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YIELD RESPONSE AND DISEASE SUSCEPTIBILITY OF PEANUT CULTIVARS IN CENTRAL ALABAMA IN 2007 AND 2008

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Introduction: Disease resistance is a useful tool for helping to managing diseases on peanut. Ongoing studies show that several recently released peanut cultivars, which have partial resistance to leaf spot diseases and white mold, can be produced with fewer costly fungicide inputs without jeopardizing yield. When compared with the current industry standard Georgia Green, a number of newly released peanut cultivars have shown superior resistance to the virus disease tomato spotted wilt (TSW). Previous peanut trials have shown that the level of TSW activity in Central Alabama is still far below that seen in the major producing counties, particularly in the Wiregrass Region. Several of the newly released peanut cultivar may have better yield potential than Georgia Green as well. The objective of this study is to evaluate the reaction of commercial peanut cultivars to TSW, early leaf spot, and white mold as well as to assess the impact of these diseases on their yield.

Production Methods: Runner market-type commercial peanut cultivars were sown on May 29, 2007 and June 2, 2008 at a rate of 6 seed/ft of row in an Independence (Cahaba) loamy fine sand (OM<1%) on a site that has been in a peanut monoculture for four years at the Plant Breeding Unit in Tallassee, AL. Plots were irrigated as needed in 2007 but not in 2008. Weed and disease control along with soil fertility recommendations were according to the recommendations of the Alabama Cooperative Extension System. Plots, which contained four 30-foot rows spaced 3-feet apart, were arranged in a randomized complete block with six replications.

Disease Assessment: Final TSWV hit counts (1 hit was defined as \leq 1 foot of consecutive TSWV-damaged plants per row) were made immediately before the peanuts were dug on the mid-season and late maturing cultivars in 2007 on October 19 and November 7 respectively and on October 16, 2008. Early and late leaf spot (LS) were rated together on October 19 and November 7 in 2007 and October 16 and November 4 in 2008 on the mid-season and late maturing cultivars, respectively, using the 1-10 Florida peanut leaf spot scoring system where 1 = no disease, 2 = very few spotted leaves in canopy, 3 = few spotted leaves in lower and upper canopy, 4 = some leaf spotting and \leq 10% defoliation, 5 = leaf spotting noticeable and \leq 25% defoliation, 6 = numerous spotted leaves and \leq 50% defoliation, 7 = spotted leaves very numerous and \leq 75% defoliation, 8 = numerous spotting on few remaining leaves and \leq 90% defoliation, 9 = very few remaining leaves covered with leaf spots and \leq 95% defoliation, and 10 = plants defoliated or dead. White mold hit counts (1 hit was defined as \leq 1 foot of consecutive white mold damaged plants per row) were made immediately after plot inversion on the mid- and late maturing cultivars on October 19 and November 7, 2007 as well as on October 21 and November 4, 2008, respectively. Yields are reported at 10% moisture. Significance of treatment effects were tested Fisher's protected least significant difference (LSD) test ($P=0.05$).

Weather Patterns: While monthly rainfall totals in 2007 were often below to well below the 30-year average for the Plant Breeding Unit, afternoon temperatures were unusually high throughout much of the summer. In 2008, rainfall totals for June and September were below the 30-year average but were average to well above average for July, August, and October. Temperatures were above average in June but seasonal in July and August. Temperatures in October were cool, particularly at night.

Results

Tomato spotted wilt: While no differences in TSW ratings between peanut cultivars were seen in 2007, minor differences in disease levels were seen in 2008 between peanut cultivars (data not shown). However, TSW pressure during the two year study period has remained well below the levels where yield loss occurs, even on the susceptible cultivar Georgia Green.

Leaf spot diseases: Early leaf spot is the dominate leaf spot disease. In both years, noticeable leaf spotting in the mid- canopy and some premature leaf loss was seen on AT3085RO, GA02C, and Georgia Green (Table 1). While leaf spot ratings for McCloud were low in 2007, early leaf spot severity on McCloud and Georgia Green was similar in 2008. Over the two years, GA03L had the lowest leaf spot ratings. Other peanut cultivars with equally low disease ratings in 2008 were FL07, Tifguard, and York.

White mold: White mold damage was higher in 2007 than 2008. Over the study period, AT3085RO had the highest white mold incidence (Table 1). Only McCloud had similar white mold hit counts in 2008 to the latter peanut cultivar. Some white mold damage was seen on Georgia Green in 2007 and to a lesser extent in 2008. In contrast, white mold ratings for AP-3, GA03L, C-99R, and GA02C were low in both years. Tifguard, FL07, and York suffered very little white mold damage in 2008.

Table 1. Early leaf spot and white mold ratings for commercial peanut cultivars screened at PBU in 2007 and 2008.

Peanut cultivar	Early leaf spot		White mold	
	2007	2008	2007	2008
Mid-maturity (mature 130-145 DAP)				
AP-3	3.4 c	4.9 c	3.2 bc	0.5 c
AT3085RO	4.6 a	5.9 a	10.7 a	5.6 a
FL07	--	4.8 c	--	1.7 bc
GA03L	2.8 d	4.2 d	0.7 c	0.5 c
Georgia Green	4.0 b	5.8 ab	6.2 b	2.8 bc
McCloud	2.8 d	5.4 b	ND	4.3 ab
Tifguard	--	4.4 d	--	0.3 c
Late maturity (mature 140-165 DAP)				
C-99R	3.8 bc	4.9 c	1.8 c	1.0 c
GA02C	4.3 ab	5.5 ab	0.5 c	0.0 c
York	--	4.3 d	--	0.0 c

^zLeaf spot was rated using the Florida 1 to 10 rating scale.

^yWhite mold severity is expressed as the number of hits per 60 foot of row.

^xMeans in each column that are followed by the same letter are not significantly different according Fisher's protected least significant difference (LSD) test ($P \leq 0.05$).

^w-- = Not included in 2007 study.

Yield: Highest yielding cultivars over the two year study period were AP-3 and GA03L (Table 2). In 2008, Tifguard, FL07, and McCloud yields were similar to those of the above peanut cultivars. While yield of Georgia Green also did not differ from AP-3 or GA03L in 2007, yield response for the former cultivar was significantly lower in 2008. In 2008, the relatively low yields for the later maturing cultivars C-99R, GA02C, and York was due to heavy frost damage.

Table 2. Yield of peanut cultivars screened in 2007 and 2008 at PBU.

Peanut cultivar	Yield (lb/A) ^z	
	2007	2008
Mid-maturity (mature 130-145 DAP)		
AP-3	4391 a ^y	4685 a
AT3085RO	3317 b	4153 c
FL07	-- ^x	4767 a
GA03L	4274 a	4705 a
Georgia Green	3760 ab	4200 bc
McCloud	ND ^w	4540 ab
Tifguard	--	4476 abc
Late maturity (mature 140-165 DAP)		
C-99R	4021 ab	3518 d
GA02C	4454 a	3446 d
York	--	4246 bc

^zYields are reported at 10% moisture.

^yMeans in each column that are followed by the same letter are not significantly different according Fisher's protected least significant difference (LSD) test ($P \leq 0.05$).

^x-- = Not included in study.

^wND = White mold and yield data for McCloud lost due to poor stand.

Summary: Due to its continued low incidence, TSW has had a negligible impact on peanut yields at this and other locations in Central Alabama. Given the relatively low peanut acreage in this region, a noticeable increase in the severity of this potential destructive disease in the near future is unlikely. However, sowing a TSW-resistant peanut cultivar such as FL07, GA03L or Tifguard is strongly suggested, particularly in situations where peanuts are planted in the last week in April through the second week of May. At later planting dates, damaging outbreaks of TSW are highly unlikely, even a virus susceptible cultivar like Georgia Green.

Over two years, AP-3, C-99R, and GA03L displayed the best resistance to early leaf spot and white mold. During the same period, GA02C proved moderately susceptible to early leaf spot but had the same white mold ratings as the above peanut cultivars. Based on 2008 results, Tifguard, FL07, and York also may have good disease resistance packages. Elevated leaf spot and/or white mold damage levels were seen in at least one year on McCloud, Georgia Green, and AT3085RO. Disease-related yield reductions were recorded for AT3085RO and Georgia Green. Heavy frost damage and lower yields for C-99R, GA02C, and York in 2008 illustrates that late maturing peanut cultivars should be planted in Central Alabama no later than the second week in May.