Partners in Progress
PEANUTS

Peanut Research at OSU 2014

Supported by the

Oklahoma Peanut Commission

and the

National Peanut Board

Oklahoma State University
Division of Agricultural Sciences
and Natural Resources
Oklahoma Agricultural Experiment Station
Oklahoma Cooperative Extension Service

In cooperation with
U.S. Department of Agriculture -
Agricultural Research Service

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Foreword

We have had a long-standing partnership with the Oklahoma Peanut Commission (OPC) and the peanut producers of this state. There have been good times and bad times in terms of state budget restraints, shifts in peanut production locations in the state and changes in the federal peanut program. Together, we have survived and are looking forward to a brighter future.

Our *2014 Partners in Progress Peanut Report* serves as a means to highlight significant accomplishments in research and Extension programs that have been supported in partnership with the OPC and the National Peanut Board (NPB). With all the work that has been accomplished, it is important to recognize that much more research and Extension programming needs to be done to keep our peanut producers competitive and in business. Therefore, our work must be focused on solving meaningful issue-based problems facing the peanut producers in Oklahoma.

This report is one means of being accountable for the funds we have received and communicating the latest results of our programs to peanut producers as rapidly as possible.

Keith Owens
Interim Associate Director
Oklahoma Agricultural Experiment Station
Division of Agricultural Sciences and Natural Resources
Oklahoma State University

Oklahoma State University Division of Agricultural Sciences and Natural Resources Mission Statement

The Mission of the Oklahoma State University Division of Agricultural Sciences and Natural Resources is to discover, develop, disseminate and preserve knowledge needed to enhance the productivity, profitability and sustainability of agriculture; conserve and improve natural resources; improve the health and well-being of all segments of our society; and to instill in its students the intellectual curiosity, discernment, knowledge and skills needed for their individual development and contribution to society.

Oh What a Year

- Temps … more favorable than expected
- Rainfall … limited but timely
- Growing Season … awesome overall
- Production … another record @4,000 lbs/A
- Quality & Grades … simply outstanding
- Marketing opportunities … not so much
  AND
- Peanut Research … timely, on-target and informative (see inside).

Throughout the year the professionals that make up the Oklahoma's Peanut Improvement Team (PIT) are hard at work implementing scientific investigations and applied research aimed at solving production and economic issues facing today's peanut producers.

Within the *2014 Partners in Progress Peanut Report* are the results of their research and Extension efforts during the crop year. This report highlights the investigations dealing with integrated strategies for managing peanut diseases, genetic improvement and variety advancements, weed management, as well as applied research and field study summaries.

Hats off to the Oklahoma State University Division of Agricultural Sciences and Natural Resources, the Oklahoma Agricultural Experiment Station, the Oklahoma Cooperative Extension Service and the USDA-Agricultural Research Services at The Center for Peanut Improvement in Stillwater for equipment and technology upgrades, as well as major investments in research station improvements.

Investment of resources is key to the continued success of this collaborative effort. In addition to the above-mentioned partners, Oklahoma's peanut producers provide essential funding and direction for research projects via the OPC and the NPB.

The success or failure of this partnership is directly associated with the commitment to provide funding and the dedicated effort of all those involved. In 2015, OPC will celebrate 50 years of investing in research since it's formation in 1965.

The average production in Oklahoma has tripled the 1,300 lbs/A average of the mid-60s. During the past five decades, research-based recommendations for weed, disease and pest management, as well as improvements in production practices, have been accepted and successfully implemented on the farm, resulting in a greater opportunity for profit. Perhaps the most important advancement has come from the development and release of multiple varieties across all market types, which is the result of years of genetic improvement to address disease resistance, maturity, grade-yield and quality factors for the benefit of the producer, sheller, product manufacturer and consumer.

With recent discoveries of genetic markers, genomic mapping and other encouraging technology, the future looks bright for even greater improvements ahead. No one knows what the next 50 years may bring. What we do know is success breeds success.

It has been a very successful partnership.

Mike Kubicek
Executive Director
Oklahoma Peanut Commission

Peanut Variety Tests

Kelly D. Chamberlin and Rebecca S. Bennett
USDA-ARS, Stillwater

John P. Damicone
Department of Entomology and Plant Pathology

2014 progress made possible through OPC and NPB support

- **Overall, 2014 was an outstanding year for agronomic performance, resulting in high yields and grades across locations and market types.**
- **ARS high-oleic runner breeding lines ARSOK-R35 and ARSOK-R37 consistently out-performed available runner cultivars. ARSOK-R35 demonstrated a high level of pod rot resistance under intense disease pressure.**
- **Spanish cultivar AT-99-98 was a top performer consistently across locations and during the last three years. In most cases, no statistical differences between cultivars OLé and Tamnut OL06 were noted during a three-year period.**
- **High-oleic Virginia breeding lines ARSOK-V30B and ARSOK-V41 and cultivar Florida Fancy were the top performers in Virginia tests. Breeding lines ARSOK-V30B, ARSOK-V41 and cultivar Florida Fancy all demonstrated enhanced pod rot resistance when compared to other Virginia-type entries.**

Entries

Entries are listed by market type. Not all 2014 entries were eligible for three-year analysis.

Runner: ARS breeding lines ARSOK-R35, ARSOK-R37, ARSOK-R47A, ARSOK-R58A and ARSOK-R60A; cultivars Flavor Runner 458, Florida 107, Georgia 09B, Red River Runner and Tamrun OL11.

Spanish: cultivars AT-98-99, Georgia 04S, OLé and Tamnut OL06.

Virginia: ARS breeding lines ARSOK-V30B, ARSOK-V31 and ARSOK-V41; cultivars Florida Fancy, Gregory and Jupiter.

Methods

All variety tests were conducted under an extensive pest management program. The objective was to prevent as much outside influence from pest pressures (weed, disease and insect) on yield and grade as possible. The interaction between variety and location was significant, so the results were separated by location. Since the varieties and advanced lines response differed by location, growers may find the data for the county closest to their location to be the most useful in selecting a variety or varieties to grow. All test plots were planted using two 36-inch rows that were 15 feet long. Plots were seeded at a rate of 5 seeds/row foot (139,392 seeds/A). Tests were conducted using randomized, complete block design with four replications. The entire plot was dug, then threshed three days to four days later. Peanuts were placed in a dryer until moisture reached 10 percent. Total sound mature kernels (TSMK) was determined on a 200 g sample from each plot.

Interpreting Data

Details of establishment and management of each test are listed below. Analysis of variance (ANOVA) tests were run on all trial data to determine significance. Least significant differences (LSD) are listed at the bottom of all tables.

Differences between varieties are significant only if they are equal to or greater than the LSD value. If a given variety out yields another variety by as much or more than the LSD value, then there is 95 percent certainty the yield difference is real, with only a 5 percent probability the difference is due to chance alone. For example, if variety X is 500 lbs/A higher in yield than variety Y, then this difference is statistically significant if the LSD is 500 or less. If the LSD is 500 or greater, then there is less confidence variety X is higher yielding than variety Y under the conditions of the test.

The coefficient of variation (CV value) listed at the bottom of each table is used as a measure of the precision of the experiment. Lower CV values will generally relate to lower experimental error in the trial. Uncontrollable or immeasurable variations in soil fertility, soil drainage and other environmental factors contribute to greater experimental error and higher CV values. Results reported here should be representative of what might occur throughout the state, but would be most applicable under environmental management conditions similar to those of the tests. The relative yields of all peanut varieties are affected by crop management and by environmental factors including soil type, summer conditions, soil moisture, disease and insects.

2014 Caddo County Peanut Variety Trial

Location: Ft. Cobb OAES
Date Planted: 5/15/14
Date Dug: 10/17/14
Date Threshed: 10/20/14

The trial was planted May 15 into a strip-till seedbed and managed for foliar and soilborne disease throughout the season. Percent pod rot estimates were taken after digging, but no significant differences were noted among those lines tested (data not shown).

Average yield for the runner test was 5,671 lbs/A and average grade was 76 percent TSMK (Table 1) with ARS breeding lines ARSOK-R37 and ARSOK-R35 topping the yield category at 6,243 lbs/A and 6171 lbs/A, respectively. Other top performers included ARS breeding lines ARSOK-R60A and ARSOK-R47A, as well as Tamrun OL11, Red River Runner and Florida 107. Georgia 09B performed the poorest with a yield of 5,106 lbs/A.

Among the Spanish entries tested, the average yield and grade was 4,703 lbs/A and 74 percent TSMK. Tamnut OL06 was the top performer yielding 5,227 lbs/A and Georgia 04S had the poorest performance at 4,223 lbs/A.

Entries in the Virginia test averaged 5,414 lbs/A and a grade of 73 percent TSMK. ARS breeding line ARSOK-V41 was the outstanding performer yielding 5,929 lbs/A. The North Carolina cultivar Gregory was the poorest performer yielding 5,082 lbs/A. No significant differences in yield were noted among other entries.

Table 2 contains Caddo County yield and grade data for the last three years, along with the three-year average. No significant differences were noted in the three-year average yield, grade or dollar value per acre for the top three runner-type performers, which were Tamrun OL11, Red River Runner and advanced breeding line ARSOK-R35. Over a three-year period, the poorest performer was Georgia 09B averaging a yield of 4,296 lbs/A.

Averages for the three-year period showed Spanish cultivars AT-98-99, Tamnut OL06 and OLé did not differ significantly in their average yields or grades. The same can be said for the yields of Virginia cultivars Jupiter, ARSOK-V30B and Gregory.

Table 1. Yields and grades from Caddo County peanut variety trials, 2014.[1]

Variety or Line	*Yield (lbs/A)*	*% of Trial Average*	*Grade[3] (%TSMK)*	*Revenue[4] ($/A)*
Runner[2]				
ARSOK-R37	6,243 a	110	76 b-d	903
ARSOK-R35	6,171 a	109	79 a	928
ARSOK-R60A	6,134 ab	108	72 e	840
ARSOK-R47A	6,098 ab	107	78 ab	905
Tamrun OL11	6,013 a-c	106	78 ab	893
Red River Runner	5,360 a-d	95	77 a-c	785
Florida 107	5,336 a-d	94	74 de	751
ARSOK-R58A	5,215 b-d	92	75 dc	744
Flavor Runner 458	5,033 cd	89	77 a-c	737
Georgia 09B	5,106 d	90	76 b-d	738
Mean	5,671		76	
CV	2.05		2.05	
LSD (0.05)	928		2.2	
Spanish[2]				
Tamnut OL06	5,227 a	111	74	698
AT-98-99	4,973 ab	106	74	664
OLé	4,393 bc	93	74	586
GA04S	4,223 c	90	74	564
Mean	4,703		74	
CV	2.26		2.26	
LSD (0.05)	604		5.5	
Virginia[2]				
ARSOK-V41	5,929 a	110	76 a	861
Florida Fancy	5,687 ab	105	75 ab	815
Jupiter	5,384 ab	99	71 b	762
ARSOK-V31	5,299 ab	98	74 ab	729
ARSOK-V30B	5,106 ab	94	73 ab	693
Gregory	5,082 b	93	67 b	651
Mean	5,414		73	
CV	2.13		2.13	
LSD (0.05)	835		3.5	

1 Values within columns followed by the same letter(s) are not significantly different.
2 Market Type.
3 % TSMK = Percent total sound mature kernels.
4 Calculated based on peanut market-type price December 2014 (AgFax).

2014 Custer/Blaine County Variety Trial

Location: Weatherford
Date Planted: 5/20/14
Date Dug: 10/10/14
Date Threshed: 10/13/14

The trial was planted May 20 into a conventional till seedbed and managed for foliar and soilborne disease throughout the season. Percent pod rot estimates were taken after digging, but no significant differences were noted among those lines tested (data not shown).

Average yield for the runner test was 5,426 lbs/A with an average grade of 78 percent TSMK (Table 3). ARS breeding line ARSOK-R60A was the top performer with a yield of 6,413 lbs/A. Breeding lines ARSOK-R35 and ARSOK-R37 also were among the top three entries. Flavor Runner 458 had the poorest average yield at 4,126 lbs/A.

For the Spanish cultivars tested, the average yield was 4,362 lbs/A and the average grade was 75 percent TSMK. AT-98-99 was the top performer, followed by OLé, averaging 4,852 lbs/A and 4,585 lbs/A, respectively. Georgia 04S turned in the poorest performance at 3,872 lbs/A and 74 percent TSMK.

Virginia entries averaged 4,888 lbs/A and a grade of 74 percent TSMK. Florida Fancy was the top performer averaging 5,820 lbs/A and a grade of 73 percent TSMK. Breeding lines ARSOK-V30B and ARSOK-V41 also were in the top three, averaging 5,287 lbs/A and 5,009 lbs/A, respectively. Gregory had the poorest performance at 3,896 lbs/A and 71 percent TSMK.

Table 4 contains yield and grade data for the last three years along with a three-year average in Custer/Blaine County. Breeding line ARSOK-R35 was the top entry averaging 5,971 lbs/A and a grade of 77 percent TSMK. Red River Runner and Florida 107 also were in the top three performers.

Among the Spanish cultivars tested, AT-98-99 performed the best over a three-year period averaging 5,111 lbs/A and a grade of 74 percent TSMK. No statistical difference was seen between the other two Spanish entries Tamnut OL06 and OLé.

No significant differences were noted among the three Virginia entries tested in Custer/Blaine County during a three-year period with the exception of ARSOK-V30B, which had a significantly higher grade than Gregory.

2014 Beckham County Variety Trial

Location: Sayre
Date Planted: 5/22/14
Date Dug: 10/08/14
Date Threshed: 10/10/14-10/17/14

The trial was planted May 22 into a no-till seedbed and managed for foliar and soilborne disease throughout the season. Heavy rainfall during harvest prolonged threshing. Percent pod rot estimates were taken at digging and significant differences were seen (Table 5).

Average yield for the runner test was 6,317 lbs/A with an average grade of 78 percent TSMK. ARS breeding lines ARSOK-R37 and ARSOK-R35, along with Tamrun OL11, were the top three yielding entries at 7,066 lbs/A; 6,752 lbs/A and 6,616 lbs/A, respectively. Red River Runner had the poorest average yield at 5,493 lbs/A. Breeding line ARSOK-R35 demonstrated the highest resistance to pod rot incidence at 1 percent, while breeding line ARSOK-R60A and Florida 107 were the most susceptible at 23.4 percent and 25.3 percent, respectively.

For the Spanish cultivars tested, the average yield was 5,635 lbs/A and average grade was 73 percent TSMK. AT-98-99 was the top performer, followed by Georgia 04S and OLé averaging 6,461

Table 2. Yields and grades from Caddo County peanut variety trials in 2012, 2013 and 2014, along with three-year averages.

Variety or Line	*Yield (lbs/A)*	*Grade[2] (%TSMK)*	*Yield (lbs/A)*	*Grade[2] (%TSMK)*	*Yield (lbs/A)*	*Grade[2] (%TSMK)*	*Yield (lbs/A)*	*Grade[2] (%TSMK)*	*Revenue[3] ($/A)*
	----2012----		----2013----		----2014----		----3-yr. Avg.----		
Runner[1]									
Tamrun OL11	4,553	70	4,477	75	6,013	78	5,014	74	706
ARSOK-R35	4,501	71	4,175	71	6,171	79	4,949	74	697
Red River Runner	4,828	71	4,344	74	5,360	77	4,844	74	683
Flavor Runner 458	4,601	71	3,775	71	5,033	77	4,469	73	621
Florida 107	4,534	64	3,896	71	5,336	75	4,588	70	612
Georgia 09B	4,287	72	3,497	72	5,106	77	4,296	74	605
LSD (0.05)	781	4	593	1	928	2	497	3	
Spanish[1]									
AT-98-99	3,924	67	3,678	70	4,973	74	5,079	70	642
OLé	3,917	64	3,242	71	4,392	73	4,583	69	571
Tamnut OL06	3,743	66	3,521	67	5,227	74	4,567	69	568
LSD (0.05)	ns	2	597	.02	604	5	689	2	
Virginia[1]									
Jupiter	4,342	68	4,658	66	5,384	72	4,794	69	633
ARSOK-V30B	4,792	70	3,884	69	5,106	73	4,594	71	624
Gregory	4,668	67	3,872	68	5,082	67	4,540	67	582
LSD (0.05)	533	2	511	1	835	3	770	4	

1 Market Type.
2 % TSMK = Percent total sound mature kernels.
3 Calculated for three-yr. average based on peanut market-type price December 2014 (AgFax).

lbs/A; 5,941 lbs/A and 5,239 lbs/A, respectively. Tamnut OL06 turned in the poorest performance at 4,900 lbs/A and 71 percent TSMK. Cultivars Tamnut OL06 and OLé were the most susceptible to pod rot at 72.5 percent and 66.3 percent, respectively.

Virginia entries averaged 6,517 lbs/A and a grade of 73 percent TSMK. ARSOK-V41 was the top performer averaging 7,889 lbs/A, a grade of 77 percent TSMK and the least amount of pod rot (3.8 percent). Cultivar Florida Fancy and breeding line ARSOK-V31 were also in the top three, averaging 6,449 and 6,437 lbs/A, respectively. Cultivar Jupiter was the most susceptible to pod rot at 55 percent.

Table 6 includes yield and grade data for Beckham County for the last three years along with a three-year average. Three-year averages for the runner test show breeding line ARSOK-R35, Florida 107, Tamrun OL11 and Red River Runner are the best performers. No significant differences were found among three-year performances of Spanish or Virginia entries.

Performance Across Locations in 2014

When analyzed across locations for performance in 2014, the top yielding runner entries were breeding lines ARSOK-R37, ARSOK-R35 and ARSOK-R60A (Table 7) averaging 6,481 lbs/A, 6,384 lbs/A and 6,356 lbs/A, respectively. Flavor Runner 458 was the poorest performer yielding 5,041 lbs/A.

Cultivar AT-98-99 had a significantly higher yield than all other entries tested. The top yielding Virginia entries were ARSOK-V41, Florida Fancy and ARSOK-V31 averaging 6,275 lbs/A; 5,985 lbs/A and 5,573 lbs/A, respectively.

Acknowledgements

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Table 3. Yields and grades from Custer County peanut variety trials, 2014.[1]

Variety or Line	*Yield (lbs/A)*	*% of Trial Average*	*Grade[3] (%TSMK)*	*Revenue[4] ($/A)*
Runner[2]				
ARSOK-R60A	6,413 a	118	76 b-d	928
ARSOK-R35	6,231 ab	115	81 a	949
ARSOK-R37	6,134 ab	113	81 a	934
ARSOK-R47A	5,965 a-c	110	79 ab	897
Tamrun OL11	5,699 a-c	105	78 bc	857
ARSOK-R58A	5,432 b-d	100	76 b-d	786
Red River Runner	5,239 cd	97	78 bc	778
Florida 107	4,779 de	88	75 d	691
Georgia 09B	4,247 e	78	78 bc	630
Flavor Runner 458	4,126 e	76	77 b-d	604
Mean	5,426		78	
CV	2.05		2.05	
LSD (0.05)	811		2.2	
Spanish[2]				
AT-98-99	4,852 a	111	76	666
OLé	4,585 ab	105	76	663
Tamnut OL06	4,138 bc	95	75	591
GA04S	3,872 c	89	74	545
Mean	4,362		75	
CV	2.26		2.62	
LSD (0.05)	647		2	
Virginia[2]				
Florida Fancy	5,820 a	119	73 b	812
ARSOK-V30B	5,287 ab	108	72 b	728
ARSOK-V41	5,009 a-c	102	78 a	747
ARSOK-V31	4,985 bc	102	77 a	734
Jupiter	4,331 cd	89	73 b	604
Gregory	3,896 d	80	71 b	529
Mean	4,888		74	
CV	2.1		2.1	
LSD (0.05)	821		1.9	

1 Values within columns followed by the same letter(s) are not significantly different.
2 Market Type.
3 % TSMK = Percent total sound mature kernels.
4 Calculated based on peanut market-type price December 2014 (AgFax).

Table 4. Yields and grades from Custer/Blaine County peanut variety trials in 2012, 2013 and 2014, along with three-year averages.

Variety or Line	*Yield (lbs/A)*	*Grade[2] (%TSMK)*	*Yield (lbs/A)*	*Grade[2] (%TSMK)*	*Yield (lbs/A)*	*Grade[2] (%TSMK)*	*Yield (lbs/A)*	*Grade[2] (%TSMK)*	*Revenue[3] ($/A)*
	----2012----		----2013----		----2014----		----3 yr. Avg.----		
Runner[1]									
ARSOK-R35	6,469	73	5,215	78	6,231	80	5,971	77	875
Red River Runner	5,572	76	4,840	77	5,239	78	5,217	77	764
Florida 107	5,986	75	4,078	74	4,779	76	4,947	75	706
Flavor Runner 458	5,590	74	4,222	75	4,126	77	4,646	75	663
Tamrun OL11	5,795	73	2,214	76	5,699	79	4,569	76	661
Georgia 09B	6,130	74	2,952	75	4,247	78	4,443	76	642
LSD (0.05)	931	2	881	1	811	2	995	3	
Spanish[1]									
AT-98-99	5,812	72	4,670	75	4,852	76	5,111	74	682
Tamnut OL06	5,049	67	4,416	71	4,138	75	4,686	71	601
OLé	5,068	69	4,404	73	4,585	76	4,534	73	598
LSD (0.05)	795	2	302	.03	647	2	434	2	
Virginia[1]									
Jupiter	4,650	67	5,118	72	4,331	72	4,699	72	779
ARSOK-V30B	5,844	71	4,937	73	5,287	73	5,356	74	766
Gregory	5,474	64	4,792	70	3,896	69	4,720	69	729
LSD (0.05)	618	5	1,170	1	821	3	805	2	

1 Market Type.
2 % TSMK = Percent total sound mature kernels.
3 Calculated for three-yr. average based on peanut market-type price December 2014 (AgFax).

Table 5. Yields and grades from Beckham County peanut variety trials, 2014.[1,6]

Variety or Line	*Yield (lbs/A)*	*% of Trial Average*	*Grade[4] (%TSMK)*	*% Pod Rot[3]*	*Revenue[5] ($/A)*
Runner[2]					
ARSOK-R37	7,066 a	112	80 a	7.8 ab	1,076
ARSOK-R35	6,752 ab	107	80 a	1.0 b	1,028
Tamrun OL11	6,616 ab	105	78 ab	3.5 ab	983
Florida 107	6,546 a-c	104	77 bc	25.3 a	947
ARSOK-R60A	6,522 a-c	103	77 bc	23.5 a	943
GA09B	6,376 a-d	101	80	7.3 ab	971
ARSOK-R47A	6,255 a-d	99	80 a	1.3 ab	953
Flavor Runner 458	5,965 b-d	94	78 a-c	4.0 ab	885
ARSOK-R58A	5,578 cd	88	75 c	4.3 ab	796
Red River Runner	5,493 cd	87	78 a-c	2.5 ab	815
Mean	6,317		78		
CV	2.05		2.05		
LSD (0.05)	988		3.0		
Spanish[2]					
AT-98-99	6,461 a	115	76 a	33.8 b	886
GA04S	5,941 ab	105	74 b	32.5 b	793
OL	5,239 b	93	72 c	66.3 a	681
Tamnut OL06	4,900 b	87	71 c	72.5 a	628
Mean	5,635		73		
CV	2.2		2.2		
LSD (.05)	1131		1.9		
Virginia[2]					
ARSOK-V41	7,889 a	121	77 a	3.8 b	1,162
Florida Fancy	6,449 b	99	71 bc	11.3 b	876
ARSOK-V31	6,437 b	99	74 ab	45.0 a	911
Gregory	6,255 b	96	69 c	41.3 a	825
Jupiter	6,195 b	95	72 bc	55.0 a	853
ARSOK-V30B	5,880 b	90	74 ab	16.8 b	832
Mean	6,517		73		
CV	2.1		2.1		
LSD (.05)	1378		3.6		

1 Values within columns followed by the same letter(s) are not significantly different.
2 Market Type.
3 Pod Rot (Pythium and/or Rhizoctonia) ratings taken immediately after digging. Numbers with the same lowercase letter within each market type are not significantly different at $P < 0.05$.
4 % TSMK = Percent total sound mature kernels.
5 Calculated based on peanut market-type price December 2014 (AgFax).
6 Yields of some entries (notably ARSOK-V30B) were affected by severe mole infestation.

Table 6. Yields and grades from Beckham County peanut variety trials in 2012, 2013 and 2014, along with three-year averages.

Variety or Line	*Yield (lbs/A)*	*Grade[2] (%TSMK)*	*Yield (lbs/A)*	*Grade[2] (%TSMK)*	*Yield (lbs/A)*	*Grade[2] (%TSMK)*	*Yield (lbs/A)*	*Grade[2] (%TSMK)*	*Revenue[3] ($/A)*
	----2012----		----2013----		----2014----		----3-yr. Avg.----		
Runner[1]									
ARSOK-R35	5,799	78	4,973	70	6,751	80	5,841	76	845
Tamrun OL11	4,603	75	4,803	69	6,616	79	5,341	74	752
Florida 107	4,080	72	5,566	68	6,546	77	5,397	72	739
Red River Runner	4,588	75	4,840	68	5,493	78	5,225	74	736
Georgia 09B	5,195	72	3,956	71	6,376	80	4,973	75	710
Flavor Runner 458	3,618	73	4,662	67	5,965	78	4,714	71	637
LSD (0.05)	654	5	715	1	988	3	1,207	3	
Spanish[1]									
AT-98-99	4,130	70	4,646	68	6,461	76	5,079	71	651
OLé	5,361	70	3,835	68	5,239	72	4,583	69	571
Tamnut OL06	4,992	67	3,811	65	4,900	72	4,567	68	561
LSD (0.05)	638	2	650	1	1,131	2	2,049	3	
Virginia[1]									
ARSOK-V30B	5,742	72	5,037	74	5,880	73	5,553	73	775
Gregory	5,170	64	4,895	71	6,522	69	5,529	68	719
Jupiter	4,200	68	5,095	72	6,195	72	5,163	71	701
LSD (0.05)	608	4	985	2	1,378	3	713	2	

1 Market Type.
2 % TSMK = Percent total sound mature kernels.
3 Calculated for three-yr. average based on peanut market-type price December 2014 (AgFax).

Table 7. Average yields, grades and seed weight from peanut variety trials across three locations (Caddo, Custer and Beckham Counties), 2014.[1]

Variety or Line	*Yield (lbs/A)*	*% of Trial Average*	*Grade[3] (%TSMK)*	*Seed Wt/100 (g)*	*Revenue[4] ($/A)*
Runner[2]					
ARSOK-R35	6,384 a	110	80 a	72	972
ARSOK-R37	6,481 a	112	79 ab	73	974
ARSOK-R47A	6,106 ab	105	79 ab	71	918
ARSOK-R58A	5,408 c	93	75 d	64	772
ARSOK-R60A	6,356 a	109	75 d	63	907
Flavor Runner 458	5,041 c	87	77 c	64	739
Florida 107	5,554 bc	96	76 cd	66	803
Georgia 09B	5,243 c	90	78 bc	65	778
Red River Runner	5,364 c	92	78 bc	70	786
Tamrun OL11	6,109 ab	105	79 ab	69	918
Mean	5,805		78	68	
CV	1.9		1.9	2.1	
LSD (0.05)	612		1.5	5	
Spanish[2]					
AT-98-99	5,428 a		75 a	51	734
GA04S	4,678 b		74 ab	43	624
OLé	4,739 b		73 b	54	626
Tamnut OL06	4,755 ab		73 b	55	627
Mean	4,900		74	51	
CV	2		2	2.1	
LSD (.05)	685		1.9	4	
Virginia[2]					
ARSOK-V30B	5,424 bc	97	73 b	90	757
ARSOK-V31	5,573 a-c	99	75 a	96	799
ARSOK-V41	6,275 a	112	77 a	91	924
Florida Fancy	5,985 ab	107	73 b	95	835
Gregory	5,078 c	91	69 c	94	670
Jupiter	5,303 bc	95	72 b	97	730
Mean	5,606		73	94	
CV	1.9		1.9	2	
LSD (.05)	842		1.9	3	

1 Values within columns followed by the same letter(s) are not significantly different.
2 Market Type.
3 % TSMK = Percent total sound mature kernels.
4 Calculated based on peanut market-type price December 2014 (AgFax).

Disease Evaluations and Agronomic Traits of Advanced Peanut Breeding Lines in 2014

Rebecca S. Bennett and Kelly D. Chamberlin
USDA-ARS, Stillwater

2014 progress made possible through OPC and NPB support

- **A total of 23 breeding lines and reference cultivars (16 runner, two Spanish and five Virginia market types) were evaluated in fields highly infested with the Sclerotinia blight fungus. All advanced breeding lines were high oleic.**
- **Environmental conditions in 2014 were favorable for Sclerotinia blight. Little southern blight or pod rot were observed.**
- **The top three runner entries in revenue were Tamrun OL11 ($917/A), ARSOK-R37 ($899/A) and ARSOK-R35 ($879/A). These three runner entries also demonstrated considerable resistance to Sclerotinia blight (25 percent to 28 percent disease incidence) compared to the highly susceptible Tifrunner (80 percent) and Florida 107 (73 percent).**
- **The new Spanish peanut cultivar OLé produced higher revenue ($784/A), yield (5,203 lbs/A) and grade (70 percent TSMK) than the small-seeded runner Georgia 04S ($546/A, 3,860 lbs/A; 66 percent TSMK). In addition, OLé was significantly more resistant to Sclerotinia blight (7.9 percent) than Georgia 04S (49 percent).**
- **Virginia entries did not differ statistically in crop value, but the top three numerical entries were ARSOK-V30B ($832/A), ARSOK-V41 ($798/A) and ARSOK-V31 ($780/A). ARSOK-V30B and ARSOK-V31 were significantly more resistant (21 percent to 23 percent) to Sclerotinia blight than the other three entries (55 percent to 62 percent). ARSOK-V30B will be released as 'VENUS' in 2015.**

The primary goal of the USDA-ARS peanut research program in Stillwater is to develop and release high-oleic peanut cultivars for the Southwest with improved yield, disease resistance and seed characteristics. In 2014, commercial and advanced breeding lines of runner, Spanish and Virginia peanuts were evaluated in small plots at the OSU's Caddo Research Station in Ft. Cobb. The objectives of the field study were to compare advanced or newly released lines to commercially available cultivars in agronomic quality (i.e. yield and seed grade) and disease resistance (Sclerotinia and southern blights, pod rot) in plots with substantial soilborne inoculum.

Methods and Field Conditions

A total of 23 breeding lines and reference cultivars (16 runner, two Spanish and five Virginia) were evaluated. The three peanut market types were grown and evaluated separately, and all advanced breeding lines were high oleic. Each breeding line or cultivar was planted at a seed rate of 5 seeds/ft in plots consisting of two 15-ft-long rows with 36-inch beds.

A randomized, complete block design was used with an equal number of replications in the Spanish study and unequal replications in the runner and Virginia studies. The field was divided into four sections (blocks) to account for potential disease gradients and environmental variables. Each breeding line or cultivar was planted at least once in each section (block). All plots were planted May 15 and were managed for weeds and foliar diseases. Plots were not managed for soilborne diseases such as Sclerotinia and southern blights, pod rot or nematodes.

Environmental conditions were conducive for Sclerotinia and southern blights, but little southern blight was observed. Daily average temperatures in May (71.6 F) and June (78.0 F) were equal to the 15-year average; however, July (78.6 F) was 3 degrees cooler, and October (64.5 F) was 4 degrees warmer (Table 8). Mesonet temperature data for Ft. Cobb are incomplete for August and September 2014. Rainfall was greater than the 15-year average in May and June, but was relatively close to the average in July and August (Table 8). A little less than 1 inch of the 15-year average rainfall was received in October (2.13 inches). Additional water (0.75 inch to 1 inch) was applied to the plots 12 times between June 4 and Sept. 24 using a pivot system.

Disease evaluations for Sclerotinia and southern blights were conducted Aug.18 and Sept. 16 and 29. Disease incidence was measured by counting the number of 6-inch sections within each plot that had symptoms of Sclerotinia blight, caused by *Sclerotinia minor*, and southern blight, caused by *Sclerotium rolfsii*. Southern blight was rarely observed. Only the results from the last Sclerotinia blight evaluation are reported because disease was most severe at that date. Deer damage was relatively minimal compared to previous years and other plots at the station. Plants were dug Oct. 17 and threshed Oct. 21. Peanut grades were determined following USDA-AMS guidelines. Pods were presorted prior to shelling, and all sound mature kernels from grade samples were assessed for visible and concealed damage. Seeds were split by hand using a razor blade instead of a mechanical seed splitter to reveal concealed damage. Pod rot ratings were taken within five hours of digging by estimating the percentage of discolored pods. Pod rot damage was minimal and no greater than 5 percent in the most affected plots, so statistical analyses were not conducted for pod rot.

Data were analyzed using one-way ANOVA with block as a random factor in PROC GLIMMIX of SAS (ver. 9.3).

Table 8. Monthly air temperature and rainfall for 2014 field season at the Caddo Research Station, Ft. Cobb.[a]

	Air Temperature (°F)		*Rainfall (Inches)*	
Month	*Daily Mean*	*Departure from 15-Year Average*	*Total*	*Departure from 15-Year Average*
May[b]	71.6	0	5.38	+1.69
June	78.0	0	5.43	+1.36
July	78.5	-3	2.22	-0.09
August	—[c]	—[c]	1.46	-0.36
September	—[c]	—[c]	1.29	-0.36
October	64.5	+4	2.13	-0.97

a Data from Mesonet.
b Mean temperature and rainfall are for May 15 (planting date) to May 30. Departure from 15-year average includes all days in May.
c Incomplete records.

Proportion data [grade, extra large kernels (ELK), hull, damaged kernels and fancy pods] were analyzed using the LOGIT function and a beta distribution, but means of untransformed data are presented (Tables 9 and 10). The Type I error rate for pairwise comparisons of breeding lines and cultivars was controlled at $\alpha = 0.05$ using the ADJUST=TUKEY option.

Performance of the Advanced Runner-Type Breeding Lines and Cultivars in 2014

Sixteen runner peanut entries, including Okrun and the high-oleic cultivars Flavor Runner 458, Florida 07, Georgia 07W, Red River Runner, Tamrun OL11 and Tifrunner were evaluated (Table 9). Statistical differences among entries were found for crop value, yield and all shelling characteristics except damaged kernels. The top three entries in crop value, which did not differ significantly, were Tamrun OL11 ($917/A), ARSOK-R37 ($899/A) and ARSOK-R35 ($879/A). The entries with the lowest crop value and yield were Tifrunner ($401/A; 2,723 lbs/A), ARSOK-R47B ($543/A; 3,715 lbs/A), and Flavor Runner 458 ($546/A; 3,594 lbs/A). The highest-yielding entries were Tamrun OL11 (5,651 lbs/A), ARSOK-R37 (5,602 lbs/A) and ARSOK-R58B (5,590 lbs/A). Tamrun OL11 was the highest grading-entry at 75 percent TSMK, but many other entries were statistically similar to Tamrun OL11 in grade.

Tamrun OL11 had the largest seeds (69.3 g/100 seeds), and ARSOK-R47B and Tifrunner had the smallest seeds (46.6 g/100 seeds to 53.4 g/100 seeds). The greatest percentage of ELK was found in ARSOK-R58C (46 percent), while ARSOK-R60A, ARSOK-R47B, and Florida 07 had the least (23 percent to 29 percent). The hull percentage for most top-yielding entries ranged from 23 percent to 25 percent; ARSOK-R60A and Okrun had the greatest percentage of hulls (27 percent to 29 percent).

The incidence of Sclerotinia blight differed among the runner entries. Tifrunner (80 percent) and Florida 07 (73 percent) were highly susceptible to *Sclerotinia minor.* ARSOK entries R60A (15 percent), R58A (15 percent) and R47 (22 percent) were the most resistant. The top six entries with the greatest crop values had disease incidences between 22 percent and 30 percent.

Performance of Spanish Market Types in 2014

Two Spanish entries, the newly released, OLé, and the small-seeded runner Georgia 04S, were evaluated (Table 10). Georgia 04S rated poorly relative to OLé on most agronomic measures (crop value, yield, grade and hull proportion). In addition, there was a considerable difference between OLé (8 percent) and Georgia 04S (49 percent) in susceptibility to Sclerotinia blight.

Performance of the Advanced Virginia-Type Breeding Lines and Cultivars in 2014

Six Virginia peanut entries, including Jupiter and mid-oleic AT-07V were evaluated (Table 10). The entries differed in grade, 100-seeds weight, and percent hulls, but did not differ in crop value, yield and percent fancy pods, ELK or damaged kernels. The breeding line ARSOK-V30B had the highest numerical crop value and yield ($832/A; 5,276 lbs/A) and Jupiter had the lowest ($654/A; 4,308 lbs/A). The best grade was found in ARSOK-V41 (74 percent TSMK), but this grade was not statistically different from grades of ARSOK entries V30B (72 percent TSMK) and V31 (71 percent TSMK), or Jupiter (69 percent TSMK). The largest kernels were found in ARSOK-V31 and ARSOK-V30B

at 93 g/100 seeds and 91 g/100 seeds, respectively. The hull fraction was largest for AT-07V (32 percent) and smallest for ARSOK-V41 (24 percent).

Statistically significant differences among Virginia entries in Sclerotinia blight were found. The incidence of Sclerotinia blight was highest in Jupiter (62 percent), ARSOK-V41 (61 percent) and AT-07V (55 percent). ARSOK entries V31 (21 percent) and V30B (23 percent) were the most resistant to *Sclerotinia*. ARSOK-V30B will be released as 'VENUS' by USDA-ARS and OSU in 2015.

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Table 9. Yield, grade, shelling characteristics, and disease incidence (Sclerotinia blight, SM; southern blight, SR) in advanced runner breeding lines at the Caddo Research Station, Ft. Cobb, 2014.[a]

Entry	*Revenue ($/A)[b]*	*Yield (lbs/A)*	*Grade (%TSMK)*	*100-Seeds (g)*	*ELK (%)[c]*	*Hull (%)*	*DK (%)*	*SM (%)*	*SR (%)*
Runner									
Tamrun OL11	917 a	5,651 a	75 a	69.3 a	42 ab	22.7 d	0.7	26.7 cd	0
ARSOK-R37	899 a	5,602 a	74 ab	66.6 a-c	39 a-c	22.7 d	0.9	25.4 cd	0
ARSOK-R35	879 a	5,506 a	74 a-c	68.1 ab	40 a-c	22.7 d	0.7	27.9 cd	0
ARSOK-R47	852 a	5,542 a	74 a-c	61.1 c-f	40 a-c	25.1 b-d	0.4	30.4 cd	0
ARSOK-R58B	849 a	5,590 a	73 a-c	57.9 ef	40 a-c	26.5 a-d	0.8	22.1 cd	0
ARSOK-R58C	845 a	5,421 a	72 a-d	61.9 a-e	46 a	24.8 b-d	1.1	22.1 cd	0
Red River Runner	788 ab	4,961 a-c	71 a-d	66.0 a-d	42 ab	23.3 cd	1.0	45.8 bc	0
ARSOK-R47A	787 ab	5,022 ab	71 a-e	65.8 a-d	35 b-d	23.7 cd	0.8	21.9 d	0
ARSOK-R60A	785 ab	5,475 a	71 a-e	57.1 ef	23 e	28.5 a	1.5	10.6 d	0
Georgia 07W	760 ab	4,985 a-c	70 a-e	68.0 ab	36 a-d	26.4 a-d	1.1	46.3 bc	0
ARSOK-R58A	742 ab	4,852 a-c	70 a-e	58.4 d-f	39 a-c	25.6 a-d	0.8	15.0 d	0
Florida 07	691 ab	4,634 a-c	69 b-e	59.3 d-f	29 c-e	26.3 a-d	0.6	72.5 a	0
Okrun	666 ab	4,441 a-c	69 c-d	66.7 a-c	35 a-d	27.1 ab	1.1	67.5 ab	0
Flavor Runner 458	546 bc	3,594 dc	68 de	63.3 a-e	29 c-e	24.6 b-d	0.8	69.6 ab	0
ARSOK-R47B	543 bc	3,715 b-d	68 de	46.6 g	24 de	26.4 a-d	1.1	61.7 ab	0
Tifrunner	401 c	2,723 d	67 e	53.4 g	35 a-d	27.1 a-c	1.2	80.0 a	0

a Market types were analyzed separately. Numbers with the same lowercase letter within columns for each market type are not significantly different (α = 0.05).
b Based on the following peanut loan amount: $4.819/ton. Calculation does not include deductions for excess splits or damaged and other kernels.
c ELK, percentage of seeds riding largest screen riding 21/64 screen. DK, kernels with visible and concealed damage.

Table 10. Yield, grade, shelling characteristics and disease incidence (Sclerotinia blight, SM; southern blight, SR) in advanced Spanish and Virginia breeding lines at the Caddo Research Station, Ft. Cobb, 2013.[a]

Entry	*Revenue ($/A)[b]*	*Yield (lbs/A)*	*Grade (%TSMK)*	*Fancy Pods (%)[c]*	*100-Seed (g)*	*ELK (%)[d]*	*Hull (%)*	*DK (%)[d]*	*SM (%)*	*SR (%)*
Spanish										
OLé	784 a	5,203 a	70.1 a	-	48.6 a	45.9 a	27.2 b	1.3	7.9 b	0
Georgia 04S	546 b	3,860 b	65.7 b	-	35.5 b	32.9 b	28.7 a	1.0	49.2 a	0
Virginia										
ARSOK-V30B	832	5,276	72 ab	86.1	90.6 a	48	26.8 ab	1.2	23.0 b	0
ARSOK-V41	798	4,913	74 a	75.0	78.4 bc	43	24.0 b	1.3	61.4 a	0
ARSOK-V31	780	5,043	71 ab	86.1	92.7 a	44	26.8 ab	2.0	21.0 b	0
AT-07V	716	4,961	66 b	82.0	76.0 c	32	31.5 a	1.4	55.0 a	0
Jupiter	654	4,308	69 ab	85.4	88.3 ab	40	28.5 ab	2.5	62.1 a	0

a Market types were analyzed separately. Numbers with the same lowercase letter within columns for each market type are not significantly different ($\alpha = 0.05$).
b Based on the following peanut loan amounts: Spanish, $4.795/ton; Virginia, $4.915/ton. Calculation does not include deductions for excess splits or damaged and other kernels.
c Percentage of Virginia pods that ride the 34/64-inch spacing on presizer.
d ELK, percentage of seeds riding largest screen: Spanish, 19/64; Virginia, 21.5/64. DK, kernels with visible and concealed damage.

The Rising Star of High-Oleic Virginia Peanuts: A Summary of Data Supporting the Release of 'VENUS'

Kelly D. Chamberlin and Rebecca S. Bennett
USDA-ARS, Stillwater

John P. Damicone
Department of Entomology and Plant Pathology

Chad B. Godsey
Formerly of the Department of Plant and Soil Sciences

Hassan A. Melouk
Formerly of the USDA-ARS

2014 progress made possible through OPC and NPB support

- **'VENUS' is a large-seeded, high-oleic, Virginia-type peanut that has enhanced Sclerotinia blight and pod rot resistance when compared to the cultivar Jupiter.**
- **'VENUS' is the first high-oleic Virginia peanut developed for and proposed for release in the Southwestern US.**
- **'VENUS' (experimental designation ARSOK-V30B) is the result of a cross between the cultivar Jupiter, a nonhigh-oleic Virginia peanut released by the OAES in 2000, and ARSOK-R2, a high-oleic advanced breeding line.**
- **Tests conducted in three locations across Oklahoma in 2012-2014 showed there was no significant difference between the yields of 'VENUS' and Jupiter. However, 'VENUS' graded significantly higher than Jupiter in two out of three locations. 'VENUS' also consistently exhibited less Sclerotinia blight (59 percent less) and pod rot (69 percent less) when compared to Jupiter.**
- **The purpose for releasing 'VENUS' is to provide peanut producers in the Southwestern US with its first high-oleic Virginia peanut, developed specifically for that region, with enhanced grade and disease resistance when compared to Jupiter.**

Introduction

Peanut seeds normally contain between 45 percent to 51 percent oil [1] with an oleic acid to linoleic acid ratio (O/L) of approximately 1.5. The discovery of a high O/L spontaneous mutant F435 [1] with a ratio of ≥ 10 has led to many studies on the effects of peanut oil composition and to the incorporation of the high-oleate trait into many cultivated peanut varieties. The fatty acid composition of peanuts has become increasingly important with the realization that oleic acid content significantly affects the development of rancidity. It has been determined that a high O/L ratio in peanut results in an increased shelf life (up to 10 times) and improved flavor when compared to a normal O/L ratio. Furthermore, food products containing these high oleic oils have been shown to be nutritionally beneficial. For these and other reasons, the peanut industry demands high oleic peanuts.

In the Southwestern US peanut production region (largely Oklahoma and Texas), all cultivated peanut varieties are high oleic except for Virginia type peanuts, largely due to the lack of available high-oleic Virginia cultivars. High-oleic Virginia cultivars have been developed and released by breeding programs in the Virginia-Carolina (VC) region (Brantley [2], Sullivan [3], Wynne [3], Georgia (Ga08V [4]) and Florida (Florida Fancy [5]).

Peanuts grown in the Southwestern US are subject to different biotic and abiotic pressures than those grown in the VC region or the Southeast. Thus, cultivars developed in those regions are generally not adapted to overcome extreme heat and disease pressure found in the Southwest and perform poorly. In statewide variety and disease evaluation trials in Oklahoma [6], none of these cultivars had consistent agronomic performance (including disease resistance) when compared to Jupiter (a nonhigh-oleic Virginia cultivar released by OAES in 2000), making them unattractive for commercial production. Consequently, Oklahoma and Texas Virginia peanut producers largely plant Jupiter despite it having normal oil chemistry.

Virginia-type peanut production takes place on approximately 45 percent of the certified acres in Oklahoma and Texas [8]. Producers, shellers and manufacturers are in urgent need of high-oleic Virginia cultivars adapted for production in the Southwest. Therefore, the purpose for releasing 'VENUS' is to provide peanut producers the first high-oleic Virginia cultivar developed specifically for the Southwestern US with acceptable yield, enhanced grade and enhanced disease resistance when compared to Jupiter.

Breeding History and Methodology

'VENUS' is the result of a cross between the cultivar Jupiter (OAES, 2000) and the advanced breeding line ARSOK-R2 (a high-oleic sister line to Red River Runner) made by the peanut breeding program at the USDA-ARS in Stillwater in 2006. The F_1 seed from this cross were grown out under greenhouse conditions in 2006 and F_2 generation seeds were genotyped for Sclerotinia blight resistance and tested for high-oleic oil quality. Seed positive for both traits were space planted in 2008 in breeding nursery plots at OAES at Ft. Cobb. Disease-free plants with the desired Virginia type growth habit were individually harvested. Bulk seed from each plant were screened for appropriate size and planted in single row test plots in 2009. Seed from disease-free plants in each row were bulked to create F_4 breeding lines. F_4 lines were planted in single row test plots in 2010 and evaluated for yield, grade and disease resistance. Breeding line ARSOK-V30-45-1-2 was identified as one of several with outstanding yield, oil quality and disease resistance. Seed from ARSOK-V30-45-1-2 were mixed in testa color and grouped as either pink or tan, forming two separate breeding lines ARSOK-30A and ARSOK-V30B,

respectively. In breeding line evaluations at the Caddo Research Station, Ft. Cobb from 2010-2012 (F_5-F_6), ARSOK-V30B emerged as the clear leader in agronomic performance and disease resistance and was further evaluated in statewide variety trials, advanced line disease trials and the Uniform Peanut Performance Test (UPPT) from 2012-2014. Seed increases also were conducted at the Puerto Rico Winter Nursery.

All peanut variety tests were conducted under an extensive pest management program. The objective was to prevent as much outside influence from pest pressures (weed, disease and insect) on yield and grade as possible. The interaction between variety and location was significant, so the results were separated by location. Since the varieties and advanced lines response differed by location, growers may find the data for the county closest to their location to be the most useful in selecting a variety or varieties to grow. All test plots were planted using two 36-inch rows that were 15 feet long. Plots were seeded at a rate of 5 seeds/row foot (139,392 seeds/A). Tests were conducted using randomized, complete block design with four replications. The entire plot was dug, then threshed three days to four days later. Peanuts were placed in a dryer until moisture reached 10 percent. TSMK was determined on a 200 g sample from each plot.

Disease incidence was measured by counting the number of 6-inch sections within each plot that had symptoms of the disease, caused by *Sclerotinia minor*, and southern blight, caused by *Sclerotium rolfsii*. The hot and dry conditions of 2012 were not favorable for either disease. Environmental conditions were conducive for both Sclerotinia and southern blights in 2013 and 2014, but little southern blight was observed. Ratings were conducted three times from August to October; the last rating, generally one to two weeks before digging, was used for the Sclerotinia blight analyses. Pod rot ratings were made within five hours of digging by visually estimating the percentage of discolored pods within each two-row plot. Sclerotinia blight and pod rot data were analyzed using one-way ANOVA in PROC GLIMMEX of SAS (ver. 9.3). Differences between 'VENUS' and Jupiter were identified using LSD.

Field Performance

'VENUS' was entered into advanced, managed peanut variety trials conducted in three Oklahoma counties (Beckham, Caddo and Custer/Blaine) from 2012-2014 (Table 11). Three-year averages are not significantly different among entries for yield, regardless of location, but 'VENUS' had a significantly higher grade than Jupiter in Custer/Blaine County and higher than Gregory [8] in Beckham County. Numerically, 'VENUS' would average a $50/A to $74/A more per acre than Jupiter in Beckham and Custer/Blaine counties without considering pest management input costs. 'VENUS' was also entered into the national Uniform Peanut Performance Test (UPPT) 2013–2014 (Table 12).

That profit margin increases if disease management costs are considered. Management of Sclerotinia blight and pod rot can increase production costs by more than $100/A. Those management costs will be reduced by production of 'VENUS' which has enhanced resistance to both diseases compared to Jupiter. In disease trials conducted at the OAES Caddo Research station (Table 13) from 2012-2014, 'VENUS' averaged 17.8 percent incidence of Sclerotinia blight, which is 59 percent less than Jupiter (43.6 percent). This enhanced Sclerotina blight resistance will save producers at least $100/A in fungicide application.

Peanut pod rot occurrence is erratic but can be devastating to production when present. Percent pod rot was measured in the 2014 Beckham County

Table 11. Yields and grades of Virginia-type entries from peanut variety trials held in Beckham, Caddo and Custer/Blaine counties from 2012-2014, along with three-year averages and predicted revenue.[4]

County/ Entry	*Yield lbs/A*	*TSMK[2] %*	*Yield lbs/A*	*TSMK[2] %*	*Yield lbs/A*	*TSMK[2] %*	*Yield lbs/A*	*TSMK[2] %*	*Value[3] $/A*
	----2012----		*----2013----*		*----2014----*		*2012-2014 ----3-yr. Avg.----[3]*		
Beckham County									
ARSOK-V30B ('VENUS')	5,742 a	72 a	5,037	74	5,880	73 a	5,553	73 a	775
Gregory	5,170 a	64 b	4,895	71	6,522	69 b	5,529	68 b	719
Jupiter	4,200 b	68 ab	5,095	72	6,195	72 ab	5,163	71 a	701
LSD (P < 0.05)	608	4	985	2	1,378	3	713	2	
Caddo County									
Jupiter	4,342	68 ab	4,658 a	66 b	5,384	72 a	4,794	69	633
ARSOK-V30B ('VENUS')	4,792	70 a	3,884 b	69 a	5,106	73 a	4,594	71	624
Gregory	4,668	67 b	3,872 b	68 a	5,082	67 b	4,540	67	582
LSD (P < 0.05)	533	2	511	1	835	3	770	4	
Custer/Blaine County									
ARSOK-V30B ('VENUS')	4,650 b	67	5,118	72 a	5,287	72 ab	5,356	72 ab	779
Gregory	5,844 a	71	4,937	73 a	3,896	73 a	4,720	74 a	766
Jupiter	5,474 a	64	4,792	70 b	4,331	69 b	4,699	69 b	729
LSD (P < 0.05)	618	5	1,170	1	821	3	805	2	

1 Market Type.
2 % TSMK = Percent total sound mature kernels.
3 Calculated for three-year average based on peanut market-type price December 2014 (AgFax).
4 Values within the same columns followed by the same letter(s) are not significantly different.

Table 12. Mean performance across 2014 UPPT in the Southwestern production region (TX and OK) for lines and checks common to all locations. Virginia entries are in bold[1] [9].

Entry	*Market Type*	*Yield lbs/A*	*Fancy pods[2] %*	*TSMK[3] %*	*Seeds/100 g*
NC 7[1]	**Virginia**	**4,356 c-e[4]**	**59 a**	**67 f**	**98 a**
Florunner	Runner	5,288 a-c	73 a-f	74 a-f	63 fg
UF13301	Runner	5,765 a	27 b-e	76 ab	78 c
UF13302	Runner	5,070 a-e	4.6 g	72 a-f	62 g
UF13303	Runner	5,405 ab	2.0 d-f	74 a-e	64 fg
GA 102716	Runner	4,068 e	30.8 a-d	78 a	70 d-f
GA 102719	Runner	4,485 b-e	12.7 c-f	74 a-e	60 g
GA 102720	Runner	4,748 a-e	38.4 a-c	73 a-f	69 d-f
N10046ol	**Virginia**	**4,205 de**	**53.8 ab**	**68 c-f**	**94 a**
SPT 10 02	Runner	4,793 a-e	6.9 d-f	68 c-f	66 e-g
SPT 10 05	**Virginia**	**4,693 b-e**	**47.7 ab**	**67 ef**	**79 bc**
TX 071304	Runner	4,912 a-e	5.3 d-f	72 a-f	74 cd
TX 071305	Runner	5,111 a-d	5.9 d-f	71 b-f	72 c-e
ARSOK-R35	Runner	5,018 a-e	1.0 e-f	75 a-c	69 d-f
ARSOK-R30B ('VENUS')	**Virginia**	**4,704 b-e**	**39.0 a-c**	**69 c-f**	**87 b**
Mean		4,842	29.5	722	74.1
CV		12.9	49.6	5.6	5.7
LSD (P < 0.05)		359	10.9	2.3	2.5

1 NC 7 is not commercially grown but is included as a check in all UPPT tests.
2 Pods riding a 34/64-inch spacing set on the presizer.
3 % TSMK = Percent total sound mature kernels.
4 Values within the same columns followed by the same letter(s) are not significantly different.

Table 13. Incidence of Sclerotinia blight (*Sclerotinia minor*) in high-disease plots from 2012-2014 at Ft. Cobb.[1]

Entry	*2012*	*2013*	*2014*	*2012-2014*
ARSOK-V30B ('VENUS')	18.9 a	10.4 b	23.0 b	17.8 b
Jupiter	23.3 a	40.4 a	62.1 a	43.6 a
LSD (P = 0.05)	5.3	14.2	13.7	12.8

1 Values within the same columns followed by the same letter(s) are not significantly different.

peanut variety trial, where 'VENUS' exhibited significantly less disease(16.8 percent) when compared to Jupiter (55 percent). This 69 percent increase in pod rot resistance will translate into additional profit for producers by reducing penalties paid at buying points.

Line Description

Plant description and maturation

The plants of 'VENUS' are typical of a Virginia-type peanut, having a bunch growth habit and vine size and color similar to Jupiter. The main stems of 'VENUS' plants were apparent at 60 days after planting (DAP). Leaflet length of 'VENUS' averaged 58 mm, which was similar to Jupiter at 57 mm. 'VENUS' seed is mature approximately 140 DAP under Oklahoma growing conditions.

Pod and seed description

Under Oklahoma growing conditions, pods of 'VENUS' are similar in reticulation to Jupiter (slight). There was no significant difference [LSD ($P < 0.05$) = 4, n = 50] in the pod constriction of 'VENUS' (13.8 percent) and Jupiter (12.6 percent). Most pods of 'VENUS' are two seeded, similar to that of Jupiter. One hundred seed weight of 'VENUS' was 90 g, which is larger than Jupiter (75 g) ($P < 0.05$). Seeds of 'VENUS' are tan, similar to those of Jupiter, and have an average length of 17 mm and a width of 11 mm (n = 100). 'VENUS' seeds are tapered on the embryo end and blunt on the distal end.

Shelling and physical properties

Shelling and physical properties on samples from the 2012-2013 UPPT were determined by the National Peanut Research Laboratory in Dawson, Georgia. 'VENUS' had a larger percentage of ELK than Jupiter at 58 percent and 53 percent, respectively. 'VENUS' averaged a seed count per pound of 539, while Jupiter averaged 601. Shelling percentage of 'VENUS' averaged 74 percent, whereas Jupiter averaged 67 percent. Pod brightness measurements (Hunter L score, [9]) were taken on pods from Virginia entries in 2014 variety trials from three locations in Oklahoma (Table 14). No significant difference was found between the average pod brightness of 'VENUS' and Jupiter (50.2 and 51.3, respectively). Percent fancy pods also were measured from the same trials. No significant differences were noted between 'VENUS' and Jupiter for percent fancy pods (87.8 percent and 83.8 percent, respectively) or for jumbo/fancy ratio (2.8 and 1.2, respectively).

Chemical composition, blanching and flavor

Total fat, fatty acid profile, sugar content, blanching and roasting flavor were determined on bulk kernels of 'VENUS' and Jupiter from a crop produced at four Oklahoma locations in 2012-13. Variety seed for trials was obtained from Clint Williams Co. in 2012-13. These tests were conducted by the Market Quality and Analysis Lab at USDA-ARS, Raleigh, North Carolina. Total oil content of 'VENUS' averaged 45.0 percent (n = 4) while the average for Jupiter (n = 4) was 47 percent. Sugar content, iodine number, and flavor profiles of 'VENUS' and Jupiter were similar and typical of Virginia-type peanuts. 'VENUS' is higholeic (O/L ratio above 10:1), having an average O/L ratio of 26:1 (n = 4), while Jupiter has normal fatty acid chemistry and averaged a ratio of 1.5.

Table 14. Incidence of pod rot in 2014 at Sayre, Beckham County, OK.

Entry	2014
ARSOK-V30B ('VENUS')	16.8 b
Jupiter	55.0 a
LSD (P = 0.05)	17.4

1 Values within the same columns followed by the same letter(s) are not significantly different.

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Evaluation of Weed Management Programs in Peanut

Todd Baughman
Institute for Agricultural Biosciences

Nine field trials were conducted in 2014 at the Caddo Research Station near Ft. Cobb. Trials were investigating potential new herbicide options in peanut. These herbicides included: Fierce® (flumioxazin + pyroxasulfone) being developed by Valent®, Warrant® (acetochlor) recently labeled in peanut by Monsanto®, and Zidua® (pyroxasulfone) being developed by BASF®. POST applications of ET herbicide (pyraflufen) effects on peanut and potential effects of glyphosate + dicamba drift on peanut also were evaluated. The final study investigated new potential formulations of Storm® herbicide (acifluorfen + bentazon).

The first three studies investigated the tolerance of Spanish, runner and Virginia market-type peanut to expected labeled and twice the labeled rates of Fierce®, Warrant®, and Zidua®. Peanut injury was less than 10 percent throughout the season with Warrant® on all three market types (Tables 15, 16 and 17). Injury with the 1x rate of Fierce® was less than 10 percent with all three market types. However, injury of greater than 10 percent was observed with the 2x rate on Spanish and Virginia market types. Injury with Zidua® was less than 10 percent on all market types, except in early July on Spanish peanut. Injury of greater than 10 percent was observed with the 2x rate on runner market types. No yield reductions were observed in Virginia market-type with any herbicide or application rate.

Spanish peanut yields were reduced with both the 1x and 2x rate of Fierce®. Runner peanut yields were reduced with the 2x rate of Zidua®. The fourth study investigated the effects of a potential safener on Spanish peanut tolerance to Fierce® herbicide. The safener did not have any affect on herbicide injury to Spanish peanut from Fierce®. No yield reductions were observed with the 1x, rate while all applications at the 2x rate of Fierce® with and without the safener reduced yields.

The next two trials evaluated Zidua® combinations for weed control in peanut. The two predominant species were Texas panicum (PANTE) and ivyleaf morningglory (IPOHE). The only time that injury was greater than 10 percent in the first trial was when Zidua was combined with Outlook PRE (Table 19). PANTE full season control was greater than 85 percent when Prowl® H_2O® was applied PPI followed by either Zidua or Outlook® + Gramoxone at crack followed by Cadre® POST (Table 20). Late season IPOHE control was at least 98 percent with those same combinations of treatments. Some injury was observed with all treatments early season, but subsided by late season (Table 21). The only treatments that controlled Texas panicum at least 85 percent late season were when Zidua® + Prowl® PRE were followed by Gramoxone® + Storm® at crack, and Cadre POST (Table 18). The PANTE pressure was very heavy at this site, and requires a full season

Table 15. Spanish peanut response to Fierce®, Warrant® and Zidua®.

Treatment	*Rate*	*Unit*	*Timing*	*Peanut Stand 6/13 No./ft*	*Peanut StdRed 5/22 %*	*Peanut StdRed 6/12 %*	*Peanut StdRed 7/5 %*	*Peanut Stunt 5/22 %*	*Peanut Stunt 6/12 %*	*Peanut Stunt 7/5 %*	*Peanut Injury 7/24 %*	*Peanut Injury 8/7 %*	*Peanut Yield 10/21 lb/A*
Check				*3.13*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*5,409*
Fierce®	3	oz/A	PRE	3.13	5	4	1	6	4	3	1	0	4,274
Fierce®	6	oz/A	PRE	2.75	8	8	6	13	13	14	14	8	4,640
Zidua®	1.5	oz/A	PRE	3.38	5	5	3	9	9	10	5	1	5,614
Zidua®	3	oz/A	PRE	3.13	4	4	3	9	8	8	5	3	5,103
Warrant®	3	pt/A	PRE	3.13	4	4	3	5	3	3	1	0	5,699
Warrant ®	6	pt/A	PRE	2.88	4	4	4	6	5	5	3	1	5,375
LSD (P=.10)				NS	4	NS	NS	4	4	5	5	3	536
Standard Deviation				0.30	3	3	3	4	4	4	4	2	437
CV				9.60	72	81	122	51	63	75	105	135	8

Table 16. Runner peanut response to Fierce®, Warrant® and Zidua®.

Treatment	*Rate*	*Unit*	*Timing*	*Peanut Stand 6/13 No./ft*	*Peanut StdRed 5/22 %*	*Peanut StdRed 6/12 %*	*Peanut StdRed 7/5 %*	*Peanut Stunt 5/22 %*	*Peanut Stunt 6/12 %*	*Peanut Stunt 7/5 %*	*Peanut Injury 7/24 %*	*Peanut Injury 8/7 %*	*Peanut Yield 10/21 lbs/A*
Check				3.08	0	0	0	0	0	0	0	0	6,028
Fierce®	3	oz/A	PRE	2.88	3	3	1	5	4	3	3	1	5,932
Fierce®	6	oz/A	PRE	2.92	8	4	4	9	9	8	3	1	5,901
Zidua ®	1.5	oz/A	PRE	2.58	6	5	6	8	8	4	6	3	6,026
Zidua ®	3	oz/A	PRE	2.58	8	5	5	11	14	9	11	9	4,880
Warrant®	3	pt/A	PRE	2.71	5	5	5	4	5	4	5	4	5,899
Warrant ®	6	pt/A	PRE	3	8	5	5	5	8	6	6	5	5,785
LSD (P=.10)				NS	NS	NS	NS	NS	NS	NS	NS	NS	678
Standard Deviation				0.56	7	4	4	6	8	6	6	5	553
CV				19.76	129	109	116	98	114	136	132	163	10

Table 17. Virginia peanut response to Fierce®, Warrant® and Zidua®.

Treatment	*Rate*	*Unit*	*Timing*	*Peanut Stand 6/13 No./ft*	*Peanut StdRed 5/22 %*	*Peanut StdRed 6/12 %*	*Peanut StdRed 7/5 %*	*Peanut Stunt 5/22 %*	*Peanut Stunt 6/12 %*	*Peanut Stunt 7/5 %*	*Peanut Injury 7/24 %*	*Peanut Injury 8/7 %*	*Peanut Yield 10/21 lbs/A*
Check	2.80			0	0	0	0	0	0	0	0	0	5,857
Fierce®	3	oz/A	PRE	3.00	1	1	1	1	1	,0	0	0	5,603
Fierce®	6	oz/A	PRE	2.67	4	6	6	9	11	13	13	8	5,551
Zidua®	1.5	oz/A	PRE	2.50	3	4	4	4	3	3	5	5	5,733
Zidua®	3	oz/A	PRE	2.29	4	4	4	4	5	6	9	5	5,844
Warrant®	3	pt/A	PRE	2.50	3	4	3	3	3	3	5	5	5,769
Warrant®	6	pt/A	PRE	2.37	5	4	4	5	5	5	8	9	5,318
LSD (P=.10)				NS	NS	3	3	NS	NS	NS	5	5	NS
Standard Deviation				0.36	3	3	3	5	5	6	4	4	681
CV				14.04	123	77	84	134	137	154	78	83	12

Table 18. Evalution of Fierce® tolerance in Spanish peanut.

Treatment	*Rate*	*Unit*	*Timing*	*Peanut StdRed 5/22 %*	*Peanut StdRed 6/12 %*	*Peanut StdRed 7/5 %*	*Peanut Stunt 5/22 %*	*Peanut Stunt 6/12 %*	*Peanut Stunt 7/5 %*	*Peanut Injury 7/24 %*	*Peanut Injury 8/7 %*	*Peanut Yield 10/21 lbs/A*
Check				0	0	0	0	0	0	0	0	3,619
Fierce®	3	oz/A	PRE	4	4	4	4	5	4	4	3	3,490
Fierce® V-10388	3 2	oz/A pt/A	PRE PRE	4	4	4	9	9	8	4	4	3,331
Fierce® V-10388	3 4	oz/A pt/A	PRE PRE	3	3	3	4	4	6	1	1	3,338
Fierce®	6	oz/A	PRE	6	6	5	8	9	6	5	4	3,173
Fierce ® V-10388	6 2	oz/A pt/A	PRE PRE	6	6	6	10	11	11	11	5	2,922
Fierce ® V-10388	6 4	oz/A pt/A	PRE PRE	5	4	4	9	9	8	5	5	3,066
LSD (P=.10)				NS	NS	NS	6	NS	NS	NS	NS	342
Standard Deviation				4	4	4	5	5	6	5	4	279
CV				93	92	104	81	82	100	118	138	9

Table 19. Zidua® tolerance and efficacy in peanut.

Treatment	*Rate*	*Unit*	*Timing*	*Peanut Injury 5/22 %*	*Peanut Injury 6/13 %*	*Peanut Injury 7/5 %*	*Peanut Injury 7/24 %*	*Peanut Injury 8/7 %*
Check				0	0	0	0	0
Zidua®	1.5	oz/A	PPI	1	0	0	0	0
Zidua®	3	oz/A	PPI	1	0	0	0	0
ProwlH_2O®	32	fl oz/A	PPI	1	0	0	0	0
Zidua ®	1.5	oz/A	PPI	1	0	0	0	0
Prowl H2O®	32	fl oz/A	PPI					
Zidua ®	1.5	oz/A	PRE	8	3	0	0	0
Zidua ®	3	oz/ A	PRE	6	4	1	0	0
Outlook®	16	fl oz/A	PRE	5	1	0	0	0
Outlook®	16	fl oz/A	PRE	13	8	4	1	0
Zidua®	1.5	oz/A	PRE					
Zidua®	1.5	oz/A	POST1	0	1	1	1	0
Gramoxone®	12	fl oz/A	POST1					
Zidua®	3	oz/A	POST1	0	5	5	3	0
Gramoxone®	12	fl oz/A	POST1					
Outlook®	16	fl oz/A	POST1	0	0	0	0	0
Gramoxone®	12	fl oz/A	POST1					
Outlook®	16	fl oz/A	POST1	0	6	3	0	0
Zidua®	1.5	oz/A	POST1					
Gramoxone®	12	fl oz/A	POST1					
Prowl H_2O®	32	fl oz/A	PPI	0	4	0	0	0
Zidua®	1.5	oz/A	POST1					
Gramoxone®	12	fl oz/A	POST1					
Cadre®	4	fl oz/A	POST2					
Prowl H_2O®	32	fl oz/A	PPI	0	5	0	0	0
Outlook®	16	fl oz/A	POST1					
Gramoxone®	12	fl oz/A	POST1					
Cadre®	4	fl oz/A	POST2					
Prowl H_2O®	32	fl oz/A	PPI	0	4	0	0	0
Outlook®	16	fl oz/A	POST1					
Gramoxone®	12	fl oz/A	POST1					
Zidua®	1.5	oz/A	POST2					
Cadre®	4	fl oz/A	POST2					
Zidua®	1.5	oz/A	PPI	3	3	4	1	0
Outlook®	16	fl oz/A	POST1					
Gramoxone®	12	fl oz/A	POST1					
Cadre®	4	fl oz/A	POST2					
LSD (P=.10)				3	4	3	NS	NS
Standard Deviation				2	3	3	2	0
CV				98	129	255	432	0

All Gramoxone treatments applied with 0.25% v/v Induce and all Cadre treatments applied with 1.25% v/v COC.

Table 20. Zidua® tolerance and efficacy in peanut.

Treatment	*Rate*	*Unit*	*Time*	*PANTE Control 5/22 %*	*PANTE Control 6/13 %*	*PANTE Control 7/5 %*	*PANTE Control 7/24 %*	*PANTE Control 8/7 %*	*PANTE Control 8/20 %*
Check				0	0	0	0	0	0
Zidua®	1.5	oz/A	PPI	48	48	14	14	9	5
Zidua®	3	oz/A	PPI	58	56	20	20	6	5
Prowl H_2O®	32	fl oz/A	PPI	63	55	16	18	6	5
Zidua®	1.5	oz/A	PPI	68	55	19	19	8	5
Prowl H_2O®	32	fl oz/A	PPI						
Zidua®	1.5	oz/A	PRE	60	65	21	23	8	5
Zidua®	3	oz/A	PRE	74	74	40	29	18	8
Outlook®	16	fl oz/A	PRE	65	55	14	16	6	5
Outlook®	16	floz/A	PRE	80	80	43	24	6	6
Zidua®	1.5	oz/A	PRE						
Zidua®	1.5	oz/A	POST1	0	95	48	39	15	11
Gramoxone®	12	fl oz/A	POST1						
Zidua®	3	oz/A	POST1	0	98	75	60	40	34
Gramoxone®	12	fl oz/A	POST1						
Outlook®	16	fl oz/A	POST1	0	93	44	28	6	6
Gramoxone®	12	fl oz/A	POST1						
Outlook®	16	fl oz/A	POST1	0	98	55	45	10	11
Zidua®	1.5	oz/A	POST1						
Gramoxone®	12	fl oz/A	POST1						
Prowl H_2O®	32	fl oz/A	PPI	60	97	70	68	91	91
Zidua®	1.5	oz/A	POST1						
Gramoxone®	12	fl oz/A	POST1						
Cadre®	4	fl oz/A	POST2						
Prowl H_2O®	32	fl oz/A	PPI	60	97	60	63	84	86
Outlook®	16	fl oz/A	POST1						
Gramoxone®	12	fl oz/A	POST1						
Cadre®	4	fl oz/A	POST2						
Prowl H_2O®	32	fl oz/A	PPI	58	97	58	60	85	86
Outlook®	16	fl oz/A	POST1						
Gramoxone®	12	fl oz/A	POST1						
Zidua®	1.5	oz/A	POST2						
Cadre®	4	fl oz/A	POST2						
Zidua®	1.5	oz/A	PPI	50	95	58	60	83	80
Outlook®	16	fl oz/A	POST1						
Gramoxone®	12	fl oz/A	POST1						
Cadre®	4	fl oz/A	POST2						
LSD (P=.10)				8	10	10	11	8	8
Standard Deviation				7	9	8	9	6	7
CV				16	12	22	26	23	27

All Gramoxone treatments applied with 0.25% v/v Induce and all Cadre treatments applied with 1.25% v/v COC.

Table 20. Zidua® tolerance and efficacy in peanut. (Continued)

Treatment	*Rate*	*Unit*	*Time*	*IPOHE Control 6/13 %*	*IPOHE Control 7/5 %*	*IPOHE Control 7/24 %*	*IPOHE Control 8/7 %*	*IPOHE Control 8/20 %*
Check				0	0	0	0	0
Zidua®	1.5	oz/A	PPI	71	71	55	55	43
Zidua®	3	oz/A	PPI	83	81	81	73	66
Prowl H_2O®	32	fl oz/A	PPI	61	55	53	50	34
Zidua®	1.5	oz/A	PPI	86	84	75	65	54
Prowl H_2O®	32	fl oz/A	PPI					
Zidua®	1.5	oz/A	PRE	88	88	66	65	58
Zidua®	3	oz/A	PRE	80	73	66	66	61
Outlook®	16	fl oz/A	PRE	60	60	53	43	33
Outlook®	16	fl oz/A	PRE	92	91	79	78	65
Zidua®	1.5	oz/A	PRE					
Zidua®	1.5	oz/A	POST1	95	88	88	84	83
Gramoxone®	12	fl oz/A	POST1					
Zidua®	3	oz/A	POST1	97	97	96	95	83
Gramoxone®	12	fl oz/A	POST1					
Outlook®	16	fl oz/A	POST1	96	89	86	81	68
Gramoxone®	12	fl oz/A	POST1					
Outlook®	16	fl oz/A	POST1	97	89	94	90	83
Zidua®	1.5	oz/A	POST1					
Gramoxone®	12	fl oz/A	POST1					
Prowl H_2O®	32	fl oz/A	PPI	99	91	90	100	99
Zidua®	1.5	oz/A	POST1					
Gramoxone®	12	fl oz/A	POST1					
Cadre®	4	fl oz/A	POST2					
Prowl H_2O®	32	fl oz/A	PPI	95	88	88	98	98
Outlook®	16	fl oz/A	POST1					
Gramoxone®	12	fl oz/A	POST1					
Cadre®	4	fl oz/A	POST2					
Prowl H_2O®	32	fl oz/A	PPI	98	88	90	100	100
Outlook®	16	fl oz/A	POST1					
Gramoxone®	12	fl oz/A	POST1					
Zidua®	1.5	oz/A	POST2					
Cadre®	4	fl oz/A	POST2					
Zidua®	1.5	oz/A	PPI	97	88	89	100	98
Outlook®	16	fl oz/A	POST1					
Gramoxone®	12	fl oz/A	POST1					
Cadre®	4	fl oz/A	POST2					
LSD (P=.10)				17	19	25	25	25
Standard Deviation				14	16	21	21	21
CV				17	20	29	29	32

All Gramoxone treatments applied with 0.25% v/v Induce and all Cadre treatments applied with 1.25% v/v COC.

Table 21. Zidua® weed control systems in peanut.

Treatment	*Rate*	*Unit*	*Timing*	*Peanut Injury 5/22 %*	*Peanut Injury 6/13 %*	*Peanut Injury 7/5 %*	*Peanut Injury 7/24 %*	*Peanut Injury 8/7 %*
Check				0	0	0	0	0
Zidua®	1.5	oz/A	PRE	9	9	1	0	0
Gramoxone®	12	fl oz/A	POST1					
Storm®	24	fl oz/A	POST1					
Induce®	0.25	% v/v	POST1					
Zidua®	1.5	oz/A	PRE	8	5	1	0	0
Prowl H_2O®	32	fl oz/A	PRE					
Gramoxone®	12	fl oz/A	POST1					
Storm®	24	fl oz/A	POST1					
Induce®	0.25	% v/v	POST1					
Zidua®	1.5	oz/A	PRE	9	4	4	0	0
Valor®	3	oz/A	PRE					
Gramoxone®	12	fl oz/A	POST1					
Storm®	24	fl oz/A	POST1					
Induce®	0.25	% v/v	POST1					
Zidua®	1.5	oz/A	PRE	13	11	8	0	0
Prowl H_2O®	32	fl oz/A	PRE					
Gramoxone®	12	fl oz/A	POST1					
Storm®	24	fl oz/A	POST1					
Induce®	0.25	% v/v	POST1					
Cadre®	4	fl oz/A	POST2					
Induce®	0.25	% v/v	POST2					
Zidua®	1.5	oz/A	PRE	8	6	1	0	0
Gramoxone®	12	fl oz/A	POST1					
Storm®	24	fl oz/A	POST1					
Induce®	0.25	% v/v	POST1					
Cadre®	4	fl oz/A	POST2					
Induce®	0.25	% v/v	POST2					

Table 21. Zidua® weed control systems in peanut. (Continued)

Treatment	*Rate*	*Unit*	*Timing*	*Peanut Injury 5/22 %*	*Peanut Injury 6/13 %*	*Peanut Injury 7/5 %*	*Peanut Injury 7/24 %*	*Peanut Injury 8/7 %*
Zidua®	1	oz/A	PRE	5	5	0	0	0
Prowl H_2O®	32	fl oz/A	PRE					
Gramoxone®	12	fl oz/A	POST1					
Storm®	24	fl oz/A	POST1					
Induce®	0.25	% v/v	POST1					
Zidua®	1	oz/A	POST2					
Cadre®	4	fl oz/A	POST2					
Induce®	0.25	% v/v	POST2					
Zidua®	1.5	oz/A	PRE	8	6	1	0	0
Gramoxone®	12	fl oz/A	POST1					
Storm®	24	fl oz/A	POST1					
Induce®	0.25	% v/v	POST1					
Zidua®	1	oz/A	POST2					
Cadre®	4	fl oz/A	POST2					
Induce®	0.25	% v/v	POST2					
Dual II Mag®	1	pt/A	PRE	9	5	0	0	0
Gramoxone®	12	fl oz/A	POST1					
Storm®	24	fl oz/A	POST1					
Induce®	0.25	% v/v	POST1					
Cadre®	4	fl oz/A	POST2					
Induce®	0.25	% v/v	POST2					
Zidua®	1.5	oz/A	PRE	11	11	6	0	0
Outlook®	16	fl oz/a	POST1					
Gramoxone®	12fl	oz/A	POST1					
Induce ®	0.25	%v/v	POST1					
Zidua®	1	oz/A	POST2					
Prowl H_2O®	32	fl oz/A	PRE	3	1	0	0	0
Cadre®	4	fl oz/A	POST2					
Induce®	0.25	% v/v	POST2					
LSD (P=.10)				5	4	3	NS	NS
Standard Deviation				4	3	2	0	0
CV				53	55	118	0	0

program to effectively manage it. Ivyleaf morningglory full season control was at least 98 percent, where a PRE followed by at crack, and a POST application of Cadre was used (Table 22). Yields above 4,000 lbs/A were observed where Zidua® + Prowl® PRE or Dual Magnum® was followed by at crack and Cadre® POST (Table 23). This further proved the need for a complete season long herbicide program to effectively manage weeds in peanut.

The next study evaluated the tolerance of peanut to POST applications of ET herbicide. No stand reduction was observed with any of the application timings of ET (Table 24). The most severe injury appeared when a 6-leaf growth stage application of ET was followed with a second application 60 days after the initial application (Table 25). However, even with injury as high as 15 percent no yield reductions were observed with any of the application timings.

Roundup® Ready Xtend soybean and cotton systems will be released in the near future. Therefore, trials were established to evaluate the effects of drift and tank contamination rates of glyphosate combined with dicamba on peanut. Peanut stand reduction was generally less than 5 percent, except early on with the one-half rate and season long with the 1x rate of glyphosate + dicamba at 30 days after planting (Table 26). Peanut stunting was at least 10 percent with all rates and timings except the one-sixteenth rate at the 90 days after planting application timing (Table 26). Yield reductions were observed with all one-fourth x, one-half x and 1x application timings (Table 27). Yield reductions also were observed when the one-eighth x rate was applied at the 90 days after planting application timing. These initial results indicate the potential for nontarget applications of glyphosate + dicamba could be detrimental to Spanish peanut yields. However, early season drift rates, though visually injuring peanuts, may not necessarily result in a yield reduction.

The final study investigated potential new formulations of acifuorfen + bentazon. Injury was less than 10 percent (leaf bronzing) with all formulations (Table 28). The entire trial area was sprayed with Valor® PRE after planting. Ivyleaf morningglory populations were sporadic in this trial but several treatments did control it at least 85 percent.

Special thanks to OPC for financial assistance to conduct these trials and to BASF® and Valent®. Finally, the help and support of the farm crew at the Caddo Research Station is appreciated. Without their dedicated help these trials would not be possible.

Table 22. Zidua® weed control systems in peanut.

Treatment	*Rate*	*Unit*	*Timing*	*PANTE Control 5/22 %*	*PANTE Control 6/13 %*	*PANTE Control 7/5 %*	*PANTE Control 7/24 %*	*PANTE Control 8/7 %*	*PANTE Control 8/20 %*
Check				0	0	0	0	0	0
Zidua®	1.5	oz/A	PRE	71	93	44	34	10	5
Gramoxone®	12	fl oz/A	POST1						
Storm®	24	fl oz/A	POST1						
Induce®	0.25	% v/v	POST1						
Zidua®	1.5	oz/ A	PRE	73	93	55	50	26	20
Prowl H_2O®	32	fl oz/A	PRE						
Gramoxone®	12	fl oz/ A	POST1						
Storm®	24	fl oz/ A	POST1						
Induce®	0.25	% v/v	POST1						
Zidua®	1.5	oz/ A	PRE	76	91	55	43	18	11
Valor®	3	oz/ A	PRE						
Gramoxone®	12	fl oz/ A	POST1						
Storm®	24	fl oz/ A	POST1						
Induce®	0.25	% v/v	POST1						
Zidua®	1.5	oz/ A	PRE	75	90	53	53	86	86
Prowl H_2O®	32	fl oz/ A	PRE						
Gramoxone®	12	fl oz/ A	POST1						
Storm®	24	fl oz/ A	POST1						
Induce®	0.25	% v/v	POST1						
Cadre®	4	fl oz/ A	POST2						
Induce®	0.25	% v/v	POST2						
Zidua®	1.5	oz/ A	PRE	69	91	39	38	73	69
Gramoxone®	12	fl oz/ A	POST1						
Storm®	24	fl oz/ A	POST1						
Induce®	0.25	% v/v	POST1						
Cadre®	4	fl oz/ A	POST2						
Induce®	0.25	% v/v	POST2						
Zidua®	1	oz/ A	PRE	71	93	60	61	88	88
Prowl H_2O®	32	fl oz/ A	PRE						
Gramoxone®	12	fl oz/ A	POST1						
Storm®	24	fl oz/ A	POST1						
Induce®	0.25	% v/v	POST1						
Zidua®	1	oz/ A	POST2						
Cadre®	4	fl oz/ A	POST2						
Induce®	0.25	% v/v	POST2						

(cont'd)

Table 22. Zidua® weed control systems in peanut. (Continued)

Treatment	*Rate*	*Unit*	*Timing*	*PANTE Control 5/22 %*	*PANTE Control 6/13 %*	*PANTE Control 7/5 %*	*PANTE Control 7/24 %*	*PANTE Control 8/7 %*	*PANTE Control 8/20 %*
Zidua®	1.5	oz/ A	PRE	69	93	38	40	75	76
Gramoxone®	12	fl oz/ A	POST1						
Storm®	24	fl oz/ A	POST1						
Induce®	0.25	% v/v	POST1						
Zidua®	1	oz/A	POST2						
Cadre®	4	fl oz/A	POST2						
Induce®	0.25	% v/v	POST2						
Dual II Mag®	1	pt/A	PRE	63	90	50	48	83	83
Gramoxone®	12	fl oz/A	POST1						
Storm®	24	fl oz/A	POST1						
Induce®	0.25	% v/v	POST1						
Cadre®	4	fl oz/A	POST2						
Induce®	0.25	% v/v	POST2						
Zidua®	1.5	oz/A	PRE	70	93	45	36	11	10
Outlook®	16	fl oz/A	POST1						
Gramoxone®	12	fl oz/A	POST1						
Induce®	0.25	% v/v	POST1						
Zidua®	1	oz/A	POST2						
Prowl H_2O®	32	fl oz/A	PRE	60	58	50	53	75	74
Cadre®	4	fl oz/A	POST2						
Induce®	0.25	% v/v	POST2						
LSD (P=.10)				7	4	14	11	10	9
Standard Deviation				6	3	12	9	8	7
CV				9	4	26	21	16	16

Table 23. Zidua® weed control systems in peanut.

Treatment	*Rate*	*Unit*	*Timing*	*IPOHE Control 6/13 %*	*IPOHE Control 7/5 %*	*IPOHE Control 7/24 %*	*IPOHE Control 8/7 %*	*IPOHE Control 8/20 %*	*Peanut Yield 10/21 lbs/A*
Check				0	0	0	0	0	2,193
Zidua®	1.5	oz/A	PRE	93	60	60	60	39	2,051
Gramoxone®	12	fl oz/A	POST1						
Storm®	24	fl oz/A	POST1						
Induce®	0.25	% v/v	POST1						
Zidua®	1.5	oz/A	PRE	97	76	71	75	65	2,968
Prowl H_2O®	32	fl oz/A	PRE						
Gramoxone®	12	fl oz/A	POST1						
Storm®	24	fl oz/A	POST1						
Induce®	0.25	% v/v	POST1						
Zidua®	1.5	oz/A	PRE	98	81	80	75	65	3,086
VALOR®	3	oz/A	PRE						
Gramoxone®	12	fl oz/A	POST1						
Storm®	24	fl oz/A	POST1						
Induce®	0.25	% v/v	POST1						
Zidua®	1.5	oz/A	PRE	96	79	79	99	98	4,159
Prowl H_2O®	32	fl oz/A	PRE						
Gramoxone®	12	fl oz/A	POST1						
Storm®	24	fl oz/A	POST1						
Induce®	0.25	% v/v	POST1						
Cadre®	4	fl oz/A	POST2						
Induce®	0.25	% v/v	POST2						
Zidua®	1.5	oz/A	PRE	96	75	74	100	98	3,624
Gramoxone®	12	fl oz/A	POST1						
Storm®	24	fl oz/A	POST1						
Induce®	0.25	% v/v	POST1						
Cadre®	4	fl oz/A	POST2						
Induce®	0.25	% v/v	POST2						
Zidua®	1	oz/A	PRE	97	78	78	98	98	4,734
Prowl H_2O®	32	fl oz/A	PRE						
Gramoxone®	12	fl oz/A	POST1						
Storm®	24	fl oz/A	POST1						
Induce®	0.25	% v/v	POST1						
Zidua®	1	oz/A	POST2						
Cadre®	4	fl oz/A	POST2						
Induce®	0.25	% v/v	POST2						

(cont'd)

Table 23. Zidua® weed control systems in peanut. (Continued)

Treatment	*Rate*	*Unit*	*Timing*	*IPOHE Control 6/13 %*	*IPOHE Control 7/5 %*	*IPOHE Control 7/24 %*	*IPOHE Control 8/7 %*	*IPOHE Control 8/20 %*	*Peanut Yield 10/21 lb/A*
Zidua®	1.5	oz/Aa	PRE	90	74	73	99	98	3,688
Gramoxone®	12	fl oz/A	POST1						
Storm®	24	fl oz/A	POST1						
Induce®	0.25	% v/v	POST1						
Zidua®	1	oz/A	POST2						
Cadre®	4	fl oz/A	POST2						
Induce®	0.25	% v/v	POST2						
Dual II Mag®	1	pt/A	PRE	79	74	74	100	100	4,625
Gramoxone®	12	fl oz/A	POST1						
Storm®	24	fl oz/A	POST1						
Induce®	0.25	% v/v	POST1						
Cadre®	4	fl oz/A	POST2						
Induce®	0.25	% v/v	POST2						
Zidua®	1.5	oz/A	PRE	98	83	85	83	78	2,583
Outlook®	16	fl oz/A	POST1						
Gramoxone®	12	fl oz/A	POST1						
Induce®	0.25	% v/v	POST1						
Zidua®	1	oz/A	POST2						
Prowl H_2O®	32	fl oz/A	PRE	60	56	56	100	98	3,554
Cadre®	4	fl oz/A	POST2						
Induce®	0.25	% v/v	POST2						
LSD (P=.10)				8	16	17	14	16	895
Standard Deviation				7	13	14	12	14	746
CV				8	20	21	14	18	22

Table 24. ET® timing in peanut.

Treatment	*Rate*	*Unit*	*Timing*	*Peanut StdRed 6/13 %*	*Peanut StdRed 7/5 %*	*Peanut StdRed 7/24 %*	*Peanut StdRed 8/7 %*	*Peanut StdRed 8/20 %*	*Peanut StdRed 9/1 %*	*Peanut StdRed 9/23 %*
Check				0	0	0	0	0	0	0
ET®	2	oz/a	6 LF	0	0	0	0	0	0	0
Induce®	0.25	% v/v	6 LF							
ET®	2	oz/a	6 LF	0	0	0	0	0	0	0
Induce®	0.25	% v/v	6 LF							
ET®	2	oz/a	30DA6LF							
Induce®	0.25	% v/v	30DA6LF							
ET®	2	oz/a	6 LF	0	0	0	0	0	0	0
Induce®	0.25	% v/v	6 LF							
ET®	2	oz/a	60DA6LF							
Induce®	0.25	% v/v	60DA6LF							
ET®	2	oz/a	6 LF	0	0	0	0	0	0	0
Induce®	0.25	% v/v	6 LF							
ET®	2	oz/a	90DA6LF							
Induce®	0.25	% v/v	90DA6LF							
ET®	2	oz/a	30DA6LF	0	0	0	0	0	0	0
Induce®	0.25	% v/v	30DA6LF							
ET®	2	oz/a	30DA6LF	0	0	0	0	0	0	0
Induce®	0.25	% v/v	30DA6LF							
ET®	2	oz/a	60DA6LF							
Induce®	0.25	% v/v	60DA6LF							
ET®	2	oz/a	30DA6LF	0	0	0	0	0	0	0
Induce®	0.25	% v/v	30DA6LF							
ET®	2	oz/a	90DA6LF							
Induce®	0.25	% v/v	90DA6LF							
ET®	2	oz/a	60DA6LF	0	0	0	0	0	0	0
Induce®	0.25	% v/v	60DA6LF							
ET®	2	oz/a	60DA6LF	0	0	0	0	0	0	0
Induce®	0.25	% v/v	60DA6LF							
ET®	2	oz/a	90DA6LF							
Induce®	0.25	% v/v	90DA6LF							
ET®	2	oz/a	90DA6LF	0	0	0	0	0	0	0
Induce®	0.25	% v/v	90DA6LF							
LSD (P=.10)				NS	NS	NS	NS	NS	NS	NS
Standard Deviation				0	0	0	0	0	0	0
CV				0	0	0	0	0	0	0

Table 25. ET® Timing in Peanut.

Treatment	Rate	Unit	Timing	Peanut Stunt 6/13 %	Peanut Stunt 7/5 %	Peanut Stunt 7/24 %	Peanut Stunt 8/7 %	Peanut Stunt 8/20 %	Peanut Stunt 9/1 %	Peanut Stunt 9/23 %	Peanut Yield 10/21 lbsA
Check				0	0	0	0	1	0	0	4,584
ET®	2	oz/a	6 LF	9	5	0	0	0	0	0	5,108
Induce®	0.25	% v/v	6 LF								
ET®	2	oz/a	6 LF	10	5	5	5	5	5	5	5,085
Induce®	0.25	% v/v	6 LF								
ET®	2	oz/a	30DA6LF								
Induce®	0.25	% v/v	30DA6LF								
ET®	2	oz/a	6 LF	10	5	0	0	15	10	10	4,753
Induce®	0.25	% v/v	6 LF								
ET®	2	oz/a	60DA6LF								
Induce®	0.25	% v/v	60DA6LF								
ET®	2	oz/a	6 LF	11	5	0	0	0	0	10	4,351
Induce®	0.25	% v/v	6 LF								
ET®	2	oz/a	90DA6LF								
Induce®	0.25	% v/v	90DA6LF								
ET®	2	oz/a	30DA6LF	0	0	6	6	6	6	6	4,709
Induce®	0.25	% v/v	30DA6LF								
ET®	2	oz/a	30DA6LF	0	0	6	5	18	14	14	4,906
Induce®	0.25	% v/v	30DA6LF								
ET®	2	oz/a	60DA6LF								
Induce®	0.25	% v/v	60DA6LF								
ET®	2	oz/a	30DA6LF	0	0	6	6	6	5	8	4,701
Induce®	0.25	% v/v	30DA6LF								
ET®	2	oz/a	90DA6LF								
Induce®	0.25	% v/v	90DA6LF								
ET®	2	oz/a	60DA6LF	0	0	0	0	14	14	13	5,243
Induce®	0.25	% v/v	60DA6LF								
ET®	2	oz/a	60DA6LF	0	0	0	0	16	14	16	4,942
Induce®	0.25	% v/v	60DA6LF								
ET®	2	oz/a	90DA6LF								
Induce®	0.25	% v/v	90DA6LF								
ET®	2	oz/a	90DA6LF	0	0	0	0	0	0	10	5,157
Induce®	0.25	% v/v	90DA6LF								
LSD (P=.10)				3	2	2	1	3	2	3	NS
Standard Deviation				2	1	1	1	2	2	2	494
CV				58	68	62	53	31	25	26	10

Table 26. Effects of Dicamba plus Roundup® on peanut performance.

Treatment	*Rate*	*Unit*	*Timing*	*Peanut StdRed 6/13 %*	*Peanut StdRed 7/5 %*	*Peanut StdRed 7/24 %*	*Peanut StdRed 8/7 %*	*Peanut StdRed 8/20 %*	*Peanut StdRed 9/1 %*	*Peanut StdRed 9/23 %*
Check				0	0	0	0	0	0	0
Dicamba 1/16x	0.03	lb ai/A	30 DAP	1	1	0	0	0	0	0
Glyphosate 1/16x	0.06	lb ai/A								
Dicamba 1/16x	0.03	lb ai/A	60 DAP	0	0	0	0	0	0	0
Glyphosate 1/16x	0.06	lb ai/A								
Dicamba 1/16x	0.03	lb ai/A	90 DAP	0	0	0	0	0	0	0
Glyphosate 1/16x	0.06	lb ai/A								
Dicamba 1/8x	0.06	lb ai/A	30 DAP	1	1	0	0	0	0	0
Glyphosate 1/8x	0.13	lb ai/A								
Dicamba 1/8x	0.06	lb ai/A	60 DAP	0	0	0	0	0	0	0
Glyphosate 1/8x	0.13	lb ai/A								
Dicamba 1/8x	0.06	lb ai/A	90 DAP	0	0	0	0	0	0	0
Glyphosate 1/8x	0.13	lb ai/A								
Dicamba 1/4x	0.13	lb ai/A	30 DAP	1	1	1	0	0	0	0
Glyphosate 1/4x	0.25	lb ai/A								
Dicamba 1/4x	0.13	lb ai/A	60 DAP	0	0	0	0	0	0	0
Glyphosate 1/4x	0.25	lb ai/A								
Dicamba 1/4x	0.13	lb ai/A	90 DAP	0	0	0	0	0	0	0
Glyphosate 1/4x	0.25	lb ai/A								
Dicamba 1/2x	0.25	lb ai/A	30 DAP	5	10	10	8	8	5	5
Glyphosate 1/2x	0.5	lb ai/A								
Dicamba 1/2x	0.25	lb ai/A	60 DAP	0	0	0	0	0	0	0
Glyphosate 1/2x	0.5	lb ai/A								
Dicamba 1/2x	0.25	lb ai/A	90 DAP	0	0	0	0	0	0	0
Glyphosate 1/2x	0.5	lb ai/A								
Dicamba 1x	0.5	lb ai/A	30 DAP	38	78	79	78	73	73	71
Glyphosate 1x	1	lb ai/A								
Dicamba 1x	0.5	lb ai/A	60 DAP	0	0	1	1	1	1	1
Glyphosate 1x	1	lb ai/A								
Dicamba 1x	0.5	lb ai/A	90 DAP	0	0	0	0	0	0	0
Glyphosate 1x	1	lb ai/A								
LSD (P=.10)				4	3	3	3	5	5	5
Standard Deviation				4	3	3	3	4	5	4
CV				137	51	54	58	98	102	95

Table 27. Effects of Dicamba plus Roundup® on peanut performance.

Treatment	*Rate*	*Unit*	*Timing*	*Peanut Stunt 6/13 %*	*Peanut Stunt 7/5 %*	*Peanut Stunt 7/24 %*	*Peanut Stunt 8/7 %*	*Peanut Stunt 8/20 %*	*Peanut Stunt 9/1 %*	*Peanut Stunt 9/23 %*	*Peanut Yield 10/21 lbs/A*
Check				0	0	0	0	0	0	0	5,134
Dicamba 1/16x Glyphosate 1/16x	0.03 0.06	lb ai/A lb ai/A	30 DAP	13	10	5	0	0	0	0	4,890
Dicamba 1/16x Glyphosate 1/16x	0.03 0.06	lb ai/A lb ai/A	60 DAP	0	0	10	10	9	6	6	4,584
Dicamba 1/16x Glyphosate 1/16x	0.03 0.06	lb ai/A lb ai/A	90 DAP	0	0	0	0	9	8	8	4,553
Dicamba 1/8x Glyphosate 1/8x	0.06 0.13	lb ai/A lb ai/A	30 DAP	13	10	5	3	3	3	0	4,766
Dicamba 1/8x Glyphosate 1/8x	0.06 0.13	lb ai/A lb ai/A	60 DAP	0	0	13	19	19	16	10	4,579
Dicamba 1/8x Glyphosate 1/8x	0.06 0.13	lb ai/A lb ai/A	90 DAP	0	0	0	0	13	10	10	4,309
Dicamba 1/4x Glyphosate 1/4x	0.13 0.25	lb ai/A lb ai/A	30 DAP	28	25	25	10	9	9	9	3,713
Dicamba 1/4x Glyphosate 1/4x	0.13 0.25	lb ai/A lb ai/A	60 DAP	0	0	18	36	33	31	31	3,495
Dicamba 1/4x Glyphosate 1/4x	0.13 0.25	lb ai/A lb ai/A	90 DAP	0	0	0	0	19	15	14	3,799
Dicamba 1/2x Glyphosate 1/2x	0.25 0.5	lb ai/A lb ai/A	30 DAP	45	45	45	33	26	25	25	3,241
Dicamba 1/2x Glyphosate 1/2x	0.25 0.5	lb ai/A lb ai/A	60 DAP	0	0	20	45	45	45	43	3,306
Dicamba 1/2x Glyphosate 1/2x	0.25 0.5	lb ai/A lb ai/A	90 DAP	0	0	0	0	24	25	26	3,098
Dicamba 1x Glyphosate 1x	0.5 1	lb ai/A lb ai/A	30 DAP	80	90	90	85	85	85	85	949
Dicamba 1x Glyphosate 1x	0.5 1	lb ai/A lb ai/A	60 DAP	0	0	23	53	53	53	53	1,779
Dicamba 1x Glyphosate 1x	0.5 1	lb ai/A lb ai/A	90 DAP	0	0	0	0	38	43	43	2,165
LSD (P=.10)				4	5	6	5	6	7	6	630
Standard Deviation				4	4	5	5	5	6	5	534
CV				37	42	34	28	23	27	27	14

Table 28. Evaluation of KFD-108 formulations for weed control in Oklahoma peanut.

Treatment	*Rate*	*Unit*	*Growth Stage*	*Appl Code*	*Peanut Injury 8/20 %*	*IPOHE Control 8/20 %*
Untreated	0	0				
KFD-108-01	12	fl oz/A	POST1	A	0	98
NIS	0.25	% v/v	POST1	A		
KFD-108-01	24	fl oz/A	POST1	A	6	93
NIS	0.25	% v/v	POST1	A		
KFD-108-01	3	PT/A	POST1	A	6	93
NIS	0.25	% v/v	POST1	A		
KFD-108-04	12	fl oz/A	POST1	A	3	75
NIS	0.25	% v/v	POST1	A		
KFD-108-04	24	fl oz/A	POST1	A	3	75
NIS	0.25	% v/v	POST1	A		
KFD-108-04	3	pt/A	POST1	A	5	79
NIS	0.25	% v/v	POST1	A		
KFD-108-03	12	fl oz/A	POST1	A	1	85
NIS	0.25	% v/v	POST1	A		
KFD-108-03	24	fl oz/A	POST1	A	3	93
NIS	0.25	% v/v	POST1	A		
KFD-108-03	3	pt/A	POST1	A	8	88
NIS	0.25	% v/v	POST1	A		
LSD (P=.10)					2	31
Standard Deviation					2	26
CV					57	33

Effect of Reduced Water Availability on the Interaction Between the Peanut Plant and the Sclerotinia Blight Fungus

Ahmed Abd-Elmagid, Carla Garzon, Robert Hunger and Hassan Melouk
Department of Entomology and Plant Pathology

Mark Payton
Department of Statistics

2014 progress made possible through OPC and NPB support

- **Sclerotinia blight of peanut, caused by the soilborne fungus *Sclerotinia minor* (Sclerotinia blight fungus), is a widespread disease in the peanut growing areas of Virginia, North Carolina, Oklahoma and Texas.**
- **The Sclerotinia fungus survives in soil mainly by producing sclerotia on and in infected plant parts (mainly stems and pods).**
- **Many factors affect survival and germination of sclerotia of the Sclerotinia fungus that include soil temperature, soil moisture, soil gases or chemicals and activities of other microorganisms in soil.**
- **Mycelial growth of the Sclerotinia blight fungus on media changed with varying levels of water availability, with less being produced at medium and severely reduced water availability.**
- **When glycerol was used to create different water availability levels in the media on which the fungus was growing, sclerotia numbers decreased as the water stress increased.**
- **Water stressed Okrun peanut plants exhibited less disease when inoculated with the Sclerotinia fungus. Area Under Disease Progress Curve (AUDPC) decreased as the water stress level increased.**
- **The above findings may have practical implications for management of Sclerotinia blight on peanut by suggesting irrigation frequency should be decreased during the high peak of Sclerotinia blight incidence.**

Introduction and Research Objectives

Sclerotinia blight of peanut, caused by the soilborne fungus *Sclerotinia minor* (Sclerotinia blight fungus), is a widespread disease in the peanut growing areas of Virginia, North Carolina, Oklahoma and Texas. The Sclerotinia fungus survives in soil mainly by producing resting structures called sclerotia on infected plant parts. Infection occurs primarily through eruptive germination of sclerotia that gives rise to white, fluffy mycelia that

infect stems and pegs of peanut. Many factors affect survival and germination of sclerotia of the Sclerotinia fungus that include soil temperature, soil moisture, soil gases or chemicals and activities of other microorganisms in soil. Temperature and moisture are significant factors affecting development of diseases caused by the Sclerotinia fungus. Viability of sclerotia also declines rapidly over time in moist soil (i.e., low water stress). In general, the Sclerotinia fungus survives better in dry soil than in moist soil, and better in shallow rather than at a deeper depth in soil where higher moisture usually exists. Most research on the effect of water potential on the Sclerotinia fungus was performed with isolates infecting lettuce under environmental factors significantly different from those found in peanut fields. Our research was performed with Sclerotinia isolates pathogenic on peanut. Development of more effective integrated disease management strategies for control of Sclerotinia blight of peanut could be improved from new knowledge of the factors that affect the biology of the host, the fungi and their interaction. Therefore, the objectives of the research were to: 1) study the effect of water potential on the vegetative growth and sclerotia production by the fungus, 2) determine the impact of water stress (reduced water availability) on the peanut and its infection with the Sclerotinia fungus.

General Methods

The cultivar Okrun, a Sclerotinia blight-susceptible runner type peanut, was used in this study. All the research was performed in the laboratory and greenhouse. Plants were grown in a climate-controlled greenhouse and maintained throughout for pod production if needed. A peanut Sclerotinia isolate was used in this study. A fungal growing medium was artificially modified to produce several levels of water potentials (water availability levels). The actual water potential of the fungal growing medium was determined by a Vapor Pressure Osmometer. Mycelial growth of the Sclerotinia fungus as well as sclerotial production and viability were determined on a nutrient medium adjusted to various water potentials (levels of water availability). Water stressed Okrun peanut plants at various water deficit levels were produced under greenhouse conditions using polyethylene glycol prior to inoculation. Plants were inoculated with the Sclerotinia fungus using mycelial plugs as inoculum. Disease progress was measured on infected plants, and was quantified by measuring the expansion of necrotic lesions on stems of Okrun peanut plants.

Results and Significance

Sclerotinia fungus mycelial growth

Mycelial growth of the Sclerotinia blight fungus on media with various levels water availability was reduced at medium and high reduction of water availability (Table 29). This pattern of mycelial growth was similar to that observed by other researchers, which indicates the observed responses were caused by changes in osmotic stress rather than by toxicity of the salt like compounds. Also, the mycelial growth responses of the peanut Sclerotinia blight to different osmotic stress in this study are similar to those previously

Table 29. Growth of the Sclerotinia blight fungus on two media adjusted to various levels of water availability.[a]

Status of available water	*Medium was adjusted with*	
	Potassium chloride	*Glycerol*
Near normal	16.3	29.4
Medium reduction	12.5	22.0
High reduction	7.0	12.0

a Mean area of growth under mycelial growth curve.

observed for other soilborne pathogens. Salt-like compounds are present in agar medium or in soil trap water molecules, and therefore water will not be available to the Sclerotinia fungus. The energy required by the fungus to obtain water molecules from the medium or soil is increased as the solute concentrations in the agar medium increase, and therefore reduction of fungal growth occurs.

Sclerotial production

Different levels of water availability in the fungus growing medium created by potassium chloride (KCl) and glycerol affected sclerotia numbers produced by the Sclerotinia blight fungus in a different way (Table 30). In general, when KCl was used to create different water availability, sclerotia numbers did not follow a consistent pattern. However, when glycerol was used to create different water availability, sclerotia numbers decreased as the water stress increased (Table 31).

Effect of plant water stress on infection of peanut

Water stressed Okrun peanut plants exhibited less disease when inoculated with the Sclerotinia fungus. The area under disease progress curve decreased as the water stress level increased (Table 31). A search of the literature found no previous research that examined the effect of the status of water hydration on peanut and its infection by the Sclerotinia fungus. The data indicate water stressed plants had smaller lesions compared with nonwater stressed plants or plants that were under less water stress. There is no known published data concerning the effects of water potential on mycelial growth or production of sclerotia by the Sclerotinia fungus. Therefore, this study is the first to show the negative effects of reduced water availability on mycelial growth and sclerotial production by the Sclerotinia fungus.

Table 30. Number of sclerotia by the Sclerotinia blight fungus on two media adjusted to various levels of water availability.[a]

Status of available water	*Medium was adjusted with*	
	Potassium chloride	*Glycerol*
Near normal	558	970
Medium reduction	775	685
High reduction	831	528

a Mean number of sclerotia produced by the Sclerotinia blight fungus.

Table 31. Area under disease progress curve of water stressed Okrun peanut plants inoculated with the Sclerotinia blight fungus.

Status of available water	*Area under disease progress curve (cm^2)*
Near Normal	29.0
Medium reduction	19.0
High reduction	14.0

Significance of the Research

These findings may have practical implications for management of Sclerotinia blight on peanut by suggesting a reduction of irrigation frequency and amount during an outbreak of Sclerotia blight may help to reduce the severity of that outbreak.

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Integrated Management of Peanut Diseases

John Damicone and Tyler Pierson
Department of Enomology and Plant Pathology

2014 progress made possible through OPC and NPB support

- **In a high-yielding trial, control of early leaf spot resulted in yield responses of 900 lbs/A to 1,600 lbs/A.**
- **In a high-yielding trial, fungicide-treated plots receiving inoculant (Vault Liquid™) averaged nearly 400 lbs/A more than fungicide-treated plots without inoculant.**
- **The experimental fungicide A18126 resulted in control of southern blight and early leaf spot and yield response that was similar to Abound®, Folicur®, Provost® and Fontelis.**
- **Calender (six applications) and weather-based (four applications) fungicide programs generally provided better disease control than the reduced (three applications) calendar programs.**

Six field trials were completed in 2014 that addressed the management of important peanut diseases in Oklahoma. The management strategies that were evaluated included chemical control and disease-resistant varieties. Efforts were made to develop and demonstrate a range of input levels for the fungicide programs. The diseases studied included seedling disease, early leaf spot, southern blight and Sclerotinia blight. The excellent cooperation of Bobby Weidenmaier and the farm crew at the Caddo Research Station continues to be greatly appreciated. Additional funding for the trials was provided by BASF®, Bayer®, DuPont® and Syngenta®.

Results from 2014 are summarized in this report. In interpreting the results, small differences in treatment values should not be overemphasized. Statistical analysis at the 95 percent confidence level is applied to all the trial data. Unless values are statistically different (followed by different letters), little confidence can be placed in the superiority of one treatment or variety over another.

Conditions generally were favorable for peanut production and disease development at the Caddo Research Station in 2014, particularly early in the season.

Compared to the 30-year average, rainfall was above normal in June and July, and below normal from August through October Average daily temperature was below normal except for October Rainfall totaled 5.43 inches for June, 2.22 inches for July, 1.46 inches for August, 1.29 inches for September and 2.13 inches for October. Plots received 15 applications of sprinkler irrigation at 0.5 inch to 1 inch per application that totaled 13 inches of water. Conditions favored foliar disease development. Foliar disease developed early in the season and reached damaging levels by harvest. Southern blight pressure was low to moderate despite inoculation of some trials. Sclerotinia blight appeared in August, but did not reach severe levels

late in the season because of the dry weather in September. Severe grazing of plots by deer heavily damaged Sclerotinia blight trials. Sclerotinia blight did not develop as a result of the severe grazing and plots were abandoned. Pod rot was a problem in some commercial fields.

Foliar Diseases

Evaluations of fungicide programs

The objective of this trial was to compare various registered fungicides applied on a full-season, 14-day schedule that totaled six sprays on a 3-spray reduced calendar program, and according to the weather-based Leaf Spot Advisor program on the Oklahoma MESONET (http://www.mesonet.org). Conditions favored foliar disease development. Early leaf spot appeared in early August and reached severe levels in untreated check plots by harvest (Table 32). All treatments reduced leaf spot and defoliation compared to the untreated check. The full-season and weather-based programs generally provided the best control. Plot yields were negatively correlated with leaf spot (r=-0.56, P=0.01) and defoliation (r=-0.45, P<0.01). All treatments had numerically higher yields and crop values than the untreated check, but only the full-season Tilt®/Bravo® program, the programs with Headline®, and the Tilt®/Bravo®-Provost®-Advisory program had statistically higher yields.

Table 32. Evaluation of fungicides and application schedule on control of early leaf spot of Tamnut OL06 peanut at the Caddo Research Station, 2014.

Treatment	*Rate/A*	*Timing*[z]	*Early leaf spot (%)*	*Defoliation (%)*	*Yield (lbs/A)*	*Value ($/A)*[y]
Tilt®/Bravo® SE 4.3F	1.5 pt	1-6	32.1 e[x]	8.7 de	3,064 a-d	518 a-d
Bravo® 6F	1.5 pt	1,6				
Folicur® 3.6F	7.2 fl oz	2-5	50.4 cd	5.8 de	2,991 a-e	506 a-e
Tilt®/Bravo® SE 4.3F	1.5 pt	1,3,5				
Headline® 2.09E	6 fl oz	2,4,6	5.7 f	0.0 e	3,340 ab	565 ab
Tilt/Bravo® SE 4.3F	1.5 pt	A1,A3				
Headline® 2.09E	6 fl oz	A2,A4	22.9 e	0.0 e	3,405 a	576 a
Tilt/Bravo® SE 4.3F	1.5 pt	3,5				
Headline® 2.09E	6 fl oz	4	45.8 d	20.4 c	3,173 abc	537 abc
Bravo® 6F	1 pt +					
Folicur® 3.6F	7.2 fl oz	A1-A4	52.5 cd	4.6 e	2,795 cde	473 cde
Bravo® 6F	1 pt +					
Folicur® 3.6F	7.2 fl oz	3,4,5	56.7 c	31.2 b	2,664 de	451 de
Tilt/Bravo® SE 4.3F	1.5 pt	A1,A3				
Provost® 3.6F	7 fl oz	A2,A4	69.1 b	15.4 cd	3,136 a-d	531 a-d
Tilt/Bravo® SE 4.3F	1.5 pt	3,5				
Provost® 3.6F	7 fl oz	4	59.2 c	40.0 b	2,897 b-e	490 b-e
Untreated check			98.3 a	74.2 a	2,534 e	429 e
LSD (P=0.05)[w]			9.6	10.0	479	81

z 1 to 6 correspond to the spray dates of 1=July 7, 2=July 21, 3=Aug 4, 4=Aug 18, 5=Sept 2, and 6=Sept 18; A1 to A4 correspond to the spray dates of A1=July 7, A2=July 21, A3=Aug 4, and 4=Sept 10 made according to the weather-based Leaf Spot Advisor.

y Loan rate value based on an average grade of 70% TSMK.

x Values in a column followed by the same letter are not significantly according to Fisher's least significant difference test at P=0.05.

w Least significant difference.

Southern Blight and Foliar Diseases

Evaluations of fungicides programs – Trial 1

The objective of this trial was to evaluate the experimental fungicide A18126 and the new fungicides Fontelis® and Provost® in comparison to older fungicides Folicur®, Abound® and Custodia® (Folicur® + Abound®) for control of early leaf spot and southern blight. Bravo® was included as a reference for control of only leaf spot. Fungicides were applied in full-season, 14-day programs. Conditions favored development of early leaf spot, which appeared in August and reached moderate levels in untreated check plots by harvest, compared to previous trials at this site. All treatments reduced leaf spot and defoliation compared to the untreated check and provided similar levels of foliar disease control (Table 33). Stem rot pressure was low despite inoculation. Stem rot levels were numerically highest for the full-season Bravo® treatment and the untreated check, but differences were not statistically significant. Plot yields were negatively correlated with leaf spot (r=-0.42, P=0.01) and defoliation (r=-0.51, P=0.05), but not stem rot. All treatments increased yield and crop value compared to the untreated check.

Table 33. Evaluation of fungicide programs for control early leaf spot and southern blight on Tamnut OL06 peanuts at the Caddo Research Station, 2014.

Treatment	*Rate/A*	*Timing*[z]	*Leaf spot (%)*	*Defoliation (%)*	*So. blight (%)*	*Yield (lbs/A)*	*Value ($/A)*[y]
Tilt/Bravo® 4.3SE	1.5 pt	1					
A18126 45WG	7.14 oz	2,4					
Bravo® 6F	1.5 pt	3,5	15.6 cd[x]	0.8 b	2.2 a	2,534 a	423 a
Tilt®/Bravo® 4.3SE	1.5 pt	1					
A18126 45WG	9.5 oz	2,4					
Bravo® 6F 1	0.5 pt	3,5	9.5 d	0.4 b	2.5 a	2,519 a	420 a
Tilt®/Bravo® 4.3SE	1.5 pt	1					
A18126 45WG	7.14 oz	2-4					
Bravo® 6F	1.5 pt	5	6.1 d	0.0 b	1.2 a	2,476 a	413 a
Bravo® 6F	1.5 pt	1,5					
Custodia® 2.67F	15.5 fl oz	2-4	15.0 d	2.5 b	2.7 a	2,577 a	430 a
Bravo® 6F	1.5 pt	1,5					
Provost® 3.6F	8 fl oz	2-4	5.4 d	0.0 b	4.5 a	2,461 a	411 a
Bravo® 6F	1.5 pt	1,5					
Folicur® 3.6F	7.2 fl oz	2-4	31.6 b	5.8 b	2.7 a	2,338 a	390 a
Tilt®/Bravo® 4.3SE	1.5 pt	1,3,5					
Abound® 2.08F	18 fl oz	2,4	13.5 d	1.7 b	2.2 a	2,555 a	426 a
Tilt®/Bravo® 4.3SE	1.5 pt	1,5					
Fontelis® 1.67F	1 pt	2-4	38.7 b	7.1 b	3.2 a	2,570 a	429 a
Bravo® 6F	1.5 pt	1-5	28.3 bc	2.9 b	7.2 a	2,374 a	396 a
Untreated check			72.5 a	47.5 a	5.5 a	1,771 b	285 b
LSD (P=0.05)[w]			13.3	8.9	NS	426	71

z One to five correspond to the spray dates of 1=7 July, 2=July 21, 3=Aug 4, 4=Aug 18, and 5=Sept 18.
y Loan rate value based on an average grade of 69% TSMK.
x Values in a column followed by the same letter are not significantly different at P=0.05 according to Fisher's Least Significant Difference Test.
w Fisher's least significant difference, NS=treatment effect not significant at P=0.05.

Inoculate, Stand Establishment and Foliar Disease

Evaluation of inoculant, infurrow fungicide application, and fungicides program on peanut disease control and yield

The objective of this trial was to evaluate the effects of inoculant with Rhizobium (Vault Liquid), in-furrow fungicide application with Abound® or Priaxor®, and fungicide programs for leaf spot and southern blight on disease control and yield.

Treatment effects on stand establishment and vigor were not statistically significant (Table 34). Conditions favored late-season development of early leaf spot, which appeared in early August and reached

Table 34. Evaluation of inoculant, in-furrow fungicide application, and fungicide program on stand establishment, disease control, and yield of Tamnut OL06 peanuts at the Caddo Research Station, 2014.

Treatment and rate/A (timing)[z]	*Stand (plts/ft)*	*Vigor (%)*	*Leaf spot (%)*	*Defoliation (%)*	*Yield (lbs/A)*	*Value ($/A)[y]*
Bravo® 6F 1.5 pt (1,4) Headline® 2.08E 9 fl oz (2,3)	2.9 a	3.7 a	47.5 d	20.4 c	4,020 b	680 b
Vault Liquid® 15 fl oz (IF) Bravo® 6F 1.5 pt (1,4) Headline® 2.08E 9 fl oz (2,3)	2.7 a	3.7 a	52.1 cd	20.0 c	4,229 ab	716 ab
Vault Liquid® 15 fl oz + Abound® 2.08F 11.6 fl oz (IF) Bravo® 6F 1.5 pt (1,4) Abound® 2.08F 18 fl oz (2,3)	2.6 a	3.5 a	62.5 bc	27.9 bc	4,265 ab	722 ab
Vault Liquid® 15 fl oz + Priaxor® 4.17F 6 fl oz (IF) Bravo® 6F 1.5 pt (1,4) Priaxor® 4.17F 8 fl oz (2,3)	2.6 a	4.0 a	56.7 bcd	27.5 bc	4,792 ab	811 ab
Vault Liquid® 15 fl oz + Priaxor® 4.17F 6 fl oz (IF) Bravo® 6F 1.5 pt (1,4) Priaxor® 4.17F 6 fl oz (2,3)	2.4 a	3.5 a	53.3 cd	22.9 c	4,937 a	836 a
Bravo® 6F 1.5 pt (1,4) Priaxor® 4.17F 6 fl oz (2,3)	2.6 a	3.5 a	52.5 cd	18.7 c	4,002 b	677 a
Bravo® 6F 1.5 pt (1,4) Headline® 2.08E 9 fl oz (2) Priaxor ®4.17F 8 fl oz (3)	2.6 a	3.2 a	45.0 d	18.7 c	4,038 b	683 b
Bravo® 6F 1.5 pt (1,4) Headline® 2.08E 9 fl oz (2) Abound® 2.08F 18 fl oz (3)	2.7 a	3.5 a	62.5 b	27.9 bc	4,447 ab	752 ab
Bravo® 6F 1.5 pt (1,4) Abound® 2.08F 18 fl oz (2,3)	2.6 a	4.0 a	69.1 b	36.2 b	4,419 ab	748 ab
Untreated check	2.3 a[x]	3.0 a	99.1 a	71.7 a	3,122 c	528 c
LSD (P=0.05)[w]	NS	NS	2.5	11.3	791	134

z One to four correspond to the spray dates of 1=July 2, 2=Aug 8, 3=Sept 2, and 4=Sept 18.
y Loan rate value based on an average grade of 71% TSMK.
x Values in a column followed by the same letter are not significantly different at P=0.05 according to Fisher's Least Significant Difference Test.
w Fisher's least significant difference, NS=treatment effect not significant at P=0.05.

severe levels in untreated check plots by harvest, compared to previous trials at this site. All treatments reduced leaf spot and defoliation compared to the untreated check and provided similar levels of disease control. Plot yields were negatively correlated with leaf spot (r=-0.39, P=0.01) and defoliation (r=-0.35, P=0.05). All treatments increased yield and crop value compared to the untreated check. The average yield of treatments receiving in-furrow inoculant (4,556 lbs/A, n=4) was statistically greater than for treatments receiving only foliar treatment (4,185 lbs/A, n=5).

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