florida C-99R	3.2 c	3.3 bc	3.8 bc
GA01R	--	--	3.3 c
GA02C	3.6 bc	3.3 bc	3.4 bc
GA03L	--	3.1 c	--
Georgia Green	4.0 ab	3.4 bc	3.9 b

*Late leaf spot was rated using the 1 to 10 Florida leaf spot scoring system.

**Means in each column that are followed by the same letters are not significantly according to Fisher's least significant difference (LSD) test (P=0.05).

Rust: In southwestern Alabama, rust is more of a threat than late leaf spot. Rust damage ratings as well as associated yield losses were higher after the wet summers of 2004 and 2005 compared with a drier 2006. Damaging rust levels were seen on Carver in 2004 and 2005. Heavy rust

damage was seen on AP-3 and Georgia Green in only 2004. Over the three year test period, Florida C-99R and GA02C had suffered relatively less rust damage when compared with Carver.

Table 3. Rust ratings for cultivars screened at GCREC.

Peanut Cultivar	Rust Rating*		
	2004	2005	2006
AP-3	7.2 a**	5.0 b	3.8 ab
Carver	6.8 a	6.0 a	4.2 ab
Florida C-99R	4.8 b	3.8 c	4.0 ab
GA01R	--	--	4.0 ab
GA02C	5.4 b	3.8 c	3.4 b
GA03L	--	4.4 bc	--
Georgia Green	6.8 a	3.8 c	4.6 a

*Rust was rated using the 1 to 9 ICRISAT rating scale.

**Means in each column that are followed by the same letters are not significantly according to Fisher's least significant difference (LSD) test (P=0.05).

White Mold: Due to the history of soybean production across southwestern Alabama, white mold is a significant threat to greatly reduce peanut yield. Disease ratings of some cultivars were high enough in all three years to indicate that significant white mold-related yield losses occurred. Of the cultivars tested, GA02C had lower white mold ratings than Florida C-99R and Carver in two of three years and AP-3 and Georgia Green in one of three years (Table 1). In 2005, white mold incidence was lower on GA03L compared with all peanut cultivars except for GA02C. In 2005, GA01R proved equally susceptible to white mold as Florida C-99R and Georgia Green.

Table 4. Occurrence of white mold on selected peanut cultivars at GCREC.

Peanut Cultivar	White Mold (hits per 60 row feet)		
	2004	2005	2006
AP-3	7.0 a**	8.0 bc	7.2 b
Carver	8.4 a	12.6 a	6.8 b
Florida C-99R	6.6 ab	14.0 a	12.0 a
GA01R	--	--	12.6 a
GA02C	3.0 b	4.2 cd	7.8 b
GA03L	--	3.6 d	--
Georgia Green	6.4 ab	11.0 ab	9.8 ab

**Means in each column that are followed by the same letters are not significantly according to Fisher's least significant difference (LSD) test (P=0.05).

Yield: Despite significant damage from one or more diseases in each year, yield response for cultivars was often quite good (Table 5). In 2004, Carver, Florida C-99R, GA02C had significantly higher yields than AP-3 and Georgia Green. Yield recorded for Carver, Florida C-99R, and GA02C differed by less than 100 pounds per acre. Due possibly to heavy late-season rains associated with two tropical systems, overall yields were lower in 2005 than in the previous year. Similar yields were noted for Florida C-99R, GA02C, GA03L, and Georgia Green in 2005. Yield response with AP-3 was significantly below that of the above peanut cultivars except for Florida C-99R. Carver had the lowest yield of all peanut cultivars screened in 2005. Despite early season dry weather patterns, yields were very high in 2006. Highest yields were recorded

for Carver and all of the late maturing cultivars Florida C-99R, GA01R, and GA02C. Georgia Green and AP-3 yielded significantly less than the above cultivars.

Table 5. Yield of peanut cultivars screened at GCREC.

Peanut Cultivar	Yield lb/A*		
	2004	2005	2006
AP-3	4358 b**	4056 b	4565 b
Carver	5291 a	3502 c	5621 a
Florida C-99R	5380 a	4328 ab	5690 a
GA01R	--	--	5607 a
GA02C	5380 a	4544 a	5559 a
GA03L	--	4565 a	--
Georgia Green	4513 b	4544 a	4778 b

*Yields are reported at 10% moisture.

**Means in each column that are followed by the same letters are not significantly according to Fisher's least significant difference (LSD) test (P=0.05).

Summary: Results of this three year study show that several peanut cultivars have the potential to yield much higher than the current industry standard Georgia Green. Florida C-99R and GA02C yielded much higher than Georgia Green in two of three years. When compared with Georgia Green, yield response of Carver was superior in 2004 and 2006 but lower in 2005. Due to its susceptibility to late leaf spot, rust, and white mold, Carver will require an intensive foliar fungicide spray program to make the high yields seen here. Despite surprisingly high virus ratings, GA01R also yielded better than Georgia Green in 2006. In contrast, yields of AP-3 and Georgia Green did not greatly differ. Performance of AP-3 was better, however, in a second series of cultivar screening trials conducted between 2003 and 2006 at the GCREC.