Partners in Progress
PEANUTS

Peanut Research at OSU 2013

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 *2013 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.

Jonathan Edelson
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.

Seeking Answers

The annual *Peanut Partners in Progress* Report contains the results of peanut research and Extension efforts during the 2013 crop year. This report highlights the investigations dealing with integrated strategies for managing peanut diseases, genetic improvement and variety advancements, weed control, as well as applied research and field study summaries … all focused on "seeking answers" to today's economic and production challenges.

As you review this report, let me encourage you to consider the people who make this collaborative effort successful. Oklahoma's peanut producers provide the funding for research projects via the OPC and the NPB. The farmers you selected to govern these boards establish research priorities based upon the production challenges producers face. The Peanut Improvement Team (PIT), a select group of research and Extension professionals, develop short- and long-term investigative studies to provide answers to the problems at hand.

The success or failure of this partnership is directly associated with the commitment to provide funding and the dedicated effort of all involved. The OPC expresses gratitude for your continued support and direction, and encourages every producer to participate in field days, turn-row and production meetings held at numerous locations throughout the state. The OPC also commends members of the PIT for their unselfish dedication to seeking answers and improving Oklahoma's peanut industry.

And it goes without saying … but let it be said, the OPC acknowledges the investments made to the success of these efforts by the OSU 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. Thank you to all.

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

2013 progress made possible through OPC and NPB support

- **Performance of Runner varieties depended on location, but long-term averages indicate Red River Runner is the top performer in most locations.**
- **Cultivar AT99-98-14 consistently performed best at most locations over the last several years compared to other varieties. Breeding line ARSOK-S140-1OL exceeded OLin and Tamnut OL06 at most locations in long-term average performance. This breeding line will be released as 'OLè' in 2014.**
- **High oleic breeding lines ARSOK-V30B and ARSOK-V31 (Virginias) and ARSOK-R35 (Runner) performed very well at most locations.**

Variety Tests

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 25 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 and then thrashed three 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 in footnotes below the tables. Least significant differences (LSD) are listed at the bottom of all but the performance summary 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 a 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, there is less confidence that variety X really 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.

2013 Caddo County Peanut Variety Trial

Location: Fort Cobb (OAES)
Date Planted: 5/22/13
Date Dug: 10/18/13
Date Threshed: 10/21/13

The trial was planted May 22 into a strip-till seedbed and managed for foliar and soilborne disease throughout the season. Percent pod rot estimates were taken after harvest, but no significant differences were noted among those lines tested (Table 1).

Average yield for the runner test was 3,998 lbs/A and average grade was 72 percent TSMK (Table 1) with Tamrun OL11, ACI243 and Red River Runner having higher yields as compared to other varieties tested. No significant differences were noted among the top five performers.

Among the Spanish varieties or lines tested, the average yield and grade were 3,382 lbs/A and 69 percent TSMK, respectively. AT-98-99 was numerically the top performer, but no significant differences were observed among the top three lines tested. OLin had the poorest performance at 3,085 lbs/A.

The varieties/lines entered into the Virginia test averaged 4047 lbs/A with an average grade of 69 percent TSMK. Jupiter, ARSOK-V31 and AT-07V were the top three performers. Several varieties/lines tested were high oleic, including ARSOK-V31, ARSOK-V30B, N08081ol and GA-11J.

Table 2 contains Caddo County yield and grade data for the last three years, along with two- and three-year averages when possible. Best performers over a two- or three-year period were Runner lines Red River Runner and ARSOK-R35, Spanish lines AT-98-99 and ARSOK-S140-1OL, and Virginia lines Jupiter and AT-07V.

2013 Custer/Blaine County Variety Trial

Location: Thomas (Les Crall Farms)
Date Planted: 5/14/13
Date Dug: 10/11/13
Date Threshed: 10/17/13

The trial was planted May 14 into a conventional till seedbed and managed for foliar and soilborne disease throughout the season. Percent pod rot estimates were taken after harvest, but no significant differences were noted among those lines tested (Table 3).

Average yield for the Runner test was 4,758 lbs/A with an average grade of 69 percent TSMK. Florida 107, ACI 240 and ARSOK-R35 were the top three performers. Georgia 09B had the poorest performance at 3,956 lbs/A and 71 percent TSMK.

For the Spanish varieties/lines tested, the average yield was 3,896 lbs/A and average grade was 67 percent TSMK. AT-98-99 was again the top performer, followed by ARSOK-S140-1OL. OLin again turned in the poorest performance at 3,291 lbs/A and 67 percent TSMK.

Virginia varieties/lines averaged 4937 lbs/A and a grade of 66 percent TSMK. No significant differences in yield were noted among the top three performers, which were AT-07V, Jupiter and Gregory. GA-11J had the poorest performance at 3,690 lbs/A and 64 percent TSMK.

Table 4 contains yield and grade data for the last three years along with two- and three- year averages in Custer/Blaine County. No long-term averages were available for the Virginia test due to the fact that the test in 2012 was not harvested.

2013 Beckham County Variety Trial

Location: Sayre (Brian Silk Farms)
Date Planted: 5/23/13
Date Dug: 10/11/13
Date Threshed: 10/15/13

The trial was planted May 23 into a no-till seedbed and managed for foliar and soilborne disease throughout the season. Percent pod rot estimates were taken and significant differences were seen among those Virginia lines tested (Table 5).

Average yield and grade for the runner test was 3,616 lbs/A and 75 percent TSMK. ARSOK-R35 and Red River Runner were the top performers and had extremely high grades at 78 percent TSMK and 77 percent TSMK, respectively. ACI240 was the poorest performer at 1,851 lbs/A and 72 percent TSMK.

The average yield and grade among Spanish varieties/lines tested were 4,646 lbs/A and 73 percent TSMK. No significant differences were observed between Spanish varieties/lines tested but OLin was the best performer numerically at 5,094 lbs/A and 72 percent TSMK.

Average yield and grade in the Virginia test was 4,741 lbs/A and 71 percent TSMK. The top three performers were AT-07V, Jupiter and ARSOK-V30B. GA-11J was the poorest performer with regards to yield at 2,988 lbs/A but had the least pod rot at 2.4 percent.

Table 6 includes yield and grade data for Beckham County for the last three years along with two- and three-year averages. Long-term averages for the Runner test show ARSOK-R35, Red River Runner and ACI149 are the best performers. For the Spanish test long term, AT-98-99 consistently comes out on top. Long term top Virginia varieties/lines include AT-07V, Jupiter and ARSOK-V30B.

Acknowledgements

Special thanks to Lisa Myers, Angie Harting and Ken Jackson for technical support and to Bobby Weidenmaier, Mike Brantes and Mike Locke at the Caddo Research Station, for location support. Thanks also to farmer cooperators Les Crall and Brian Silk. Variety seed for these trials was provided by the Clint Williams Co., Madill. This project was supported by the OPC and NPB, as well as the USDA-ARS and OSU. Mention of trade names or commercial products in this publication is solely for the purpose of providing specific information and does not imply recommendation or endorsement by the USDA. USDA is an equal opportunity provider and employer.

Table 1. Peanut yields and grades from Caddo County variety tests in 2013.

Variety or Line	*% Pod Rot*[2]	*Yield (lbs/A)*	*% of Trial Average*	*Grade*[3] *(%TSMK)*	*Seed Weight (g/100)*	*Revenue*[4] *($/A)*
Runner[1]						
Tamrun OL11	2.2	4,477	112	75	64	729
ACI243	0.7	4,368	109	73	53	692
Red River Runner	1.5	4,344	109	74	67	697
ARSOK-R35	1.0	4,175	104	71	67	643
ACI240	1.5	4,017	101	73	50	636
Florida 107	1.1	3,896	97	71	65	600
Flavor Runner 458	1.8	3,775	94	71	62	581
Georgia 09B	1.1	3,497	87	72	61	546
ACI149	2.9	3,473	87	70	58	527
Mean		3,998		72	61	
CV		2.05		2.05	2.05	
LSD (0.05)	ns	593		.03	5	
Spanish[1]						
AT-98-99	1.2	3,678	109	70	48	556
Tamnut OL06	1.3	3,521	104	67	53	509
ARSOK-S140-1OL	1.0	3,242	96	71	53	497
OLin	2.0	3,085	91	70	47	466
Mean		3,382		69	50	
CV		2.26		2.26	2.26	
LSD (0.05)	ns	597		.02	2.75	
Virginia[1]						
Jupiter	3.5	4,658	115	66	88	680
ARSOK-V31	1.8	4,513	112	74	98	739
AT-07V	1.9	4,186	103	65	80	602
ARSOK-V30B	1.0	3,884	96	69	86	593
Gregory	3.9	3,872	96	68	95	583
N08081ol	3.0	3,726	92	69	96	569
GA-11J	3.1	3,146	78	66	96	460
Mean		4,047		68	92	
CV		2.07		2.07	2.07	
LSD (0.05)	ns	511		.03	9.5	

[1] Market type.
[2] Pod rot (Pythium and/or Rhizoctonia) readings taken after threshing; Runner P value = 0.28, Spanish P value = 0.43, Virginia P value = 0.45; ns = not significantly different.
[3] % TSMK = Percent total sound mature kernels.
[4] Calculated based on peanut loan levels for the 2013 crop year.

Table 2. Peanut yields and grades from Caddo County variety tests in 2011, 2012 and 2013, along with two- and 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)*	*Yield (lbs/A)*	*Grade[2] (%TSMK)*
	----2011----		*----2012----*		*----2013----*		*----2-yr. Avg.----*		*----3-yr. Avg.----*	
Runner[1]										
Tamrun OL11	-	-	-	-	4,477	75	-	-	-	-
ACI243	-	-	3,256	71	4,368	73	3,843	72	-	-
Red River Runner	4,497	64	4,828	71	4,344	74	4,586	73	4,556	69
ARSOK-R35	-	-	4,501	71	4,175	71	4,338	71	-	-
ACI240	-	-	3,256	71	4,017	73	3,636	72	-	-
Florida 107	-	-	4,534	64	3,896	71	4,215	68	-	-
Flavor Runner 458	3,968	58	4,601	71	3,775	71	4,188	71	4,114	66
Georgia 09B	4,080	63	4,287	72	3,497	72	3,892	72	3,955	69
ACI149	3,993	58	4,211	66	3,473	70	3,842	68	3,892	64
LSD (0.05)	496	4.5	781	4	593	.03	1,229	4	272	3.3
Spanish[1]										
AT-98-99	3,739	61	3,924	67	3,678	70	4,646	69	3,780	66
Tamnut OL06	2,973	59	3,743	66	3,521	67	3,811	68	3,412	63
ARSOK-S140-1OL	3,238	61	3,917	64	3,242	71	3,835	68	3,465	65
OLin	3,002	60	3,621	66	3,085	70	3,291	66	3,236	65
LSD (0.05)	542	2.9	ns	2	597	.02	767	.03	358	2.7
Virginia[1]										
Jupiter	4,048	63	4,342	68	4,658	66	4,500	67	4,349	67
ARSOK-V31	-	-	-	-	4,513	74	-	-	-	-
AT-07V	3,132	63	5,598	65	4,186	65	4,892	65	4,305	64
ARSOK-V30B	-	-	4,792	70	3,884	69	4,338	70	-	-
Gregory	-	-	4,668	67	3,872	68	4,270	68	-	-
N08081ol	3,492	56	3,597	69	3,726	69	3,661	69	3,605	64
GA-11J	-	-	4,646	65	3,146	66	3,896	66	-	-
LSD (0.05)	758	3.2	533	2	511	.03	1,388	2	1,545	10

[1] Market type.
[2] % TSMK = Percent total sound mature kernels.

Table 3. Peanut yields and grades from Custer County variety tests in 2013.

Variety or Line	*% Pod Rot*[2]	*Yield (lbs/A)*	*% of Trial Average*	*Grade*[3] *(%TSMK)*	*Seed Weight (g/100)*	*Revenue*[4] *($/A)*
Runner[1]						
Florida 107	0.7	5,566	117	68	56	822
ACI240	0.8	5,553	117	67	44	807
ARSOK-R35	1.9	4,973	105	70	63	756
ACI243	0.6	4,948	103	70	44	752
Red River Runner	1.6	4,840	102	68	58	714
Tamrun OL11	0.9	4,803	101	69	53	719
Flavor Runner 458	1.9	4,662	98	67	50	678
ACI149	1.0	3,993	84	66	50	572
Georgia 09B	0.3	3,956	83	71	57	609
Mean		4,758		69	54	
CV		2.05		2.05	2.05	
LSD (0.05)	ns	715		.03	2.6	
Spanish[1]						
AT-98-99	0.9	4,646	119	68	42	682
ARSOK-S140-1OL	1.1	3,835	98	68	51	563
Tamnut OL06	1.4	3,811	97	65	50	535
OLin	1.2	3,291	84	67	45	476
Mean		3,896		67	47	
CV		2.26		2.26	2.26	
LSD (0.05)	ns	767		.03	3.92	
Virginia[1]						
AT-07V	0.6	5,844	118	61	72	798
Jupiter	0.8	5,517	112	66	80	806
Gregory	2.1	5,336	108	66	86	779
ARSOK-V31	0.8	5,094	103	71	84	800
N08081ol	1.4	4,622	94	65	89	665
ARSOK-V30B	2.6	4,174	85	65	75	600
GA-11J	1.0	3,690	75	64	87	522
Mean		4,937		66	81	
CV		2.07		2.07	2.07	
LSD (0.05)	ns	650		.03	6.24	

[1] Market type.
[2] Pod rot (Pythium and/or Rhizoctonia) readings taken after threshing; Runner P value = 0.06, Spanish P value = 0.51, Virginia P value = 0.15; ns = not significantly different.
[3] % TSMK = Percent total sound mature kernels.
[4] Calculated based on peanut loan levels for the 2013 crop year.

Table 4. Peanut yields and grades from Custer/Blaine County variety tests in 2011, 2012 and 2013, along with two- and 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)*	*Yield (lbs/A)*	*Grade[2] (%TSMK)*
	----2011----		*----2012----*		*----2013----*		*----2-yr. Avg.----*		*----3-yr. Avg.----*	
Runner[1]										
Florida 107	-	-	4,080	72	5,566	68	4,823	70	-	-
ACI240	-	-	2,579	73	5,553	67	4,066	70	-	-
ARSOK-R35	-	-	5,799	78	4,973	70	5,386	74	-	-
ACI243	-	-	2,442	73	4,948	70	3,595	72	-	-
Red River Runner	4,821	61	4,588	75	4,840	68	5,092	72	5,001	73
Tamrun OL11	-	-	-	-	4,803	69	-	-	-	-
Flavor Runner 458	4,149	54	3,618	73	4,662	67	4,090	68	4,109	70
ACI149	3,899	53	3,517	69	3,993	66	3,806	70	3,836	69
Georgia 09B	4,095	55	5,195	72	3,956	71	4,272	73	4,213	73
LSD (0.05)	823	6	654	5	715	.03	ns	3.8	854	ns
Spanish[1]										
AT-98-99	5,295	59	4,130	70	4,646	68	4,388	69	4,690	65
ARSOK-S140-1OL	4,545	63	5,361	70	3,835	68	4,255	68	4,351	67
Tamnut OL06	3,793	60	4,992	67	3,811	65	4,401	66	4,198	64
OLin	3,557	66	4,675	68	3,291	67	3,983	67	3,841	67
LSD (0.05)	802	4	638	2	650	.03	ns	2	ns	ns

[1] Market type.
[2] % TSMK = Percent total sound mature kernels.

Table 5. Peanut yields and grades from Beckham County variety tests in 2013.

Variety or Line	*% Pod Rot*[2]	*Yield (lbs/A)*	*% of Trial Average*	*Grade*[3] *(%TSMK)*	*Seed Weight (g/100)*	*Revenue*[4] *($/A)*
Runner[1]						
ARSOK-R35	1.5	5,215	144	78	73	883
Red River Runner	1.8	4,840	134	77	75	825
ACI149	2.6	4,331	120	75	65	719
Flavor Runner 458	1.4	4,222	117	75	62	701
Florida 107	2.8	4,078	113	74	67	668
Georgia 09B	3.8	2,952	82	75	67	490
Tamrun OL11	3.8	2,214	61	76	71	373
ACI243	2.7	1,899	52	73	56	306
ACI240	3.0	1,851	51	72	50	295
Mean		3,616		75	66	
CV		2.05		2.05	2.05	
LSD (0.05)	ns	881		.03	3.8	
Spanish[1]						
OLin	1.8	5,094	109	72	54	792
AT-98-99	2.8	4,670	101	75	52	775
Tamnut OL06	3.6	4,416	95	71	56	694
ARSOK-S140-1OL	1.0	4,404	95	73	59	711
Mean		4,646		73	55	
CV		2.26		2.26	2.26	
LSD (0.05)	ns	ns		.03	3.88	
Virginia[1]						
AT-07V	6.1ab	5,662	119	67	87	839
Jupiter	5.8ab	5,118	108	72	104	815
ARSOK-V30B	3.1bc	4,937	104	73	91	798
Gregory	7.9a	4,792	101	70	99	743
N08081ol	4.5bc	4,731	99	72	105	754
ARSOK-V31	3.8gc	4,658	98	75	100	773
GA-11J	2.4c	2,988	63	70	107	463
Mean		4,741		71	100	
CV		2.07		2.07	2.07	
LSD (0.05)		1170		.02	3.73	

[1] Market type.

[2] Pod rot (Pythium and/or Rhizoctonia) readings taken after threshing; Runner P value = 0.07, Spanish P value = 0.06, Virginia P value = 0.01. Values within the same column followed by the same letter not significantly different at P = .01; ns = not significantly different.

[3] % TSMK = Percent total sound mature kernels.

[4] Calculated based on peanut loan levels for the 2013 crop year.

Table 6. Peanut yields and grades from Beckham County variety tests in 2011, 2012 and 2013, along with two- and 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)*	*Yield (lbs/A)*	*Grade[2] (%TSMK)*
	----2011----		*----2012----*		*----2013----*		*----2-yr. Avg.----*		*----3-yr. Avg.----*	
Runner[1]										
ARSOK-R35	-	-	6,469	73	5,215	78	5,842	76	-	-
Red River Runner	5,615	74	5,572	76	4,840	77	5,206	76	5,342	76
ACI149	5,209	71	6,394	74	4,331	75	5,362	75	5,311	73
Flavor Runner 458	5,129	69	5,590	74	4,222	75	4,906	75	4,980	73
Florida 107	-	-	5,986	75	4,078	74	5,032	75	-	-
Georgia 09B	5,554	74	6,130	74	2,952	75	4,541	75	4,878	74
Tamrun OL11	-	-	-	-	2,214	76	-	-	-	-
ACI243	-	-	5,844	76	1,899	73	3,871	75	-	-
ACI240	-	-	6,265	75	1,851	72	4,058	74	-	-
LSD (0.05)	375	2	ns	2	881	.03	ns	ns	ns	2.4
Spanish[1]										
OLin	3,920	67	4,882	70	5,094	72	4,988	74	4,632	70
AT-98-99	4,563	68	5,812	72	4,670	75	5,241	71	5,015	72
Tamnut OL06	3,532	65	5,049	67	4,416	71	4,732	69	4,332	72
ARSOK-S140-1OL	3,772	66	5,068	69	4,404	73	4,736	71	4,414	68
LSD (0.05)	633	2	ns	2	ns	.03	ns	2	617	1.3
Virginia[1]										
AT-07V	5,351	62	5,761	66	5,662	67	5,733	66	5,605	64
Jupiter	4,930	72	4,650	67	5,118	72	5,439	69	5,269	70
ARSOK-V30B	-	-	5,844	71	4,937	73	5,390	72	-	-
Gregory	-	-	5,474	64	4,792	70	5,133	67	-	-
N08081ol	4,632	70	4,650	67	4,731	72	4,690	70	4,671	70
ARSOK-V31	-	-	-	-	4,658	75	-	-	-	-
GA-11J	-	-	4,984	66	2,988	70	3,986	65	-	-
LSD (0.05)	568	4	618	5	1,170	.02	1,322	6	518	4.6

[1] Market type.
[2] % TSMK = Percent total sound mature kernels.

Disease Evaluations and Agronomic Traits of Advanced Peanut Breeding Lines in 2013

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2013 progress made possible through OPC and NPB support

- **A total of 21 breeding lines and reference cultivars (11 Runner, four Spanish and six Virginia) were evaluated. All advanced breeding lines were high oleic.**
- **Environmental conditions in 2013 were favorable for both Sclerotinia and southern blights, but more Sclerotinia blight was observed than southern blight. The field also was infested with root-knot and lesion nematodes.**
- **The top three Runner entries in revenue and yield were ARSOK-R37 ($545/A, 3,468 lbs/A), ARSOK-R35 ($530/A, 3,401 lbs/A) and ARSOK-R60A ($513/A, 3,388 lbs/A). ARSOK-R35 also was among the Runner entries most resistant to Sclerotinia blight.**
- **The Spanish entries did not differ statistically in yield or grade, but ARSOK-S140-1OL had the greatest crop value ($439/A) and yield (3,001 lbs/A). ARSOK-S140-1OL, in addition to Tamnut OL06, had the least Sclerotinia blight. ARSOK-S140-1OL will be released as "OLé" in 2014.**
- **The Virginia breeding line, ARSOK-V41, had the highest crop value ($609/A), grade (74) and a large proportion of extra-large kernels (63 percent). GA11J and ARSOK-V31 were most resistant to pod rot.**

The primary goal of this research is to develop and release high oleic peanut cultivars for the Southwestern U.S. with superior yield, disease resistance and agronomic performance. In 2013, advanced breeding lines of Runner, Spanish and Virginia peanuts were evaluated in small plots at the Caddo Research Station in Fort Cobb. The objectives of the field study were to compare the advanced lines to commercially available cultivars in agronomic quality (such as 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 21 breeding lines and reference cultivars (11 Runner, four Spanish and six 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 five seeds / ft in plots consisting of two 15-foot-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 16 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.

Temperatures and rainfall in most months of the 2013 season were relatively close to the 15-year average (Table 7). However, July received 3.6 inches more rainfall than the 15-year average, and September was warmer by an average of 3°F. Additional water (one-half inch to 1 inch) was applied 16 times to the plots between June 14 and Oct. 8 using a pivot system.

Disease evaluations for Sclerotinia and southern blights were conducted Aug. 22, Sept. 19 and Oct. 9. 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*. Environmental conditions were conducive for both diseases, but more Sclerotinia blight than southern blight was observed. Deer damage was present in several plots. Plants were dug Oct. 25. Spanish peanut plots were threshed Oct. 28, and the Runner and Virginia peanut plots were threshed Oct. 29. Peanut grades were determined following USDA-AMS guidelines. Pods were presorted prior to shelling, and TMSK from grade samples were assessed for visible and concealed damage. Pod rot ratings were taken from bagged peanuts, after the pods had been threshed, dried and cleaned. A liter-volume sample was taken from each bag, and the proportion of pods with discoloration typical of Pythium or Rhizoctonia pod rot was assessed by weight. Because threshing removes a significant portion of lightweight pods with severe pod rot, these ratings likely underestimate the actual levels of pod rot observed in the field. Discoloration from lesion nematodes (*Pratylenchus brachyurus*) and tumor-like growths from root-knot nematodes (*Meloidogyne arenaria*) also were frequently observed on the pods rated for pod rot, but these diseases were not quantified.

Data were analyzed using one-way ANOVA with block as a random factor in PROC GLIMMIX of SAS (ver. 9.2). 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

Table 7. Monthly air temperature and rainfall for 2013 field season at the Caddo Research Station, Fort Cobb.[z]

	Air Temperature (°F)		*Rainfall (Inches)*	
Month	*Daily Mean*	*Departure from 15-Year Average*	*Total*	*Departure from 15-Year Average*
May[y]	73.2	-2	2.77	-0.51
June	78.8	+1	4.69	+0.62
July	79.5[x]	-2[x]	5.93	+3.62
August	79.2	-2	1.79[x]	-[x]
September	74.9	+3	2.01	+0.36[x]
October	61.2	0	2.14	-0.96

z Data from Mesonet.
y Mean temperature and rainfall are for May 16 (planting date) to May 30. Departure from 15-year average includes all days in May.
x Incomplete records. Missing data for total rainfall for August provided by R. Weidenmaier.

(Tables 8 and 9). 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 2013

Eleven Runner peanut entries, including Okrun and the high-oleic cultivars Red River Runner, Tamrun OL07 and Flavor Runner 458, were evaluated (Table 8). Statistical differences among entries were found for all shelling characteristics and yield ($P \leq 0.01$). ARSOK-R37 generated the greatest revenue at $545/A. The ARSOK entries, R35, R60A, R47A, Red River Runner and R47, did not differ statistically from ARSOK-R37 in crop value, but their returns were between $410 and $530/A. ARSOK-R37, ARSOK-R35, ARSOK-R60A, ARSOK-R47A and Red River Runner also had the highest yields, ranging from 3,468 to 3,074 lbs/A. Flavor Runner 458, ARSOK-R60C and ARSOK-R60B had the lowest crop value ($297 to $362/A) and yield (2,067 to 2,347 lbs/A). Significant differences in grade were found among all entries, but none of the entry-by-entry comparisons were significant at the $\alpha = 0.05$ level.

Red River Runner had the largest seeds (72.1g/100 seeds; 35.2 seeds/oz), while ARSOK-R60C, ARSOK-60B and ARSOK-60A had the smallest seeds (55.9 g to 59.7 g/100 seeds; 43.3 to 46.1 seeds/oz). More extra-large kernels were found in ARSOK-R47 (52 percent) and Red River Runner (48 percent). Tamrun OL07, ARSOK-R60C, ARSOK-60A and Flavor Runner 458 had the fewest extra-large kernels (29 percent to 30 percent). Tamrun OL07 had the greatest proportion of hulls (25.4 percent) and damaged kernels (7.8 percent). The smallest proportion of hulls was found in Red River Runner (21.5 percent), and the fewest damaged kernels were in ARSOK-R47 (1.1 percent).

The incidence of Sclerotinia blight differed among the Runner entries ($P < 0.01$). Flavor Runner 458 (32 percent) and Okrun (28 percent) were highly susceptible; ARSOK entries R60B, R47, R60C, and R35 were more resistant to Sclerotinia blight (5.8 percent to 9.6 percent). No statistically significant differences were found among the entries for southern blight ($P = 0.37$). The entries differed in incidence of pod rot ($P = 0.02$), but none of the pairwise multiple comparisons were significant.

Performance of the Advanced Spanish Breeding Lines and Cultivars in 2013

Four Spanish entries, Tamnut OL06, OLin and AT98-99, and the breeding line ARSOK-S140-1OL, were evaluated (Table 9). Significant differences were observed among the entries in the number of seeds/oz. ($P = 0.01$), and proportions of ELK ($P = 0.01$) and hulls ($P < 0.01$). OLin had the smallest seeds at 54.4 seeds/oz. Tamnut OL06 had the largest seeds at 51.6 seeds/oz. More extra-large kernels were harvested from ARSOK-S140-1OL and OLin (38 percent and 37 percent, respectively) than from AT98-99 (28 percent). Tamnut OL06 (27 percent) had the greatest proportion of hulls relative to AT98-99 (24 percent), which had the smallest proportion. The entries did not differ statistically in crop value ($P = 0.62$), and yield ($P = 0.56$), but numerically, ARSOK-S140-1OL had the greatest crop value ($439/A) and yield (3,001 lbs/A). No differences among entries were found for grade ($P = 0.18$), 100-seed weight ($P = 0.13$) or proportion of damaged kernels ($P = 0.42$).

The incidence of Sclerotinia blight differed among the entries ($P = 0.01$). AT98-99 (11.4 percent) had the most Sclerotinia blight of all the Spanish entries. ARSOK-S140-1OL and Tamnut OL06 had the

Table 8. Yield, grade, shelling characteristics and disease incidence (Sclerotinia blight, SM; southern blight, SR; pod rot) in advanced Runner breeding lines at the Caddo Research Station, Fort Cobb, 2013.[z]

Entry	*Revenue ($/A)[y]*	*Yield (lbs/A)*	*Grade*	*100 Seed (g)*	*No. Seeds per oz[x]*	*ELK (%)[x]*	*Hull (%)*	*DK (%)[x]*	*SM (%)*	*SR (%)*	*Pod Rot (%)[w]*
Runner											
ARSOK-R37	545 a	3468 a	72	71.8 ab	36.3 bc	43 a-c	21.8 cd	2.5 ab	10.8 bc	0	2.0
ARSOK-R35	530 ab	3401 ab	72	72.0 ab	36.2 bc	46 ab	22.3 b-d	2.6 ab	7.9 c	0	1.0
ARSOK-R60A	513 a-c	3388 ab	70	59.7 c-e	43.3 a	30 d	24.1 a-c	3.8 ab	12.1 bc	0	1.0
ARSOK-R47A	501 a-d	3214 a-c	72	71.3 ab	36.0 bc	45 ab	21.8 cd	3.4 ab	14.0 a-c	0	2.9
Red River Runner	481 a-d	3074 a-c	72	72.1 a	35.2 c	48 a	21.5 d	4.8 ab	14.4 a-c	0	2.2
ARSOK-R47	410 a-e	2588 cd	73	66.2 a-c	37.4 bc	52 a	22.9 b-d	1.1 b	6.3 c	0	1.4
Okrun	390 b-e	2708 b-d	66	64.2 b-c	38.0 bc	36 b-d	24.3 ab	7.6 ab	28.1 ab	0	4.4
Tamrun OL07	371 c-e	2588 cd	65	63.5 c-e	37.7 bc	29 d	25.4 a	7.8 a	15.7 a-c	0	3.3
ARSOK-R60B	362 d-e	2347 d	71	57.7 de	45.9 a	31 cd	23.1 b-d	3.0 ab	5.8 c	0	1.1
ARSOK-R60C	349 e	2254 d	71	55.9 e	46.1 a	29 d	23.6 a-c	3.3 ab	9.6 c	0	1.0
Flavor Runner 458	297 e	2067 d	66	62.4 c-e	38.6 b	30 d	23.5 a-c	7.0 ab	32.1 a	0	4.3

z Market types were analyzed separately. Numbers with the same lowercase letter within columns for each market type are not significantly different ($\alpha = 0.05$).
y Based on the following peanut loan amount: $4.845/ton. Calculation does not include deductions for excess splits or damaged and other kernels.
x ELK: number of seeds/oz or percentage of seeds riding largest screen riding 21/64 screen. DK: kernels with visible and concealed damage.
w Ratings made on threshed and cleaned peanuts.

Table 9. Yield, grade, shelling characteristics and disease incidence (Sclerotinia blight, SM; southern blight, SR; pod rot) in advanced Spanish and Virginia breeding lines at the Caddo Research Station, Fort Cobb, 2013.[z]

Entry	Revenue ($/A)[y]	Yield (lbs/A)	Grade	100 Seed (g)	No. Seeds per oz[x]	ELK (%)[x]	Hull (%)	DK (%)[x]	Fancy Pods (%)[w]	SM (%)	SR (%)	Pod Rot (%)[v]
Spanish												
ARSOK-S140-1OL	439	3,001	68	47.7	52.4 ab	38 a	25.8 ab	4.9	-	2.5 b	4.2	1.1
AT98-99	406	2,734	69	45.2	53.2 ab	28 b	23.8 c	5.6	-	11.4 a	1.4	1.7
OLin	403	2,694	69	42.1	54.4 a	37 a	25.1 bc	3.3	-	4.9 ab	1.1	2.4
Tamnut OL06	388	2,721	66	49.4	51.6 b	36 ab	27.1 a	4.9	-	2.5 b	2.8	1.2
Virginia												
ARSOK-V41	609 a	3,708	74 a	91.0 c	29.3 a	63 a	21.8 d	4.0 ab	73.2 c	18.8	0	1.6 bc
GA-11J	507 ab	3,134	73 a	124.7 a	22.0 c	67 a	25.5 b	1.9 b	99.1 a	7.5	0	0 c
ARSOK-V30B	495 ab	3,148	71 ab	99.4 bc	27.0 b	59 a	23.8 bc	4.8 ab	84.0 b	9.9	0	2.9 a-c
ARSOK-V31	482 ab	2,974	73 a	102.3 b	26.3 b	66 a	22.6 cd	4.3 ab	79.3 bc	9.7	0	1.1 c
AT-07V	422 ab	3,054	62 bc	79.5 d	30.9 a	39 b	27.4 a	8.7 ab	46.8 d	21.1	0	5.9 a
Jupiter	394 b	2,948	60 c	98.0 bc	26.8 b	49 b	27.6 a	12.1 a	80.6 bc	18.8	0	5.7 ab

z Market types were analyzed separately. Numbers with the same lowercase letter within columns for each market type are not significantly different ($\alpha = 0.05$).
y Based on the following peanut loan amounts: Spanish, $4.821/ton; Virginia, $4.942/ton. Calculation does not include deductions for excess splits or damaged and other kernels.
x ELK: number of seeds/oz or percentage of seeds riding largest screen: Spanish, 19/64; Virginia, 21.5/64. DK: kernels with visible and concealed damage.
w Percentage of Virginia pods that ride the 34/64-inch spacing on presizer.
v Ratings made on threshed and cleaned peanuts.

least Sclerotinia blight (both 2.5 percent). Statistically significant differences in southern blight ($P = 0.41$) or pod rot ($P = 0.20$) were not observed among the entries.

ARSOK-S140-1OL will be released by USDA-AMS and OSU as "OLé" in 2014.

Performance of the Advanced Virginia Type Breeding Lines and Cultivars in 2013

Six Virginia peanut entries, including Jupiter, mid-oleic AT-07V and high-oleic GA-11J, were evaluated (Table 9). The entries differed in crop value ($P = 0.04$), grade ($P < 0.01$), 100 seed weight ($P < 0.01$), number of seeds/oz ($P < 0.01$) and proportions of extra-large kernels ($P < 0.01$), hulls ($P < 0.01$), damaged kernels ($P = 0.01$) and fancy pods ($P < 0.01$). No statistically significant differences among yields were found ($P = 0.23$). The breeding line ARSOK-V41 had the highest crop value at $609/A, and Jupiter had the lowest value at $394/A. The highest grades were obtained from ARSOK-V41 (74), GA-11J (73) and ARSOK-V31 (73), while the lowest grades were from AT-07V (62) and Jupiter (60). GA-11J had the largest seeds (124.7 g/100 seeds; 22 seeds/oz) relative to AT-07V (79.5 g/100 seeds; 31 seeds/oz) and ARSOK-V41 (91.0 g/100 seeds; 29 seeds/oz). More extra-large kernels were found in GA-11J, ARSOK-31, ARSOK-V41 and ARSOK-V30B (59 percent to 67 percent) than in AT-07V or Jupiter (39 percent to 49 percent). The hull fraction was largest for AT-07V (27.4 percent) and Jupiter (27.6 percent), and smallest for ARSOK-V41 (21.8 percent). Jupiter (12.1 percent) kernels had the most visible and concealed damage, and GA-11J (1.0 percent) had the least. The entry with the highest proportion of fancy pods was GA-11J (99.1 percent); AT-07V (46.8 percent) had the fewest fancy pods.

Statistically significant differences were not found among entries in Sclerotinia ($P = 0.11$) and southern blights ($P = 0.53$). However, the incidence of Sclerotinia blight was 21 percent in AT-07V, while the incidence was 10 percent or less in GA-11J, ARSOK-V30B and ARSOK-V31. The entries differed in the proportion of pods with symptoms of pod rot ($P < 0.01$). Nearly 6 percent of the AT-07V pods had Rhizoctonia or Pythium pod rot symptoms compared with 1.1 percent or less for ARSOK-V31 and GA-11J.

Acknowledgements

Special thanks to Angie Harting, Lisa Myers and Ken Jackson at USDA-ARS and Robert Weidenmaier, Mike Brantes and Mike Locke at the Caddo Research Station, for providing excellent technical support. USDA-AMS in Anadarko and John Damicone gave helpful advice regarding grading and pod rot rating, respectively. Planting seed for some commercial lines was provided by The Clint Williams Company, and a seed splitter was provided by Golden Peanut Company. This research is supported by USDA-ARS CRIS Project No. 6217-21220-006-00D. Mention of trade names or commercial products in this publication is solely for the purpose of providing specific information and does not imply recommendation or endorsement by the USDA. USDA is an equal opportunity provider and employer.

A Preliminary Report on the Effect of Digging Date on Fatty Acid Composition of Red River Runner Peanut Cultivar

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2013 progress made possible through OPC and NPB support

- **Peanut marketability in the southwestern U.S. is driven by the availability of cultivars possessing high oleic content, high yield and superior grade.**
- **For the traditional low oleic to linoleic (O/L) peanuts, the O/L ratio increases as the developmental stage increases.**
- **No previous reports have appeared on the effects of maturity on the O/L ratios of high O/L ratio lines.**
- **A preliminary test in 2013 was conducted to determine the effect of crop maturity on the O/L ratio of the high oleic cultivar Red River Runner.**
- **The ratio of O/L of the 19/64 kernel size did not change regardless of the digging date.**
- **There was a clear relationship between seed size and O/L ratio. As the seed size increases, the O/L ratio increases.**
- **At full maturity at 148 days after planting, the 19/64 kernels of Red River Runner peanut weighed more than 54 percent of the total kernel weight.**
- **More research is needed to determine the effects of digging date, seed size and seed maturity on the fatty acid composition of high O/L ratio peanut cultivars.**

Background

Peanut (*Arachis hypogaea* L.) marketability in the southwestern U.S. is driven by the availability of cultivars possessing high oleic content, high yield, and superior grade. For this reason, the peanut improving program has been incorporating these marketability concerns into the newly developed cultivars during the last 15 years.

Peanut seed consists primarily of protein and lipid with the lipid portion accounting for approximately 50 percent by weight. There are several lipid classes present, however, 95 percent to 98 percent of the lipid is triacylglycerol (Sanders, 1980a). There are eight major fatty acids including palmitic acid (hexadecanoic acid, 16:0), stearic acid (octadecanoic acid, 18:0), Oleic (cis-9-octadecenoic acid, 18:1),

linoleic acid (cis, cis- 9,12-octadecadienoic acid, 18:2), arachidic acid (eicosenoic acid, 20:0), eicosenoic acid (cis-11-eicosenoic acid, 20:1), behenic acid (docosanoic acid, 22:0) and lignoceric acid (tetracosanoic acid 24:0) (Hinds, 1995). Fatty acid composition has been shown to vary greatly among varieties under different environmental conditions and with seed maturity (Branch et al. 1990, Dwivedi et al. 1993, Sanders 1980b, Hinds, 1995). Oleic and linoleic acid together make up approximately 75 percent to 80 percent of the fatty acids depending on variety, and because linoleic acid is derived biosynthetically from oleic acid, the levels of the two are negatively correlated (Mercer et al. 1990). The stability and health benefits of peanut oil depend on fatty acid composition. Linoleic acid with its two double bonds is much more susceptible to oxidation resulting in rancidity of the oil. In the past, most peanut lines had low ratios of oleic to linoleic acid (O/L ratio), in the range of 1:3. However, lines have been developed that have much higher ratios, in the range of 20:25. These lines are being produced in the southwestern U.S. and will be the predominant varieties grown in 2014.

One of the factors that has been shown to influence the O/L ratio is the maturity of seeds at harvest. For the traditional low O/L peanuts, the O/L ratio increases as the developmental stage increases (Sanders, 1980b). In these studies, there was an increase in the amount of oleic acid with maturation, while the amount of linoleic acid remained relatively constant. There also was an increase in the percentage of oil with maturity that was largely due to increases in the triacylglycerol content (Sanders, 1980a). In another study, the amount of linoleic acid decreased with maturity and the amount of oleic acid increased, resulting in an increase in the O/L ratio (Hinds, 1995). In most of the studies on the effects of maturity on fatty acid composition, the developmental stage of the seeds was determined. However, there also have been studies where the market grade of the peanut has been related to fatty acid composition. In one study of five peanut cultivars, the larger seeds were shown to contain significantly higher levels of oleic acid and to have higher O/L ratios (Mozingo et al. 1988). Another study showed digging date had no influence on the fatty acid composition (Knauft et al. 1986). However, in this report, there was no information about how the size or maturity of the seeds affected fatty acid composition.

In peanut lines with low O/L ratios, there appears to be a clear correlation between seed maturity and fatty acid composition. However, all of the available data is for low O/L ratio lines. No published reports have appeared on the effects of maturity on the O/L ratios of high O/L ratio lines are known. Therefore, a preliminary test in 2011 was conducted to determine the effect of crop maturity on the O/L ratio of the high oleic cultivar Red River Runner.

Methodology

Peanut plots were established at Stillwater. Plots were planted in May 2011 and harvested as needed from mid September to mid October to attain a maximum growing season of 155 days. Kernels were harvested at various maturity stages. The experiment had four replications in a complete randomized block design. Each plot consisted of two 6-meter rows spaced at 0.91 meter. Seed (treated with Trilex Star fungicide, Bayer, Research Triangle Park, NC, at 2.5 g/kg seed) were planted at a rate of 18 seeds/m at a depth of 4 cm. Plots were irrigated as needed to ensure good growth. Standard agronomic practices were followed throughout the growing season to manage foliar diseases and soilborne diseases according to the peanut production guide for Oklahoma (Godsey et al. 2007).

Plants were dug with a standard two-row digger-inverter. Plants were allowed to dry in the windrow for three to four

days before threshing with a stationary combine. Freshly harvested pods were cured in an air dryer for about three days at a temperature not exceeding 34°C. Plant debris and other foreign materials were removed from harvested pods by a standard peanut cleaner. Grading was performed as described (Davidson et al. 1982). Kernel weight (weight in g of 100 kernels riding on the 16/64 screen) of graded samples was determined. Also, the number of kernels retained on the 19/64 screen (large) was determined. Total lipid and fatty acid composition from individual seeds was analyzed according to the methods of Mercer et al. (1990) and Shipley et al. (1993).

Results

The ratio of O/L of the 19/64 kernel size did not change regardless of the digging date (Table 10). Also, there was a clear relationship between seed size and O/L ratio, as the seed size increases the O/L ratio increases. At full maturity at 148 days after planting, the 19/64 kernels of Red River Runner weighed more than 54 percent of the total kernel weight. These data were obtained from test plots at a single location with one cultivar, Red River Runner. Also, these data from 2011 were obtained from an irrigated crop grown under extreme heat, which created unfavorable conditions for peanut growth. Therefore, more studies are needed to determine the effects of digging date, seed size and seed maturity on the fatty acid composition of high O/L ratio cultivars. This information will be critical to producers and processors as the production of the high O/L ratio lines increases.

Table 10. Oleic/Linoleic (O/L) ratios and percent kernel weight of Red River Runner grown at Stillwater, 2013.

	O/L Ratio and % Kernel Weight				
Harvest	*Other Kernels*	*15/64*	*16/64*	*19/64*	*SMK (%)*
1. 120 DAP	7.1 (7.4)*	8.5 (2.6)	17.8 (16.1)	23.6 (43.4)	60.1
2. 133 DAP	5.2 (5.7)	8.9 (1.3)	15.0 (12.8)	25.1 (49.7)	64.6
3. 148 DAP	4.9 (5.2)	6.2 (1.1)	14.2 (7.1)	24.9 (54.4)	64.7

* Number in parenthesis represents % kernel weight.

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Integrated Management of Peanut Diseases

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Department of Entomology and Plant Pathology

2013 progress made possible through OPC and NPB support

- **The new fungicides Fontelis® and MCW 710 provided excellent leaf spot and southern blight control, resulting in yield responses of more than 1,000 lbs/A on Spanish peanuts.**
- **Two fungicides recently registered for peanuts (Fontelis® and Propulse®) did not have consistent activity against Sclerotinia blight when applied alone or in alternation with each other compared to Omega® and Endura®.**
- **Under low pressure from Sclerotinia blight, the varieties Florida-07 and Red River Runner produced the highest yields and crop value ($/A).**
- **Runner (ARSOK-R30) and Spanish (ARSOK-S140-10L) breeding lines from the USDA/ARS breeding program showed excellent resistance to Sclerotinia blight, and had the highest yields and grades.**
- **Calendar (six applications) and weather-based (three applications) programs increased yields of Spanish peanuts by more than 1,000 lbs/A where early leafspot was severe.**

Eight field trials were completed in 2013 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 early leaf spot, web blotch, Sclerotinia blight and root knot nematode. Nathan Walker and Kelli Black, OSU Department of Entomology and Plant Pathology, cooperated in the project by providing nematode counts. 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 Mana.

Results from 2013 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, particularly early in the season. Compared to the 30-year average, rainfall was above normal in June and July, and below normal in August and September. Average daily temperature was nearly normal in June and September, and below normal for July and August. Rainfall totaled 4.69 inches for June, 5.93 inches for July, 2.22 inches for August, 2.01 inches for September and 2.14 inches for October. Plots received 16 applications of sprinkler

irrigation at one-half inch to 1 inch per application that totaled 11.75 inches of water. Foliar disease developed early in the season and reached damaging levels unlike the past several years. Southern blight also was severe, particularly in plots inoculated with the pathogen. 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 also reduced levels of Sclerotinia blight by reducing plant canopy development, which favors disease development. Pod rot was a problem in commercial fields cropped to Virginia varieties. Yields and grades were mostly good, except for the Sclerotinia trials, which were heavily damaged by deer grazing and digging.

Sclerotinia Blight

Sclerotinia blight remains a destructive disease in Oklahoma. Field trials at the Caddo Research Station were focused on evaluating new fungicides, developing effective reduced fungicide programs with registered fungicides, and determining the disease and yield responses of new, high O/L varieties and breeding lines to fungicide programs. In 2013, disease pressure was low to moderate compared to previous trials at this site.

Evaluation of fungicide - Trial 1: The objective of this study was to evaluate the new fungicides Fontelis® and Propulse ®in comparison to Endura® and Omega® for control of Sclerotinia blight. Fungicides were applied on a preventive schedule at 75 days and 105 days after planting, as a single application made on demand when symptoms first appeared, or on a preventive 14-day schedule.

Sclerotinia blight and stem rot appeared in mid August and reached moderate levels compared to previous trials at this site. All treatments reduced levels of disease compared to the untreated check (Table 11). Preventive applications of Omega® and Endura® generally provided the best disease control. Most treatments numerically increased yields compare to untreated check, but the effect of treatment on yield was not statistically significant and yields were about 1,500 lbs/A lower than expected due to plot damage by deer.

Table 11. Evaluation of fungicides and application timing for control of Sclerotinia blight of peanuts (Flavor Runner 458), Trial 1, 2013.

Treatment and rate/A (timing)[z]	*Sclerotinia blight (%) Oct. 24*	*Southern blight (%) Sept. 24*	*Yield (lbs/A)*	*Value ($/A)[y]*
Omega® 4F 1.5 pt (P1, P2)	20.5 dx	3.2 b	2,447 a	448 a
Omega® 4F 1.5 pt (D)	24.7 cd	2.7 b	2,606 a	477 a
Endura® 70WG 10 oz (P1, P2)	20.0 d	1.7 b	2,367 a	433 a
Endura® 70WG 10 oz (D)	35.7 bc	4.7 b	2,309 a	423 a
Propulse® 3.3F 10 fl oz (P1, P2)	35.2 bc	3.5 b	2,265 a	415 a
Propulse® 3.3F 13.7 fl oz (P1, P2)	27.0 bcd	4.0 b	1,996 a	365 a
Propulse® 3.3F 10 fl oz (14-d)	25.0 cd	1.7 b	2,185 a	400 a
Fontelis® 1.67F 1 pt (P1, P2)	38.0 b	1.2 b	2,163 a	396 a
Fontelis® 1.67F 1.5 pt (P1, P2)	36.0 bc	1.5 b	2,418 a	443 a
Untreated check	53.2 a	13.0 a	1,996 a	365 a

z P1 and P2 refer to preventive applications July 30 and Aug. 30, respectively. D refers to the demand application made Aug. 16, 14-day=July 30, Aug. 16 and Aug. 27.

y Loan rate value based on an average grade of 75% TSMK.

x Values in a column followed by the same letter are not statistically different at P=0.05.

Evaluation of fungicide - Trial 2: The objective of this study was to evaluate the new fungicides Fontelis® and Propulse® for control of Sclerotinia blight. The new fungicides were compared to the registered fungicides Omega® and Endura®. Fungicides were applied alone or in alternation on a preventive schedule at 75 days and 105 days after planting, or on a 14-day schedule.

Sclerotinia blight and stem rot appeared in mid August and reached moderate levels compared to previous trials at this site. All treatments reduced levels of Sclerotinia blight compared to the untreated check (Table 12). Endura® followed by Omega® provided the best control. The treatment effect on southern blight was not statistically significant. All treatments except Fontelis® applied twice increased yields compared to the untreated check. However, yields were about 1,000 lbs/A lower than expected due to plot damage by deer. Efficacy of Fontelis® was improved when applied three times on a 14-day interval compared to twice on a 4-week interval.

Variety response to fungicide programs: The objective of this study was to evaluate the disease and yield responses of high O/L varieties Georgia 09B (GA-09B), Flavor Runner 458 (FR 458), Red River Runner (RRR), Tamrun OL11 (TOL11), Florida 107 (FL-07) and AT 98-99-14 to various levels of fungicide input for control of Sclerotinia blight. The high-input treatment consisted of two preventive applications. The low-input treatment was a single application made at the first appearance of disease (demand).

Sclerotinia blight first appeared in late August and increased to low levels by harvest compared to previous trials at this site. Conditions favored disease development. However, deer grazing and digging of plots was severe. Deer damage reduced disease levels by increasing air circulation and reduced yields. Deer damage also made evaluating disease levels difficult. Fungicides reduced Sclerotinia blight on all varieties (Table 13). There were no differences in disease

Table 12. Evaluation of fungicides for control of Sclerotinia blight of peanuts (Flavor Runner 458), Trial 2, 2013.

Treatment and rate/A (timing)[z]	*Sclerotinia blight (%) Oct. 24*	*Southern blight (%) Sept. 24*	*Yield (lbs/A)*	*Value ($/A)* [y]
Omega® 4F 1 pt (1,2)	26.7 def[x]	1.2 a	2,606 bcd	490 bcd
Endura® 70WG 8 oz (1,2)	29.5 cde	5.2 a	2,679 a-d	503 a-d
Fontelis® 1.67F 1 pt (1,2)	43.7 b	4.7 a	2,403 d	503 d
Fontelis® 1.67F 1 pt (14-d)	33.0 cd	0.7 a	2,955 ab	555 ab
Propulse® 3.3F 10 fl oz (1,2)	25.0 ef	3.5 a	2,505 bcd	471 bcd
Propulse® 3.3F 13.7 fl oz (1) Fontelis® 1.67F 1 pt (2)	36.5 c	1.7 a	2,505 bcd	471 bcd
Endura® 70WG 8 oz (1) Fontelis® 1.67F 1 pt (2)	22.2 fg	4.2 a	3,100 a	583 a
Endura® 70WG 8 oz (1) Propulse®3.3F 10 fl oz (2)	23.5 ef	4.2 a	2,766 abc	520 abc
Endura® 70WG 8 oz (1) Omega® 4F 1 pt (2)	15.7 g	1.2 a	2,839 abc	533 abc
Untreated check	52.7 a	7.0 a	2,221 d	417 d

z Spray dates were 1=July 30 and 2=Aug. 30. Spray dates for the 14-day program were July 30, Aug. 16 and Aug. 27.
y Loan rate value based on an average grade of 77% TSMK.
x Values in a column followed by the same letter are not significantly different at P=0.05.

Table 13. Disease and yield responses of high O/L peanut varieties to fungicide programs for Sclerotinia blight at the Caddo Research Station, Fort Cobb, 2013.

Treatment and rate/A (timing)[z]	*GA 09B*	*FR 458*	*RRR*	*TOL11*	*FL-07*	*AT 98-99-14*	*Avg*[y]
			Sclerotinia blight (%) – Oct. 24				
Omega® 4F 1.0 pt (P1, P2)	23.4	25.6	22.8	39.1	19.1	15.6	24.3 b[x]
Omega® 1.5 pt (D)	20.3	30.6	14.7	37.2	21.2	16.2	23.4 b
Endura® 70WG 8 oz (P1,P2)	23.1	26.9	11.2	30.0	16.6	12.2	20.0 b
Endura® 70WG 10 oz (D)	14.4	22.2	13.4	36.6	14.7	11.9	18.8 b
Untreated check	32.8	45.9	24.1	39.7	36.2	30.6	34.9 a
Avg[w]	22.8 c	30.2 b	17.2 d	36.5 a	21.6 cd	17.3 d	
			Yield (lbs/A)				
Omega® 4F 1.0 pt (P1, P2)	1,915	2,550	2,868	2,468	3,140	1,924	2,477 a
Omega® 1.5 pt (D)	1,860	2,341	2,940	2,541	3,321	2,187	2,532 a
Endura® 70WG 8 oz (P1,P2)	2,196	2,859	3,439	2,940	3,648	2,114	2,866 a
Endura® 70WG 10 oz (D)	1,942	2,387	2,886	2,659	3,312	2,505	2,615 a
Untreated check	1,851	2,396	2,859	3,058	3,231	2,378	2,629 a
Avg	1,953 f	2,507 d	2,998 b	2,733 c	3,331 a	2,222 e	
			Value[v] **($/A)**				
Omega® 4F 1.0 pt (P1, P2)	337	455	525	468	542	346	445 a
Omega® 1.5 pt (D)	327	417	538	482	574	393	455 a
Endura® 70WG 8 oz (P1,P2)	386	510	630	558	630	380	515 a
Endura® 70WG 10 oz (D)	341	425	528	504	572	450	470 a
Untreated check	325	427	523	580	558	427	474 a
Avg	343 e	447 c	549 ab	518 b	575 a	399 d	

z P1 and P2 are preventive applications July 30 and Aug. 30, respectively; D1 is the demand application Aug. 16.
y Averaged over variety.
x Values in a column or row followed by the same letter are not statistically different at P=0.05.
w Averaged over fungicide treatment.
v Based on an average grade (% TSMK) of 72 for GA 09B, 73 for FR 458, 75 for RRR, 78 for TOL11, 71 for FL-07 and 74 for AT 98-99-14.

control between the preventive and demand programs of Omega® or Endura® on any of the varieties. Disease levels were lowest for Red River Runner and AT 98-99-14, and highest for Tamrun OL11 and FR 458. Because of the low disease pressure and yields, yield responses to fungicide programs were not apparent.

Responses of breeding lines to fungicide programs: The objective of this study was to evaluate the disease and yield responses of high O/L breeding lines from the USDA-ARS breeding program (ARSOK-R35, ARSOK-V30A, ARSOK-V30B, ARSOK-S140-10L) to fungicide for control of Sclerotinia blight in comparison to resistant Tamnut OL06 (TOL06) and susceptible Flavor Runner 458 (FR458) check varieties. The fungicide program was a high-input treatment consisting of two preventive applications.

Conditions favored disease development. However, deer grazing and digging of plots was severe. Deer damage reduced disease levels by increasing air circulation and reduced yields. Sclerotinia blight and southern blight stem rot appeared in mid August and reached moderate levels compared to previous trials at this site. Omega® reduced disease levels on Flavor Runner

Table 14. Disease and yield responses of high O/L breeding lines to fungicide application for Sclerotinia blight at the Caddo Research Station, Fort Cobb, 2013.

Treatment and rate/A (timing)[z]	*FR 458*	*TOL06*	*ARSOK-R35*	*ARSOK-V30A*	*ARSOK-V30B*	*ARSOK-S140-10L*	*Avg*[y]
Sclerotinia blight (%) – Oct. 24							
Omega®4F 1.5 pt (P1,P2)	17.5 bx	1.9 a	8.4 a	10.6 a	9.1 a	1.3 a	8.1
Untreated check	47.5 a	4.1 a	11.2 a	23.1 b	16.2 a	3.1 a	17.6
Avg[w]	32.5	3.0	9.8	16.9	12.7	2.2	
Southern blight (%) - Sept. 24							
Omega® 4F 1.5 pt (P1,P2)	0.9 b	0.6 a	0.9 a	1.9 a	0.6 a	0.9 a	1.0
Untreated check	18.7 a	3.1 a	5.6 a	7.2 b	3.4 a	2.5 a	6.8
Avg[w]	9.8	1.9	3.3	4.5	2.0	1.7	
Yield (lbs/A)							
Omega® 4F 1.5 pt (P1,P2)	2,816	2,427	3,133	1,965	2,273	2,390	2,500 a
Untreated check	1,847	1,856	2,852	1,458	1,865	2,001	1,980 b
Avg	2,331 b	2,141 b	2,992 a	1,711 c	2,069 b	2,196 b	
Grade (% TSMK)							
Omega® 4F 1.5 pt (P1,P2)	73.2	68.7	74.4	72.3	71.4	70.3	71.7 a
Untreated check	71.2	69.0	74.0	71.9	73.2	70.7	71.7 a
Avg	72.2 ab	68.9 c	74.2 a	72.1 ab	72.3 ab	70.5 bc	
Value ($/A)							
Omega® 4F 1.5 pt (P1,P2)	504	407	569	369	418	407	446 a
Untreated check	324	311	516	271	352	342	353 b
Avg	414 b	359 cd	542 a	320 d	385 bc	375 bc	

z P1 and P2 are preventive applications July 30 and Aug. 30, respectively.
y Averaged over variety.
x Values in a column or row followed by the same letter are not significantly different at P=0.05.
w Averaged over fungicide treatment.

458 and ARSOK-V30A, but not on any of the other entries (Table 14). Yield responses to Omega® were significant for all entries but were numerically lowest for ARSOK-R35 and ARSOK-S140-10L. Grade (%TSMK) was greatest for ARSOK-R35 and lowest for Tamnut OL06. Fungicide treatment had no effect on grade. Loan rate values, including premiums for ELK for Virginia-type entries, were greatest for ARSOK-R35. Fungicide increased crop value for all entries.

Foliar Diseases

Foliar diseases are widespread across all production areas of Oklahoma and can be damaging when severe. Where early leaf spot is not controlled, yield losses have averaged from 500 to 700 lbs/A. However, losses exceeding 1,000 lbs/A are possible in years when weather favors severe disease development and vines become completely defoliated. Foliar diseases can be effectively controlled with a full-season fungicide program that consists of six sprays per season. However, reduced fungicide programs that are effective and utilize fewer sprays per season are needed to reduce the costs of peanut production. The objectives of the research on foliar diseases were to evaluate new fungicides and to develop effective reduced application programs.

Evaluation of fungicides – Trial 1: 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 three-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 August and reached severe levels in untreated check plots by harvest (Table 15). All treatments reduced leaf spot and defoliation compared to the untreated check. The full-season and weather-based programs generally provided the best control. All treatments except Bravo® + Folicur®, applied on a reduced calendar schedule, had significantly higher yields compared to the untreated check.

Southern Blight

Southern blight, also known as stem rot, is an important soilborne disease of peanuts in Oklahoma. The fungus attacks peanuts during mid season when weather is hot and humid and the plant canopy is fully developed. The disease kills plants prior to maturity and causes pod rot. Fungicides such as Folicur® are available for control of both foliar diseases and southern blight. Fungicide trials were conducted in plots inoculated with the southern blight fungus in order to compare the effectiveness of new fungicides with Folicur®.

Evaluations of fungicides programs – Trial 1: The objective of this trial was to evaluate the new fungicides Fontelis® and Priaxor® in comparison to Folicur®, Moncut®, and Abound® for control of early

Table 15. Evaluation of fungicides and application schedule on control of early leaf spot of Tamnut OL06 peanut at the Caddo Research Station, Fort Cobb, 2013.

Treatment and rate/A (timing)[z]	*Early leaf spot (%) Sept. 23*	*Defoliation (%) Sept. 23*	*Yield (lbs/A)*	*Value ($/A)*[x]
Tilt®/Bravo® SE 4.3F 1.5 pt (1-6)	18.7 d[y]	0.4 f	3,078 bc	521 bc
Bravo® 6F 1.5 pt (1,6)				
Folicur® 3.6F 7.2 fl oz (2-5)	32.1 d	8.7 ef	3,405 ab	577 ab
Tilt®/Bravo® SE 4.3F 1.5 pt (1,3,5)				
Headline® 2.09E 6 fl oz (2,4,6)	27.1 d	10.0 ef	2,882 bc	488 bc
Tilt®/Bravo® SE 4.3F 1.5 pt (A1,A3)				
Headline® 2.09E 6 fl oz (A2)	37.1 cd	11.3 ef	3,187 abc	540 abc
Tilt®/Bravo® SE 4.3F 1.5 pt (3,5)				
Headline® 2.09E 6 fl oz (4)	56.7 b	27.5 bcd	3,216 abc	545 abc
Bravo® 6F 1 pt +				
Folicur® 3.6F 7.2 fl oz (A1-A3)	53.7 bc	13.7 def	3,659 a	620 a
Bravo® 6F 1 pt +				
Folicur® 3.6F 7.2 fl oz (3,4,5)	62.1 b	40.8 b	2,802 cd	475 cd
Tilt®/Bravo® SE 4.3F 1.5 pt (A1,A3)				
Provost® 3.6F 7 fl oz (A2)	57.9 b	22.5 cde	3,267 abc	553 abc
Tilt®/Bravo® SE 4.3F 1.5 pt (3,5)				
Provost® 3.6F 7 fl oz (4)	57.5 b	32.9 bc	2,948 bc	499 bc
Untreated check	97.5 a	82.1 a	2,251 d	381 d

z 1 to 6 correspond to the spray dates of 1=July 3, 2=July 17, 3=July 31, 4=Aug. 14, 5=Aug. 27 and 6=Sept. 10; A1 to A3 correspond to the spray dates of A1=July 3, A2=July 17 and A3=Aug. 14 made according to the weather-based Leaf Spot Advisor.

y Values in a column followed by the same letter are not statistically different at P=0.05.

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

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 both foliar disease and southern blight. Early leaf spot appeared in August and reached severe levels in untreated check plots by harvest (Table 16). All treatments reduced leaf spot and defoliation compared to the untreated check and generally provided excellent foliar disease control. Southern blight appeared in August and was most severe in the full-season Bravo® treatment, which had a dense canopy that created a favorable environment for soilborne disease. Treatments with Moncut®, Fontelis® and Folicur® generally provided the best southern blight control compared to the full season Bravo® treatment. All treatments except the full-season Bravo® program had higher yields and crop values compared to the untreated check.

Evaluation of fungicides – Trial 2: The objective of this trial was to evaluate the new fungicides MCW 710, Provost, and

Table 16. Evaluation of fungicide programs for control early leaf spot and southern blight on Tamnut OL06 peanuts at the Caddo Research Station, Trial 1, 2013.

Treatment and rate/A (timing)[z]	*Early leaf spot (%)*	*Defoliation (%)*	*Southern blight (%)*	*Yield (lbs/A)*	*Value ($/A)[x]*
Bravo® 6F 1.5 pt (1-6)	18.7 by	1.7 b	21.7 a	1,859 d	306 d
Bravo® 6F 1.5 pt + Folicur® 3.6F 7.2 fl oz (1,2) Fontelis® 1.67F 1 pt (3,4,5) Bravo® 6F 1.5 pt (6)	9.3 bc	0.0 b	9.0 bc	2,773 bc	456 bc
Bravo® 6F 1.5 pt + Folicur® 3.6F 7.2 fl oz (1,2,3) Fontelis® 1.67F 1 pt (4,5) Bravo® 6F 1.5 pt (6)	5.6 c	0.0 b	13.7 abc	2,722 bc	448 bc
Headline® 2.08E 9 fl oz (1) Fontelis® 1.67F 1 pt (2,3,4) Bravo® 6F 1.5 pt (5,6)	5.1 c	0.0 b	9.0 bc	2,955 ab	486 ab
Headline® 2.08E 9 fl oz (1) Fontelis® 1.67F 1 pt (2,3) Bravo® 6F 1.5 pt Folicur® 3.6F 7.2 fl oz (4,5) Bravo® 6F 1.5 pt (6)	5.2 c	0.0 b	8.2 bc	2,802 bc	461 bc
Bravo® 6F 1.5 pt + Folicur® 3.6F 7.2 fl oz (1,2) Bravo® 6F 1.5 pt + Moncut® 50W 0.77 lb (3,4,5) Bravo® 6F 1.5 pt (6)	4.6 c	0.0 b	6.0 c	3,289 a	541 a
Bravo® 6F 1.5 pt (1,6) Folicur® 3.6F 7.2 fl oz (2-5)	9.9 bc	0.4 b	9.2 bc	2,933 ab	483 ab
Bravo® 6F 1.5 pr (1,3,5,6) Priaxor® 4.17F 8 fl oz (2,4)	0.6 c	0.0 b	13.7 abc	2,447 c	403 c
Bravo® 6F 1.5 pt (1,3,5,6) Abound® 2.07F 18.5 fl oz (2,4)	5.9 c	0.0 a	16.7 ab	2,577 bc	424 bc
Untreated check	92.5 a	66.2 a	11.5 bc	1,503 d	247 d

z 1 to 6 correspond to the spray dates of 1=July 3, 2=July 17, 3=July 31, 4=Aug., 5=Aug. 27 and 6=Sept. 10.
y Values in a column followed by the same letter are not significantly different at P=0.05.
x Loan rate value based on an average grade of 68% TSMK.

Priaxor® for control of early leaf spot and southern blight in comparison to Folicur® and Artisan®. Equus® (generic 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 both foliar disease and southern blight. Early leaf spot appeared in August and reached severe levels in untreated check plots by harvest (Table 17). All treatments reduced leaf spot and defoliation compared to the untreated check. Provost® and Priaxor® provided the best leaf spot control. Southern blight appeared in August and was most severe in the full-season Equus® treatment. It is likely that defoliation from leaf spot reduced southern blight in the untreated check by creating a less favorable environment for disease development. All treatments had lower levels of southern blight than the full-season Equus® program and provided similar levels of disease control. All treatments except the full-season Equus® program had higher yields compared to the untreated check.

Table 17. Evaluation of fungicide programs for control early leaf spot and southern blight on Tamnut OL06 peanuts at the Caddo Research Station, Trial 2, 2013.

Treatment and rate/A (timing)[z]	*Early leaf spot (%)*	*Defoliation (%)*	*Southern blight (%)*	*Yield (lbs/A)*	*Value ($/A)*[x]
Equus® 720 1.5 pt (1-6)	16.7 de[y]	1.7 c	28.5 a	1,670 d	268 d
Equus® 720 1.5 pt (1,6) MCW® 710-SC 8 fl oz (2-5)	22.5 cd	2.1 c	9.2 bc	2,962 abc	475 abc
Equus® 720 1.5 pt (1,6) MCW® 710-SC 10 fl oz (2-5)	26.7 bcd	2.9 c	9.2 bc	3,078 ab	494 ab
Equus® 720 1.5 pt (1,6) MCW® 710-SC 12 fl oz (2-5)	17.5 de	1.2 c	11.0 bc	2,722 abc	437 abc
Equus® 720 1.5 pt (1,6) MCW® 710-SC 15.5 fl oz (2-5)	16.2 de	1.2 c	9.2 bc	3,260 a	523 a
Equus® 720 1.5 pt (1,6) Provost® 3.6F 8 fl oz (2-5)	11.6 ef	1.2 c	15.7 b	2,693 bc	432 bc
Equus® 720 1.5 pt (1,6) Folicur® 3.6F 7.2 fl oz (2-5)	34.2 b	11.2 b	9.5 bc	2,781 abc	446 abc
Bravo® 6F 1.5 pr (1,3,5,6) Artisan® 3.6F 26 fl oz (2,4)	28.8 bc	4.6 bc	13.0 bc	2,795 abc	449 abc
Bravo® 6F 1.5 pt (1,3,5,6) Priaxor®4.17F 8 fl oz (2,4)	2.0 f	0.0 c	12.2 ab	2,483 c	399 c
Untreated check	95.4 a	79.2 a	4.7 c	1,379 d	221 d

z 1 to 6 correspond to the spray dates of 1=July 3, 2=July 17, 3=July 31, 4=Aug. 14, 5=Aug. 27, and 6=Sept. 10.
y Values in a column followed by the same letter are not significantly different at P=0.05.
x Loan rate value based on a average grade of 66% TSMK.

Evaluation of Weed Management Programs in Peanut

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Institute for Agricultural Biosciences

Five field trials were conducted in 2013 at the Caddo Research Station near Fort Cobb. Trials were investigating potential new herbicide options in peanuts. These new herbicides included CHA-030 (pethoxamide) being developed by Cheminova, V-10206 (pyroxasulfone) and Fierce (flumioxazin + pyroxasulfone) being developed by Valent®, Warrant® (acetochlor) being developed by Monsanto®, and Zidua® (pyroxasulfone) being developed by BASF®.

The first study investigates tolerance of Spanish peanuts to expected labeled rates and twice the labeled rates of Fierce®, Warrant®, and Zidua®. The trial area was kept weed free through the application of Cadre® and Select® postemergence and hand weeding. Injury with Warrant® was 5 percent or less throughout the season (Table 18). Injury with Fierce® and Zidua® at twice the labeled rate was 10 percent or greater initially but had subsided by mid and late season. There were no differences in yield with any of the treatments. Preliminary results from this trial indicate good tolerance to these herbicides applied pre-emergence in peanuts.

The second and third trials investigated weed control programs with Zidua® (Table 19 and Table 20). Injury was 10 percent or less initially with all PPI and PRE applications of Zidua® alone or in combination with either Valor® or Prowl®. By season end, no visual injury was observed. In the first trial, initial ivyleaf morningglory (IPOHE) control was at least 80 percent with Zidua® + Prowl® H_2O

Table 18. Spanish peanut response to Fierce®, Warrant® and Zidua®, 2013.

Trt No.	*Treatment Name*	*Rate*	*Rate Unit*	*Appl Code*	*Peanut Injury 6/19* %	*Peanut Injury 7/17* %	*Peanut Injury 8/19* %	*Peanut Yield 10/23* lbs/A
1	Untreated				0	0	0	3,034
2	Fierce®	3	oz/A	PRE	8	3	1	3,482
3	Fierce®	6	oz/A	PRE	13	5	4	3,165
4	Zidua®	1.5	oz/A	PRE	9	5	3	3,442
5	Zidua®	3	oz/A	PRE	10	5	0	3,293
6	Warrant®	3	pt/A	PRE	5	0	0	3,284
7	Warrant®	6	pt/A	PRE	4	1	0	3,201
LSD (P=.10)					4	6	4	435
Standard Deviation					3	5	3	354
CV					48	ns	ns	ns

Table 19. Evaluation of Zidua® for weed control in peanuts, 2013.

Trt No.	Treatment Name	Rate	Rate Unit	Appl Code	Peanut Injury 6/19	Peanut Injury 7/17	Peanut Injury 8/19	IPOHE Control 6/19	IPOHE Control 7/17	IPOHE Control 8/19	PANTE Control 6/19	PANTE Control 7/17	PANTE Control 8/19	Peanut Yield 10/23
					%	%	%	%	%	%	%	%	%	lbs./A
1	Untreated				0	0	0	0	0	0	0	0	0	2,132
2	Zidua®	1.5	oz/A	PPI	8	1	0	65	18	16	79	25	11	2,220
3	Prowl® H_2O	32	fl oz/A	PPI	4	0	0	68	34	18	79	45	18	2,657
4	Zidua®	1.5	oz/A	PPI										
	Prowl® H_2O	32	fl oz/A	PPI	5	0	0	80	38	21	97	73	25	2,487
5	Zidua®	1.5	oz/A	PRE										
	Gramoxone®	12	fl oz/A	At Crack	10	1	0	73	55	31	83	48	21	2,299
6	Outlook®	16	fl oz/A	PRE										
	Gramoxone®	12	fl oz/A	At Crack	4	0	0	65	35	26	74	53	18	2,4417
7	Zidua®	1.5	oz/A	At Crack										
	Gramoxone®	12	fl oz/A	At Crack		0	0		31	25		55	13	2,747
8	Outlook®	16	fl oz/A	PRE										
	Gramoxone®	12	fl oz/A	At Crack										
9	Prowl® H_2O	32	fl oz/A	PPI		0	0		30	13		48	15	2,280
	Zidua®	1.5	oz/A	At Crack										
	Gramoxone®	12	fl oz/A	At Crack										
	Pursuit®	4	fl oz/A	POST	3	0	0	65	55	84	79	63	48	2,798
10	Prowl® H_2O	32	fl oz/A	PPI										
	Outlook®	16	fl oz/A	At Crack										
	Gramoxone®	12	fl oz/A	At Crack										
	Zidua®	1.5	oz/A	POST										
	Pursuit®	4	fl oz/A	POST	5	0	0	60	40	75	73	70	38	2,765
11	Zidua®	1.5	oz/A	PPI										
	Outlook®	16	fl oz/A	At Crack										
	Gramoxone®	12	fl oz/A	At Crack										
	Pursuit®	4	fl oz/A	POST	4	0	0	75	45	68	78	53	21	2,572
12	Prowl® H_2O	32	fl oz/A	PPI										
	Valor® SX	3	oz/A	PRE										
	Gramoxone®	12	fl oz/A	At Crack										
	Pursuit®	4	fl oz/A	POST	8	1	0	93	65	93	95	81	41	2,867
13	Prowl® H_2O	32	fl oz/A	PPI										
	Outlook®	16	fl oz/A	At Crack										
	Gramoxone®	12	fl oz/A	At Crack										
	Pursuit®	4	fl oz/A	POST	1	0	0	68	53	89	83	63	41	2,656
14	Valor® SX	3	oz/A	PRE										
	Gramoxone®	12	fl oz/A	At Crack										
	Outlook®	16	fl oz/A	POST										
	Pursuit®	4	fl oz/A	POST	5	0	0	88	28	93	79	50	28	2,649
15	Gramoxone®	12	fl oz/A	At Crack										
	Pursuit®	4	fl oz/A	POST		0	0		33	60		28	15	2,100
LSD (P=0.10)					4	ns	ns	9	11	9	11	12	10	ns
Standard Deviation					3	1	0	8	10	8	9	10	8	595
CV					71	444	0	11	26	16	12	21	35	24

All At Crack treatments applied with Induce® @ 0.25 % v/v
All POST treatments applied with Agridex® @ 1.25 %v/v

PPI, Prowl H_2O PPI followed by Valor® SX PRE and Valor SX PRE. (Table 19). IPOHE control was greater than 90 percent late season when Pursuit® was used in combination with Valor® PRE. PANTE control was greater than 90 percent when Prowl ®H20 PPI was followed by either Zidua® or Valor® SX PRE. Late season PANTE control was less than 50 percent with all treatments. The only treatment that controlled IPOHE at least 80 percent early season in the third trial was Zidua® + Valor® SX pre-emergent (Table 20). Initial PANTE control was only greater than 85 percent when Zidua® was used in combination with Prowl® H_2O or Valor® SX PRE. IPOHE and PANTE control was less than 50 percent with all treatments. At Crack and post emergent treatments went out late in both of these trials reducing the overall effectiveness of these herbicide programs at this location. Proper timing should have improved control in both trials. The only treatment that yielded more than 3,250 lbs/A in either trial was Zidua® + Prowl® H_2O PRE followed by Gramoxone® + Storm At Crack® followed by Zidua® + Cadre® POST.

Peanut injury was less than 10 percent with all treatments except when CHA-030 was applied PRE in combination with Strongarm® (Table 21). There was no visible injury from any of the treatments by season end. The CHA-030 + Strongarm combination was the only treatment that controlled IPOHE at least 70 percent season long. CHA-030 applied PRE in combination with either Pursuit® or Strongarm® were the only treatments that controlled PANTE more than 90 percent early season. Control was less than 50 percent with all treatments by the end of the season.

The final trial investigated various postemergence herbicides for IPOHE control in peanut. The entire trail area was sprayed with Valor ®SX PRE followed by two applications of Select® POST. Injury was less than 5 percent with all treatments. Some treatments, as would be expected did initially burn the peanuts. IPOHE control was at least 90 percent with all treatments except Cobra® applied at 10 fl oz/A and Storm®.

Acknowledgements

Appreciation is extended to Robert Weidenmaier, Michael Brantes and Michael Locke for assistance with these trials.

BASF, Cheminova and Valent® for support of these trials.

Table 20. Evaluation of Zidua® combinations for weed control in peanuts, 2013.

Trt No.	Treatment Name	Rate	Rate Unit	Appl Code	Peanut Injury 6/19 %	Peanut Injury 7/17 %	Peanut Injury 8/19 %	IPOHE Control 6/19 %	IPOHE Control 7/17 %	IPOHE Control 8/19 %	PANTE Control 6/19 %	PANTE Control 7/17 %	PANTE Control 8/19 %	Peanut Yield 10/23 lbs/A
1	Untreated				0	0	0	0	0	0	0	0	0	1,986
2	Zidua®	1.5	oz/A	PRE										
	Gramoxone®	12	fl oz/A	At Crack										
	Storm®	24	fl oz/A	At Crack	8	0	0	65	18	16	79	25	11	2,658
3	Zidua®	1.5	oz/A	PRE										
	Prowl® H2O	32	fl oz/A	PRE										
	Gramoxone®	12	fl oz/A	At Crack										
	Storm®	24	fl oz/A	At Crack	4	0	0	68	34	18	88	45	18	2,774
4	Zidua®	1.5	oz/A	PRE										
	Valor® SX	3	oz/A	PRE										
	Gramoxone®	12	fl oz/A	At Crack										
	Storm®	24	fl oz/A	At Crack	5	0	0	80	38	21	94	73	25	2,969
5	Zidua®	1.5	oz/A	PRE										
	Prowl® H2O	32	fl oz/A	PRE										
	Gramoxone®	12	fl oz/A	At Crack										
	Storm®	24	fl oz/A	At Crack										
	Cadre®	4	fl oz/A	POST	10	4	0	73	55	31	86	48	21	2,731
6	Zidua®	1.5	oz/A	PRE										
	Gramoxone®	12	fl oz/A	At Crack										
	Storm®	24	fl oz/A	At Crack										
	Cadre®	4	fl oz/A	POST	4	1	0	65	35	26	74	53	18	2,934
7	Zidua®	1.5	oz/A	PRE										
	Prowl® H2O	32	fl oz/A	PRE										
	Gramoxone®	12	fl oz/A	At Crack										
	Storm®	24	fl oz/A	At Crack										
	Zidua®	1	oz/A	POST										
	Cadre®	4	fl oz/A	POST	4	3	0	73	31	25	93	55	13	3,302
8	Zidua®	1.5	oz/A	PRE										
	Gramoxone®	12	fl oz/A	At Crack										
	Storm®	24	fl oz/A	At Crack										
	Zidua®	1	oz/A	POST										
	Cadre®	4	fl oz/A	POST	6	0	0	73	30	13	78	48	15	3,024
9	Dual Magnum®	1	pt/A	PRE										
	Gramoxone®	12	fl oz/A	At Crack										
	Storm®	24	fl oz/A	At Crack										
	Cadre®	4	fl oz/A	POST	3	1	0	65	55	48	79	63	48	2,985
10	Zidua®	1.5	oz/A	PRE										
	Outlook®	16	oz/A	At Crack										
	Gramoxone®	12	fl oz/A	At Crack										
	Zidua®	1	oz/A	POST	5	5	1	60	40	48	73	70	38	3,188
LSD (P=0.10)					3	2	ns	8	10	9	8	8	7	528
Standard Deviation					3	2	1	7	8	7	7	7	6	438
CV					55	117	632	11	24	30	9	14	28	15

All At Crack and POST treatments applied with Induce® @ 0.25 %v/v.

Table 21. Evaluation of CHA-030 for weed control in peanuts, 2013.

Trt No.	Treatment Name	Rate	Rate Unit	Appl. Code	Peanut Injury 6/19 %	Peanut Injury 7/17 %	Peanut Injury 8/20 %	IPOHE Control 6/19 %	IPOHE Control 7/17 %	IPOHE Control 8/20 %	PANTE Control 6/19 %	PANTE Control 7/17 %	PANTE Control 8/20 %
1	Untreated				0	0	0	0	0	0	0	0	0
2	CHA-030	1	lb ai/A	PPI	4	0	0	48	28	18	50	34	13
3	Dual Magnum®	1	lb ai/A	PPI	1	0	0	34	18	9	38	14	10
4	CHA-030	2	lb ai/A	PPI	3	0	0	49	30	14	69	30	14
5	Dual Magnum®	2	lb ai/A	PPI	6	0	0	59	29	18	68	39	10
6	CHA-030	0.75	lb ai/A	PRE	5	0	0	43	19	10	55	16	10
7	CHA-030	1	lb ai/A	PRE	6	0	0	55	20	9	60	26	10
8	CHA--030	2	lb ai/A	PRE	9	0	0	63	20	9	76	16	10
9	Dual Magnum®	1	lb ai/A	PRE	4	1	0	40	19	11	59	20	14
10	Dual Magnum®	2	lb ai/A	PRE	8	1	0	55	44	10	79	23	10
11	CHA-030	1	lb ai/A	PRE									
	Pursuit®	0.063	lb ai/A	PRE	6	1	0	80	64	38	95	66	21
12	CHA-030	1	lb ai/A	PRE									
	Strongarm®	0.024	lb ai/A	PRE	13	6	0	84	75	73	98	81	43
13	CHA-030	1	lb ai/A	PRE									
	Valor®	0.096	lb ai/A	PRE	5	0	0	63	35	20	71	36	10
14	CHA-030	1	lb ai/A	At Crack									
	Gramoxone® SL	0.188	lb ai/A	At Crack									
	Basagran®	0.5	lb ai/A	At Crack	0	0	0	0	24	10	0	28	10
15	Dual Magnum®	1	lb ai/A	PRE									
	Gramoxone® SL	0.188	lb ai/A	At Crack									
	Basagran®	0.5	lb ai/A	At Crack	4	1	0	30	38	10	50	24	10
LSD (P=0.05)					4	2	ns	14	17	8	15	15	8
Standard Deviation					3	2	0	10	12	6	10	10	6
CV					58	228	0	21	38	34	18	34	43

All At Crack treatments applied with Induce® @ 0.25%v/v.

Table 22. Evaluation of POST herbicides for ivyleaf morningglory control, 2013.

Trt No.	Treatment Name	Rate	Rate Unit	Appl. Code	Peanut Injury 8/20 %	Peanut Injury 9/24 %	IPOHE Control 8/20 %	IPOHE Control 9/24 %
1	Untreated				0	0	0	0
2	Cobra®	12	fl oz/A	POST				
	Agridex®	1	pt/A	POST	0	0	91	91
3	Cobra®	12	fl oz/A	POST				
	V-10206	1.5	oz/A	POST				
	Agridex®	1	pt/A	POST	0	0	94	95
4	Cobra®	10	fl oz/A	POST				
	V-10206	1.8	oz/A	POST				
	Agridex®	1	pt/A	POST	0	0	94	94
5	Cobra®	10	fl oz/A	POST				
	Agridex®	1	pt/A	POST	0	0	71	73
6	Pursuit®	4	fl oz/A	POST				
	Agridex®	1	pt/A	POST	0	0	95	95
7	Storm®	1.5	pt/A	POST				
	Agridex®	1	pt/A	POST	0	0	88	86
8	Cadre®	4	fl oz/A	POST				
	Agridex®	1	pt/A	POST	3	0	98	96
9	Ultra Blazer®	1.5	pt/A	POST				
	Agridex®	1	pt/A	POST	1	0	90	90
LSD (P=.05)					ns	ns	12	9
Standard Deviation					1	0	10	7
CV					316	0	12	9


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