

## **Yield Response and Disease Susceptibility of Commercial Runner Peanut Lines in an Irrigated Production System**

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Currently, Georgia Green is the most widely planted runner-type peanut line planted in Alabama and surrounding states. A much smaller acreage is cropped to Virugard, C-99R, and AT 201. Within the last few months, a half dozen peanut lines have been released by breeders in Georgia and Florida for seed increase. Dr. William Branch at UGA has developed TSWV-resistant lines GA 01R and GA 02C. The latter cultivar has a high oleic acid content. Carver, DP-1, GP-1, Hull, Norden and Andru II are products of the Florida breeding program. Of the six Florida lines, Andru II, Norden and GP-1 have high oleic acid profiles. Andersen Seed Co will market Andru II. Small quantities of these peanut lines will be available to producers of registered and certified seed.

Commercial peanut lines, including those newly released by Florida and Georgia, were evaluated in a series of studies at the WGREC to assess their susceptibility to destructive diseases such as tomato spotted wilt, leaf spot diseases and southern stem rot, as well as to determine their yield potential and value in an irrigated production system.

### **Material and Methods**

Test sites were prepared using conventional tillage practices and were fertilized according to the results of a soil fertility assay. In most cases, peanuts were planted at a rate of 6 seed per ft of row in early May. The experimental design was a randomized complete block with four replications. In some cases, a split plot design was used with peanut lines as whole plots and a pesticide treatment as the subplot treatment. Individual plots consisted of 2 or 4 rows that were 20 to 30 ft in length and spaced 3 ft apart. Weed control practices of the Alabama Cooperative Extension System were followed, and escape weeds were pulled by hand. The plot areas were

watered as needed with a side-roll irrigation system as needed. For the annual uniform PVT study, the fungicide program included two initial applications of Bravo Ultrex @ 1.4 lb/A followed by a block of 4 successive applications of Folicur 3.6F @ 0.45 pt/A and a final application of Bravo Ultrex @ 1.4 lb/A. In the remaining studies in 2002, several different programs, including the above Folicur 3.6F program, were used to control leaf spot, peanut rust, and depending on the treatment regime, white mold. Rating scales used to evaluate the severity of tomato spotted wilt (TSWV), early and late leaf spot, and white mold are described in the footnotes for each table. Yields are reported at approximately 10% moisture.

## Results

Peanut lines listed in Table 1 include those from which seed should be available or have been recently released by the Florida or Georgia Seed Foundation for seed increase in 2003. Florunner is the susceptible standard in the uniform PVT and UPPT trials and is included for comparison purposes. Results from the PVT and UPPT trials have been blended in Table 1, Table 2, Table 5, and Table 6. Data for peanut lines such as Andru 93 that have been replaced by newer selections are not included in the tables.

**TSWV** - Over the four-year reporting period, Virugard, AT 201, Carver, Georgia Green, Florida C-99R, and Southern Runner have lower TSWV ratings than Florunner (Table 1). The TSWV ratings for Virugard and C-99R in two years may be slightly lower than those for the remaining peanut lines, particularly the very widely grown Georgia Green. As expected, all of the remaining peanut lines suffered less TSWV damage than did Florunner. Of these peanut lines, GA 02C and DP-1 appear to have a high level of TSWV resistance, particularly when compared with Georgia Green in 2002. In contrast, the levels of TSWV resistance for newly released lines Carver, Georgia Hi Oil, Norden and Hull may be very similar to that exhibited by Georgia Green. While the newly released lines GA 01R and Andru II had low TSWV ratings in 2002, at least one more year of data will be required before their resistance to this virus can be confirmed.

**Early and Late Leaf Spot** - For the past few years, late leaf spot has been the most common and damaging leaf spot disease on the peanut lines evaluated in the annual PVT test. In 2002, the predominate leaf spot on AgraTech 201, DP-1, GA 01R, Georgia Hi Oil, and Norden was late leaf spot, while the incidence of both early and late leaf spot was similar on Florida C99R and Southern Runner. As in 2002, frequent late summer showers are very conducive to the spread and development of this disease. Late season dry weather patterns like those recorded in 2001 will suppress both early and late leaf spot. Despite an intensive fungicide program, some leaf spotting and premature defoliation develops in the canopy of all of the peanut lines screened. However, significant differences in the level of late and early leaf spot are recorded each year among the 20 to 22 entries.

Of the peanut lines evaluated from 1999 through 2002 in the PVT test, AT 201 and Virugard typically had leaf spot ratings similar to or higher than those recorded for Florunner (Table 1). In contrast, Carver, Georgia Green, Florida C-99R, and Southern Runner had leaf spot ratings similar to and often lower than those noted for Florunner. Reaction of Georgia Hi Oil, Hull, and Norton to leaf spot disease did not differ appreciably from that of the four latter peanut lines. GA 02C and DP-1, which were tested in only two years, displayed a slightly higher level of resistance to both leaf spot diseases than did several cultivars evaluated during the same time period.

In a second study in 2002, the reactions of seven peanut lines to leaf spot diseases and peanut rust were compared. The heaviest damage due to a combination of early and late leaf spot was seen on AT 1-1 and AT 201. As indicated by leaf spot ratings of 7.4, both peanut lines suffered from defoliation in excess of 75% and heavy spotting of the remaining leaflets (Table 3). Virugard, Georgia Green, and Southern Runner, which had defoliation levels of approximately 50%, also proved highly sensitive to a mixed outbreak of early and late leaf spot. Significantly lower levels of both leaf spot diseases were seen on DP-1 and Florida C-99R. Damage on DP-1 was limited to moderate leaf spotting throughout the plant canopy and a low level of defoliation.

Of the above peanut lines, the heaviest rust development was seen on AT 201 (Table 3). Light rusting of the leaflets was noted on five of the remaining six peanut lines. The early maturing lines AT 1-1 and Virugard, which had the lowest rust ratings, were probably dug before this disease became established.

In this third study at the WGREC, leaf spot severity was much worse on Georgia Green than on the remaining peanut lines (Table 4). A leaf spot severity rating of 6.5 indicated that Georgia Green lost between 50 and 75% of the leaf canopy. Also, most of the remaining leaves on the plants were badly spotted and would have been shed if digging had been delayed. While considerable evidence of early leaf spot was found on Georgia Green, late leaf spot appeared to be the more common of the two diseases. Among the remaining peanuts, Norton had the higher leaf spot ratings and suffered from moderate defoliation and spotting of the leaves. The ratio of early to late leaf spot on Norden and Virugard was about 50/50. Damage on Virugard, DP-1, Hull, and Florida C-99R was limited to light defoliation and some leaf spotting in the lower and upper leaf canopy.

**White Mold** - Particularly in the last two years, white mold damage has not been as severe in the PVT and UPPT trials than in many of the other irrigated studies conducted at the WGREC. The relatively low white mold pressure has been due to the two-year interval between peanut crops, compared with a one-year interval for most other studies. Despite two years of cotton between peanuts, significant differences in the level of white mold damage have been noted between commercial peanut lines. In three of four years, the Florunner peanut had white mold damage ratings higher than those recorded for nearly all of the other peanut lines screened, including the current industry standard Georgia Green (Table 5). Generally, relatively few differences in white mold incidence have been found between Georgia Green and the majority of other commercial peanut lines. Virugard had lower white mold ratings than Georgia Green in three of four years, while Florida C-99R, GA 02C, and Hull may have suffered less damage in only one year. Damage ratings for AT 201, which were higher than those of Georgia Green in two of four years, may be the most susceptible to white mold of commonly grown peanut lines.

**Yield** – With the possible exception of 2002, all of the peanut lines screened over the full four-year study period had significantly higher yields than Florunner. Yield for Carver and Virugard was considerably higher in two of four years than those yields recorded for the current standard Georgia Green. Yields recorded for Florida C-99R and Georgia Green were similar. In contrast, Georgia Green outyielded AT 201 and Southern Runner in three and two years, respectively. Of the cultivars evaluated for three years, Norton did not yield as high as Georgia Green, but Hull did. So far, yield of DP-1 has been also lower than that of Georgia Green, while GA 02C and GA 01R demonstrated good yield potential, respectively, in two and one year of testing. In 2002, Andru II and GP-1 produced higher pod yields than Georgia Green.

Table 1. Reaction of selected commercial peanut lines to TSWV in the PVT and UPPT Test at the WGREC, 1999-2002.

Peanut Line	TSWV Incidence Number of hits/40 row ft <sup>z</sup>			
	1999	2000	2001	2002
<b>Maturity Group 3 (mature at 126-140 DAP)</b>				
<b>Andru II</b>	--	--	--	<b>5.3</b>
<b>GP-1</b>	--	--	--	<b>10.5</b>
<b>Virugard</b>	<b>5.3</b>	<b>13.5</b>	<b>5.5</b>	<b>6.0</b>
<b>Maturity Group 4 (mature at 130-145 DAP)</b>				
<b>AgraTech 201</b>	<b>9.5</b>	<b>21.3</b>	<b>10.5</b>	<b>7.0</b>
<b>Carver</b>	<b>6.0</b>	<b>19.3</b>	<b>13.3</b>	<b>7.0</b>
<b>Florunner</b>	<b>20.0</b>	<b>28.3</b>	<b>20.0</b>	<b>17.0</b>
<b>GA 02C</b>	--	--	<b>4.8</b>	<b>7.5</b>
<b>Georgia Green</b>	<b>4.8</b>	<b>21.0</b>	<b>8.8</b>	<b>13.3</b>
<b>Georgia Hi Oil</b>	--	<b>12.0</b>	<b>10.5</b>	<b>5.8</b>
<b>Norden</b>	--	<b>16.5</b>	<b>11.3</b>	<b>8.0</b>
<b>Maturity Group 5 (mature at 140-165 DAP)</b>				
<b>DP-1</b>	<b>3.8</b>	--	--	<b>4.3</b>
<b>Florida C-99R</b>	<b>9.3</b>	<b>14.8</b>	<b>7.5</b>	<b>7.0</b>
<b>GA 01R</b>	--	--	--	<b>4.3</b>
<b>Hull</b>	--	<b>20.3</b>	<b>9.8</b>	<b>9.8</b>
<b>Southern Runner</b>	<b>13.0</b>	<b>20.3</b>	<b>11.8</b>	<b>11.3</b>

<sup>z</sup>Counts of TSWV hits (1 hit was defined as < 1 ft of consecutive diseased plant(s) in a row) were made the day the plots were dug.

Table 2. Reaction of selected commercial peanut lines to leaf spot diseases in the PVT and UPPT test, WGREC, 1999-2002.

Peanut Line	Combination Early and Late Leaf Spot Severity Rating <sup>z</sup>			
	1999	2000	2001	2002
<b>Maturity Group 3 (mature at 126-140 DAP)</b>				
<b>Andru II</b>	--	--	--	<b>4.5</b>
<b>GP-1</b>	--	--	--	<b>5.8</b>
<b>Virugard</b>	<b>4.3</b>	<b>4.5</b>	<b>3.8</b>	<b>4.5</b>
<b>Maturity Group 4 (mature at 130-145 DAP)</b>				
<b>AgraTech 201</b>	<b>5.0</b>	<b>4.3</b>	<b>3.5</b>	<b>5.3</b>
<b>Carver</b>	<b>4.0</b>	<b>4.8</b>	<b>3.0</b>	<b>5.0</b>
<b>Florunner</b>	<b>4.5</b>	<b>3.8</b>	<b>3.8</b>	<b>5.8</b>
<b>GA 02C</b>	--	--	<b>2.3</b>	<b>3.8</b>
<b>Georgia Green</b>	<b>4.8</b>	<b>4.0</b>	<b>2.3</b>	<b>4.8</b>
<b>Georgia Hi Oil</b>	--	<b>3.3</b>	<b>3.8</b>	<b>4.8</b>
<b>Norden</b>	--	<b>4.0</b>	<b>3.0</b>	<b>4.0</b>
<b>Maturity Group 5 (mature at 140-165 DAP)</b>				
<b>DP-1</b>	<b>3.8</b>	--	--	<b>4.0</b>
<b>Florida C-99R</b>	<b>3.5</b>	<b>4.8</b>	<b>3.0</b>	<b>4.8</b>
<b>GA 01R</b>	--	--	--	<b>4.0</b>
<b>Hull</b>	--	<b>5.5</b>	<b>2.3</b>	<b>5.3</b>
<b>Southern Runner</b>	<b>4.3</b>	<b>4.3</b>	<b>2.0</b>	<b>4.3</b>

<sup>z</sup>Leaf spot severity was rated within 1 week of plot inversion using the 1 to 10 leaf spot scoring system where 1 = no disease, 2 = very few leaf spots, 3 = few leaf spots in lower and upper canopy, 4 = light spotting and defoliation, 5 = spotting noticeable with some defoliation, 6 = noticeable spotting with significant defoliation, 7 = heavy spotting and defoliation, 8 = heavy spotting of few remaining leaves, 9 = very few leaves remaining, and 10 = plants defoliated or dead.

Table 3. Reaction of selected commercial peanut lines to leaf spot diseases and peanut rust, WGREC 2002<sup>z</sup>.

Peanut Line	Maturity Group	Leaf Spot rating <sup>y</sup>	Peanut Rust rating <sup>w</sup>	Peanut Line	Maturity Group	Leaf Spot rating <sup>y</sup>	Peanut Rust rating <sup>w</sup>
<b>AT 1-1</b>	<b>3</b>	<b>7.4</b>	<b>1.0</b>	<b>DP-1</b>	<b>5</b>	<b>4.3</b>	<b>2.3</b>
<b>Virugard</b>	<b>3</b>	<b>6.1</b>	<b>1.3</b>	<b>Florida C-99R</b>	<b>5</b>	<b>5.3</b>	<b>1.8</b>
<b>AT 201</b>	<b>4</b>	<b>7.4</b>	<b>3.0</b>	<b>Southern Runner</b>	<b>5</b>	<b>5.9</b>	<b>2.1</b>
<b>Georgia Green</b>	<b>4</b>	<b>6.2</b>	<b>2.3</b>				

<sup>z</sup>Virugard was dug 126 DAP, Georgia Green and Norton at 131 DAP, and the remaining peanut lines were dug at 140 DAP.

<sup>y</sup>Leaf spot severity was rated within 1 week of plot inversion using the 1 to 10 leaf spot scoring system where 1 = no disease, 2 = very few leaf spots, 3 = few leaf spots in lower and upper canopy, 4 = light spotting and defoliation, 5 = spotting noticeable with some defoliation, 6 = noticeable spotting with significant defoliation, 7 = heavy spotting and defoliation, 8 = heavy spotting of few remaining leaves, 9 = very few leaves remaining, and 10 = plants defoliated or dead.

<sup>w</sup>Peanut rust was rated using the 1 to 9 ICRISAT rating scale.

Table 4. Comparison of leaf spot damage on several newly-released Florida lines compared to standard peanut lines at the WGREC, 2002<sup>y</sup>.

Peanut Line	Maturity Group <sup>z</sup>	Leaf Spot Rating <sup>w</sup>	Peanut Line	Maturity Group	Leaf Spot Rating
<b>Virugard</b>	<b>3</b>	<b>3.8</b>	<b>DP-1</b>	<b>5</b>	<b>3.3</b>
<b>Georgia Green</b>	<b>4</b>	<b>6.5</b>	<b>Florida C-99R</b>	<b>5</b>	<b>4.0</b>
<b>Norton</b>	<b>4</b>	<b>5.5</b>	<b>Hull</b>	<b>5</b>	<b>4.0</b>

<sup>z</sup>Virugard was dug 126 DAP, Georgia Green and Norton at 131 DAP, and the remaining peanut lines at 140 DAP.

<sup>y</sup>Leaf spot control was maintained by seven applications of Bravo Ultrex @ 1.4 lb/A applied at two-week intervals between 1 July and 23 September 2002.

<sup>w</sup>Leaf spot severity was rated within 1 week of plot inversion using the 1 to 10 leaf spot scoring system where 1 = no disease, 2 = very few leaf spots, 3 = few leaf spots in lower and upper canopy, 4 = light spotting and defoliation, 5 = spotting noticeable with some defoliation, 6 = noticeable spotting with significant defoliation, 7 = heavy spotting and defoliation, 8 = heavy spotting of few remaining leaves, 9 = very few leaves remaining, and 10 = plants defoliated or dead.

Table 5. Reaction of selected commercial peanut lines to white mold in the PVT and UPPT test, WGREC, 1999-2002.

Peanut Line	White Mold Incidence Number of hits/40 row ft			
	1999	2000	2001	2002
Maturity Group 3 (mature at 126-140 DAP)				
Andru II	--	--	--	0.4
GP-1	--	--	--	2.0
Virugard	1.8	0.8	1.0	1.3
Maturity Group 4 (mature at 130-145 DAP)				
AgraTech 201	9.8	9.5	3.5	1.3
Carver	1.0	7.0	3.0	1.8
Florunner	3.8	13.3	7.3	5.0
GA 02C	--	--	1.0	0.8
Georgia Green	3.5	6.3	3.3	1.0
Georgia Hi Oil	--	7.3	2.5	0.5
Norden	--	11.8	3.0	1.8
Maturity Group 5 (mature at 140-165 DAP)				
DP-1	6.5	--	--	1.3
Florida C-99R	5.0	4.5	1.3	3.5
GA 01R	--	--	--	1.0
Hull	--	8.0	0.8	1.5
Southern Runner	4.8	4.8	4.8	3.0

<sup>2</sup>Counts of TSWV hits (1 hit was defined as < 1 ft of consecutive diseased plant(s) in a row) were made the day the plots were dug.

Table 6. Yield of selected commercial peanut lines in the PVT and UPPT test at the WGREC, 1999-2002.

Peanut Line	Yield lb/A			
	1999	2000	2001	2002
Maturity Group 3 (mature at 126-140 DAP)				
Andru II	--	--	--	5902
GP-1	--	--	--	5463
Virugard	4701	5037	5191	5651
Maturity Group 4 (mature at 130-145 DAP)				
AgraTech 201	4048	4283	5935	6090
Carver	5033	4320	5754	6212
Florunner	3685	2523	4528	5699
GA 02C	--	--	5890	5699
Georgia Green	4912	4538	6071	4733
Georgia Hi Oil	--	4783	5881	5594
Norden	--	4066	5100	5142
Maturity Group 5 (mature at 140-165 DAP)				
DP-1	5000	--	--	4906
Florida C-99R	5155	4447	5953	5592
GA 01R	--	--	--	6559
Hull	--	4320	5654	5443
Southern Runner	4129	3866	4801	5346

## SUMMARY

Peanut Line	Comments
<b>Maturity Group 3 (matures 126 to 140 DAP)</b>	
Andru II (high oleic)	Good TSWV resistance and average susceptibility to leaf spot diseases.
GP-1 (high oleic)	Considered very sensitive to TSWV by breeder.
Virugard	Has good resistance to TSWV, leaf spot diseases and white mold.
<b>Maturity Group 4 (matures 130 to 145 DAP)</b>	
AgraTech 201	Is susceptible to TSWV and peanut rust. So highly susceptible to early and late leaf spot that it may need additional fungicide protection.
Carver	Average reaction to TSWV and leaf spot but may be less sensitive to white mold than Georgia Green.
Florunner	Susceptible standard for PVT and UPPT trials.
GA02C (high oleic)	Better than average resistance to TSWV and also may be partially resistant to leaf spot diseases, white mold, and CBR.
Georgia Green	Some new lines are less sensitive to TSWV but still the king.
Georgia Hi Oil	Ratings for TSWV, leaf spot and, white mold are roughly similar to those of Georgia Green.
Norden (high oleic)	Ratings for TSWV, leaf spot and, white mold are roughly similar to those of Georgia Green.
<b>Maturity Group 5 (matures 140 to 165 DAP)</b>	
DP-1	Has good resistance to TSWV, leaf spot, and possibly white mold. Good yield potential in root-knot infested fields.
Florida C-99R	Has better than average TSWV ratings, as well as lower leaf spot and white mold ratings than Georgia Green.
GA 01R	Very good TSWV and leaf spot ratings logged in 2002 but other data is lacking.
Hull	TSWV, leaf spot, and white mold ratings are on a par with those of Georgia Green.
Southern Runner	Has been or will be replaced by the above late maturing peanut lines.