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Yield Response And Disease Susceptibility Of Commercial Peanut Cultivars In Southwest Alabama From 2003 To 2006

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Introduction: Resistance is among the most effective methods for minimizing losses to damaging diseases in peanut and the need for costly fungicide inputs. Increasing losses due to tomato spotted wilt virus (TSWV), which cannot be controlled with pesticides, has spurred the selection of cultivars that have resistance to these diseases as well as leaf spot diseases, rust, and white mold. Currently, several recently released peanut cultivars not only have a good disease resistance package and excellent yield potential.

Production Methods: Peanut cultivars were planted in mid-May 2003, 2004, 2005, and 2006 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 System were followed. A randomized complete block design with four replications was used. Plots consisted of four 30-foot rows spaced 3.2 feet apart. Seven applications of Bravo Ultrex at 1.4 pounds per acre were made at approximately 14-day intervals to control leaf spot diseases.

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

Results

TSWV: While the incidence of TSWV gradually increased between 2003 and 2005, a sizeable jump in virus levels was seen in 2006. For Georgia Green, TSWV hit counts went from modest 5.3 in 2003 to a highly destructive 42.7 in 2006 (Table 1). Similar but smaller increases in virus levels were recorded over the same period for all other peanut cultivars. In 2006, AP-3, Florida C-99R, GA01R, GA02C, GA03L, and Tifrunner, which generally had similar virus ratings, suffered far less TSWV damage compared with Georgia Green.

Table 1. Reaction of commercial peanut cultivars to TSWV.

Peanut Cultivar	2003	TSWV Ratings		
		2004	2005	2006
AP-3	1.8 ab*	4.3 b	3.7 e	12.5 c
Florida C-99R	4.5 a	7.8 ab	11.2 bc	14.5 bc
GA01R	--	13.0 a	12.2 ab	22.8 b
GA02C	1.3 b	8.0 ab	5.7 de	16.7 bc
GA03L	--	--	2.8 e	15.3 bc
Georgia Green	5.3 a	13.3 a	15.8 a	42.7 a
Tifrunner	--	5.8 b	8.0 cd	11.7 c

*Means followed by same letter are not significantly different according to Fisher's least significant difference (LSD) test, P=0.05.

Late Leaf Spot: Late leaf spot is the primary leaf spot disease on peanut in this trial. While some year to year differences in disease ratings were seen on all cultivars, none proved to be highly susceptible to late leaf spot. When adequately protected with fungicides, this disease should not cause appreciable yield loss.

Table 2. Reaction of peanut cultivars to late leaf spot.

Peanut Cultivar	Late Leaf Spot			
	2003	2004	2005	2006
AP-3	3.8 b*	3.9 a	3.7 a	3.3 bc
Florida C-99R	4.5 a	3.1 b	3.6 a	3.8 ab
GA01R	--	3.0 b	3.9 a	3.3 bc
GA02C	3.3 b	3.8 a	4.0 a	3.9 a
GA03L	--	--	3.6 a	2.9 c
Georgia Green	3.5 b	4.0 a	4.0 a	3.0 c
Tifrunner	--	2.9 b	3.6 a	2.9 c

*Means followed by same letter are not significantly different according to Fisher's least significant difference (LSD) test, P=0.05.

Considerable differences in rust ratings were seen between peanut cultivars in all four years (Table 3). While none of the cultivars had consistently high rust ratings, AP-3, Georgia Green, and GA02C had high rust ratings in at least 1 year. Tifrunner and Florida C-99R had among the lowest rust ratings from 2004 through 2006.

Table 3. Rust ratings for commercial peanut cultivars.

Peanut Cultivar	Rust Rating			
	2003	2004	2005	2006
AP-3	4.5 a*	6.0 a	4.3 b	4.0 b
Florida C-99R	3.3 ab	3.8 c	4.2 b	4.7 ab
GA01R	--	3.5 c	5.0 b	4.3 b
GA02C	2.8 b	4.5 bc	4.3 b	5.6 a
GA03L	--	--	4.7 b	4.7 ab
Georgia Green	4.5 a	5.5 ab	6.2 a	4.2 b
Tifrunner	--	4.3 bc	4.2 b	4.3 b

*Means followed by same letter are not significantly different according to Fisher's least significant difference (LSD) test, P=0.05.

Significant differences in yield were noted between peanut cultivars in three of four years (Table 4). Despite relatively low ratings for TSWV, late leaf spot, and rust, yields for Tifrunner consistently were among the lowest of all peanut cultivars in 2004 through 2006. Increasing TSWV ratings between 2004 and 2006 for Georgia Green are reflected in declining yields. By 2006, Georgia Green yielded considerably less than AP-3 and GA03L. The cultivars GA01R and GA02C, which had among the highest yields in 2004 and 2005, also yielded less than AP-3 and GA03L in 2006. Florida C-99R was among the highest yielding cultivars in 2003, 2004, and 2005 but not 2006.

Table 4. Yields of commercial peanut cultivars.

Peanut Cultivar	Yield lb/A			
	2003	2004	2005	2006
AP-3	4324 a*	5114 a	3540 e	5574 a
Florida C-99R	4129 a	5034 ab	4925 bc	3961 c
GA01R	--	5590 a	5827 a	4152 bc
GA02C	4359 a	5300 a	5360 ab	4259 bc
GA03L	--	--	4718 cd	4802 ab
Georgia Green	3877 a	5009 ab	4145 d	3854 c
Tifrunner	--	4259 b	4183 d	3731 c

*Means followed by same letter are not significantly different according to Fisher's least significant difference (LSD) test, P=0.05.

Summary: The steadily increasing incidence of TSWV is a major cause for concern for growers in Southwest Alabama. Before 2006, virus incidence was not high enough to cut the yield of Georgia Green. Given the high levels of this disease seen here and nearby farms in 2006, precautions such as delaying planting until mid- to late May on twin rows must be taken in 2007 when planting Georgia Green, Carver, and other TSWV-susceptible cultivars. Planting a more TSWV-resistant cultivar is the preferred strategy for minimizing the risk of a destructive virus outbreak. In 2006, the cultivars with the best combination of low virus ratings and highest yields were AP-3 and GA03L.

None of the cultivars screened proved to consistently show a high level of susceptibility to either late leaf spot or rust. Effective control of both diseases on all cultivars can be effectively obtained with a recommended seven application calendar fungicide program.

Despite a good disease resistance package, Tifrunner was consistently among the lowest yielding cultivars. Growers should consider planting other cultivars that have demonstrated higher yield potential. With the exception of 2006, the cultivars Florida C-99R, GA01R, and GA02C demonstrated good yield potential in Southwest Alabama and have proven much more resistant to TSWV than Georgia Green. As previously mentioned, AP-3 and GA03L have also produced high pod yields in 2006.