

266  
TX-72  
549  
2008

**Final report: March 31, 2009**

**Project Title:**

Year 2: Development of early maturing peanut varieties through modified plant types and cultural practices.

**Personnel and Agency:**

Principal investigators:

Kim M. Moore  
1011 Joe Sumner Rd.  
Ashburn, Georgia 31714  
Phone: 229 776 1218  
Cell: 229 402 0435  
Fax: 229 776 0653  
Email: [kmoore@surfsouth.com](mailto:kmoore@surfsouth.com)

Jim Gregory  
PO Box 125  
Wellman, Texas 79378  
Phone: 806 637 0930  
Cell: 806 777 1459  
Fax: 806 637 0930  
Email: [jim.gregory@ttu.edu](mailto:jim.gregory@ttu.edu) or  
[jgregory@esc17.net](mailto:jgregory@esc17.net)

Agency:

AgResearch Consultants Inc.  
1011 Joe Sumner Rd.  
Ashburn, Georgia 31714

Problem and Need:

Current peanut cultural practices have developed over the years in part due to the plant architecture of available varieties. Generally, cultivars have been low growing spreading vines. Planting rates and harvest methods have developed to accommodate these plant types. Large spreading plants tend to produce far more vegetative material than seed so are not as physiologically efficient as smaller upright plants. In addition, the larger spreading plants are indeterminate and late maturing adding to size and quality variation. Spreading plants also tend to be more vulnerable to soil born fungal infections. Varieties with smaller upright plant types and large tap root crops could potentially have higher grades, greater uniformity, and earlier maturity. These varieties if planted in narrow rows and uniform spacing could improve quality, reduce inputs, and yield competitively with larger spreading cultivars. Smaller plants planted in higher density could cover the ground faster. This could improve water use efficiency and provide early season weed competition. If maturity could be reduced to 120 days, there could be significant savings in irrigation applications. This project proposes to develop early maturing disease resistant peanut varieties suitable for high density planting by their plant architecture using conventional plant breeding. The resulting varieties will have a small upright plant with a heavy tap root crop

that is uniform and early maturing. The morphology of these varieties may require a modified management system and some modifications to planting and harvesting equipment. Through this research project, the appropriate management system will be developed maximizing yield and grade so these ultra early, more efficient varieties will yield competitively with current peanut varieties and cultural practices.

#### Evaluation of existing lines in twin and single row

A preliminary test in West Texas 2006 identified several peanut lines with a significant number of mature pods at 120 days. These lines have small upright plant types that may be more productive with narrow row spacing or twin row spacing. In 2007, these lines were planted in a test to compare 40 inch row spacing with 20 inch row spacing. Flavor Runner 458 was also planted in the test as a check variety. The test was dug at 136 days and was evaluated for yield, grade, hull scrape, and disease incidence. Test results showed an increase in yield due to narrow row spacing. Also in 2007, three of the experimental varieties were more than 90% mature as measured by the hull scrape maturity method. In 2008, this test was repeated with further modification of the row spacing to simplify planting and digging for commercial production. This row spacing is similar to twin row spacing rather than 20 inch evenly spaced rows. Also in the 2008 evaluation, there are three digging dates which will help with determining the optimum maturity for each of the experimental lines. This evaluation will be repeated in 2009. It will be important to compare the results of the previous years and to have another year of multiple digging dates. There may be additional improved varieties to include as new entries to the 2009 test.

#### 2008 Twin row maturity test

Eight ultra-early maturing peanut lines were selected for planting in the modified row pattern test. These are uniform lines that mature in 130-40 days after planting when planted in West Texas. The test was planted on May 18, 2008 near Brownfield, Texas. The test consisted of a total four replications. Two replications were planted with narrow or twin row planting pattern and two replications on 40 inch row spacing. Flavor Runner 458 was included in the test as a check variety. All entries were planted in three two row plots within each replication. With this arrangement, a plot of each entry in each replication could be dug at 3 different digging dates. The digging dates were 9/22/08, 10/3/08, and 10/12/08, corresponding to 128, 139, and 148 days after planting. Samples were collected for hull scrape maturity evaluation. Plot yields are listed in the Table 1 and hull scrape data is listed in Tables 2, 3, and 4 below.

Table 1 Yield data at three digging dates with twin and single rows  
**Twin row maturity test 2008**

Day after planting	Entry-digging	Lbs/acre	Lbs/acre	Lbs/acre
		Single row*	Twin row*	Twin row single row difference
128	D116-1	3625	4246	621
139	D116-2	3607	3515	-92
148	D116-3	3013	4132	1118
128	D140-1	3831	4408	577
139	D140-2	3767	4725	958
148	D140-3	4081	4766	685
128	D158-1	3309	4035	726
139	D158-2	3734	3849	114
148	D158-3	3352	4176	824
128	D173-1	3440	4084	644
139	D173-2	3460	4027	567
148	D173-3	3571	3474	-96
128	D174-1	3579	3864	284
139	D174-2	4055	4858	803
148	D174-3	4065	4743	679
128	FR 458-1	4410	5320	911
139	FR 458-2	5237	5304	67
148	FR 458-3	5456	5883	427
128	WT04-0088-1	4310	4738	428
139	WT04-0088-2	4974	5631	657
148	WT04-0088-3	5041	5808	767
128	WT06-1165-1	3895	4305	410
139	WT06-1165-2	4344	4946	602
148	WT06-1165-3	4117	5472	1355
128	WT06-1166-1	3752	4359	607
139	WT06-1166-2	3816	4694	878
148	WT06-1166-3	4467	5052	585

\*Average 2 replications

In the hull scrape maturity evaluation, in-shell peanuts are blasted with sand or water to remove the outer layer of the hull revealing the color of the inner-layer of the hull. Darker colors brown and black are a sign of maturity. In tables 2, 3, and 4 the percent of the color classes are listed for each line, in each row pattern, and for each digging date.

Table 2 Hull scrape classes at 128 days after planting

<b>Digging 128 days</b>	<b>Hull Scrape</b>					
	<b>Rows</b>	<b>% Yellow 1</b>	<b>% Yellow 2</b>	<b>% Brown</b>	<b>% Black</b>	<b>% Brown &amp; Black</b>
<b>Twin Row Mat. Test</b>						
D-116	single	15.5	29.6	46.6	8.3	54.9
D-116	twin	4.3	27.2	57.1	11.4	68.5
D-140	single	0.0	11.3	88.7	0.0	88.7
D-140	twin	0.0	12.1	87.9	0.0	87.9
D-158	single	0.0	30.9	68.6	0.5	69.1
D-158	twin	7.9	19.1	68.4	4.6	73.0
D-173	single	0.0	21.1	68.0	10.9	78.9
D-173	twin	5.5	22.0	62.5	10.0	72.5
D-174	single	38.0	37.2	22.6	2.2	24.9
D-174	twin	24.0	40.2	33.3	2.5	35.8
FR 458	single	44.8	42.4	12.8	0.0	12.8
FR 458	twin	45.1	53.0	1.9	0.0	1.9
WT04-0088	single	55.0	45.0	0.0	0.0	0.0
WT04-0088	twin	54.8	42.0	3.2	0.0	3.2
WT06-1165	single	35.3	30.3	33.1	1.2	34.3
WT06-1165	twin	3.2	11.6	82.7	2.4	85.1
WT06-1166	single	24.0	29.8	46.2	0.0	46.2
WT06-1166	twin	18.4	36.7	37.1	7.8	44.9

Table 3 Hull scrape classes at 139 days after planting

<b>Digging 139 days</b>						
<b>Twin Row Mat. Test</b>	<b>Rows</b>	<b>% Yellow 1</b>	<b>% Yellow 2</b>	<b>% Brown</b>	<b>% Black</b>	<b>% Brown &amp; Black</b>
D-116	single	0.0	11.9	61.9	26.1	88.1
D-116	twin	3.6	12.8	53.8	29.8	83.6
D-140	single	2.8	6.0	86.5	4.8	91.2
D-140	twin	1.6	10.8	82.8	4.8	87.6
D-158	single	5.8	25.4	64.7	4.0	68.8
D-158	twin	2.5	22.4	74.7	0.4	75.1
D-173	single	0.0	25.3	64.1	10.6	74.7
D-173	twin	1.0	13.9	75.6	9.4	85.0
D-174	single	21.8	41.4	31.7	5.1	36.8
D-174	twin	12.1	39.4	44.6	3.9	48.5
FR 458	single	36.6	26.4	36.1	0.9	37.0
FR 458	twin	18.7	33.7	47.6	0.0	47.6
WT04-0088	single	13.6	44.6	41.8	0.0	41.8
WT04-0088	twin	19.9	47.4	32.6	0.0	32.6
WT06-1165	single	0.0	12.0	88.0	0.0	88.0
WT06-1165	twin	1.9	22.8	75.3	0.0	75.3
WT06-1166	single	10.8	17.5	66.0	5.7	71.7
WT06-1166	twin	24.9	30.2	40.0	4.9	44.9

Table 4 Hull scrape classes at 148 days after planting

<b>Digging 148 days</b>						
<b>Twin Row Mat. Test</b>	<b>Rows</b>	<b>% Yellow 1</b>	<b>% Yellow 2</b>	<b>% Brown</b>	<b>% Black</b>	<b>% Brown &amp; Black</b>
D-116	single	4.0	15.3	31.6	49.1	80.7
D-116	twin	0.0	7.0	27.5	65.5	93.0
D-140	single	0.0	5.9	69.1	25.0	94.1
D-140	twin	0.0	21.2	73.6	5.2	78.8
D-158	single	3.5	20.1	59.8	16.6	76.4
D-158	twin	22.4	5.0	65.6	6.9	72.6
D-173	single	0.0	3.2	37.4	59.4	96.8
D-173	twin	2.4	4.7	28.3	64.6	92.9
D-174	single	8.5	34.2	42.7	14.5	57.3
D-174	twin	12.2	16.5	33.1	38.2	71.2
FR 458	single	16.3	33.0	50.7	0.0	50.7
FR 458	twin	15.5	24.7	55.1	4.8	59.8
WT04-0088	single	5.4	12.9	51.5	29.0	80.5
WT04-0088	twin	10.2	45.8	39.2	4.8	44.0
WT06-1165	single	0.0	8.9	64.3	26.8	91.1
WT06-1165	twin	0.0	18.1	59.1	22.8	81.9
WT06-1166	single	5.0	9.5	63.2	22.4	85.6
WT06-1166	twin	4.8	23.4	62.1	9.7	71.8

## Conclusions

The twin and single row patterns appear to have some effect on yield but not much effect on maturity. The earliest maturing line based on hull scrape data was D140. At 128 days after planting, D140 had 88.7% and 87.9% black and brown hulls in single and twin row planting patterns respectively. By comparison, at 128 days after planting, the check variety Flavor Runner 458 had only 12.8% and 1.9% black and brown hulls in single and twin row planting patterns respectively. All early lines had a positive yield response to twin row planting patterns including D140. Increases in yield due to twin row planting patterns, ranged from 577lbs/acre in the 128 day digging to 958lbs/acre in the 139 day digging. The check variety, Flavor Runner 458, also responded to twin row planting pattern but not as significantly as the earlier maturing bunch type varieties. Flavor Runner 458 also continued to increase in yield over digging dates and was the highest yielding variety in the test. Seven out of eight experimental lines were significantly earlier maturing than the check varieties. However, the check variety continued to out yield the experimental lines over all digging dates. Further development and evaluation of additional lines will be conducted with the objective of identifying an early maturing high oleic line with yield competitive with Flavor Runner 458.