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**NATIONAL PEANUT BOARD / SOUTHEAST PEANUT RESEARCH
INITIATIVE**

FINAL REPORT for WORK DONE UNDER RESEARCH AGREEMENT # 26-31-
RE671-626 GACCP RESPONSE TO BEASL

INSTITUTION: University of Georgia
PROJECT TITLE: Peanut Response to Agronomic Management
RES. AGR. NO.: 26-31-RE671-626
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FINAL REPORT:

Executive Summary:

In crop year 2010 in Georgia, trials were conducted to determine peanut cultivar response to a number of different agronomic factors. These factors included: planting date, irrigated and non-irrigated conditions, seeding rate, plant growth regulator applications, row pattern, and tillage. The more recently released cultivars, Georgia-06G, Georgia-07W, Florida-07, Tifguard, and Georgia Greener, all performed better than Georgia Green and AP-4, two older cultivars. One of the more interesting responses was that we do not see these newer cultivars respond as much to the twin row pattern as we saw with Georgia Green. Another response we saw was that the newer cultivars have a higher yield potential at earlier planting dates. Therefore, it would be recommended that planting in Georgia be initiated in late April and completed, if practical, by the third week in May and avoid planting near or soon after June 1st. We did not see a positive response to plant growth regulator application. We continue to see higher yields under conventional tillage (deep turning with a mold board plow) compared to strip tillage. In a dry year like 2010 we had a positive economic response to irrigation compared to non-irrigated conditions. We also see the newer cultivars have a better yield response under non-irrigated conditions compared to the old standard, Georgia Green.

The following trials were planted in Georgia in crop year 2010 evaluating peanut response to various agronomic management factors.

1) Cultivar Response to Planting Date / New Methods of Maturity Determination –
A trial was established to evaluate two potential new methods for determining optimal harvest date of peanut. A degree day model and a system based on measured light reflectance are being compared to the Hull-Scrape Maturity Profile method. The following four peanut cultivars were planted at seven planting dates: Georgia Green,

Georgia Greener, Georgia-06G, and Georgia-02C. The seven planting dates were: April 20 and 27, May 3, 11, 18, 25, and June 1. The trial was established at the Gibbs Farm on the University of Georgia's Coastal Plain Experiment Station at Tifton. Experimental design is a split plot with planting date as the main plot and cultivar as the sub-plot. Plots are 2 rows by 40 feet in length and there are 4 replications. The trial was planted in the twin row pattern. The degree day model is an experimental model being tested by the USDA-ARS National Peanut Research Lab in cooperation with UGA. The model is based on a base minimum temperature of 56 degrees F and also includes rainfall and/or irrigation as a component. The light reflectance model is based on the NDVI (Normalized Difference Vegetation Index) as measured by a light bar passed over the rows beginning several weeks before anticipated optimal maturity. The NDVI model is being used to determine if a cultivar changes the level of light reflectance as it matures and how closely does the light reflectance correlate to the Hull-Scrape method. The degree day model is being tested to determine if there is a threshold level of degree day accumulation that correlates to the Hull-Scrape method. The reason for including several cultivars is to determine if there are genotypic differences in degree day accumulation or light reflectance compared to the Hull-Scrape method. Harvest of each cultivar within each planting date will be triggered by the Hull-Scrape Maturity Profile and compared to the degree day accumulation and light reflectance.

Cultivar Response to Planting Date – The data in Table 1 below is the yield response of the four cultivars at each of the seven planting dates. Analysis of the data indicated a significant interaction between cultivars and planting dates

Table 1. Yield (lbs/acre) of four peanut cultivars at seven planting dates, UGA Gibbs Research Farm, Tift County, GA, 2010.

Planting Date	Georgia Green	Georgia Greener	Georgia-02C	Georgia-06G
April 20	4356 e-j*	4888 a-f	3660 jk	4788 a-g
April 27	4011 h-k	5190 abc	4611 b-h	5480 a
May 4	4768 a-g	5101 a-d	4030 h-k	5294 ab
May 11	5022 a-e	5004 a-e	4713 b-h	5124 a-d
May 18	4472 c-i	4580 b-i	4348 e-j	4711 b-h
May 25	4137 g-k	5026 a-e	3869 ijk	4262 f-j
June 1	3889 ijk	4131 g-k	3489 k	4399 d-i

*Yields that have the same letters are not significantly different in yield at the $P \geq 0.05$ level of probability (Duncan's New Multiple Range Test). LSD = 604 lbs/acre, CV = 9.4%

When averaged over cultivars, the highest yield based on planting date was May 11, followed closely by April 27 and May 4 (see Table 2 below).

Table 2. Peanut yield (lbs/acre) at seven planting dates when average over four cultivars, UGA Gibbs Research Farm, Tift County, GA, 2010.

Planting Date	Yield (lbs/acre)
April 20	4423
April 27	4823
May 4	4798
May 11	4966
May 18	4528
May 25	4323
June 1	3977

This data indicates we can plant our currently available cultivars in late April and early May and not suffer yield reduction due to tomato spotted wilt virus (TSWV). The highest yields occurred in the late April and first two weeks of May. There were seven yields that were above 5,000 lbs/acre, all occurring April 27, May 4, or May 11 (Table 1).

The harvest timing of this trial was done comparing the Hull-Scrape Maturity Profile against the proposed Growing Degree Day model developed by scientists at the USDA-ARS National Peanut Research Lab. The proposed adjusted growing degree day unit accumulation (@GDD) for optimal maturity and harvest initiation is proposed to be 2450 to 2500. In the case of Georgia Green, Georgia Greener, and Georgia-06G, the proposed units were accurate. Georgia-02C showed to take approximately 2700 @GDD.

- 2) **Irrigated and Non-Irrigated Cultivar Trial** – Four cultivars were planted at the University of Georgia’s Stripling Irrigation Research Park and are being compared in an irrigated versus non-irrigated trial. The four cultivars are: Georgia Green, Georgia Greener, Georgia-06G, and Georgia-02C. The objective is to determine which cultivars respond best to non-irrigated production. The trial was planted on May 20. The experimental design is a randomized complete block. The plots are ten rows by 55 feet in length and there are 4 replications. The two center rows within the ten-row plot will be harvested for yield.

Analysis of the yield date did not indicate an interaction between cultivars and irrigation (irrigated vs. non-irrigated). There was a significant difference for yield between the irrigated and non-irrigated treatment when averaged over cultivars. There was also a significant difference among yields for cultivars when averaged over the irrigated and non-irrigated treatments. Table 3 below provides the yield and grade (percent total sound mature kernels) data from this trial.

Table 3. Peanut cultivar response to irrigation, UGA Stripling Irrigation Research Park, 2010.

Cultivars	Yield (lbs/acre)	Total Sound Mature Kernels (%)
Georgia Green	2969	72.6
Georgia Greener	3535	73.8
Georgia-06G	3627	75.4
Georgia-02C	2387	X
Irrigated vs. Non-Irrigated		
Irrigated	3486	74.7
Non-Irrigated	2773	73.2

The irrigated treatment out yielded the non-irrigated treatment by over 700 pounds per acre and had a 1.5% increase in percent TSMK. The total amount of rainfall during the time of the experiment was 14.97 inches. UGA EASY Pan was used to trigger irrigation applications and a total of 6.30 inches of water was applied over 7 applications. Using \$15 per acre-inch, it cost \$94.50 to irrigate. The irrigated treatments made 713 pounds per acre more. Using an average value of \$432 per ton, or \$0.216/lb (USDA-NASS figure for 2010 peanut crop in Georgia), we made \$154 per acre in yield increase. Subtracting the \$94.50 per acre to irrigate, the net return was for irrigation was \$59.50. The 1.5% increase in grade also added another \$7.20 in value per acre. Therefore, the total net gain for irrigating was approximately \$66.70 per acre.

- 3) **Row Pattern and Seeding Rates** –A trial was initiated at the University of Georgia’s Southwest Georgia Research and Education Center near Plains evaluating the response of peanut cultivars to seeding rates on both twin and single row patterns. The following cultivars were included in the trial: Georgia Green, Georgia Greener, Georgia-06G, Georgia-07W, Georgia-09B, AP-4, Florida-07, and Tifguard. These cultivars were planted on the twin row and single row patterns at the following seeding rates: 2.5, and 3.0 seed per foot on each twin row and 5 and 6 seed per foot on each single row. The experimental design is a split-split block with cultivar as the main plot, row pattern as the sub-plot, and seeding rate as the sub-sub-plot. Plots are two rows by 40 feet in length and there are 4 replications. The trial was planted May 14. Yield, grade, and spotted wilt disease ratings will be collected.

Data analysis indicated no three-way interaction between cultivar, row pattern, and seeding rate for yield. There were no two-way interactions either (cultivar x row pattern, cultivar X seeding rate, row pattern X seeding rate). There was, however, a significant difference between seeding rates (5 vs. 6 seed per foot), between row patterns (single vs. twin), and between cultivars. The yield data for these factors is presented in Table 4 below.

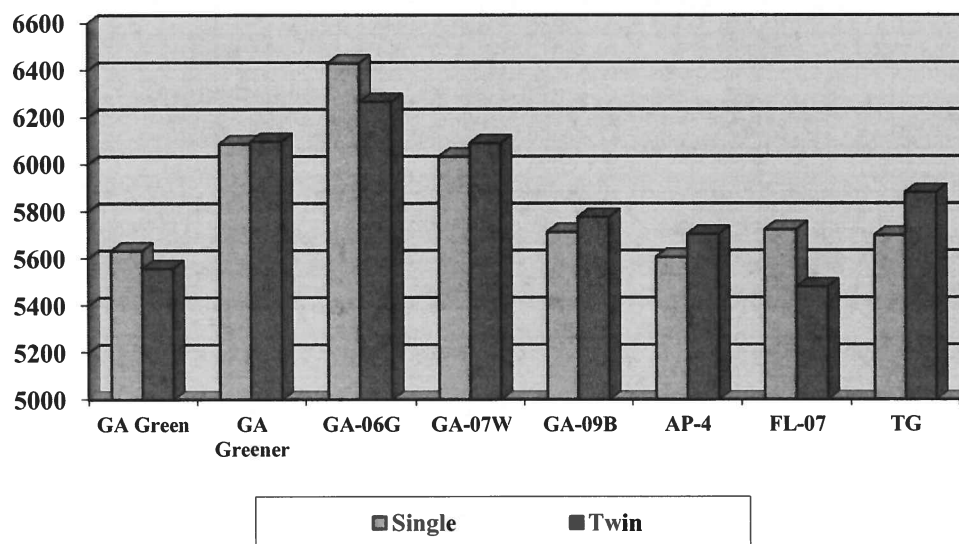
Table 4. Peanut yields (lbs/acre) for cultivars, row patterns, and seeding rates, UGA Southwest Georgia Research and Education Center, 2010.

Cultivars	Yield (lbs/acre)
Georgia Green	3797
Georgia Greener	3440
Georgia-06G	4045
Georgia-07W	3578
Georgia-09B	4030
Florida-07	4055
Tifguard	3681
Row Patterns	
Single	3929
Twin	3679
Seeding Rates	
6 seed/ft	3744
5 seed/ft	3863

Georgia-06G, Georgia-09B, and Florida-07 had the highest yield averaged over the row patterns and seeding rates. In this particular trial, the single row pattern had a higher yield averaged over cultivars and seeding rates and 5 seed per foot of row had a higher average yield when averaged over cultivars and row patterns.

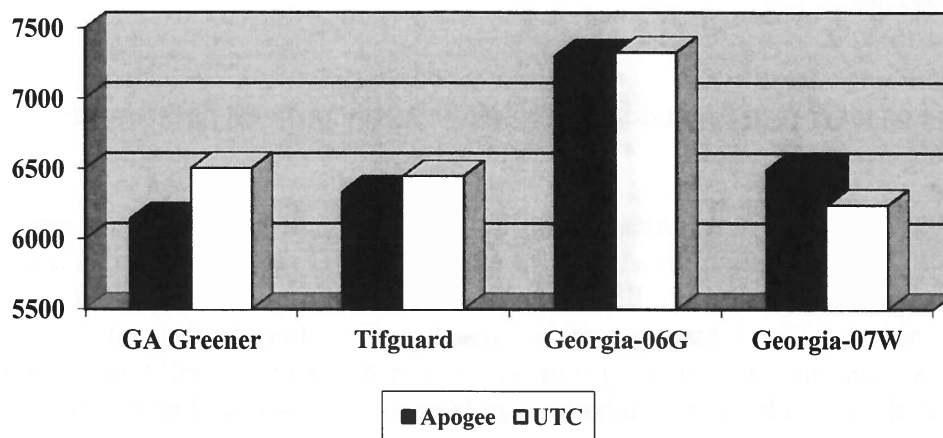
- 4) **Cultivar X Row Pattern** – Eight cultivars were planted on twin and single row patterns at the Darrell Williams Research Farm at the Sunbelt Expo in Colquitt County, GA. The cultivars are: Georgia Green, Georgia Greener, Georgia-06G, Georgia-07W, Georgia-09B, Florida-07, Tifguard, and AP-4. The experimental design is a randomized complete block with 4 replications. Plots were 2 rows by 700 feet in length. The trial was planted on May 12. Seeding rate was 6 seed per foot of row on the single row pattern and 3 seed per foot of row on the twin row pattern. Yield, grade and spotted wilt disease severity ratings will be collected.

Data analysis did not indicate an interaction between cultivar and row pattern. There was no difference between row patterns when averaged over cultivars but data analysis did indicate a significant difference among cultivars. The yield data is presented in the chart below.



- 5) **Cultivars and Plant Growth Regulators following Onion Harvest** – Four cultivars were planted on the Vidalia Onion and Vegetable Research Farm in Toombs County, Georgia following onion harvest. The trial was planted June 3. The objective is to determine which cultivars perform best following onions, a common practice in a 13-county area of southeast Georgia. The cultivars are: Georgia Greener, Georgia-06G, Georgia-07W, and Tifguard. The experimental design is a two factorial arrangement in a randomized complete block. The four cultivars are compared with and without the plant growth regulator, Apogee. Plots are two rows, 40 feet in length and there are 4 replications. One concern of planting peanut following onions is the high fertility levels in the onion crop that can cause excessive vine growth in peanut due to residual fertility levels. Apogee plant growth regulator was applied at 50% and 100% row closure on the plots receiving the PGR treatment. Evaluations will include yield, grade, and growth regulation measurements.

Data analysis indicated there was no interaction between cultivars and Apogee application. The data analysis also indicated no difference between the Apogee treatment and no PGR application when averaged over cultivars. There was, however, a significant difference among cultivars when averaged over the Apogee and untreated treatment. The data for this trial is presented in the chart below.



- 6) **Cultivar by Seeding Rate by Apogee Plant Growth Regulator Trial** – A trial was initiated at the Attapulgus Research Farm in Decatur County, Georgia to compare the response of Georgia Greener, Georgia-06G, Georgia-07W, and Tifguard peanut cultivars planted at two seeding rates (2.5 vs. 3 seed per foot of row per twin row) to applications of Apogee plant growth regulator. Georgia-06G and Georgia-07W are new high-yielding cultivars. Georgia-07W has a higher level of resistance to white mold than Georgia-06G. Both cultivars have the decumbent growth habit with more vine growth than Georgia Green. The trial is set up as a 4 X 2 X 2 factorial of the four cultivars, two seeding rates, with and without the plant growth regulator Apogee. Apogee will be applied at 50% vine closure and a second application will be applied three weeks later. The experimental design is a randomized complete block with 4 replications. Plots are 2 rows by 40 feet long and are planted in the twin row pattern. The trail was planted on April 29. Data to be collected will be main stem height (taken at 110 days after planting as an indicator of growth retardation), tomato spotted wilt virus ratings, yield, and grade.

Data analysis indicated no three-way interaction (cultivar X seeding rate X PGR treatment) and no two-way interactions. The only significant differences were among cultivars and between the Apogee vs. no Apogee PGR treatment. When averaged over cultivars and seeding rate, the plots that received no Apogee average 4,712 pounds per acre compared to 4,450 pounds per acre for the Apogee treated plots. Cultivar yields when average over seeding rate and PGR treatments were:

Georgia-07W – 4,884 lbs/acre
 Tifguard – 4,877 lbs/acre
 Georgia-06G – 4,469 lbs/acre
 Georgia Greener – 4,094 lbs/acre

Analysis of the total sound mature kernel percentage data indicated a significant difference among cultivars averaged over seeding rate and PGR treatment. The percent TSMK for each cultivar were:

Georgia-07W – 71.9
 Georgia-06G – 71.7

Georgia Greener – 70.9
Tifguard – 70.0

There were no other significant differences, two-way interactions, or three-way interaction.

- 7) **Georgia-02C Maturity Evaluation** – A trial was set up to determine harvest timing of Georgia-02C in order to optimize yield and grade. The trial was established at the Southeast Georgia Research and Education Center near Midville. Georgia-02C was planted on May 12. Harvest timing will begin at 135 days after planting and will continue in one-week intervals for a period of four weeks. The harvest rows will be determined at random and there will be four replications per harvest. The plots will be two rows by 300 feet in length.

Hull-Scrape data from this trial indicated that the timing to reach optimal maturity on Georgia-02C is typically 155-160 days.

- 8) **Cultivar X Row Pattern X Tillage** – Nine cultivars were planted on twin and single row patterns and in conventional and strip tillage on May 26 at the University of Georgia’s Coastal Plain Experiment Station’s RDC Pivot. The experimental design was a split-split plot with tillage as the main block, cultivar as the sub-plot, and row pattern nested within cultivar. Plots were 2 rows by 40 feet long and there are 4 replications. The cultivars are: Georgia Green, Georgia Greener, Georgia-02C, Georgia-06G, Georgia-07W, Georgia-09B, Florida-07, AP-1, and Tifguard. Data to be collected include tomato spotted wilt virus ratings, yield, and grade.

Data analysis for yield in this trial indicated no three-way interaction among tillage, cultivar, and row pattern treatments. The data analysis also indicated there were no two-way interactions for tillage X cultivar, tillage X row pattern, or cultivar X row pattern. There was a significant difference between row patterns, between tillage, and among cultivars. Table 5 below provides the yield and grade data for the significantly different factors.

Treatment Factors	Yield (lbs/acre)
Cultivars	
Georgia Green	4839
Georgia Greener	4997
Georgia-02C	3534
Florida-07	4980
AP-4	4390
Georgia-06G	5666
Georgia-07W	5142
Tifguard	4984
Georgia-09B	5552
FloRun ‘107’	5400

Tillage	
Conventional (deep turn)	5642
Strip Till	4255
Row Pattern	
Single	5407
Twin	4490

- 9) **On-Farm Trials** – As a part of this overall project, there are seven on-farm trials scattered across the state of Georgia in cooperation with county Extension agents. There are five (5) cultivar trials. These trials are in Irwin, Berrien, Thomas, and Jeff Davis Counties. The trials in Jeff Davis and Thomas are non-irrigated. All of these trials are large plots with multiple replications. Plot size was dictated by size of harvest equipment (4 or 6-row combine) and length of field. A calcium trial was established in Tift County evaluating Georgia-06G response to no gypsum application versus 500 and 1,000 lbs/acre gypsum levels. The base level of calcium in the pegging zone was 490 lbs/acre. The plots are 2 rows by approximately 1,700 feet in length with 4 replications. A cultivar by row pattern trial was established in Thomas County. The cultivars in this trial are: Tifguard, Georgia Greener, Georgia-06G, Georgia-07W, and Florida-07 planted in twin and single row patterns.

The yield data from these trials is provided in Table 6 below.

Cultivars	Berrien	Jeff Davis	Irwin	Thomas
Georgia-06G	5818 a	4085 ab	4713 a	4907 a
Georgia Greener	5505 a	4134 ab	4264 ab	5182 a
Georgia Green	5070 a	3712 b	3584 c	
Georgia-07W	5605 a	4492 a		5275 a
Tifguard	5349 a	4401 a	3843 bc	4755 a
Florida-07	5450 a	4016 ab		5096 a
AP-4	4714 a			
LSD (0.05)	742	487	506	515