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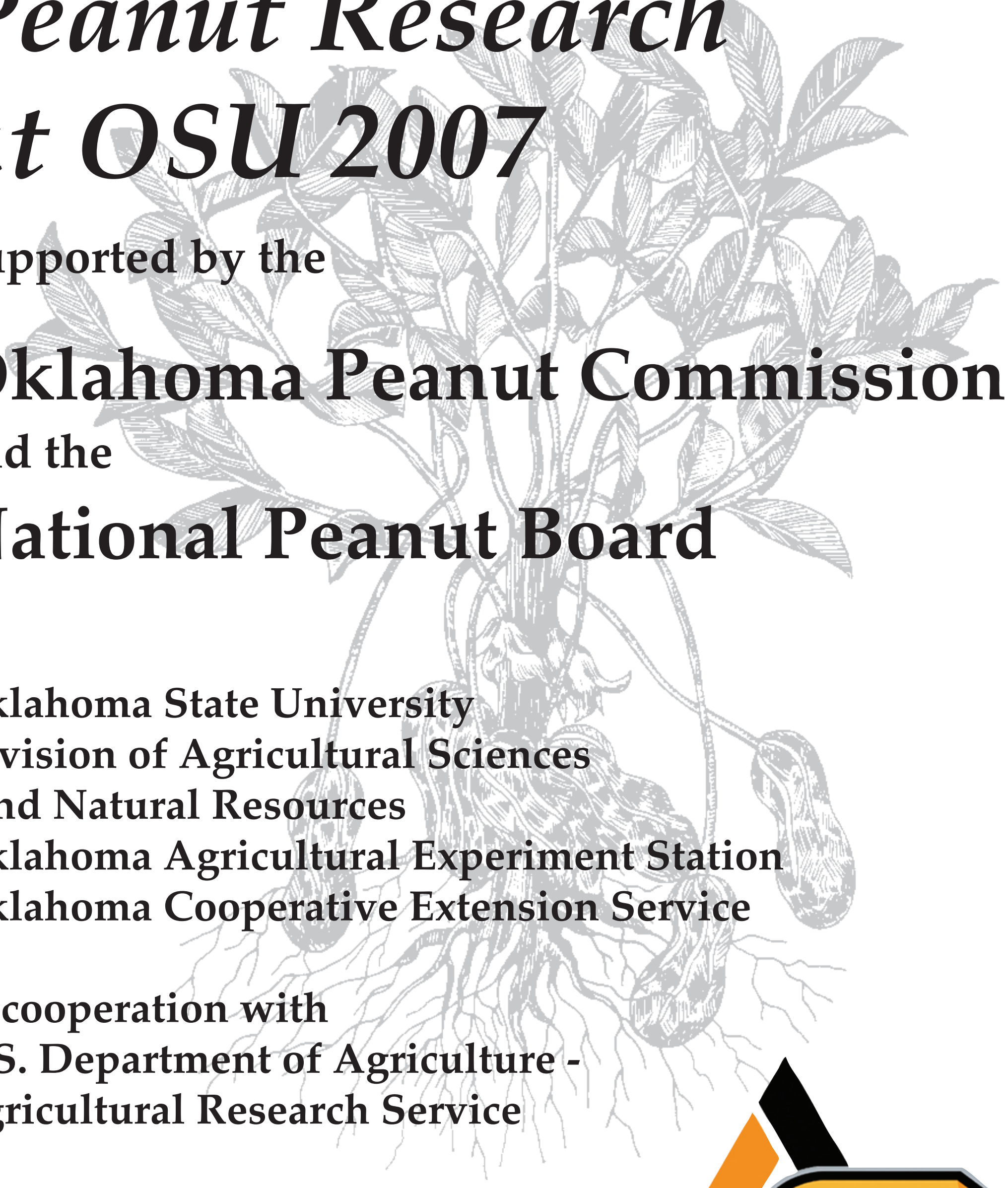
PEANUTS

Peanut Research at OSU 2007



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

P-1019

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Foreword

We have had a long standing partnership with the Oklahoma Peanut Commission 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 *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 Oklahoma Peanut Commission and the National Peanut Board. With all of 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 to solve meaningful issue-based problems facing the peanut producers in the state.

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.

Clarence Watson,
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.

Oklahoma Peanuts – A Centennial Year

During November 2007, Oklahoma's citizens were celebrating 100 years of statehood with all the revelry, pomp and circumstance fitting a centennial salute. All the while, farmers along the back roads from Alfalfa County to Love County; and from Pittsburg County to Beckham County were routinely tending to business by wrapping up the harvest of one of Oklahoma's most important crops – peanuts.

And fitting of a Centennial Year, the 2007 peanut crop was a record breaker. The largest per acre yield in 100 years – 3,400 pounds per acre.

History reflects the movement of goober peas into Oklahoma and Indian territories by Civil War veterans moving westward in their search for a new life. These sod busters found peanuts to be a valuable crop for food and feed in early day Oklahoma. Agricultural officials, taking note of the significance of this simple crop, first began keeping planting and harvesting records in 1909.

Since records have been kept, yields have ranged from 260 pounds per acre in 1943 to 3,400 pounds in 2007. This amazing progress in yield could have only been a dream to those early producers.

Today's farmers credit the yield advancement to the development of improved varieties, agricultural chemicals, disease and pest resistance, new farming techniques and equipment, and the advent of irrigation. I would add to the list good ol' farmer know-how and perseverance and the dedicated effort of peanut research and Extension personnel.

The recipe for successfully growing peanuts in Oklahoma is annually scrutinized by the Peanut Improvement Team at Oklahoma State University and the United States Department of Agriculture – Center for Peanut Improvement; via research and Extension investigations funded in part by the Oklahoma Peanut Commission in cooperation with the National Peanut Board. The results of these prioritized projects are published each year in the *Partners in Progress Peanut Report*.

Producers are encouraged to review the contents of this report as a preparation for the 2008 peanut crop. Variety performance and comparisons, effects of production practices, management of diseases and weeds, and an overview of upcoming varieties developed for Oklahoma are all contained within.

As plans are being made for 2008, improved marketing options have producers optimistic. The record year of 2007 is a good foundation for building perhaps another outstanding year. Working together to improve producer profit potential is a goal worth striving for.

The Commission wishes to commend the Peanut Improvement Team for their unselfish dedication of time and effort to improve Oklahoma's peanut industry and for their partnership with producers.

Mike Kubicek
Executive Secretary
Oklahoma Peanut Commission

Sclerotinia Blight Resistance in Peanuts

H.A. Melouk and K.D. Chenault, USDA-ARS
J.P. Damicone, Department of Entomology and Plant Pathology
C.B. Godsey, Department of Plant and Soil Sciences

2007 progress made possible through OPC and NPB support

- Averaged over years, incidence of Sclerotinia blight in 13 genotypes ranged from 7% to 17%, which was lower than the 24% in Southwest Runner and 69% in Okrun.
- Based on the high level of Sclerotinia resistance and acceptable agronomic characteristics, PI 476016 and Grif 13838, of Peruvian and Ecuadorian origin, respectively, were selected for inclusion in a crossing program to enhance the Sclerotinia resistance of high oleic peanut cultivars.
- Information being analyzed now will assist in the decision making regarding the release of ARSOK-R1, a high oleic runner-type peanut.

Peanut acreage in Oklahoma has declined in recent years; however, peanuts remain an important economic crop for certain growers. Yield limiting factors such as diseases, adverse weather conditions, weeds, and insects can decrease yield. Managing irrigation, chemical applications, and tillage practices are some of the avenues used to mitigate these yield-limiting factors, but often become cost prohibitive. Our peanut breeding efforts are focusing on enhancing yield and quality through breeding for disease resistance.

Sclerotinia blight of peanuts caused by *Sclerotinia minor* results in about a 10% loss annually if not treated. Currently, about 40% of peanut fields in Oklahoma experience some loss due to Sclerotinia blight, with the highest concentration of the disease occurring in Caddo County. Typical symptoms of Sclerotinia blight include flagging, wilting, and necrosis of one or more stems. Necrotic areas are common on stems near or in contact with soil, but may occur several inches above the soil surface. Infected areas are usually covered with white, fluffy mycelium during periods of high humidity. All plant parts below ground including pegs and pods are subject to attack by the fungus. sclerotia are also produced externally on affected plant stems and internally in stem pith cavities. The Sclerotia eventually reach the soil where they remain on the soil surface or are buried during farming operations that disturb the soil surfaces.

Planting Sclerotinia-resistant cultivars is the most logical disease management option that has been efficient and cost effective. Efforts by peanut breeders and plant pathologists in the last 25 years were fruitful in developing several cultivars with resistance to Sclerotinia blight. Southwest peanut improvement efforts in the last 20 years were successful in developing and releasing six Sclerotinia-resistant peanuts representing the Spanish and runner market type peanuts. Tamspan 90, a Spanish peanut, was released in 1990; and Southwest Runner, a Sclerotinia-resistant runner-type peanut was released in 1995. More recently, Tamrun 98, a runner peanut with moderate resistance, was released in 1998. OLin, a Sclerotinia-resistant Spanish peanut cultivar with high oleic acid, was released in 2001. Also, four high oleic peanut cultivars (Tamrun OL01, Tamrun OL02, Tamrun OL07, and Tamnut OL06) with moderate Sclerotinia resistance were recently released. The search in peanut germplasm for higher resistance to Sclerotinia blight is continuing, and therefore, we report on new sources of resistance to *S. minor*, and their potential as parents in a crossing program to enhance the resistance in high oleic peanut cultivars.

A four-year study (2003-2006) in small field plots at the Caddo Research Station in Ft. Cobb was conducted to determine the reaction of new peanut introductions to *S. minor.* Entries in this study are presented in Table 1. In the four-year study (2003-2006), plots were planted in May and harvested in late September to mid October to attain a growing season of 155 days. Plots were irrigated as needed to ensure good growth. Standard agronomic practices were followed throughout the growing season to manage foliar diseases according to the *Peanut Production Guide for Oklahoma*.

Incidence of Sclerotinia blight (%) in the plots was determined on Oct. 1, Sept. 14, Sept. 29, and Sept. 26 in 2003, 2004, 2005, and 2006, respectively. An infection locus was defined as an area of blight symptoms in a 6-inch segment in a standard row. Percent Sclerotinia blight was calculated by dividing the number of infection loci by the number of potential infection loci and multiplying by 100.

Table 1. Peanut entries used in a four-year study (2003-2006) at the Caddo Research Station at Ft. Cobb.

Entry	Source Country	Peanut Type
PI 501983	Peru	*Arachis hypogaea* L.
PI 501996	Peru	*Arachis hypogaea* L.
PI 502006	Peru	*Arachis hypogaea* L.
PI 502009	Peru	*Arachis hypogaea* L.
PI 502034	Peru	*Arachis hypogaea* L.
PI 502047	Peru	*Arachis hypogaea* L.
PI 502069	Peru	*Arachis hypogaea* L.
PI 502073	Peru	*Arachis hypogaea* L.
PI 502095	Peru	*Arachis hypogaea* L.
PI 502137	Peru	*Arachis hypogaea* L.
PI 502157	Peru	*Arachis hypogaea* L.
PI 531499 (cv. Okrun)*	USA	*Arachis hypogaea* L.
PI 599178 (cv. Southwest Runner)*	USA	*Arachis hypogaea* L.
TX 994374*	USA	*Arachis hypogaea* L.
Grif 13838	Ecuador, Manabi	*Arachis hypogaea* L. subsp. *Fastigiata*
PI 501291	Peru, Lima	*Arachis hypogaea* L. subsp. *Fastigiata*
PI 476016	Peru, Lima	*Arachis hypogaea* L. subsp. *Fastigiata*

*Denotes runner-type peanut.

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 93°F. Plant debris and other foreign materials were removed from harvested pods by a standard peanut cleaner. Grading was performed by a standard procedure. Kernel weight (weight in grams of 100 kernels) of graded samples was determined. Also, the number of kernels riding the 19/64 screen or 21/64 screen (in runner type) was determined.

Analysis of the 2003-2006 data indicated that the year by entry interaction was significant for Sclerotinia disease incidence and yield, and therefore, each year was analyzed separately.

Incidence of Sclerotinia blight in 2003 and 2004 on the susceptible Okrun was over 80%, and the incidence in 2005 and 2006 was 63% and 48%, respectively (Table 2). In the Sclerotinia-resistant Southwest Runner, the incidence did not exceed 30% in the four years of study (Table 2). From 2003-2006, the mean incidence of Sclerotinia blight in TX 994374, a breeding line possessing high oleic acid, was significantly lower than on Okrun (Table 2). Several peanut entries in this study had a Sclerotinia blight incidence equal to or lower than Southwest Runner in all four years (Table 2). PI 476016 and PI 501996 had the lowest incidence of Sclerotinia blight in 2004 (Table 2). Also, PI 476016 has exhibited physiologic resistance to *S. minor* (*i.e.* short lesions on inoculated stems) when evaluated under greenhouse conditions. Generally, high disease incidence correlates with high disease severity and consequently more production of sclerotia in diseased host tissues. Therefore, selection of parental lines based on low disease incidence should contribute to a lowered sclerotial mass return to soil. Also, our past success using small field plots to identify resistance to *S. minor* strengthen our findings in this study to select resistant parents for the crossing program.

As expected, pod yield from 2003-2006 of the runner entries (Okrun, Southwest Runner, and TX 994374) was greater than the rest of the entries in the study (Table 3). Mean pod yield of Grif 13838 was over 2,700 lbs/A (Table 3); and Grif 13838, Okrun, and Southwest Runner graded 66 (Table 4).

The statistical 100 kernel weight of Grif 13838 and Okrun was the same but better than that of Southwest Runner (Table 4). Based on these attributes, Grif 13838 and PI 476016 were selected as parents for inclusion in a crossing program to improve the Sclerotinia resistance of high oleic cultivars.

ARSOK-R1, a high oleic runner-type peanut

The Peanut Improvement Team at Stillwater is working on summarizing data of ARSOK-R1 from studies over several years. Also, more sensory evaluation of several seed lots, from the 2007 growing season, will be conducted by a private independent laboratory. A report comprising these data will be available early in 2008. This information will assist in the decision making regarding the potential release of this line.

The technical assistance provided by Doug Glasgow, Kenneth Jackson, Lisa Myers, Jerald Nickels, Bruce Greenhagen, Bobby Weidenmaier, Rocky Walker, and Mike Brantes is greatly appreciated.

Table 2. Percent Sclerotinia blight incidence in a selected peanut germplasm in a four-year study (2003-2006) at the Caddo Research Station, Ft. Cobb.

Entry	% Sclerotinia blight[1]				
	2003[2]	2004[2]	2005[2]	2006[2]	Mean
PI 501983	9	12	24	14	15
PI 501996	3	8	11	6	7
PI 502006	17	18	16	8	14
PI 502009	17	18	5	7	11
PI 502034	15	26	15	13	17
PI 502047	9	20	16	6	13
PI 502069	7	17	15	8	12
PI 502073	12	30	15	19	19
PI 502095	6	19	7	9	10
PI 502137	8	20	11	12	13
PI 502157	6	13	12	7	10
PI 531499 (cv. Okrun)*	88	83	63	48	69
PI 599178 (cv. Southwest Runner)*	29	23	14	28	24
TX 994374*	38	48	32	33	38
Grif 13838	11	13	9	10	11
PI 501291	15	18	15	13	15
PI 476016	13	8	15	18	14
Pr>F	>0.001	>0.001	>0.001	>0.001	>0.001
LSD 0.05	19	12	13	11	6

1 Percent Sclerotinia blight was determined by dividing the number of infection loci by the number of potential infection loci and multiplying by 100. An infection locus is defined as an area of disease symptoms in a 6 inch segment in a standard row.

2 Disease ratings were made Oct. 1, 2003; Sept. 14, 2004; Sept. 29, 2005; and Sept. 26, 2006.

Table 3. Pod yield of a selected peanut germplasm in a four-year study (2003-2006) at the Caddo Research Station, Ft. Cobb.

	Pod Yield (lbs/A)[1]				
Entry	2003[2]	2004[2]	2005[2]	2006[2]	Mean
PI 501983	1479	2352	2052	1725	1930
PI 501996	1239	2075	2108	1821	1849
PI 502006	1625	2666	2307	1845	2143
PI 502009	1625	2582	2018	1641	1988
PI 502034	1271	2256	2153	1677	1877
PI 502047	1946	2473	2207	1736	2100
PI 502069	1785	2435	2170	1725	2045
PI 502073	2316	2871	3112	2569	2743
PI 502095	2284	2678	2759	1773	2379
PI 502137	2557	2677	2958	1959	2537
PI 502157	1143	2015	2071	1653	1759
PI 531499 (cv. Okrun)*	2187	2822	3266	3401	2967
PI 599178 (cv. Southwest Runner)*	3329	3860	3482	3341	3515
TX 994374*	3393	3039	3998	3703	3542
Grif 13838	2059	2942	2949	2715	2706
PI 501291	1254	2497	2044	1688	1912
PI 476016	1415	2520	2144	1604	1954
Pr>F	<0.01	<0.01	<0.01	<0.01	<0.01
LSD 0.05	425	313	341	412	171

[1] Plots were harvested Oct. 17, 2003; Sept. 27, 2004; Oct. 3, 2005; and Oct. 9, 2006.
[2] Average based on n=15.
* Denotes runner-type peanut.

Table 4. Mean percent of total sound mature kernels (%TSMK), weight of 100 kernels, and number of kernels per ounce of peanut germplasm in a four-year study (2003-2006) at the Caddo Research Station, Ft. Cobb.

Entry	%TSMK[1]	100 kernel weight (g)[2]	Number of kernels/oz[3]
PI 501983	56	44	54
PI 501996	53	52	45
PI 502006	56	45	53
PI 502009	55	49	49
PI 502034	60	48	52
PI 502047	56	43	55
PI 502069	53	44	53
PI 502073	57	45	52
PI 502095	57	52	47
PI 502137	55	48	50
PI 502157	57	60	42
PI 531499 (cv. Okrun)*	66	54	43
PI 599178 (cv. Southwest Runner)*	66	46	49
TX 994374*	59	63	38
Grif 13838	66	51	50
PI 501291	59	44	56
PI 476016	57	44	55
Pr>F	<0.001	<0.001	<0.001
LSD 0.05	3	3	2

[1] %TSMK = Percent total sound mature kernels plus percent sound splits (grade).
[2] Weight of 100 kernels riding the 15/64 screen or 16/64 screen for runner type peanuts.
[3] Kernels per ounce was determined by number of seeds riding the 19/64 screen or 21/64 screen (runner type).
* Denotes runner-type peanut.

Peanut Variety Tests

C.B. Godsey, W. Vaughan, and B. Heister
Department of Plant and Soil Sciences

2007 progress made possible through OPC and NPB support

- Runner, Spanish, and Virginia variety trials were conducted in Beckham, Tillman, and Caddo counties. Experimental line ARSOK-R1 performed well at all three locations for the second year in a row.
- In the Spanish test AT 98-99-14, ARSOK-S1, Tamnut 06, GA 04S, and Spanco were consistent yield performers across all three locations.
- Perry, Gregory, and Brantley were top performers in the Virginia test.

Variety Tests

All variety tests were conducted under an extensive pest management program. The objective was to prevent as much outside influence from pest (weed, disease, and insect) pressures on yield and grade as possible. The variety times location interaction was significant so the results are presented by county in Tables 1-3. 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 20 ft long. Plots were seeded at a rate of eight seeds per row foot (139,392 seeds per acre). At planting, a liquid inoculant formulation was applied with the seed. Tests were conducted using randomized complete block designs with four replications. The entire plot was dug and then thrashed three to four days later.

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 the 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 we are 95% sure that the yield difference is real, with only a 5% probability that 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 we are less confident that variety X really is higher yielding than variety Y under the conditions of the test.

Results reported here should be representative of what might occur throughout the state but would be most applicable under environmental and 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 conditions, diseases, and insects.

Additional Information on the Web

A copy of this publication as well as additional variety information and more information on peanut management can be found at www.peanut.okstate.edu/

Beckham County

Good growing conditions were observed at Erick throughout the 2007 growing season. Early season precipitation was above normal, which delayed planting in some cases but the trial was planted on time. Average yield for the runner test was 4,694 lbs/A with an average grade of 74%. Tamrun OL07, ARSOK-R1, and Tamrun 96 were the top yield performers. ARSOK-R1 continued to perform well in 2007. Tamrun OL07, which was a new release in the spring from Texas A&M, also performed well.

In the Spanish test ARSOK-S1, Tamnut 06, AT 98-99-14, GA 04S, and Spanco were the top yield performers. Average yield and grade for the Spanish test were 3,599 lbs/A and 74% TSMK, respectively. ARSOK-S1 is an experimental variety that has not been released at this time. Tamnut 06 was a new release from Texas A&M in spring 2007.

Average yield and grade in the Virginia test was 4,612 lbs/A and 72% TSMK, respectively. All four varieties have been consistent performers over the last two years.

Caddo County

An abundant amount of rainfall the first two months of the 2007 growing season delayed plant development at Ft. Cobb. Average yield for the runner test was 2,472 lbs/A with an average grade of 69% TSMK. ARSOK-R1 was at the top of the yield list and continued to perform well in 2007.

In the Spanish test AT 98-99-14, ARSOK-S1, and Spanco were the top yield performers. Average yield and grade for the Spanish test were 2,087 lbs/A and 68% TSMK, respectively. ARSOK-S1 is an experimental variety that has not been released at this time. Tamnut 06 was a new release from Texas A&M in spring 2007.

Average yield and grade in the Virginia test was 2,133 lbs/A and 67% TSMK, respectively. All four varieties have been consistent performers over the last two years.

Tillman County

This was the first year since 2005 that we have had a variety trial in Tillman County. Good growing conditions were observed at Tipton throughout the growing season. Early season precipitation was above normal, which delayed planting in some cases but the trial was planted on time. Average yield for the runner test was 4,256 lbs/A with an average grade of 73%. No yield differences were detected in the top four varieites. ARSOK-R1 continued to perform well at this location. Grade for ARSOK-R1 was significantly higher compared to the other varieties at 77% TSMK.

In the Spanish test AT 98-99-14, GA 04S, Spanco, ARSOK-S1, and Tamnut 06 were the top yield performers. Average yield and grade for the Spanish test were 3,329 lbs/A and 71% TSMK, respectively.

Average yield and grade in the Virginia test was 3,988 lbs/A and 69% TSMK, respectively. Perry, Gregory, and Brantley out yielded Jupiter at this location.

Appreciation is expressed for the cooperation and assistance from:

OSU
John Damicone
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Caddo Research Station
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Mike Brantes, Field Forman
Kyle Scaggs, Field Assistant

Cooperators
Mark DeLeon, Beckham County
Jimmy Meeks Family,
Tillman County

Table 1. Peanut yields and grades from Beckham County variety tests in 2006, 2007, and 2 year average.

Variety or line	Yield (lbs/A)	Grade (% TSMK)	Yield (lbs/A)[1]	Grade (% TSMK)[1,2]	Yield (lbs/A)	Grade (% TSMK)
	- - - - 2006 - - - -		- - - - 2007 - - - -		- - - - 2 yr Avg. - - - -	
Runner[3]						
Tamrun OL07	na[4]	na	5838	74	5838	74
ARSOK-R1	5273	75	5229	77	5251	76
Tamrun 96	5250	71	5041	74	5146	72
Tamrun OL01	5286	71	4687	73	4987	72
Flavorunner 458	na	na	4443	74	4443	74
SW Runner	4238	69	4473	74	4356	72
Tamrun OL02	5322	68	3147	71	4235	69
LSD 0.05	417	4	1825	2		
Spanish[3]						
Tamnut 06	na	na	4029	73	4029	73
AT 98-99-14	3843	71	4000	75	3922	73
Spanco	3930	72	3740	76	3835	74
ARSOK-S1	3421	69	4046	74	3734	71
GA 04S	3639	65	3766	71	3703	68
Tamspan 90	3526	70	3323	74	3425	72
OLin	3612	69	2998	74	3305	71
Pronto	3326	72	2886	77	3106	74
LSD 0.05	416	ns	577	2		
Virginia[3]						
Gregory	na	na	4866	69	4866	69
Brantley	4456	72	4433	72	4445	72
Perry	4102	72	4740	72	4421	72
Jupiter	4147	73	4409	73	4278	73
LSD 0.05	ns	ns	ns	1		

1 Runner average – 4,694 lbs/A, 74% TSMK; Spanish average – 3,599 lbs/A, 74% TSMK; Virginia average – 4,612 lbs/A, 72% TSMK.
2 % TSMK = Percent total sound mature kernels.
3 Market type.
4 Data was not available because variety was not included in given year.

Table 2. Peanut yields and grades from Caddo County variety tests in 2006, 2007, and 2 year average.

Variety or line	Yield (lbs/A)	Grade (% TSMK)	Yield (lbs/A)[1]	Grade (% TSMK)[1,2]	Yield (lbs/A)	Grade (% TSMK)
	- - - - 2006 - - - -		- - - - 2007 - - - -		- - - - 2 yr Avg. - - - -	
Runner[3]						
ARSOK-R1	4737	69	2831	72	3784	71
Tamrun OL 01	4333	70	2564	70	3448	70
Tamrun 96	4125	70	2600	68	3363	69
Tamrun OL 02	4283	67	2323	68	3303	68
SW Runner	4097	67	2355	70	3226	68
Flavorunner 458	na[4]	na	2355	69	2355	69
Tamrun OL 07	na	na	2278	68	2278	68
LSD 0.05	406	3	374	2		
Spanish[3]						
AT 98-99-14	4061	63	2804	70	3433	67
Spanco	3979	67	2314	70	3147	68
ARSOK-S1	3771	66	2350	68	3061	67
Tamspan 90	3889	66	1938	65	2913	66
GA 04S	4007	64	1661	63	2834	63
Pronto	3653	67	1788	72	2720	70
OLin	3802	66	1593	68	2697	67
Tamnut 06	na	na	2246	64	2246	64
LSD 0.05	ns	2	521	4		
Virginia[3]						
Perry	4029	70	2423	71	3226	70
Brantley	4057	68	1974	68	3015	68
Jupiter	4111	67	1892	64	3002	65
Gregory	na	na	2242	65	2242	65
LSD 0.05	ns	1	455	3		

[1] Runner average – 2,472 lbs/A, 69% TSMK; Spanish average – 2,087 lbs/A, 68% TSMK; Virginia average – 2,133 lbs/A, 67% TSMK.
[2] % TSMK = Percent total sound mature kernels.
[3] Market type.
[4] Data was not available because variety was not included in given year.

Table 3. Peanut yields and grades from Tillman County variety tests in 2007.

Variety or line	Yield (lbs/A)[1]	Grade (% TSMK)[1,2]
	- - - - 2007 - - - -	
Runner[3]		
ARSOK-R1	5060	77
Tamrun OL01	4701	73
Tamrun OL02	4447	72
Tamrun 96	4305	73
Tamrun OL07	4069	72
Flavorunner 458	3757	74
SW Runner	3453	72
LSD 0.05	964	3
Spanish[3]		
AT 98-99-14	3517	70
GA 04S	3494	69
Spanco	3453	73
ARSOK-S1	3390	72
Tamnut 06	3217	69
Tamspan 90	3145	72
Pronto	3086	74
OLin	na[4]	na
LSD 0.05	420	3
Virginia[3]		
Perry	4397	70
Gregory	4383	68
Brantley	3889	69
Jupiter	3281	69
LSD 0.05	924	ns

1 Runner average – 4,256 lbs/A, 73% TSMK; Spanish average – 3,329 lbs/A, 71% TSMK; Virginia average – 3,988 lbs/A, 69% TSMK.
2 % TSMK = Percent total sound mature kernels.
3 Market type.
4 Data for OLin was not available as plots were affected by Round-up® that was applied with a rope-wick. OLin was only variety affected since it was taller than other plants.

The Effects of Reduced Tillage Practices on Peanut Production and Pest Management

C.B. Godsey, Department of Plant and Soil Sciences
P.G. Mulder, J.P. Damicone, and S.K. Seuhs;
Department of Entomology and Plant Pathology

2007 progress made possible through OPC and NPB support

- No consistent differences were observed with insect populations in 2007 when comparing tillage treatments.
- No differences were observed in weed populations, volunteer peanut plants, and nematodes.
- Peanut yields and grades were similar between no-till, strip-till, and conventional tillage treatments.

Introduction

In 2007, the long-term tillage study at the Ft. Cobb Research Station was continued. The objectives of this study are to assist Oklahoma growers in developing management strategies for conventional and conservation tillage practices in peanut production. Originally, plots were 76 ft wide by 130 ft long, to be representative of what growers would experience in adopting reduced tillage practices. Changes were made for the 2007-growing season. Large plots (76 ft by 130 ft) were split to evaluate three different rotations, while maintaining the objectives of the original study. Each tillage plot was split into three sub-plots (40 ft by 50 ft). Main plots were tillage and sub-plots became crop rotation. Crop rotations evaluated were a three-year corn-corn-peanut rotation, and a three-year switch grass-switch grass-peanut rotation. Including crop rotation as a variable in this study will provide beneficial data of how crop rotation effects weeds, diseases, and insects in reduced and conventional tillage systems. Most importantly we will be able to evaluate the economic profitability of these rotations.

Materials and Methods

An outline of field operations is presented in Table 1.

Arthropod Monitoring and Weed Populations

Once damage became apparent, thrips populations were monitored on three separate occasions. Ten quadrifoliate leaves were pulled from each plot and placed in 70% ethyl alcohol (ETOH) for transportation to the laboratory. Leaves were carefully separated and rinsed in an ETOH solution and the liquid strained for larvae and adults.

Peanut volunteer plants and weed counts were taken shortly after planting. Volunteer counts were taken on two separate occasions throughout the trial, once before a field implement with sweeps was run through the plots and once afterward by taking an average of five quadrates per plot. Weed counts were also taken twice. Weed assessments were made by taking the total number of weeds found in a 90-ft^2 area within each replication. Weed assessments were made before and after herbicide application.

Plot Design and Analysis

The plot design was a randomized complete block with four replications of each treatment. An analysis of variance was conducted on the data and a least significant difference (LSD) (P=0.05) test was generated to compare differences between the three tillage treatments in reference to insect and disease pressure as well as yield and grade.

Results and Discussion

The information found in Table 2 presents results from monitoring insects populations encountered in the tillage test at Ft. Cobb. Thrips were the main problem noticed throughout the season. No insecticides were applied throughout this test. A large number of larvae were present at the first sampling. A significantly higher number of thrips larvae were found in conventional till plots. These differences did not carry over to the following sampling times as thrips numbers were low or not detectable. A large number of potato leaf hoppers were observed in the first two samplings, but no significant differences were detected between tillage treatments (Table 3).

No significant differences in peanut yields or grades were identified between tillage treatments (Table 4). This follows previous year's data. Tillage does not appear to have an effect on peanut yield or peanut grade after four years. Corn grain yields were determined for each plot. Average corn grain yield was 214 bu/A. Switchgrass was swathed and harvested after dormancy and estimated yield was 1,500 lbs/A. Corn and switchgrass plots will be planted to peanuts in 2009.

Information in Table 5 presents results from agronomic evaluations on volunteer and weed presence. Weed counts were taken prior to post-emergence herbicide application. In 2007, nutsedge, spurge, and horse nettle were the primary plants identified. No differences were observed in weed populations or volunteer peanut counts across the three tillage systems.

Information in Table 6 presents results from nematode counts from 2005-2007. Nematode samples were taken in May. No differences in nematodes were observed between tillage treatments.

While certain trends appear to be evident from year to year that may relate to tillage effects on arthropods, weeds, and diseases, no consistent differences seem to indicate at least a very minor impact from reduced tillage practices in peanuts.

Table 1. Summary of field operations in 2007.

Date	Description
March 19	Sprayed glyphosate on no-till corn plots and run Triple K® on conventional corn plots
March 20	Applied 75 lbs N/A on corn plots and planted corn (DKC64-76 at 32,000 plants/A ; 114 day hybrid)
April 4	Sprayed glyphosate on switch grass plots and disc conventional peanut plots
April 16	Sprayed glyphosate on strip-till and no-till peanut plots
April 23	Run Triple K® on conventional peanut and switch grass plots
May 4	Sprayed glyphosate on corn plots
May 14	Run Triple K® on conventional plots
May 17	Prowl® H20 at 2.5 pt on conventional peanut plots and all plots planted
May 21	Applied 100 lbs N/A on corn plots and sprayed glyphosate on everything
June 4	Planted Alamo switch grass at 5 lbs/A
July 5	Cadre® at 1.44 oz + Butyrac® 200 at 1 pt + crop oil at 1 qt on peanut plots
Oct. 10	Swathed switch grass/1,500 lbs
Oct. 25	Dug peanuts
Oct. 30	Thrashed peanuts
Fungicide Applications	
July 4	Bravo® 2.5 pt/A
July 18	Headline® 6 oz/A
Aug. 10	Folicur® 7.2 oz/A
Aug. 29	Folicur® 7.2 oz/A
Sept. 14	Folicur® 7.2 oz/A
Sept. 14	Omega® 1.5 pt/A

Table 2. Mean number of thrips/10 quadrifoliate leaves.

Treatment Date	1st Sample Date June 13, 2007			2nd Sample Date June 24, 2007			3rd Sample Date July 12, 2007			4th Sample Aug. 1, 2007		
	Larvae	Adult	Total	Larvae	Adult	Total	Larvae	Adult	Total	Larvae	Adult	Total
Strip-Till	38.0 b*	5.3 a	43.3 b	1.5 a	1.0 a	2.5 a	0	.5	.25	0	0	0
No-Till	34.5 b	4.8 a	39.3 b	1.8 a	1.0 a	2.8 a	0	0	0	0	0	0
Conventional Till	79.7 a	5.8 a	85.5 a	2.3 a	.3 a	2.5 a	0	.25	.13	0	0	0

* Means, within columns, followed by the same letter are not significantly different (ANOVA, LSD: P=0.05).

Table 3. Mean number of potato leaf hoppers (10 sweeps/plot).

Treatment	July 18, 2007	Aug. 1, 2007	Aug. 16, 2007
Strip-Till	57.3 a*	45.5 a	0.0 a
No-Till	59.8 a	56.5 a	1.0 a
Conventional-Till	32.0 a	57.0 a	2.8 a

* Means, within columns, followed by the same letter are not significantly different (ANOVA, LSD: P=0.05).

Table 4. Peanut yield and grade from the long-term tillage study at Ft. Cobb in 2007.

Tillage	Yield	Grade
	- - lbs/A - -	- % TSMK[1] -
No-till	3,517 a*	69.7 a
Strip-till	3,966 a	69.99 a
Conventional Till	3,449 a	70.5 a

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

* Means, within columns, followed by the same letter are not significantly different (ANOVA, LSD: P=0.05).

Table 5. Weed and volunteer peanut populations in 2005, 2006, and 2007.

Treatment	Volunteer Peanut			Weeds		
	May 26 2005	June 12 2006	July 3 2007	Aug. 3 2005[1]	June 12 2006[2]	July 3 2007[3]
	- - - - - plants/ft² - - - - -			- - - - - weeds/ft² - - - - -		
Strip-Till	1.2 a[4]	0.7 b	0 a	0.1 a	0.1 b	0.9 a
No-Till	0.7 ab	1.2 a	0 a	0.1 a	0.4 a	0.7 a
Conventional Till	0.5 b	0.2 c	0 a	0.1 a	0.1 b	0.7 a

[1] Evaluations were made on all weeds after in-season herbicide application, with the most common weed being horse nettle.

[2] Evaluations were made on all weeds, with the most occurring identified as nutsedge, spurge, and carpetweed.

[3] Evaluations were made on all weeds, with the most occurring identified as nutsedge, spurge, and horse nettle.

[4] Means, within columns, followed by the same letter are not significantly different (ANOVA, LSD: P=0.05).

Table 6. Root-knot nematode counts for the spring of 2005, 2006, and 2007.

Treatment	2005	2006	2007
		- - - - Number/100cc of soil - - - -	
Strip-Till	104 a[1]	0 a	11 a
No-Till	71 a	0 a	3 a
Conventional Till	56 a	0 a	15 a

[1] Means, within columns, followed by the same letter are not significantly different (∝=0.05).

Integrated Management of Peanut Diseases

J.P. Damicone
Department of Entomology and Plant Pathology

2007 progress made possible through OPC and NPB support

- Tamrun OL07 had the best resistance to Sclerotinia blight among high oleic runner varieties.
- The breeding line ARSOK-R1 had the best yield and grade among high oleic runner entries grown with and without fungicide for Sclerotinia blight.
- Two new experimental fungicides have activity on Sclerotinia blight.
- Control of Sclerotinia blight with single applications of Endura® and Omega® made on demand continue to be similar to full-season preventive programs and may provide better net returns.
- In western production areas, levels of soilborne diseases such as southern blight, limb rot, and pod rot are low and fungicide programs for their control do not appear to be warranted.

Seven field trials were completed in 2007 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, southern blight, Sclerotinia blight, and pod rot. Cooperation and assistance in these studies was provided by Chad Godsey and Wendell Vaughan, Department of Plant and Soil Sciences; Phil Mulder and Kelly Seuhs, Department of Entomology and Plant Pathology; and Hassan Melouk, USDA/ARS in Stillwater. Appreciation is expressed to Mark DeLeon, a peanut farmer in Beckham County, who provided time and resources as a cooperator for the trials at Erick. Bobby Weidenmaier and the farm crew at the Caddo Research Station also are especially acknowledged for their cooperation and assistance that made the trials at the Caddo Research Station a success.

The field studies in 2007 served several purposes. The first was to identify and refine better strategies for managing diseases. The second was to use the trials sites as demonstrations to show growers firsthand the benefits of disease management in peanut production. Trial sites at the Caddo Research Station and Beckham County were showcased during annual fall field tours. Results from 2007 are summarized in this report. In interpreting the results, small differences in treatment values should not be overemphasized. Least significant differences (LSD) values are shown at the bottom of most tables. Unless two values differ by at least the LSD value shown, little confidence can be placed in the superiority of one treatment or variety over another.

In 2007, excessive rainfall and below normal temperatures in May and June generally limited peanut planting and plant growth and development. While rainfall was near normal in July, the monthly average temperature was 5°F to 6°F cooler than normal further limiting vine growth. Wet weather returned at the Caddo Research Station in August when tropical storm Erin dropped 12 inches of rain on Aug. 18. Drier than normal weather generally prevailed in September and October, which favored peanut maturity and produced near ideal harvest conditions. The wet growing season resulted in stunted vines that never lapped at the Caddo Research Station. There was only one day at or above 100°F at the Caddo Research Station and there were two days at or above 100°F at Erick. Pod set and maturity was delayed at the Caddo Research Station, but was better than normal at Erick. The overall wet and cool growing season favored early and severe leaf spot levels in most commercial fields. However, due to late planting at the Caddo Research Station and a previous crop of cotton at Erick, leaf spot pressure in plots did not reflect commercial fields in the vicinity. Sclerotinia blight was also below normal in plots and did not appear until mid September. It is presumed that the small plant canopy did not favor disease development despite the favorable weather for this disease. Pod rot and southern blight were also sporadic problems in the research trials and in commercial fields. Yields and grades were generally good despite the adverse growing conditions.

Sclerotinia Blight

Sclerotinia blight remains a destructive disease in Oklahoma. It occurs in all areas of the state except in far southwestern production areas. Industry preferences have resulted in the loss of Tamrun 96 and Tamrun OL01 as high yielding runner varieties with moderate resistance to Sclerotinia blight. Trials on management of Sclerotinia blight were conducted at the Caddo Research Station. The trials focused on evaluating new fungicides, developing effective reduced fungicide programs for Omega® and Endura®, and determining the yield responses of high oleic varieties and a promising breeding line (ARSOK-R1) to fungicide programs.

Evaluation of fungicides

The objective of this study was to evaluate two experimental fungicides (V-10190 and LEM 17) for control of Sclerotinia blight on the variety Tamrun OL02. The experimental fungicides were compared to the registered fungicides Omega® and Endura®. Application timings were made preventively according to the calendar on 14-day or monthly intervals.

Plant canopy development was particularly reduced in this trial compared to the two other adjacent trials. Deer grazing in this area of the research station also contributed to the reduced vine growth. Sclerotinia blight did not develop in the trial until mid September and only reached an incidence of 32% by harvest (Table 1). All of the treatments reduced Sclerotinia blight compared to the untreated check on both Oct. 12 and Oct. 29. Omega® at 1.5 pt/A applied twice preventively has generally provided the best disease control and yield response over many years. While this program is not affordable for growers, it can be considered a benchmark for effective disease control. Treatments that provided similar disease control to the full preventive Omega® treatment included the 14-day programs with V-10190, all of the LEM 17 treatments, all of the Endura® treatments, Omega®+Tilt®/Bravo®, and the single application of Omega® at 2.0 pt/A. Most of the treatments numerically increased yield and crop value compared to the untreated check. However, yield responses were not statistically significant because of the low disease pressure in this trial. Given the cost of the treatments

Table 1. Effect of fungicides on control of Sclerotinia blight on Tamrun OL02 peanuts at the Caddo Research Station, Ft. Cobb, 2007.

Treatment and rate/A (timing)[1]	Sclerotinia blight (%) Oct. 12	Sclerotinia blight (%) Oct. 29	Yield (lbs/A)	Crop value ($/A)[2]
Omega® 4F 1.5 pt (P1)	10.0 bc[3]	16.2 b	3325 a	567 a
Omega® 4F 2 pt (P1)	9.2 bc	11.7 bcd	3419 a	583 a
Endura® 70WG 10 oz (P1)	5.2 bc	9.0 cde	3173 a	541 a
Omega® 4F 0.5 pt + Tilt®/Bravo® 4.3F 1.5 pt (14-d (4))	11.2 b	12.7 bc	3289 a	561 a
V-10190 2.5F 9.6 fl oz (P1,P2)	10.2 bc	14.2 bc	3325 a	567 a
V-10190 2.5F 18 fl oz (P1,P2)	6.7 bc	16.2 b	3136 a	535 a
V-10190 2.5F 9.6 fl oz (14-d (5))	4.0 c	10.2 b-e	3049 a	520 a
V-10190 2.5F 18 fl oz (14-d (5))	4.2 c	7.7 cde	3151 a	537 a
LEM17 1.7F 9.6 fl oz (14-d (5))	8.5 bc	11.7 bcd	3369 a	574 a
LEM17 1.7F 16.8 fl oz (14-d (5))	6.2 bc	9.2 cde	3223 a	550 a
LEM17 1.7F 24.0 fl oz (14-d (5))	5.0 bc	5.2 de	3252 a	554 a
Endura® 70WG 8 oz (P1, P2)	7.2 bc	11.0 b-e	3093 a	527 a
Endura® 70WG 10 oz (P1, P2)	5.2 bc	5.0 e	3303 a	563 a
Omega® 4F 1.5 pt (P1, P2)	7.2 bc	9.5 cde	3514 a	599 a
Check	21.5 a	32.0 a	2889 a	493 a
LSD (P=0.05)[4]	6.3	6.7	NS	NS

1 Preventive timings (P) correspond to the application dates of P1=Aug. 1 and P2=Sept. 5. Application timings for the 14-day program were July 25, Aug. 8, Aug. 22, Sept. 5, and Sept. 19. The Omega® +Tilt®/Bravo® treatment received four applications from July 25 to Sept. 5.
2 Crop value based on an average grade of 69% TSMK.
3 Values in a column followed by the same letter are not significantly different at P=0.05.
4 Fisher's least significant difference (LSD); NS=treatment effect not significant at P=0.05.

($4/oz for Endura® and $40/pt of Omega®), net returns (crop value less chemicals costs) were mostly break even or worse in this study. The experimental fungicides V-10190 and LEM 17 have potential for use in Sclerotinia blight management.

Timing of Fungicide Applications

A fungicide application for Sclerotinia blight lasts about three weeks, and two applications are recommended to provide full-season protection. Because the fungicides Omega® and Endura® are expensive, reduced application programs are needed that use a single, well-timed application. The objective of this study was to identify efficient use patterns for the registered fungicides Omega® and Endura® in the control of Sclerotinia blight. Reduced application programs consisted of single applications made on demand (first sign of disease). Reduced application programs were compared to preventive applications made according to the calendar in order to provide full-season protection. Additionally, the experimental fungicide V-10190 was evaluated in a second location.

Sclerotinia blight developed late in the season but levels of the disease at the Caddo Research Station were highest in this trial, reaching 75% in untreated plots at harvest (Table 2). The demand application for the reduced program was made on

Table 2. Effect of fungicide programs on control of Sclerotinia blight of Tamrun OL02 peanuts at the Caddo Research Station, Ft. Cobb, 2007.

Treatment and rate/A (timing)[1]	Sclerotinia blight (%) Sept. 18	Oct.12	Oct. 29	Yield (lbs/A)	Crop value ($/A)[2]
Omega® 4F 1.5 pt (P1, P2)	6.0 bcd[3]	22.0 cd	33.2 cd	3419 a	575 a
Omega® 4F 1 pt (P1, P2)	8.5 bc	32.2 bc	38.7 bc	3267 ab	549 ab
Omega® 4F 1.5 pt (D1)	2.0 d	20.7 cd	27.0 c-f	3361 ab	565 ab
Omega® 4F 2.0 pt (D1)	1.0 d	17.7 d	30.0 cde	3608 a	606 a
Endura® 70WG 8 oz (P1, P2)	4.2 cd	19.0 cd	18.5 def	3383 a	568 a
Endura® 70WG 10 oz (D1)	4.0 cd	16.0 d	13.0 f	3434 a	577 a
Endura® 70WG 15 oz (D1)	1.5 d	16.0 d	17.0 ef	3536 a	594 a
V-10190 2.5F 9.6 fl oz (P1, P2)	10.5 b	45.0 b	52.2 b	2984 bc	501 bc
V-10190 2.5F 18 fl oz (P1, P2)	5.0 cd	27.0 cd	36.2 c	2824 cd	474 cd
Check	23.0 a	67.5 a	75.0 a	2447 d	411 d
LSD (P=0.05)[4]	5.1	14.1	15.5	383	64

1 Preventive timings (P) correspond to the application dates of P1=Aug. 1 and P2=Sept. 4. The application timing for the demand program was July 22.
2 Crop value based on an average grade of 68% TSMK.
3 Values in a column followed by the same letter are not significantly different at P=0.05.
4 Fisher's least significant difference (LSD).

Aug. 21, three days after tropical storm Erin dropped 12 inches of rain, but before symptoms of the disease were found. All of the treatments reduced disease incidence compared to the untreated check. Generally, Endura® resulted in better disease control compared to Omega®. Demand applications of Omega® and Endura® were generally more effective than respective preventive applications. Apparently the first preventive application was made too early and the second was made too late. V-10190 was less effective in this trial compared to an adjacent trial where disease pressure was lower and where applications were made on a 14-day schedule. Compared to respective preventive applications of Omega® and Endura®, V-10190 was less effective than currently registered fungicides. All of the treatments except the high rate of V-10190 increased yields compare to the untreated check. Yield responses ranged from 800 lbs/A for Omega® applied preventively at 1.0 pt/A to 1,200 lbs/A for Omega® applied on demand at 2.0 pt/A. Given the cost of the treatments ($4/oz for Endura® and $40/pt for Omega®), net returns (crop value less chemicals costs) were positive for all Omega® and Endura® treatments. The most favorable economic return resulted from a single, on demand application of Endura® at 10.0 oz/A.

Variety Response to Fungicide Programs

Two fungicides that are highly effective in the control of Sclerotinia blight are now registered for use on peanuts. However, the high cost of both Omega® and Endura® has limited their usage. Peanut cultivars have different reactions to Sclerotinia blight and may require specific levels of fungicide input for optimum control. Previous research has shown that economic returns from Omega® are generally positive for susceptible varieties such as Okrun and break even for moderately resistant cultivars such as Tamrun 96 and Tamrun OL01. Economic returns are almost always negative for Omega® use on resistant varieties such as Tamspan 90 and Southwest Runner. However, Tamrun 96 and Tamrun OL01 are no longer available. Runner varieties available to be planted in Oklahoma now consist of entirely high oleic types.

The objective of this study was to evaluate the disease and yield responses of high oleic runner varieties (Tamrun OL02, Flavor Runner 458, and Tamrun OL07), a large-seeded Spanish variety (Tamnut OL06), and a promising runner breeding line (ARSOK-R1) to low, moderate, and high levels of input of the fungicides Omega® and Endura® for control of Sclerotinia blight. Fungicide programs consisted of two preventive applications of Omega® at 1.5 pt/A. This treatment is excessively expensive ($120/A), but was included as a benchmark to measure yield loss to Sclerotinia blight. The other treatments were single demand applications of Omega® at 1.5 pt/A ($60) and 2.0 pt/A ($80), and Endura® at 10.0 oz/A ($40). Demand applications were to have been made at the first appearance of disease. However, they were made on Aug. 21, three days after tropical storm Erin dropped 12 inches of rain and before symptoms of the disease were found.

Sclerotinia blight developed later than normal in this trial, but increased to higher levels than in the adjacent fungicide screening trial. Among the entries, Tamnut OL06 had the best resistance (Table 3), being similar to the level of resistance observed for Tamspan 90 in previous trials. Among the runner entries, Tamrun OL07 had the lowest disease incidence, about 50% less than for Tamrun OL02 and ARSOK-R1. Flavor Runner 458 was most susceptible. Fungicide treatments reduced disease incidence for all entries except for Tamnut OL06. Demand applications of Omega® and Endura® were generally more effective than the preventive Omega® program. Apparently the first preventive application was made too early and the second was made too late. Despite an intermediate level of disease, ARSOK-R1 was the highest yielding entry in the trial. In untreated plots, yields of ARSOK-R1 were 800 lbs/A better than Tamrun OL02 and 400 lbs/A better than Tamrun OL07. Yields of Tamnut OL06 were low, similar to other trials with Spanish types on the station. Fungicide programs increased yields of all varieties except Tamnut OL06 and Tamrun OL07. Yield responses were at least 800 lbs/A for Tamrun OL02, 1,200 lbs/A for Flavor Runner 458, and 600 lbs/A for ARSOK-R1. There were numerical trends for increased yield in Tamrun OL07 (400 lbs/A) but they were not significant. Crop value responses mirrored yield except for ARSOK-R1, which had the best grade, and Tamnut OL06, which had the worst grade. Net returns (crop value minus treatment costs) were greater than the check for all entries and treatments except for those treatments applied to Tamnut OL06 and Tamrun OL07. Net returns were negative for all treatments on Tamnut OL06, and were negative or break even for all treatments on Tamrun OL07 except Endura®. Generally, the Endura® treatments provided the greatest net returns across entries.

Southern Blight, Limb Rot, and Pod Rot

Southern blight, limb rot, and pod rot are damaging soilborne diseases that can occur statewide. Southern blight appears to be declining in importance as acreage along the Red River in southern Oklahoma declines. A moderate level of resistance to these diseases occurs in Tamspan 90, but on runner and Virginia varieties, effective management relies on the use of fungicide programs that control both foliar and soilborne diseases. Fungicide programs are recommended in fields with a history of damage from southern blight and limb rot. Folicur®, Abound®, and Moncut® have provided good to excellent control of these diseases. Headline® is also registered for use on southern blight and limb rot, but

Table 3. Responses of high oleic peanut varieties and a breeding line to fungicide programs for control of Sclerotinia blight at the Caddo Research Station, 2007.

Treatment and rate/A (timing)[1]	Tamrun OL02	FR 458	ARSOK-R1	Tamnut OL06	Tamrun OL07	mean[2]
			Sclerotinia blight (%) – Oct. 29			
Omega® 4F 1.5 pt (P1, P2)	21.7 b[3]	26.2 b	14.5 b	0.5 a	6.2 b	13.8
Omega® 4F 1.5 pt (D1)	9.0 c	15.2 bc	9.5 b	1.2 a	2.7 b	7.6
Omega® 4F 2 pt (D1)	7.5 c	6.5 c	10.0 b	1.0 a	1.7 b	5.3
Endura® 70WG 10 oz (D1)	8.7 c	12.0 c	11.7 b	1.0 a	2.5 b	7.2
Check	43.0 a	60.2 a	45.0 a	3.2 a	22.0 a	34.7
mean[4]	18.0	24.0	18.1	1.4	7.0	
LSD (P=0.05)[5]	12.0	13.6	13.0	NS	8.5	
			Yield (lb/A)			
Omega® 4F 1.5 pt (P1, P2)	4240 a[3]	4044 a	4813 a	2512 a	4167 a	3955
Omega® 4F 1.5 pt (D1)	4168 a	4044 a	4770 a	2265 a	4153 a	3880
Omega® 4F 2 pt (D1)	4233 a	3913 a	5169 a	2410 a	4174 a	3980
Endura® 70WG 10 oz (D1)	4167 a	3906 a	4726 a	2483 a	4371 a	3931
Check	3345 b	2737 b	4145 b	2425 a	3724 a	3276
mean[4]	4031	3729	4725	2419	4118	
LSD (P=0.05)[5]	423	578	539	NS	NS	
			Crop value ($/A)[6]			
Omega® 4F 1.5 pt (P1, P2)	723 a[3]	699 a	864 a	396 a	731 a	683
Omega® 4F 1.5 pt (D1)	710 a	699 a	856 a	357 a	728 a	670
Omega® 4F 2 pt (D1)	722 a	677 a	928 a	380 a	732 a	688
Endura® 70WG 10 oz (D1)	710 a	675 a	849 a	391 a	766 a	678
Check	571 b	473 b	744 b	382 a	653 a	565
mean[4]	687	645	848	381	722	
LSD (P=0.05)[5]	72	100	97	NS	NS	

1 Preventive timings (P) correspond to the application dates of P1=Aug. 1 and P2=Sept. 4. The demand timing (D) corresponds to the application date of D1=Aug. 21.
2 Averaged over varieties.
3 Values in a column followed by the same letter are not statistically different at P=0.05.
4 Averaged over treatments.
5 Fisher's least significant difference (LSD), NS=treatment effect not significant at P=0.05.
6 Based on an average grade (%TSMK) of 69% for Tamrun OL02, 70% for FR 458, 73% for ARSOK-R1, 64% for Tamnut OL06, and 71% for Tamrun OL07.

control of southern blight has not been comparable to the other products, and data on limb rot control in Oklahoma with Headline® has not been developed. Except for Moncut®, which must be tank-mixed with another fungicide, these fungicides are also effective against foliar diseases. Pod rot can be caused by *Rhizoctonia*, which also causes limb rot, *Pythium*, or both fungi in combination. Pod rot control has relied on planting partially resistant varieties and avoiding highly susceptible varieties such as Virginia types. Oklahoma State University data on pod rot control with fungicides has been inconclusive. However, Abound® is being used by many growers to control this disease. Research is still needed to assess the benefits and economic returns from using these fungicides

Evaluation of fungicide programs

The objective of this study was to evaluate fungicide programs with various registered fungicides on control of soilborne diseases (southern blight, limb rot, and pod rot) and foliar diseases on a runner variety. Fungicide programs consisting of five applications on a 14-day schedule were compared to an untreated check and a full-season Bravo® program to control only leaf spot. Programs designed to control soilborne diseases included four mid-season sprays on 14-day intervals of Provost®, and Folicur® alternated with Evito®; and two mid-season sprays on four-week intervals of Abound®, Evito®, and Headline®.

Disease pressure was low in this trial, probably because the field had previously cropped to cotton. Leaf spot did not appear until late August and only increased to 44% in untreated check plots by harvest (Table 4). All of the fungicide programs provided excellent leaf spot control. Southern blight did not develop in the trial. After the peanuts were dug, pod rot caused primarily by *Rhizoctonia* was apparent. The disease was not evenly distributed and overall was a minor problem occurring at an incidence of less than 5%. The effect of the fungicide program on pot rot was not statistically significant. Yields were high, but did not differ among treatments because of the low disease pressure. The good grades and high yields in this study resulted in crop values of over $900/A for most of the fungicide programs. Fungicide programs were not required in this field and generally resulted in negative net returns (crop value minus chemical costs).

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 lbs/A 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 where a full-season fungicide program that consists of six sprays per season is used. However, reduced fungicide programs that are effective and utilize fewer sprays per season are needed to reduce the costs of peanut production. The objective of the research on foliar diseases is to identify new chemistries for control of foliar diseases and to develop effective reduced application programs.

Evaluation of full-season fungicide programs on Spanish peanuts

Fungicide programs were evaluated for control of early leaf spot on Tamspan 90 at the Caddo Research Station. Experimental fungicides evaluated were V-10116, Lem 17, and Punch. Recently registered fungicides evaluated included Provost® and Evito®. Fungicides were applied in programs using various application sequences with Bravo®, Tilt®/Bravo®, and Headline®. Fungicides were applied in full-season, 14-day application schedules.

The trial was planted late (May 29) which tends to delay leaf spot pressure.

Table 4. Effect of fungicide programs on control of pod rot and foliar diseases of Flavor Runner 458 peanuts at the DeLeon Farm, Erick, 2007.

Treatment and rate/A (timing)[1]	Early leaf spot (%)[2]	Defoliation (%)[3]	Pod Rot (%)	Yield (lbs/A)	Crop value ($/A)[4]
Check	44.6 a	6.7 a	4.1 a	4846 a	897 a
Bravo® 720 1.5 pt (1-5)	1.3 c	0.0 b	3.1 a	5091 a	942 a
Echo® 6F 1.5 pt (1,6) Provost® 3.6F 8 fl oz (2-5)	6.0 bc	0.0 b	1.2 a	5282 a	978 a
Echo® 6F 1.5 pt (1,6) Provost® 3.6F 10.7 fl oz (2-5)	1.7 c	0.0 b	3.7 a	5354 a	991 a
Bravo® 6F 1.5 pt (1,3,5,6) Evito® 4F 5.7 fl oz (2,4)[5]	1.8 c	0.0 b	1.9 a	4710 a	872 a
Bravo® 6F 1.5 pt (1,3,5,6) Evito® 4F 3.8 fl oz (2,4)[5]	5.1 bc	0.0 b	4.1 a	4928 a	912 a
Bravo® 6F 1.5 pt (1,3,5,6) Evito® 4F 3.8 fl oz + Folicur® 3.6F 6 fl oz (2,4)[5]	2.4 c	0.0 b	4.7 a	4964 a	919 a
Tilt®/Bravo® 4.3SE 1.5 pt (1,3,4,5) Abound® 2.08F 18.5 fl oz (2,4)	6.7 bc	0.0 b	3.4 a	5064 a	937 a
Tilt®/Bravo® 4.3SE 1.5 pt (1,3,4,5) Abound® 2.08F 12.3 fl oz (2,4)	12.1 b	0.0 b	1.9 a	5091 a	942 a
Bravo® 6F 1.5 pt (1,3,5,6) Headline® 2.08E 15 fl oz (2,4)	0.0 c	0.0 b	0.0 a	5690 a	1053 a
LSD (P=0.05)[6]	7.3	3.3	NS	NS	NS

1 Application numbers 1-6 correspond to spray dates of 1=July 5, 2=July 19, 3=Aug. 1, 4=Aug. 16, 5=Aug. 30, and 6=Sept. 13.
2 Percentage of leaflets with symptoms (including defoliation).
3 Percentage of leaflets defoliated.
4 Crop value based on an average grade of 75% TSMK.
5 The adjuvant Induce was added at 0.06% of the total spray volume.
6 Fisher's least significant difference (LSD), NS=treatment effect not significant at P≤0.05.

Heavy rains throughout the season reduced plant canopy development and caused soil erosion in some areas of the trial. Leaf spot did not develop until September, but the disease reached 90% in untreated check plots by harvest (Table 5). All spray programs reduced leaf spot and defoliation compared to untreated check. Treatments that provided the best control included Bravo®, Tilt®/Bravo®, Provost®, V-10116 and Folicur® alternated with Headline®, and Punch + Lem 17. The tank mixture of Omega® + Tilt®/Bravo® was less effective than Tilt®/Bravo® alone. All of the fungicide programs reduced defoliation compared to the check. Defoliation levels in untreated check plots were not sufficient to have a large effect on yield. Yields and grade were low and the Folicur®/Headline® program was the only treatment that increased yield compared to the untreated control.

Evaluation of full-season and reduced fungicide programs on runner peanuts

In southwestern production areas, soilborne diseases have not been severe, however, early leaf spot has been a problem in fields where peanuts are cropped continuously. In previous trials in the area,

Table 5. Effect of fungicide programs on control of early leaf spot on Spanish peanuts at the Caddo Research Station, Ft. Cobb, 2007.

Treatment and rate/A (timing)[1]	Early leaf spot (%)[2]	Defoliation (%)[3]	Yield (lbs/A)	Crop value ($/A)[4]
Check	89.2 a[5]	62.1 a	2604 b-f	407 b-f
Bravo® 6F 1.5 pt (1-6)	8.7 fg	0.0 c	2559 c-f	400 c-f
Tilt®/Bravo® 4.3SE 1.5 pt (1-6)	11.0 efg	0.0 c	2450 def	383 def
Tilt®/Bravo® 4.3 SE 1.5 pt (1,6) Tilt®/Bravo® 4.3 SE 1.5 pt + Omega® 4F 0.5 pt (2-5)	44.6 b	6.7 b	2341 f	366 f
Bravo® 6F 1.5 pt (1,6) Endura® 70WG 8 oz (2-5)	22.5 cde	1.3 bc	2505 def	391 def
Echo® 6F 1.5 pt (1,6) Provost® 3.6F 8 fl oz (2-5)	8.8 fg	0.0 c	2641 b-f	412 b-f
Bravo® 6F 1.5 pt (1,3,5,6) Evito® 4F 5.7 fl oz (2,4)[6]	25.0 cd	2.9 bc	2704 a-f	422 a-f
V-10116 50WG 1.75 oz (1,3,5) Headline® 2.08F 9 fl oz (2,4) Bravo® 6F 1.5 pt (6)	15.6 d-g	0.8 bc	2840 a-d	444 a-d
V-10116 50WG 2.5 oz (1,3,5) Headline® 2.08F 9 fl oz (2,4) Bravo® 6F 1.5 pt (6)	8.2 fg	0.0 c	2904 abc	453 abc
V-10116 50WG 4 oz (1,3,5) Headline® 2.08F 9 fl oz (2,4) Bravo® 6F 1.5 pt (6)	6.6 fg	0.0 c	2813 a-e	439 a-e
V-10116 2F 3.5 fl oz (1,3,5) Headline® 2.08F 9 fl oz (2,4) Bravo® 6F 1.5 pt (6)	25.4 cd	0.0 c	2423 ef	378 ef
Folicur® 3.6F 7.2 fl oz (1,3,5)[6] Headline® 2.08F 9 fl oz (2,4) Bravo® 6F 1.5 pt (6)	3.7 g	0.0 c	3040 a	475 a
Lem 17 1.67F 16.8 fl oz (1-6)	18.3 def	0.0 c	2777 a-e	434 a-e
Lem 17 1.67E 16.8 fl oz (1-6)	32.1 bc	3.1 bc	2668 a-f	417 a-f
Punch 3.3E 4 fl oz + Lem 17 1.67F 16.8 fl oz (1-6)	3.0 bc	0.0 c	2977 ab	465 ab
LSD (P=0.05)[7]	13.5	6.2	395	62

1 Application numbers 1-6 correspond to spray dates for the calendar programs of 1=July 10, 2=July 25, 3=Aug. 8, 4=Aug. 22, 5=Sept. 5, and 6=Sept. 19.
2 Percentage of leaflets with symptoms (including defoliation).
3 Percentage of leaflets defoliated.
4 Crop value based on an average grade of 62% TSMK.
5 Values in a column followed by the same letter are not significantly different at P=0.05.
6 The adjuvant Induce was added at 0.06% of the total spray volume.
7 Fisher's least significant difference (LSD), NS=treatment effect not significant at P=0.05.

excellent control of early leaf spot followed a reduced calendar program consisting of three applications made on 14-day intervals beginning about Aug. 1. Good control has also been achieved making application when recommended by the early leaf spot advisory program (http://agweather.mesonet.org). The objective of this study was to compare reduced fungicide programs made according to the weather-based early leaf spot advisory program and the three-application calendar program to full-season calendar programs that included various registered and experimental fungicides.

Weather conditions favored leaf spot development since the advisory program recommended four fungicide applications. However, the field had been previously cropped to cotton, which may explain the low leaf spot pressure at this site compared to commercial peanut fields in the vicinity. All of the fungicide programs provided good disease control compared to the untreated check, which had only 35% leaf spot (Table 6). Leaf spot pressure was not sufficient to cause defoliation. Pod rot was evident after digging the trial, but levels were low and did not differ among treatments. Leaf spot pressure was not sufficient to reduce yields that were high in this trial.

Seedling Diseases

Evaluation of fungicide seed treatments for stand establishment

Seedling disease is usually not a problem in peanut production because fungicide seed treatments such as Vitavax® PC and Tops®/Vitavax® PC are applied to commercial seed and provide effective disease control and stand establishment. A trial was conducted at the Caddo Research Station in Ft. Cobb on the variety Tamrun OL02 to compare new seed treatment fungicides (Trilex® Optimum, Trilex® Star, and Dynasty®) to Vitavax® PC.

Wet cool conditions after planting resulted in moderate seedling disease pressure. Plant stand was increased from 1.6 plants/ft to 2.5 plants/ft for all of the seed treatments. However, the plants compensated for the differences in plant stand and yields did not differ among treatments. Results from this trial and those in previous years indicate that new seed treatment fungicides are comparable in performance to Vitavax® PC.

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Table 6. Effect of fungicide programs on control of early leaf spot and pod rot on Flavor Runner 458 peanuts at the DeLeon Farm, Erick, 2007.

Treatment and rate/A (timing)[1]	Early leaf spot (%)[2]	Pod rot (%)	Yield (lbs/A)	Crop value ($/A)[3]
Check	34.6 a[4]	0.3 a	5273 a	989 a
Bravo® 720 1.5 pt (1-5)	1.1 bc	0.3 a	4828 a	905 a
V-10116 50WG 1.75 oz (1,3,5) Headline® 2.08F 9 fl oz (2,4) Bravo® 6F 1.5 pt (6)	0.3 c	1.9 a	4855 a	911 a
V-10116 50WG 2.5 oz (1,3,5) Headline® 2.08F 9 fl oz (2,4) Bravo® 6F 1.5 pt (6)	1.5 bc	2.2 a	5626 a	1055 a
V-10116 50WG 4 oz (1,3,5) Headline® 2.08F 9 fl oz (2,4) Bravo® 6F 1.5 pt (6)	0.5 bc	1.2 a	5400 a	1013 a
V-10116 2F 3.5 fl oz (1,3,5) Headline® 2.08F 9 fl oz (2,4) Bravo® 6F 1.5 pt (6)	2.0 bc	0.3 a	5508 a	1033 a
Folicur® 3.6F 7.2 fl oz (1,3,5)[5] Headline® 2.08F 9 fl oz (2,4) Bravo® 6F 1.5 pt (6)	0.3 c	0.3 a	5554 a	1042 a
DPX-Lem 17 1.67F 9.6 fl oz (1-6)	8.3 b	1.9 a	5100 a	957 a
DPX-Lem 17 1.67F 16.8 fl oz (1-6)	3.4 bc	0.3 a	5109 a	958 a
DPX-Lem 17 1.67E 16.8 fl oz (1-6)	4.2 bc	1.2 a	5318 a	997 a
DPX-Lem 17 1.67F 24.0 fl oz (1-6)	3.4 bc	0.9 a	5291 a	992 a
Tilt®/Bravo® 4.3SE 1.5 pt (1) DPX-Lem 17 1.67F 16.8 fl oz (2,4) Bravo® 6F 1.5 pt (3,5,6)	2.8 bc	0.6 a	5418 a	1016 a
Punch 3.3E 4 fl oz + DPX-Lem 17 1.67F 16.8 fl oz (1-6)	0.8 bc	3.4 a	5164 a	968 a
Headline® 2.08F 9 fl oz (3,5) Tilt®/Bravo® 4.3SE 1.5 pt (4)	2.2 bc	4.7 a	5336 a	1001 a
Headline® 2.08F 9 fl oz (A1,A3) Tilt®/Bravo® 4.3SE 1.5 pt (A2,A4)	1.9 bc	2.2 a	5218 a	979 a
LSD (P=0.05)[6]	7.8	NS	NS	NS

1 Application numbers 1-6 correspond to spray dates for the full-season (14-day) program of 1=July 5, 2=July 19, 3=Aug. 1, 4=Aug. 16, 5=Aug. 30, and 6=Sept. 13. Applications numbers A1 to A4 correspond to spray dates for the Early Leaf Spot Advisory Program of A1=July 5, A2=July 19, A3=Aug. 16, and A4=Sept. 13.
2 Percentage of leaflets with symptoms.
3 Crop value based on an average grade of 76% TSMK.
4 Values in a column followed by the same letter are not significantly different at P=0.05.
5 The adjuvant Induce was added at 0.06% of the total spray volume.
6 Fisher's least significant difference (LSD), NS=treatment effect not significant at P≤0.05.

Peanut Field Studies

C.B. Godsey, W. Vaughan, and B. Heister
Department of Plant and Soil Sciences

Partners in Progress
PEANUTS

2007 progress made possible through OPC and NPB support

- Twin-row planted Tampsan 90 increased yield by 671 lbs/A and %TSMK by 4% compared to single-row.
- No significant yield increase was observed with Tamrun OL02 between twin-row and single-row planting.
- Application of mid-season nitrogen did not affect peanut yield or grade.

Planting Configuration (Twin-row versus Single-row)

In 2007 at Ft. Cobb a twin-row study was initiated to investigate agronomic advantages to twin-row planting. Tamrun OL02 and Tamspan 90 were planted. Both varieties were planted on June 4 at a population of approximately 80 lbs seed/A. The single-row peanuts were planted in rows spaced at 36 inches, while the twin-row treatment was planted in twin-rows on 36 inch centers and the spacing between the twin-rows was 7.5 inches. Both row configurations were treated similar throughout the growing season.

Tamspan 90 responded to the twin-row planting configuration (Table 1). Considering a P-value of 0.10 being significant (one could expect this result to occur 90% of the time), twin-row planted Tampsan 90 increased yield by 671 lbs/A and %TSMK by 4% compared to single-row. The reason for the yield increase can probably be attributed to increased leaf area, which enables greater light interception in the twin-row configuration.

No significant yield increase was observed with Tamrun OL02. However, numerically a 560 lbs/A increase was observed compared to single-row. No differences were observed in %TSMK. This study will be continued in 2008 to include more varieties and different seeding rates.

Nitrogen Study

Due to the abundant rainfall in early summer and cooler soil temperatures many peanut plants appeared to be nitrogen (N) deficient. For this reason an N study was conducted in Tillman County and Beckham County to determine the effect of N application throughout the growing season. Treatments included one-time applications of 0, 10, 20, 30, 40 lbs N/A and 10 lbs N/A applied approximately every two weeks starting in early July. Nitrogen was applied as urea and broadcast in plots. Plots were 20 ft in length and 12 ft wide. Plots were treated similar to the whole field with the exception of the N treatments. The Beckham County location was not harvested because of weed pressure.

Results support past data from N studies in Oklahoma that indicated no yield or grade response to N application in peanuts (Table 2).

Table 1. Planting configuration study at Ft. Cobb in 2007.

Variety	Row spacing	Yield	Grade
		- - lbs/A - -	- % TSMK[1] -
Tamspan 90			
	Single-row	1784	59
	Twin-row	2455	63
P-value		0.10	0.03
Tamrun OL02			
	Single-row	4014	69
	Twin-row	4574	69
P-value		0.14	0.32

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

Table 2. Peanut yield and grade from the nitrogen study in Tillman County 2007.

Treatment	Yield	Grade
- - lbs N/A - -	- - lbs/A - -	- % TSMK[1] -
0	4540	72
10	4375	72
20	4540	72
30	4522	69
40	4844	71
10 lbs approx. every 2 weeks[2]	4683	71

[1] % TSMK = Percent total sound mature kernels.
[2] Nitrogen applications were made on July 2, July 24, and Aug. 5.

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