Partners in Progress
PEANUTS

Peanut Research at OSU 2012

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-1039

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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 *2012 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
Interim Associate Director
Oklahoma Agricultural Experiment Station
Division of Agricultural Sciences and Natural Resources
Oklahoma State University

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

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

Record Drought!
Record Yield!
2012 - Oh, What a Year for Peanuts

Drought continued to dominate Oklahoma's weather story for the second consecutive year. At year's end, 2012 was recorded as the warmest ever; with nearly 40 percent of the state under exceptional drought, the U.S. Drought Monitor's worst designation. The state's peanut production and harvest season (May through November) was the driest such period ever recorded.

In spite of severe adverse conditions, Oklahoma's peanut farmers reaped a record 3,800 pounds per acre; a nearly 32 percent increase over the drought year of 2011. Twenty-two thousand acres of peanuts (the same as 2011) were planted in 2012. There was much concern about seed availability, quality and germination due to adverse conditions during last year's harvest. Substandard classification for seed sales were granted by authorities and seeding rate recommendations increased for certain varieties to compensate for the germination concerns.

Boosted by early-spring moisture and near ideal conditions at planting, the crop got off to an excellent start. Armed with the best genetics available, employing the latest technology, implementing proven management skills, efficiently irrigating and applying timely pest control—after a season of endurance—it all came down to having enough growing days to allow the crop to sufficiently mature. And a quality crop it was, with yields and grades much improved over last year.

Nationwide the peanut belt is bulging with the largest crop ever grown due, in part, to an ideal growing season with new, high yielding varieties and little disease or pest pressure; and perhaps due in even larger part to an average 45 percent increase in planted acreage (unlike Oklahoma).

On the home front, the battle for increased yields and profit potential continues to advance via the ongoing efforts of Oklahoma's Peanut Improvement Team. The year began without the services of Hassan Melouk, who retired after a stellar 40-year research career dealing with peanut pathogens including, most importantly, Sclerotinia, leaf-spot, verticillium wilt, tomato spotted wilt, peanut mottle and peanut stripe viruses.

Mid-year, we welcomed the arrival of Rebecca Bennett to the USDA/ARS team. She has initiated a solid peanut pathology-screening program to assist the advanced ARS breeding work of Kelly Chamberlin and field trials in association with Oklahoma State University Cooperative Extension Plant Pathologist and fellow team member John Damicone.

We ended the year saying farewell to team leader, Chad Godsey, who took a leave of absence for professional advancement. Chad wore many hats for many crops in his role as OSU Cooperative Extension cropping systems specialist. He is respected by canola and soybean farmers for his problem-solving approach to their concerns, but he will be most fondly recalled by our folks as *Oklahoma's Cooperative Extension PEANUT specialist*.

Let me encourage you to study the following pages of the annual *Partners in Progress Peanut Report* summarizing the research investigations supported in part by the Oklahoma Peanut Commission and the National Peanut Board. Herein lies valuable information concerning screening new breeding lines for pest resistance, evaluating production practices and profit potential, establishing disease control and management protocols and, in general, a recipe for success. Let me also encourage you to engage the members of the team on specific challenges you face during the course of the production year.

A special acknowledgement to the farmer cooperators who unselfishly give of themselves and their farms to the advancement of peanut production research in Oklahoma. Also, to the support agencies: the OSU Division of Agricultural Sciences and Natural Resources, the Oklahoma Agricultural Experiment Station, the Oklahoma Cooperative Extension Service and the USDA/ARS Center for Peanut Improvement.

Congratulations to Oklahoma's peanut producers for a record-breaking year!

Mike Kubicek
Executive Director
Oklahoma Peanut Commission

Peanut Variety Tests

Chad B. Godsey and Wendal Vaughan
Department of Plant and Soil Sciences

2012 progress made possible through OPC and NPB support

- **Performance of runner varieties depended on location but long-term averages indicate Red River Runner, GA-09B and Florida-07 are top yield performers in most locations.**
- **Tamnut OL06 and AT99-98-14 were the two commercially available Spanish varieties that consistently performed well at most locations over the last several years.**
- **Breeding lines ARSOK-V30B (Virginia) 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). At planting, a liquid inoculant formulation was applied with the seed. Tests were conducted using randomized, complete block design with five replications. The entire plot was dug and then thrashed three to four days later. Peanuts were placed in a drier 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, or 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 we are 95 percent sure the yield difference is real, with only a 5 percent probability the difference is due to chance alone. For example, if variety X is 500 lbs/A higher in yield than variety Y, then this difference is statistically significant if the LSD is 500 or less. If the LSD is 500 or greater, then we are less confident that variety X really is higher yielding than variety Y under the conditions of the test.

The coefficient of variation, or 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 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.

2012 Caddo County Peanut Variety Trial

Location: Fort Cobb, Okla.
Date Planted: 5/15/2012
Date Dug and Harvested: 10/20/2012 and 11/25/2012

The trial was planted on May 15 into a strip-till seedbed. No significant foliar diseases were observed during the growing season.

Average yield for the runner test was 4,357 lbs/A with an average grade of 69 percent (Table 1). McCloud, Red River Runner and Florida-07 had a higher yield when compared to the other varieties.

For the Spanish varieties, average yield and grade were 3,630 lbs/A and 66% TSMK, respectively. No significant differences were detected between varieties.

Average yield and grade in the Virginia test were 4,469 lbs/A and 68% TSMK, respectively. Very little pod rot was observed. AT-07V had the highest yield at Fort Cobb.

Table 2 contains Caddo County yield and grade data for three years, along with a two- and three-year average.

Table 1. Peanut yields and grades from Caddo County variety tests in 2012.

Variety or line	Yield (lbs/A)	Percent of Trial Average	Grade (% TSMK)[2]	Revenue ($/A)
Runner[1]				
McCloud	5,264	121%	68	903
Red River Runner	4,828	111%	71	861
Florida-07	5,009	115%	68	849
FlavorRunner 458	4,601	106%	71	820
ARSOK-R35	4,501	103%	71	800
GA-09B	4,287	98%	72	770
Flo-Run 107	4,534	104%	64	727
Tamrun OL07	4,116	94%	69	710
ACI 149	4,211	97%	66	694
ACI-WT09-243	3,318	76%	71	592
ACI-WT09-240	3,256	75%	71	577
Mean	4,357		69	
CV	14		5	
LSD 0.05	781		4	
Spanish[1]				
AT99-98-14	3,924	103%	67	655
ARSOK-S140-1OL	3,917	103%	64	626
Tamnut OL06	3,743	98%	66	618
OLin	3,621	95%	66	590
Mean	3,630		66	
CV	13		2	
LSD 0.05	ns[3]		2	
Virginia[1]				
AT-07V	5,598	125%	65	951
ARSOK-V30B[4]	*4,792*	*107%*	*70*	*867*
Gregory	4,668	104%	67	812
GA-11J	4,646	104%	65	794
Jupiter	4,342	97%	68	765
N08070ol JC	4,077	91%	70	745
ARSOK-V30A[4]	*4,029*	*90%*	*69*	*722*
N08081ol JC	3,597	81%	69	649
Mean	4,469		68	
CV	9		2	
LSD 0.05	533		2	

[1] Market type.
[2] % TSMK = Percent total sound mature kernels.
[3] Not significantly different at a probability level of 5 percent.
[4] Seed limited to only one rep so varieties were excluded from statistical analysis.

Since two varieties were moved into the Runner section, are the Means still correct for the Runner and Spanish?

Should these be in italics?

Table 2. Peanut yields and grades from Caddo County variety tests in 2010, 2011 and 2012 and a two- and three-year average.

Variety or line	Yield (lbs/A)	Grade (% TSMK)[2]	Yield (lbs/A)	Grade (% TSMK)	Yield (lbs/A)	Grade (% TSMK)	Yield (lbs/A)	Grade (% TSMK)	Yield (lbs/A)	Grade (% TSMK)
	- - - - 2010 - - - -		- - - - 2011 - - - -		- - - - 2012 - - - -		- - - - 2-yr. Avg. - - - -		- - - - 3-yr. Avg. - - - -	
Runner[1]										
Red River Runner	4,519	71.7	4,497	63.5	4,828	71	4,662	67	4,615	69
GA-09B	4,559	69.6	4,080	62.8	4,287	72	4,184	67	4,309	68
FlavorRunner 458	4,116	69.4	3,968	57.6	4,601	71	4,285	64	4,228	66
ACI 149	-[3]	-	3,993	57.5	4,211	66	4,102	62	4,102	62
Tamrun OL07	4,218	68.9	3,884	54.8	4,116	69	4,000	62	4,073	64
ARSOK-R29-3	-	-	3,558	56.4	-	-	3,558	56	3,558	56
ARSOK-R34-1	-	-	3,539	57.5	-	-	3,539	58	3,539	58
Florida-07	-	-	4,614	63.1	5,009	68	4,812	65	-	-
ARSOK-R29-3	-	-	4,044	64.0	3,318	71	3,681	68	-	-
ARSOK-R34-1	-	-	4,048	63.0	3,256	71	3,652	67	-	-
LSD 0.05	452	1.9	496	4.5	781	4				
Spanish[1]										
AT99-98-14	3,989	65.8	3,739	60.6	3,924	67	3,832	64	3,884	65
Tamnut OL06	3,881	64.2	2,973	58.7	3,743	66	3,358	63	3,532	63
OLin	3,441	63.4	3,002	60.9	3,621	66	3,312	63	3,355	63
ARSOK-S140-1OL	-	-	3,238	61.1	3,917	64	3,578	63	-	-
LSD 0.05	459	1.7	542	2.9	ns[4]	2				
Virginia[1]										
Jupiter	3,599	62.7	4,048	63.2	4,342	68	4,195	65	3,996	65
N08081ol JC	-	-	3,492	55.5	3,597	69	-	-	3,545	62
N08070ol JC	4,273	67.8	2,454	66.6	4,077	70	3,265	68	3,601	68
AT-07V	-	-	3,132	63.4	5,598	65	-	-	4,365	64
LSD 0.05	706	1.3	758	3.2	533.0	2				

[1] Market type.
[2] % TSMK = Percent total sound mature kernels.
[3] Data was not available because variety was not included in given year.
[4] Not significantly different at a probability level of 5 percent.

These two varieties only used in 2011--take out 2- and 3-year avaerages?

These three varieties only used two years. Do we take out three-year average?

Since two varieties were moved into the Runner section, are the Means still correct for the Runner and Spanish?

Decimals--not consistent with averages. Leave in or take out?

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2012 Blaine/Custer County Peanut Variety Trial

Location: Weatherford, Okla.
Date Planted: 5/4/2012
Date Dug and Harvested: 10/11/2012 and 10/15/2012

The trial was planted on May 4 into a conventional till seedbed. No significant foliar diseases were observed during the growing season. Sclerotinia was observed in plots and yield potential was most likely reduced in some varieties. The Virginia test was not harvested for yield due to planting problems.

Average yield for the runner test was 4,020 lbs/A with an average grade of 73 percent (Table 3). ARSOK-R35, Red River Runner and Tamrun OL07 had a higher yield when compared to the other commercially available varieties. The grade of Red River Runner and ARSOK-R35 was excellent as well. ARSOK-R35 is a USDA-ARS breeding line from Stillwater.

For the Spanish varieties, average yield and grade were 4,970 lbs/A and 69% TSMK, respectively. ARSOK-S140-1OL was the top yielding variety in this test.

Table 4 contains Blaine/Custer County yield and grade data for three years, along with a two- and three-year average.

Table 3. Peanut yields and grades from Blaine/Custer County variety tests in 2012.

Variety or line	Yield (lbs/A)	Percent of Trial Average	Grade (% TSMK)[2]	Revenue ($/A)
Runner[1]				
ARSOK-R35	5,799	144%	78	1134
Red River Runner	5,343	133%	76	1013
Tamrun OL07	5,195	129%	72	942
GA-09B	4,588	114%	75	858
Flo-Run 107	4,080	101%	72	735
Florida-07	4,005	100%	71	707
ACI 149	3,618	90%	73	661
FlavorRunner 458	3,517	87%	69	605
McCloud	3,052	76%	72	546
ACI-WT09-240	2,579	64%	73	471
ACI-WT09-243	2,442	61%	73	444
Mean	4,020		73	
CV	13		5	
LSD 0.05	654		5.1	
Spanish[1]				
ARSOK-S140-1OL	5,361	112%	70	930
Tamnut OL06	4,992	104%	67	836
OLin	4,675	98%	68	792
AT99-98-14	4,130	86%	70	717
Mean	4,790		69	
CV	10		2	
LSD 0.05	638		2.0	

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

Table 4. Peanut yields and grades from Blaine/Custer County variety tests in 2010, 2011 and 2012 and a two- and three-year average.

Variety or line	Yield (lbs/A)	Grade (% TSMK)[2]	Yield (lbs/A)	Grade (% TSMK)	Yield (lbs/A)	Grade (% TSMK)	Yield (lbs/A)	Grade (% TSMK)	Yield (lbs/A)	Grade (% TSMK)
	- - - - 2010 - - - -		- - - - 2011 - - - -		- - - - 2012 - - - -		- - - - 2-yr. Avg. - - - -		- - - - 3-yr. Avg. - - - -	
Runner[1]										
Florida-07	6,552	69.4	4,784	67	5,343	76	5,064	71	5,560	71
GA-09B	7,162	68.4	4,095	55	5,195	72	4,645	64	5,484	65
Red River Runner	6,679	68.5	4,821	61	4,588	75	4,705	68	5,363	68
ACI 149	7,184	70.0	3,899	53	3,517	69	3,708	61	4,867	64
Tamrun OL07	-[3]	-	4,970	61	4,005	71	4,487	66	-	-
FlavorRunner 458	-	-	4,149	54	3,618	73	3,884	64	-	-
LSD 0.05	ns[4]	ns	823	6	654	5				
Spanish[1]										
AT99-98-14	6,803	64.9	5,295	59	4,130	70	4,713	65	5,409	65
Tamnut OL06	5,852	65.3	3,793	60	4,992	67	4,393	64	4,879	64
OLin	5,427	65.3	3,557	66	4,675	68	4,116	67	4,553	67
ARSOK-S140-1OL	-	-	4,545	63	5,361	70	4,953	66	-	-
LSD 0.05	598	2.5	802	4	638	2				

[1] Market type.
[2] %TSMK = Percent total sound mature kernels.
[3] Data was not available because variety was not included in the trial.
[4] Not significantly different at a probability level of 5 percent.

Decimals--not consistent with averages. Leave in or take out?

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2012 Beckham County Peanut Variety Trial

Location: Sayre, Okla.
Date Planted: 5/15/2012
Date Dug and Harvested: 10/11/2012 and 10/15/2012

The trial was planted on May 15 into a strip-till seedbed. No significant foliar diseases were observed during the growing season. The only yield-limiting disease observed in the plots was pod rot. Pod rot was severe in some of the Virginia varieties.

Average yield for the runner test was 6,019 lbs/A with an average grade of 73 percent (Table 5). No significant differences were observed between runner varieties and all yields were excellent.

For the Spanish varieties, average yield and grade were 5,203 lbs/A and 69% TSMK, respectively. No significant differences were observed between Spanish varieties; however, AT99-98-14 was at the top when considering revenue generated per acre.

Average yield and grade in the Virginia test was 5,312 lbs/A and 66% TSMK, respectively. Some pod rot was visible at harvest and ratings are provided in Table 5.

Table 6 includes yield and grade data for Beckham County in 2010, 2011 and 2012, along with a two- and three-year average.

What is considered an excellent number in grade for runner peanuts? if it is above 65, then the text needs to be changed.

Table 5. Peanut yields and grades from Beckham County variety tests in 2012.

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Variety or line	Pod Rot (% of plot)	Yield (lbs/A)	Percent of Trial Average	Grade (% TSMK)[2]	Revenue ($/A)
Runner[1]					
ARSOK-R35	0	6,469	107%	73	1,188
ACI 149	0	6,394	106%	74	1,179
ACI-WT09-240	0	6,265	104%	75	1,169
GA-09B	0	6,130	102%	74	1,136
Flo-Run 107	0	5,986	99%	75	1,115
ACI-WT09-243	0	5,844	97%	76	1,103
McCloud	0	5,924	98%	72	1,065
Tamrun OL07	0	5,939	99%	72	1,062
Red River Runner	0	5,572	93%	76	1,062
FlavorRunner 458	0	5,590	93%	74	1,039
Florida-07	0	6,095	101%	65	991
Mean		6,019		73	
CV		9		3.5	
LSD 0.05		ns[3]		3	
Spanish[1]					
AT99-98-14	0	5,812	112%	72	1,057
ARSOK-S140-1OL	0	5,068	97%	69	881
OLin	0	4,882	94%	70	863
Tamnut OL06	0	5,049	97%	67	848
Mean		5,203		69	
CV		11		2	
LSD 0.05		ns		2	
Virginia[1]					
ARSOK-V30B	0	5,844	110%	71	1,080
Jupiter	7	5,761	108%	66	996
AT-07V	6	5,804	109%	64	974
Gregory	3	5,474	103%	64	913
GA-11J	1	4,984	94%	66	853
N08070ol JC	2	4,667	88%	67	817
N08081ol JC	2	4,650	88%	67	814
Mean	3	5,312		66	
CV	56	7		5	
LSD 0.05	3	618		5	

[1] Market type.
[2] % TSMK = Percent total sound mature kernels.
[3] Not significantly different at a probability level of 5 percent.

Table 6. Peanut yields and grades from Beckham County variety tests in 2010, 2011 and 2012 and a two- and three-year average.

Variety or line	Yield (lbs/A)	Grade (% TSMK)[2]	Yield (lbs/A)	Grade (% TSMK)	Yield (lbs/A)	Grade (% TSMK)	Yield (lbs/A)	Grade (% TSMK)	Yield (lbs/A)	Grade (% TSMK)
	- - - - 2010 - - - -		- - - - 2011 - - - -		- - - - 2012 - - - -		- - - - 2-yr. Avg. - - - -		- - - - 3-yr. Avg. - - - -	
Runner[1]										
GA-09B	5,359	70	5,554	74	6,130	74	5,842	74	5,681	73
Red River Runner	5,223	74	5,615	74	5,572	76	5,594	75	5,470	75
Tamrun OL07	5,064	71	5,049	69	5,939	72	5,494	70	5,351	71
FlavorRunner 458	4,866	75	5,129	69	5,590	74	5,360	71	5,195	73
Florida-07	-[3]	-	5,543	70	6,095	65	5,819	68	-	-
ACI 149	-	-	5,209	71	6,394	74	5,801	72	-	-
LSD 0.05	ns[4]	ns	375	2	ns	3				
Spanish[1]										
AT99-98-14	4,411	69	4,563	68	5,812	72	5,187	70	4,928	70
Tamnut OL06	5,374	67	3,532	65	5,049	67	4,291	66	4,652	66
OLin	4,206	67	3,920	67	4,882	70	4,401	69	4,336	68
ARSOK-S140-1OL	-	-	3,772	66	5,068	69	4,420	67	-	-
LSD 0.05	706	4	633	2	ns	2				
Virginia[1]										
Jupiter	3,528	65	4,930	72	5,761	66	5,345	69	4,740	68
N08081ol JC	4,256	69	4,632	70	4,650	67	4,641	68	4,513	69
AT-07V	-	-	5,351	62	5,804	64	5,578	63	-	-
LSD 0.05	ns	3	568	4	618	5				

[1] Market type.
[2] % TSMK = Percent total sound mature kernels.
[3] Data was not available because variety was not included in the trial.
[4] Not significantly different at a probability level of 5 percent.

Disease Evaluations and Agronomic Traits of Advanced Peanut Breeding Lines in 2012

Partners in Progress PEANUTS

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

2012 progress made possible through OPC and NPB support

- **All Spanish, runner and Virginia peanut breeding lines evaluated were high oleic.**
- **Environmental conditions in 2012 were not favorable for Sclerotinia or southern blights, and little disease was observed. No significant differences in disease incidences were found among the Spanish, runner and Virginia peanut entries.**
- **The breeding line ARSOK-S140-1OL (3,477 lbs/A) and cultivar Tamnut OL06 (3,259 lbs/A) had the highest yield among the Spanish entries. These two lines, in addition to Tamspan 90, also had the largest seeds (47 g to 48.1 g per 100 seeds).**
- **Red River Runner had the highest yield (4,501 lbs/A) and grade (72.5) among the runner entries, and it was among the highest ranked in 100-seed weight (65.5 g).**
- **Tamrun 96 (4,340 lbs/A) and the breeding line KC47 (4,162 lbs/A) were not significantly different from Red River Runner in yield. The breeding lines KC37 (71.6; 65.4 g) and KC35 (71.4; 64.7 g) were similar to Red River Runner in grade and 100-seed weight, but their yields were significantly lower than Red River Runner.**
- **The highest-yielding Virginia entry was KC11 (4,888 lbs/A), and yield from this breeding line was significantly higher than that of Jupiter (4,211 lbs/A). However, KC11 and KC12, which also had high yields (4,259 lbs/A), were among the lowest in 100-seed weight.**
- **The Virginia breeding lines KC31 and KC30A had the largest 100-seed weight (94.4 g and 92.8 g, respectively), but they also had the lowest yields among the Virginia entries.**

Introduction

The objective of our research is to develop and release high oleic peanut cultivars for the Southwestern United States with superior yield, disease resistance and agronomic performance. In 2012, we evaluated advanced breeding lines of Spanish, runner and Virginia peanuts in small plots at the Caddo Research Station near Fort Cobb. The objectives of the field study were to evaluate the lines for agronomic quality (yield, seed grade and 100-seed weight) and resistance to Sclerotinia and southern blights.

A total of 38 breeding lines and reference cultivars (14 Spanish, 16 runner and 8 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 density of 5 seeds/ft, in plots with two 15-foot-long rows and 36-inch beds. The field was divided into three 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) for a minimum of three plots (replications) per line or cultivar. All plots were planted on May 5 and were managed for weeds and foliar diseases. The 2012 field season was marked by above-average temperatures and little rainfall, and one-half to 1 inch of water was applied 23 to 24 times using a pivot system between planting and Oct. 8. Disease evaluations for Sclerotinia and southern blights were conducted on Sept. 18 and Oct. 1. Overall, little disease was observed due to unfavorable environmental conditions. The Spanish peanut plots were harvested on Oct. 3, Virginia plots were harvested on Oct. 16 and runner plots were harvested on Oct. 30. Yield and grade of all entries were determined using standard techniques. Data were analyzed using one-way ANOVA with block as a random factor in PROC MIXED of SAS (ver. 9.2).

Performance of the Advanced Spanish Breeding Lines and Cultivars in 2012

Fourteen Spanish entries, including cultivars Tamnut OL06, Tamspan 90, OLin and AT98-99-14 were evaluated (Table 1). Significant differences in yield ($F = 4.91$; df = 13, 32; $P < 0.01$) and 100-seed weight ($F = 11.24$; df = 13, 34; $P < 0.01$) were observed among the entries. The breeding line ARSOK-S140-1OL, at 3,477 lbs/A, and cultivar Tamnut OL06, at 3,259 lbs/A, had the highest yield among the entries evaluated. These two lines, in addition to Tamspan 90, also had significantly larger seeds than the other entries. No statistical differences in seed grade ($P = 0.12$) or disease incidences (Sclerotinia blight, $P = 0.87$; southern blight, $P = 0.56$) were observed among the Spanish entries.

Table 1. Yield, grade, 100-seed weight and incidences of Sclerotinia and southern blights in advanced Spanish peanut breeding lines at the Caddo Research Station in 2012.

Entry	Yield (lbs/A)	Grade[1]	100-seed wt. (g)	Sclerotinia blight (%)[1]	Southern blight (%)[1]
Tamnut OL06	3,259 a[2]	57.6	48.1 a	0	1
Tamspan 90	3,210 ab	50.1	47.0 a	0	3
AT98-99-14	2,702 bcd	59.0	41.8 bc	0	0
OLin	2,597 bcde	57.0	40.6 bc	1	0
ARSOK-S140-1OL	3,477 a	58.9	47.9 a	1	1
103	3,098 abc	58.0	42.6 b	0	2
133-2	2,646 bcde	57.8	42.7 b	0	0
112-2	2,517 cdef	57.2	39.4 bcd	0	0
113	2,501 cdef	54.6	37.0 d	0	1
129	2,468 def	57.4	41.1 bc	0	1
108-1	2,178 ef	59.5	39.8 bcd	1	1
99-2	2,146 ef	56.1	38.0 cd	0	1
135-1	1,920 f	52.8	39.8 bcd	0	1
133-3	1,888 f	52.6	38.2 cd	0	0

[1] No significant differences were found among the entries.
[2] Values with the same lowercase letter within each column are not significantly different at $P = 0.05$.

Performance of the Advanced Runner Breeding Lines and Cultivars in 2012

Sixteen runner peanut entries, including cultivars Red River Runner, Tamrun 96, Tamrun OL07 and Okrun were evaluated (Table 2). Significant differences in yield ($F = 3.14$; df = 15, 30; $P < 0.01$), grade ($F = 4.16$; df = 15, 32; $P < 0.01$) and 100-seed weight ($F = 13.16$; df = 15, 32; $P < 0.01$) were observed. Red River Runner had the highest yield (4,501 lbs/A) and grade (72.5), and high 100-seed weight (65.5 g). Yields from Tamrun 96 (4,340 lbs/A) and the breeding line KC47 (4,162 lbs/A) and were similar to that for Red River Runner. The breeding lines KC37 and KC35 were similar to Red River Runner in grade and 100-seed weight, but their yields were significantly less than that of Red River Runner. No statistical differences in disease incidences (Sclerotinia blight, $P = 0.09$; southern blight, $P = 0.56$) were observed among the runner entries.

Performance of the Advanced Virginia Breeding Lines and Cultivars in 2012

Eight Virginia peanut entries, including the cultivar Jupiter, were evaluated (Table 3). Significant differences in yield ($F = 5.97$; df = 7, 16; $P < 0.01$) and 100-seed weight ($F = 25.98$; df = 7, 14; $P < 0.01$) were observed. The breeding line KC11 had the highest yield (4,888 lbs/A), followed by KC12 (4,259 lbs/A), but these lines were also among the lowest in 100-seed weight at 67.9 g and 67.6 g, respectively. Conversely, the largest seeds

Table 2. Yield, grade, 100-seed weight and incidences of Sclerotinia and southern blights in advanced runner breeding lines at the Caddo Research Station in 2012.

Entry	Yield (lbs/A)	Grade	100-seed wt. (g)	Sclerotinia blight (%)[1]	Southern blight (%)[1]
Red River Runner	4,501 a[2]	72.5 a	65.5 abc	18	3
Tamrun 96	4,340 ab	66.2 def	57.1 f	8	0
Tamrun OL07	3,775 cde	65.1 ef	62.3 cde	12	2
Okrun	3,662 de	68.6 bcde	58.4 ef	11	3
KC47	4,162 abc	67.8 cdef	63.3 bcd	4	10
143-1	4,033 bcd	65.6 ef	51.7 g	7	3
143-3	3,888 bcde	64.5 f	49.2 g	11	1
23-1	3,872 cde	68.4 bcde	62.8 bcde	4	0
32-1	3,840 cde	69.3 abcd	67.5 ab	3	2
29-2	3,807 cde	70.1 abc	68.9 a	2	5
143-2	3,775 cde	64.5 f	51.6 g	12	0
KC37	3,711 cde	71.6 ab	65.4 abc	4	0
23-3	3,630 de	69.4 abcd	64.4 abcd	4	2
36-1	3,565 e	66.6 cdef	60.4 def	3	2
29-3	3,533 e	69.4 abcd	66.0 abc	4	5
KC35	3,517 e	71.4 ab	64.7 abcd	7	0

[1] No significant differences were found among the entries.
[2] Values with the same lowercase letter within each column are not significantly different at $P = 0.05$.

were found in KC31 (94.4 g) and KC30A (92.8 g), which also had the lowest yields (3,485 lbs/A and 3,307 lbs/A, respectively). No statistical differences in grade (*P* = 0.10) or disease incidences (Sclerotinia blight, *P* = 0.06; southern blight, *P* = 0.20) were observed among the Virginia entries.

Table 3. Yield, grade, 100-seed weight and incidences of Sclerotinia and southern blights in advanced Virginia breeding lines at the Caddo Research Station in 2012.

Entry	Yield (lbs/A)	Grade[1]	100-seed wt. (g)	Sclerotinia blight (%)[1]	Southern blight (%)[1]
Jupiter	4,211 b[2]	61.7	84.1 b	5	0
KC11	4,888 a	67.2	67.9 d	3	4
KC12	4,259 ab	66.7	67.6 d	14	2
KC30B	4,227 b	65.7	76.5 c	1	3
KC7	4,017 bc	65.2	62.8 d	4	0
KC6	3,517 cd	67.4	66.0 d	12	3
KC31	3,485 cde	70.4	94.4 a	0	11
KC30A	3,307 e	64.8	92.8 a	1	2

[1] No significant differences were found among the entries.
[2] Values with the same lowercase letter within each column are not significantly different at *P* = 0.05.

We would like to thank Lisa Myers and Ken Jackson at USDA-ARS and Bobby Weidenmaier, Mike Brantes and Michael Locke at OSU's Caddo Research Station for providing excellent technical support. 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 U.S. Department of Agriculture. USDA is an equal opportunity provider and employer.

Development of a Molecular Tool to Differentiate Among Sclerotinia Blight Fungi

Ahmed Abd-Elmagid, Carla D. Garzon, Patricia A. Garrido, Robert Hunger, and Hassan Melouk (emeritus)**
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2012 progress made possible through OPC and NPB support

- **Preemergence (PRE) herbicides are valuable and necessary to improve control of many weeds, including grass weeds, Palmer amaranth, yellow nutsedge and morning glory species in Oklahoma peanut production.**
- **Many of the PRE herbicides evaluated in this trial provided good to excellent early-season weed control at four weeks after planting (WAP).**
- **However, because no single herbicide will be effective on all weeds, it is necessary to choose the appropriate combination of herbicides to maximize control of early-season weeds present in each individual field.**

Sclerotinia minor and *Sclerotinia sclerotiorum* are destructive plant pathogens that cause stem and crown rot, also known as Sclerotinia blight, on many crops including peanuts. At least 246 *Sclerotinia* species have been reported worldwide. Species identification based on morphological characteristics is challenging and time consuming, especially when one crop hosts multiple species. In Oklahoma, Sclerotinia blight causes significant yield loss in peanuts. An early sign of infection with the two pathogens is the presence of cottony, fluffy white mycelia, and several days later black sclerotial bodies of the pathogens are formed on and/or in infected plant parts. Sclerotia of *S. minor* are small (0.5 mm to 1 mm) while sclerotia of *S. sclerotiorum* are typically much larger (2 mm to 3 mm); however, some *S. sclerotiorum* strains can produce smaller sclerotia that can be confused with those of *S. minor*. Early diagnosis to determine which of the two pathogens responsible for infection is impossible based on mycelial morphology. Therefore, this study was initiated to design a specific polymerase chain reaction (PCR) assay for rapid, sensitive and accurate detection of four *Sclerotinia* species that clearly differentiates between *S. minor* and *S. sclerotiorum*.

To obtain the DNA from *Sclerotinia* samples, the fungi were grown on potato dextrose agar medium for three to five days, and then transferred into a liquid potato dextrose medium to continue growing for additional seven days. Fungal mycelia were harvested and then the DNA was extracted following established protocols.

PCR reactions include standard components (water, nucleotides,

** This research was part of the senior author's Ph.D. dissertation.

polymerase enzyme, salts, target DNA) and two specific primers (short pieces of single stranded DNA) that attach to the DNA of the target organism and produce millions of copies of, or amplify, the targeted genes. In order to design a highly specific assay, the primers must attach to the DNA of the target organism exclusively. For that purpose, the DNA sequences of four different genes of several *Sclerotinia* spp. were retrieved from the National Center for Biotechnology Information GenBank.

The retrieved nucleotide sequences were aligned using a matching program and examined for conserved regions for each gene. Species-conserved nucleotide regions were selected to design PCR primers suitable for multiple detection (multiplex) of *Sclerotinia* species. Primers were designed based on specificity, stability, PCR product size and optimum reaction temperature compatibility. Three primer sets for each species were designed and of these, only one primer set produced a single band for each species when tested individually (simplex) and in combination (multiplex). Table 1 shows the fungal samples (isolates) used in this research and their sources.

Is "in combination" correct to say here?

The specificity and sensitivity of each primer set was tested individually (simplex) and in combination (multiplex) against isolates of each species, and each PCR assay was validated using genomic DNA from infected plants. PCR products of different sizes were amplified and separated by size and electric charge on horizontal gels stained with a DNA binding dye.

Agarose gels serve as horizontal filters that allow smaller DNA pieces to move faster and farther than large pieces, so that PCR products of different sizes can be seen as bands on a gel and their size can be estimated based on how far they have moved through the gel compared to size standards (Figure 1). The simplex and multiplex assays developed can be used for identification of *Sclerotinia* species in culture or from infected plants.

The multiplex assay was more sensitive than the simplex assays. The following example is a single DNA strand showing a base sequence with the primer complement below it.

"TACG" Forward primer

5'__________"ATGC"____________________3'

Target DNA

3'______________________"GTAC"_______5'

"CATG" Reverse primer

5' ATGC______________CATG 3'

PCR product

3' TACG______________GTAC 5'

pairing or pairings?

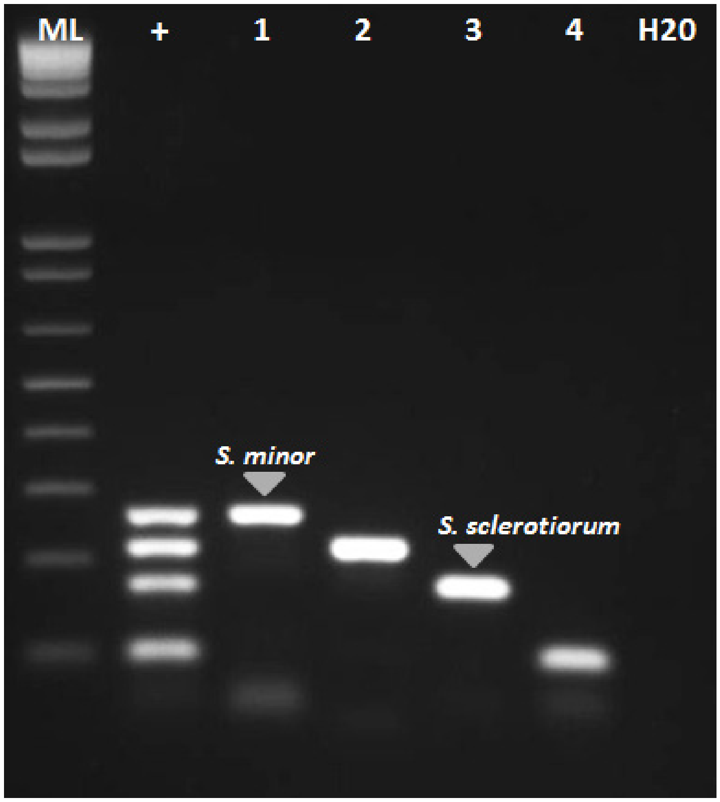
Nucleotide bases and pairing:
A= Adenosine
T= Thymidine
G= Guanosine
C= Cytosine

In the above example, the primer pair (forward/reverse) will attach to the target DNA, allowing the specific PCR to occur, that will result in millions of copies of the targeted sequence (PCR product). The PCR product will show on the gel as a fluorescent band under UV light (Figure 1).

Table 1. List and origin of *Sclerotinia* and *Monilina fructicola* isolates used in this study.

Organism	Sample code	Origin
S. homoeocarpa	S 18	Pennsylvania
S. homoeocarpa	S 30	Pennsylvania
S. homoeocarpa	OKC-OSU	Oklahoma
S. homoeocarpa	$99	Oklahoma
S. *homoeocarpa*	Logan	Oklahoma
S. homoeocarpa	Spot 06	Oklahoma
S. homoeocarpa	Homeo RCC10	Massachusetts
S. homoeocarpa	Homeo RCC11	Massachusetts
S. homoeocarpa	SD20	Massachusetts
S trifoliorum	CF 6	California
S. trifoliorum	CF 18	California
S. trifoliorum	CF 24	California
S. trifoliorum	CF 31	California
S. trifoliorum	CF 34	California
S. trifoliorum	Trif A	California
S. trifoliorum	Trif B	California
S. trifoliorum	Trif C	California
S. sclerotiorum	Peanut-1	Oklahoma
S sclerotiorum	Pumpkin-1	Oklahoma
S. sclerotiorum	UF15	Florida
S. sclerotiorum	UF28	Florida
S. sclerotiorum	UF 70	Florida
S. sclerotiorum	44 Ea1	California
S. sclerotiorum	44 B17	California
S. sclerotiorum	44 Bb6	California
S. sclerotiorum	321 DB2	California
S. minor	Peanut-1	Oklahoma
S. minor	Peanut-2	Oklahoma
S. minor	Peanut-3	Oklahoma
S. minor	Peanut-4	Oklahoma
S. minor	Peanut-5	Oklahoma
S. minor	Peanut-6	Oklahoma
S. minor	Peanut-6	Oklahoma
S. minor	Peanut-7	Oklahoma
S. minor	Peanut-8	Oklahoma
S. minor	Peanut-10	Oklahoma
Monilinia fructicola	MF	Oklahoma

UF 70--space between, or no space?
Two Peanut-6 references?



ML - mass ladder (reference used for sizing the PCR products)
+ - positive control containing DNA of four *Sclerotinia* species, from top to bottom: *S. minor*, *S. homoeocarpa*, *S. sclerotiorum* and *S. trifoliorum*.
1 - *S. minor* DNA
2 - *S. homoeocarpa* DNA
3 - *S. sclerotiorum* DNA
4 - *S. trifoliorum* DNA

Figure 1. A gel separation of PCR products from four species of the genus *Sclerotinia*, depicting *S. minor* and *S. sclerotiorum* diagnostic bands.

In summary, methods used in diagnostics and detection of plant pathogens need to be quick, simple, reliable and cost effective. The simplex and multiplex PCR assays described here are reliable, rapid, sensitive, specific and cost-effective diagnostic tools for the most common agricultural associated species of the genus *Sclerotinia*. The multiplex assay developed differentiates among *Sclerotinia* species in a single polymerase chain reaction, and it should be useful in detection and discrimination of *S. minor* and *S. sclerotiorum* for rapid screening of infected plants for routine diagnostics. Also, the developed primers and PCR assays have several potential downstream applications in disease monitoring, infected seed detection and disease resistance assessment in breeding programs.

Integrated Management of Peanut Diseases

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2012 progress made possible through OPC and NPB support

- **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®.**
- **Red River Runner again produced the highest yield and crop value ($/A) under pressure from Sclerotinia blight.**
- **A runner (ARSOK-R30) and a Spanish (ARSOK-S140-1OL) breeding line from the USDA/ARS-Stillwater breeding program showed excellent resistance to Sclerotinia blight and had high yield and grades.**
- **Provost® and Fontelis® produced the highest yields in a foliar disease control trial.**

Six field trials were completed in 2012 that addressed the management of important peanut diseases in Oklahoma. The management strategies 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.

Results from 2012 are summarized in this report. When 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.

Hot and dry weather continued to plague much of the state in 2012, however weather was more favorable to crop production in Caddo County compared to other areas. Compared to the 30-year average, rainfall was 28 percent below normal from June through September. Average daily temperature was nearly normal in June and July, and below normal from August until harvest. Plots received 23 applications of sprinkler irrigation at one-half to 1 inch per application that totaled 17 inches of water. Except for Sclerotinia blight and pod rot, diseases were minor problems in 2012. Pressure from foliar diseases such as leaf spot and web blotch were low. Southern blight, a hot weather disease, developed in September and reached low levels. Sclerotinia blight first appeared in late-August and increased to moderate levels by harvest compared to previous trials at this site. The peanut crop was terminated by an early freeze on Oct. 8. Despite the shortened growing season, yields and grades were generally good.

Page 19 just says September. Should this be the same, or both early September?

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 oleic to linoleic oil ratio (high O/L) varieties and breeding lines to fungicide programs. In 2012, disease pressure was moderate compared to previous trials at this site.

Evaluation of fungicides – 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 65 days and 95 days after planting. Additionally, Endura® and Omega® were applied as a single application made on demand (when symptoms first appeared or by early September, whichever occurred first), and Omega® was applied on a 14-day schedule with Tilt®/Bravo® beginning in July.

Sclerotinia blight first appeared in late-August and increased to moderate levels by harvest compared to previous trials at this site. Southern blight appeared in early September and only reached low levels (<10 percent) by harvest (Table 1). All treatments except the demand application of Omega®, the low rate of Propulse® and the Fontelis® treatments reduced the incidence of Sclerotinia blight compared to the untreated check. All treatments reduced stem rot compared to the untreated check. All treatments except the demand application of Endura®, and the low rates of Propulse® and Fontelis® increased yield and crop value compared to the check. Preventive treatments with Omega® and Endura® the high rate of Propulse® and the 14-day program with Tilt®/Bravo® + Omega® were generally the most effective treatments.

stem rot not in table.

Table 1. Evaluation of fungicides and application timing for control of Sclerotinia blight of peanuts (FlavorRunner 458), Trial 1, 2012.

Treatment and rate/A (timing)[1]	Sclerotinia blight (%)	Southern blight (%)	Yield (lbs/A)	Crop value ($/A)[2]
Omega® 4F 1.5 pt (P1, P2)	12.7 def[3]	0.5 b	4,247 a	761 a
Omega® 4F 1.5 pt (D)	21.7 a-e	0.0 b	3,855 a-d	691 a-d
Endura® 70WG 10 oz (P1, P2)	6.0 f	0.7 b	3,964 abc	710 abc
Endura® 70WG 10 oz (D)	19.0 b-f	1.5 b	3,528 cde	632 cde
Propulse® 3.3F 10 fl oz (P1, P2)	26.7 abc	0.0 b	3,187 e	571 e
Propulse® 3.3F 13.7 fl oz (P1, P2)	16.0 c-f	1.2 b	4,109 ab	736 ab
Fontelis® 1.67F 1 pt (P1, P2)	29.7 ab	1.0 b	3,405 de	610 de
Fontelis® 1.67F 1.5 pt (P1, P2)	25.7 a-d	0.0 b	3,695 bcd	662 bcd
Tilt®/Bravo® 4.3F 1.5 pt + Omega® 4F 0.5 pt (14-d)	10.7 ef	0.5 b	4,131 ab	740 ab
Untreated check	32.5 a	6.2 a	3,238 e	580 e
LSD (P=0.05)[4]	13.4	3.2	456	82

[1] P1 and P2 refer to preventive applications on Aug. 7 and Sept. 6, respectively. D refers to the demand application made on Aug. 30. 14-day=Aug. 2, Aug. 16, Aug. 30 and Sept. 13.
[2] Based on an average grade of 73% TSMK.
[3] Values in a column followed by the same letter are not significantly different a P=0.05.
[4] Fisher's least significant difference (LSD).

Georgia-09B?

Evaluation of fungicides - 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 65 days and 95 days after planting. Sclerotinia blight first appeared in late-August and increased to moderate levels by harvest compared to previous trials at this site. All treatments except Fontelis® alone reduced the incidence of Sclerotinia blight compared to the untreated check (Table 2). All treatments except Fontelis® alone, and Propulse®/Fontelis® increased yield and crop value compared to the check.

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), FlavorRunner 458 (FR 458), Red River Runner (RRR), Tamrun OL07 (TOL07), Florida-07 (FL-07) and AT99-98-14] 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. Fungicides reduced Sclerotinia blight on all varieties except Tamrun OL07 and Florida-07 (Table 3). There were no differences in disease control between the preventive and demand programs of Omega® or Endura® on any of the varieties. In untreated check plots, Tamrun OL07 was most resistant; Georgia 09B, Red River Runner and

Table 2. Evaluation of fungicides for control of Sclerotinia blight of peanuts (FlavorRunner 458), Trial 2, 2012.

Treatment and rate/A (timing)[1]	Sclerotinia blight (%)	Yield (lbs/A)	Crop value ($/A)[2]
Omega® 4F 1 pt (1,2)	7.0 c[3]	3,986 bc	704 bc
Endura® 70WG 8 oz (1,2)	5.5 c	4,269 ab	754 ab
Fontelis® 1.67F 1 pt (1,2)	37.7 a	3,434 e	607 e
Propulse® 3.3F 13.7 fl oz (1,2)	28.7 b	3,826 cd	676 cd
Omega® 4F 1 pt (1) Fontelis® 1.67F 1 pt (2)	7.5 c	3,942 bc	697 bc
Endura® 70WG 8 oz (1) Fontelis® 1.67F 1 pt (2)	5.2 c	4,421 a	781 a
Omega® 4F 1 pt (1) Propulse® 3.3F 13.7 fl oz (2)	11.0 c	3,826 cd	676 cd
Endura® 70WG 8 oz (1) Propulse® 3.3F 13.7 fl oz (2)	4.2 c	3,840 cd	679 cd
Propulse® 3.3F 13.7 fl oz (1) Fontelis® 1.67F 1 pt (2)	25.0 b	3,477 de	614 de
Untreated check	40.7 a	3,412 e	603 e
LSD (P=0.05)[4]	13.4	385	68

[1] Spray dates were 1=Aug. 7 and 2=Sept. 6.
[2] Based on an average grade of 72% TSMK.
[3] Values in a column followed by the same letter are not significantly different a P=0.05.
[4] Fisher's least significant difference (LSD).

Table 3. Disease and yield responses of high O/L peanut varieties to fungicide programs for Sclerotinia blight at the Caddo Research Station, Fort Cobb, 2012.

Treatment and rate/A (timing)[1]	GA-09B	FR 458	RRR	TOL07	FL-07	AT98-99-14	Avg[2]
			Sclerotinia blight (%) – Oct. 9				
Omega® 4F 1.0 pt (P1, P2)	2.0 b[3]	11.7 b	1.0 b	0.7 a	4.5 a	3.2 b	3.9
Omega® 1.5 pt (D)	2.2 b	14.2 b	3.2 b	1.0 a	5.7 a	3.5 b	5.0
Endura® 70WG 8 oz (P1+P2)	1.5 b	0.5 b	0.0 b	0.2 a	1.7 a	1.7 b	0.9
Endura® 70WG 10 oz (D)	2.5 b	11.7 b	2.2 b	1.7 a	3.5 a	1.5 b	3.9
Untreated check	8.0 a	29.7 a	7.7 a	0.7 a	6.7 a	14.0 a	11.2
Avg[4]	3.2	13.6	2.8	0.9	4.4	4.8	
LSD (P=0.05)[5]	4.6	14.6	4.1	ns[6]	ns	5.8	
			Yield (lbs/A)				
Omega® 4F 1.0 pt (P1, P2)	4,047	4,238	5,191	4,945	4,827	3,857	4,518 a
Omega® 1.5 pt (D)	3,784	3,929	4,982	4,565	5,082	3,757	4,350 ab
Endura® 70WG 8 oz (P1, P2)	3,276	3,929	5,055	4,011	4,229	3,621	4,020 bc
Endura® 70WG 10 oz (D)	3,866	3,458	5,064	4,519	4,882	3,766	4,259 abc
Untreated check	3,730	3,648	4,855	4,093	4,174	3,276	3,963 c
Avg	3,741 c	3,840 c	5,029 a	4,427 b	4,639 b	3,655 c	
LSD (P=0.05)							366
			Value[7] ($/A)				
Omega® 4F 1.0 pt (P1, P2)	715	739	917	874	818	669	789 a
Omega® 1.5 pt (D)	669	685	880	807	870	651	759 ab
Endura® 70WG 8 oz (P1, P2)	579	685	893	709	716	628	702 bc
Endura® 70WG 10 oz (D)	683	603	895	798	827	653	743 abc
Untreated check	659	636	858	723	707	568	692 c
Avg	661 c	670 c	889 a	782 b	786 b	634 c	
LSD (P=0.05)							64

1 P1 and P2 are preventive applications on Aug. 7 and Sept. 6, respectively; D1 is the demand application on Sept. 1.
2 Averaged over variety.
3 Values in a column or row followed by the same letter are not significantly different at P=0.05.
4 Averaged over fungicide treatment. The least significant difference (LSD) between varieties for yield is 260 lbs/A and for value is $45/A.
5 Fisher's least significant difference (LSD).
6 Treatment effect not significant at P=0.05.
7 Based on an average grade (% TSMK) of 72 for GA-09B, 71 for FR 458, 73 for RRR, 72 for TOL07, 69 for FL-07 and 71 for AT99-98-14.

Georgia-09B?

Florida-07 were intermediate; and FlavorRunner 458 and AT99-98-14 were most susceptible. Because of the low disease pressure, yield responses to fungicide programs were less than in previous trials. Averaged over varieties, Omega® but not Endura® programs increased yield compared to the untreated check. The effects of variety on yield were greater than those of the fungicide program. Red River Runner had the highest yield and crop value based on grade, more than 1,000 lbs/A greater yield than Georgia 09B, FlavorRunner 458 and AT99-98-14; and 400 to 600 lbs/A greater than Tamrun OL07 and Florida-07.

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 - Stillwater breeding program (ARSOK-R35, ARSOK-V30A, ARSOK-V30B, ARSOK-S140-1OL; R=runner, V=Virginia, S=Spanish) to fungicide for control of Sclerotinia blight in comparison to resistant [Tamnut OL06 (TOL06)] and susceptible [FlavorRunner 458 (FR 458)] check varieties. The fungicide program was a high-input treatment consisting of two preventive applications.

Sclerotinia blight first appeared in late-August and increased to moderate levels by harvest compared to previous trials at this site. Omega® reduced Sclerotinia blight on FlavorRunner 458 and Tamnut OL06, but not on any of the breeding lines (Table 4). Yield responses to Omega® were significant only for FlavorRunner 458 and ARSOK-V30B, although the response of the latter entry did not appear to be due to control of Sclerotinia blight. Grade (%TSMK) was greatest for ARSOK-R35. Fungicide treatment increased grade only for FlavorRunner 458 and ARSOK-V30A. Damage kernels reduced grades of FlavorRunner 458 and the two Virginia-type entries. Loan rate values, including premiums for extra large kernels for Virginia-type entries, were greatest for ARSOK-R35. Fungicide increased crop value only for FlavorRunner 458.

Root-knot Nematode

Root-knot nematodes are widely distributed in peanut production areas and are particularly severe in sandy soils. Both the northern and peanut root-knot nematodes occur in Oklahoma, but the northern type is most common. Crop rotation with nonhost crops such as cotton, corn or sorghum is recommended to reduce nematode levels and resulting damage. However, use of a preplant nematicide treatment is beneficial in and is a standard practice for problem fields. Over the years, registrations for nonfumigant nematicides have been lost. In 2011, Temik®, the only registered nonfumigant preplant nematicide was no longer available for nematode control in peanuts and other crops.

The objective of this trial was to evaluate an experimental nematicide for control of northern root-knot nematode. The trial was conducted at the Caddo Research Station in a field previously cropped to peanuts. Granular treatments were applied in furrow at planting using granular boxes mounted to the planters. The liquid treatment applied in furrow was made through flat-fan nozzles mounted diagonally to the planting furrow in 18.5 gal/A. Post-emergence applications at cracking and at pegging were made with a single flat-fan nozzle centered over each row at a height to provide complete coverage of the plants in 38 gal/A.

Root-knot nematodes were present at moderate levels that did differ among treatments at planting. Above ground symptoms of nematode damage were not apparent. However, RDL-29 at 3 pt applied infurrow and at pegging reduced plant growth compared to the untreated check (Table 5). All treatments except RDL-29 applied at cracking and at pegging reduced the incidence of plants with galls compared to the untreated check. Gall severity was

Table 4. Disease and yield responses of high O/L breeding lines to fungicide application for Sclerotinia blight at the Caddo Research Station, Fort Cobb, 2012.

Treatment and rate/A (timing)[1]	FR 458	TOL06	ARSOK-R35	ARSOK-V30A	ARSOK-V30B	ARSOK-S140-1OL	Avg[2]
Sclerotinia blight (%) – Oct. 9							
Omega® 4F 1.5 pt	21.6 b[3]	0.6 b	0.3 a	4.7 a	2.2 a	0.9 a	5.0
Untreated check	66.2 a	3.7 a	0.9 a	6.8 a	4.3 a	0.9 a	13.8
Avg[4]	43.9	2.2	0.6	5.8	3.3	0.9	
LSD (P=0.05)[5]	24.4	1.1	ns[6]	ns	ns	ns	
Yield (lbs/A)							
Omega® 4F 1.5 pt	3,630 a	3,521 a	5,309 a	3,095 a	4,220 a	4,528 a	4,050
Untreated check	2,359 b	3,104 a	5,037 a	3,104 a	3,467 b	4,565 a	3,606
Avg	2,995	3,312	5,173	3,099	3,843	4,547	
LSD (P=0.05)	250	ns	ns	ns	662	ns	
Grade (% Total Sound Mature Kernels)							
Omega® 4F 1.5 pt	73.5 a	67.7 a	77.2 a	69.4 a	70.3 a	70.7 a	71.5
Untreated check	68.5 b	65.8 a	78.2 a	66.8 b	69.4 a	70.4 a	69.9
Avg	71.0	66.8	77.7	68.1	69.9	70.6	
LSD (P=0.05)	3.9	ns	ns	1.6	ns	ns	
Value ($/A)							
Omega® 4F 1.5 pt	657 a	581 a	1,004 a	557 a	772 a	781 a	725
Untreated check	402 b	500 a	963 a	538 a	624 a	779 a	635
Avg	530	541	983	547	698	780	
LSD (P=0.05)	36	ns	ns	ns	ns	ns	

1 Omega® was applied preventively on Aug. 7 and Sept. 6.
2 Averaged over variety.
3 Values in a column or row followed by the same letter are not significantly different at P=0.05.
4 Averaged over fungicide treatment.
5 Fisher's least significant difference (LSD).
6 Treatment effect not significant at P=0.05.

low and did not differ among treatments. Yield and crop values did not differ among treatments, apparently because of the low level of gall severity in the trial.

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 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 identify new fungicides and to develop effective reduced application programs.

Table 5. Evaluation of nematicides for control of northern root-knot nematode of peanuts, 2012.

Treatment and rate/A (timing)[1]	Pre-plant RKN(no./ 100 cc soil)	Row Closure (%) July 19	Gall Incidence (%)[2]	Gall Severity (0-9)	Yield (lbs/A)	Crop Value ($/A)[3]
Untreated check	7.7	52.5 ab	41.2 a	0.58	3448	564
Temik® 15G 7 lb (IF)	11.5	52.5 ab	0.0 b	0.00	3347	548
Temik® 15G 7 lb (IF) RDL-29 4F 3 pt (P)	5.7	57.5 a	0.0 b	0.00	3231	529
RDL-29 4F 3 pt (IF, P)	13.7	32.5 d	7.2 b	1.00	2795	458
RDL-29 4F 3 pt (AC, P)	5.0	47.5 bc	32.7 a	0.80	3114	510
LSD (P=0.05)[4]	ns[5]	9.3	20.6	ns	ns	ns

[1] IF=application in the furrow at planting, AC=application made at cracking on June 1, P=pegging application on July 5.
[2] Percentage of plants with galls.
[3] Based on an average grade of 67% TSMK.
[4] Fisher's least significant difference (LSD).
[5] Treatment effect not significant at P=0.05.

Evaluations of fungicides at the Caddo Research Station – Trial 1

The objective of this trial was to evaluate the experimental fungicide Topguard at various rates and in combination with Koverall® (mancozeb) for control of early leaf spot and southern blight. Topguard treatments were compared to the registered fungicides Bravo®, Tilt®/Bravo®, Folicur®, Provost® and Headline®. Fungicides were applied on a full-season, 14-day schedule totaling six sprays, on a 3-spray reduced calendar program and according to the weather-based Leaf Spot Advisory program on the Oklahoma MESONET (http://agweather.mesonet.org/). Early leaf spot did not appear in this trial until September and reached only trace levels by harvest (Table 6). Levels of stem rot and Sclerotinia blight also were low (<3 percent). However, all treatments except Folicur® applied alone as a 4-spray block increased yield compare to the untreated check. The yield responses were not associated with levels of any disease that was apparent.

Evaluations of fungicides at the Caddo Research Station – Trial 2

The objective of this trial was to evaluate new (Fontelis®) and experimental (Approach) fungicides in comparison with the registered fungicides Bravo®, Folicur®, Headline® and Provost® in programs for control of early leaf spot and southern blight. Fungicides were applied as full-season, 14-day schedules except for Bravo® + Folicur® which was applied in a reduced (3 application) calendar program and according to the Leaf Spot Advisory program. Early leaf spot did not appear in this trial until September, reached only low levels by harvest and did not cause defoliation (Table 7). All treatments reduced levels of leaf spot compared to the untreated check. Levels of southern blight were low and did not differ among treatments except for the advisory program, which had the highest level of stem rot. The Fontelis® and Provost® treatments increased yield and crop value compared to the untreated check.

Table 6. Evaluation of fungicides and application schedule on control of early leaf spot of peanuts (Tamnut OL06) at the Caddo Research Station, Trial 1, 2012.

Treatment and rate/A (timing)[1]	Early leaf spot (%)	Yield (lbs/A)	Value ($/A)[2]
Untreated check	1.5 b[3]	3,419 c	568 c
Bravo® 6F 1.5 pt (1-6)	0.5 b	4,015 ab	667 ab
Koverall® 75DF 2 lb + Bravo® 6F 1 pt (1,6) Koverall® 75DF 2 lb + Topguard 1.04F 14 fl oz (2-5)	0.0 b	4,102 ab	681 ab
Bravo® 6F 1.5 pt (1,6) Folicur® 3.6F 7.2 fl oz + Bravo® 6F 1 pt (2-5)	0.0 b	4,124 ab	685 ab
Bravo® 6F 1.5 pt (1,6) Topguard 1F 14 fl oz (2-5)	0.0 b	4,283 a	712 a
Bravo® 6F 1.5 pt (1,6) Folicur® 3.6F 7.2 fl oz (2-5)	0.4 b	3,724 bc	619 bc
Bravo® 6F 1.5 pt (1,6) Provost® 3.6F 8 fl oz (2-5)	0.5 b	4,254 a	707 a
Tilt®/Bravo® 4.3F 1.5 pt (1,3,5) Headline® 2.08E 6 fl oz (2,4,6)	0.5 b	4,254 a	707 a
Tilt®/Bravo® 4.3F 1.5 pt (A1) Headline® 2.08E 6 fl oz (A1, A2)	4.2 a	4,160 ab	691 ab
Tilt®/Bravo® 4.3F 1.5 pt (3,5) Headline® 2.08E 6 fl oz (4)	0.0 b	4,145 ab	689 ab
LSD (P=0.05)[4]	1.3	470	78

[1] 1 to 6 correspond to the spray dates of 1=July 5, 2=July 19, 3=Aug. 2, 4=Aug. 16, 5=Aug. 30 and 6=Sept. 13; A1 to A2 corresponds to the spray dates of A1=July 5 and A2=Aug. 30 made according to the Mesonet Peanut Leaf Spot Advisor.

[2] Based on an average grade of 68% TSMK.

[3] Values in a column followed by the same letter are not significantly different a P=0.05.

[4] Fisher's least significant difference (LSD).

Table 7. Evaluation of fungicide programs for control early leaf spot on peanuts (Tamnut OL06) at the Caddo Research Station, Trial 2, 2012.

Treatment and rate/A (timing)[1]	Early leaf spot (%)	Southern blight (%)	Yield (lbs/A)	Value ($/A) [2]
Check	25.4 a[3]	1.2 b	4,211 d	699 d
Bravo® 6F 1.5 pt (1-6)	1.1 de	1.2 b	4,697 a-d	780 a-d
Headline® 2.08E 9 fl oz (1) Fontelis® 1.67F 1 pt (2,3,4) Bravo® 6F 1.5 pt (5,6)	5.7 cd	0.5 b	4,821 abc	801 abc
Headline® 2.08E 9 fl oz (1) Fontelis® 1.67F 3 pt (2,3,4) Bravo® 6F 1.5 pt (5,6)	1.7 de	0.5 b	4,864 ab	808 ab
Bravo® 6F 1.5 pt (1,5,6) Approach 2.08F 1 pt (2,3,4)	9.5 c	2.0 ab	4,661 a-d	774 a-d
Bravo® 6F 1.5 pt (1,5,6) Approach 2.08F 2 pt (2,3,4)	0.3 e	0.7 b	4,465 bcd	742 bcd
Headline® 2.08E 9 fl oz (1) Provost® 3.6F 7 fl oz (2,3,4) Bravo® 6F 1.5 pt (5,6)	2.2 de	0.0 b	5,104 a	848 a
Headline® 2.08E 9 fl oz (1) Moncut® 70DF 0.68 lb + Bravo® 6F 1 pt (2,3,4) Bravo® 6F 1.5 pt (5,6)	0.4 e	0.5 b	4,617 a-d	767 a-d
Bravo® 6F 1 pt + Folicur® 3.6F 7.2 fl oz (A1, A2)	16.2 b	4.0 a	4,262 cd	708 cd
Bravo® 6F 1 pt + Folicur® 3.6F 7.2 fl oz (3,4,5)	4.3 de	0.2 b	4,697 a-d	780 a-d
LSD (P=0.05)[4]	5.1	2.2	561	93

[1] 1 to 6 correspond to the spray dates of 1=July 5, 2=July 19, 3=Aug. 2, 4=Aug. 16, 5=Aug. 30, and 6=Sept. 13; A1 to A2 corresponds to the spray dates of A1=July 5 and A2=Aug. 30 made according to the Mesonet Peanut Leaf Spot Advisor.

[2] Based on an average grade of 68% TSMK.

[3] Values in a column followed by the same letter are not significantly different a P=0.05.

[4] Fisher's least significant difference (LSD).

Application of an AgLeader® Cotton Yield Monitor for Measuring Peanut Yield

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Introduction

Precision agriculture is the better management of crop inputs based on knowledge gained from the crop or production field. Typical practices range from a soil sampling scheme to yield data analysis. To perform many of these operations specific technologies are needed. Yield monitors are very common in new grain combines and cotton pickers. Yield monitors designed for specialty crops have been slower on the development, accuracy and use side than the yield monitors used for grain and cotton. Dynamic crop harvest environments such as those seen during peanut harvest slow and hinder the development and use of yield monitors due to factors including high levels of foreign material, wide diversity in crop uniformity during harvest and lack of suitable measurement locations on the harvester.

Multiple studies (Durrence et al., 1999; Hamrita et al., 2000; Thomas et al., 1999; Thomasson et al., 2006; Rains et al., 2005; and Vellidis et al., 2001) have investigated various solutions to accurately measure the mass flow of peanuts in a combine. Most of the earlier studies focused on using load cells strategically placed to measure mass flow yield of the peanuts as they traveled through the combine in conveyance augers under the combine. One of the most successful load cell based systems was the Peanut Yield Monitoring System (PYMS) developed by Vellidis et al. (2001). Four load cells were placed under the basket located on top of the peanut combine. Typical errors in the PYMS were in the ±5 percent range. These errors were considered within the acceptable range for yield estimation. However, the major flaw of the PYMS was low resolution. When using a system such as this, small differences in yield cannot be detected due to the way the system is monitoring weight. This system is very accurate in monitoring load weights and can be used as a check for other systems.

Rains et al. (2005) reported an optical monitor could be one of the best options for peanut yield monitoring. Extensive work was performed by University of Georgia researchers during the 2000, 2001 and 2002 peanut harvest seasons testing the AgLeader® cotton yield monitor (AgLeader® Technology), for use in a peanut combine. A few problems were discovered while using this system in peanuts, including settings in the controlling computer, damage to the optical sensors by the increased foreign material from peanut harvest and moisture content of the peanuts. Once these issues were solved Rains et al. (2005) reported very high correlations with peanut yield using the AgLeader® yield monitor. Thomasson et al. (2006) reported very strong correlations with a reflectance-based optical sensor tested in both Australia and Mississippi. The benefit of the sensor used in this study was it did not work in a pair (one transmitter and one receiver) as the AgLeader® sensors do. This sensor has an emitter and receiver on the same side of the duct. Using only one side of the air duct eliminates the need for sensor alignment that is critical when sensor pairs are used.

This project was started to have a valid way of checking peanut yields for research trials. More work was completed to further the work performed on the two previous research attempts of using optical sensors in peanuts. As with any sensor, calibration is a key component to proper operation. Thus the main goal of this project was to outline some standard calibration procedures for using an AgLeader® cotton yield monitor for estimating peanut yield.

The objectives of this study were to expand on the work completed by Rains et al. (2005) to determine proper calibration procedures for use of the AgLeader® cotton yield monitor in peanuts and to develop an effective protection device for use with the sensor inside the peanut conveyance duct, find correlations between yield monitor weight and peanut sale weight and determine the optimum number of calibration loads for proper sensor calibration for various conditions.

Should there be heading to indicate beginning of discussion?

Materials and Methods

A single AgLeader® sensor pair (4101069) was retrofitted on the conveying duct of two KMC 6-row peanut combines (Figure 1).

The sensor was used in collaboration with the AgLeader® Insight® controller, a header height sensor and a GPS. The 2010 season was used for checking the feasibility of using the system on collaborating producer's equipment and in the producer's field. A dirt deflector (Figure 2) was designed, built and installed

Figure 1. Mounting location of the AgLeader® flow sensor.

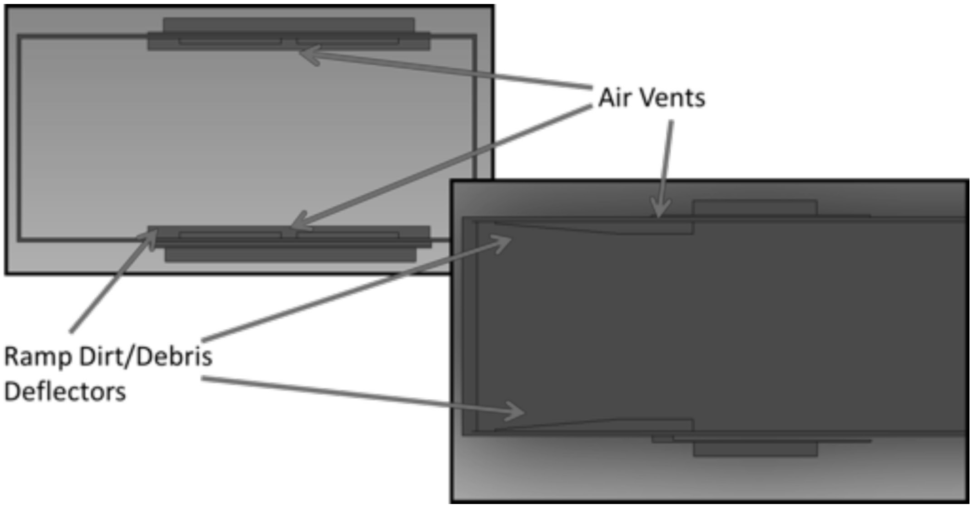

Figure 2. Top and side views of the dust deflectors.

to protect the optical sensors from debris in the conveying system.

Expanding on the work and taking recommendations from Rains et al. (2005) the dirt deflector was made from high-density PVC. Air vent slots were incorporated into the design of the deflectors and slits were cut into the side of the air duct corresponding to the location of these slots. The air vents allow for clean air to pass over the sensor emitters and receivers to prevent the buildup of dust and dirt (Figure 3). As reported by Rains et al. (2005) the buildup of dirt and dust on the sensors will hinder their operation. The deflectors did an excellent job of preventing both damage and dust accumulation on the sensors.

slits or slots?

During each of the 2011 and 2012 harvest seasons, more than 202 ha (500 A) of peanuts were yield mapped near Eakley, Okla. Yield checks were performed for two different peanut types including Spanish and runner. Twelve loads were flagged each year in the Insight® monitor as calibration loads. The loads were collected into Sol Air peanut drying wagons. A wagon typically holds about two bin loads from the peanut combine. Thus, using a set of truck scales (Figure 4), the weight of each load flagged for calibration was weighed. The truck scales were not used during the 2012 harvest season due to the availability of obtaining individual grade sheets from the Clint Williams Peanut Company.

Figure 3. Optical sensor after harvesting for three days.

Figure 4. Truck scales used for weighing the peanut wagons.

Since a single wagon held two bin loads, the first load weight was recorded to prevent loss of the initial weight before the second load was added to the wagon. A sample was collected from each of the wagon loads of peanuts to obtain field moisture content. Wet weight of the samples was measured in the field. These samples were dried at 29.4° C for 72 hours and then dry weight was measured.

Once a wagon was filled its unique identifying number was recorded. When all of the calibration loads for a specific field were finished the peanut buy point was contacted with the wagon numbers. A peanut grade sheet was obtained for each of the individual calibration wagons. The grade sheet was used to obtain pertinent information for each of the calibration wagons tested, such as moisture content, foreign material and sale net weight. It is important to note peanuts are usually delivered to the buy point in one of two conditions, either after being allowed to dry in the fields to approximately 10 percent moisture content in trailers similar to the ones in Figure 4, or delivered to the buy point at initial field moisture and dried at the buy point (which will induce extra cost to the producer). Net weight as represented on a peanut grade sheet is what a producer gets paid for, thus, it is one of the most important weights during peanut production.

Calibrations were not applied using the Insight® during the harvest process. All combinations of load calibrations were performed and recorded post-process. The use of post-process calibration procedures allowed for multiple combinations of loads to be used. More uniform results were collected from the runner peanuts, thus, those were used for calibration checks. Since five loads were collected from the runner type combinations of calibrations were performed using from only one load to using all five loads. Calibrations for both field weight and net weight as reported by the peanut grade sheet were tested. However, since the net weight is the more important value it was used for all data analysis and calibration procedures.

Results and Discussion

Data for the 12 loads from 2011 and 12 loads from 2012 are shown in Tables 1 and 2. The net weight for all loads exceeded 3,500 kg. The loads in the tables are listed in the order they were harvested. The net weight was obtained from the inspection sheets from the selling point. It is the gross weight minus foreign matter and moisture corrections. The net weights from the five loads from the Blood field were used for calibration and the errors shown are based on this calibration. The calibration number was 3,797 and the yield monitor weights are based on this number. The error for Spanish type peanuts ranged from -5.4 percent to 3.0 percent. It should be noted that the -5.4 percent error was on a load not used for calibration. The errors for the runner type peanuts ranged from -23.2 percent to -16.3 percent. The greater errors are a result of not being included in the calibration. Performing the calibration with all 12 loads resulted in a calibration number of 4,165. The errors ranged from -15.8 percent to 12.9 percent with this calibration. Including both peanut types in the same calibration resulted in a compromised calibration that was unacceptable for both types. In the AgLeader® system, each peanut type has to be an individual crop to have a separate calibration (i.e. Spanish peanuts or runner peanuts).

Moisture content at harvest ranged from 11.1 percent to 25.6 percent between the two years but was generally related to the type of peanuts with runners being higher moisture than the Spanish. The runners were harvested last and are generally later maturing, which led to the higher harvest moisture. However, the higher moisture contents during the first loads were due to an impending frost, thus the peanuts were combined a

Do we need to change to standard and F versus metric and C to be consistent with the rest of the report

Table 1. Summary data for the 12 loads. The yield monitor weights were based on a calibration number of 3,767 using net weight from the first five loads in the table. Error is calculated from the net weights obtained at the selling point.

Wagon Label/Field	Type	Moisture Content (%)	Yield Monitor Weight (kg)	Net Weight (kg)	Error (%)
LK1/Blood	Spanish	18.2	4,104.5	4,172.1	-1.8
LK16/Blood	Spanish	20.5	4,312.7	4,342.7	-0.9
SK11/Blood	Spanish	15.1	4,339.5	4,206.2	3.0
LK27/Blood	Spanish	16.3	4,130.5	4,113.6	0.2
LK15/Blood	Spanish	14.8	4,156.4	4,169.9	-0.5
LK41/S. Harvey	Spanish	14.5	3,668.6	3,871.4	-5.4
SK14/S. Harvey	Spanish	12.4	3,652.3	3,666.8	-0.6
LK41/Deckboat	Runner	25.3	4,280.0	5,104.7	-16.3
LK1/Deckboat	Runner	21.1	4,172.7	4,974.5	-16.3
LK17/Deckboat	Runner	25.0	3,628.2	4,504.2	-19.6
LK26/Deckboat	Runner	25.6	3,732.7	4,682.4	-20.4
LK42/Deckboat	Runner	24.6	3,603.6	4,682.4	-23.2

Table 2. Summary data for the 12 loads collected in 2012. The yield monitor weights were based on a calibration number of 3,500 using net weight from the first five loads in the table. Error is calculated from the net weights obtained at the selling point.

Wagon Label/Field	Type	Moisture Content (%)	Yield Monitor Weight (kg)	Net Weight (kg)	Error (%)
SK14-LK1/Huckabee	Spanish	9.70	9,081.8	9,407.1	-3.46
SK6/N. Barger	Spanish	21.56	4,738.2	4,450.2	6.47
LK3/N. Barger	Spanish	24.41	4,830.3	4,438.4	8.83
LK50/Suter	Spanish	13.82	4,558.1	3,911.8	16.52
SK9/Suter	Spanish	12.84	5,419.5	4,729.6	14.59
LK6/Hughes	Spanish	11.11	4,207.8	4,676.5	-10.02
LK48/Hughes	Spanish	15.59	4,786.3	4,400.8	8.76
LK45/N. Barger 2	Runner	15.82	4,540.0	4,286.0	5.93
SK13/N. Barger 2	Runner	20.62	4,530.4	4,169.9	8.65
LK27/Butler Endura	Runner	12.29	4,612.1	3,992.1	15.53
LK42/Butler Endura	Runner	11.01	4,726.0	4,295.5	10.02

few days earlier than necessary. Figure 5 shows the error as a function of moisture content. The data are separated in Figure 5 by type. The relationship that appears between moisture content and error is more likely due to the type of peanut and the limited data. It should be noted the Spanish type has a load with moisture exceeding 20 percent similar to that for the runners, but the error for this load is small. Unfortunately, similar trends with moisture content are not represented in Figure 6 from the 2012 harvest season. More data analysis will hopefully discover the cause of the errors from this harvest season.

However, since the yield monitor does not include a moisture sensor like grain yield monitors, there is some cause for concern. Further studies across a wider range of moisture content are needed for the three main types of peanuts before conclusions can be drawn.

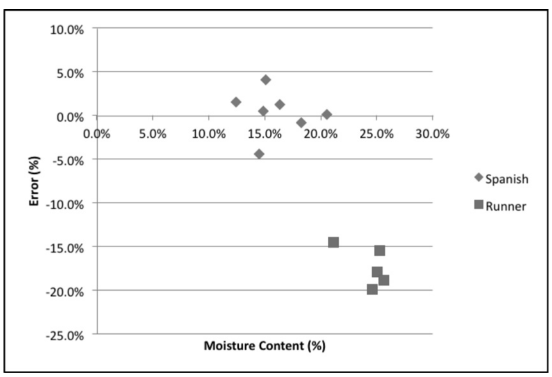

Figure 5. Field moisture content and error incurred when using five calibration loads from Spanish peanuts.

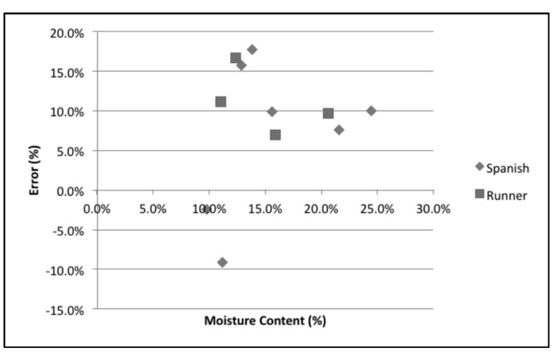

Figure 6. Field moisture content and error incurred when using five calibration loads from Spanish peanuts.

Figure 7 represents the error based on the number of calibration loads used. This data is for the five loads of runner type peanuts. The error is for an individual load and all possible combinations of loads were used for calibration. As expected, error was reduced as the number of loads used for calibration increased. The number of calibration loads may be based on the individual user's preference. However, this data indicates at least four loads are required to reduce errors to the ±5 percent range.

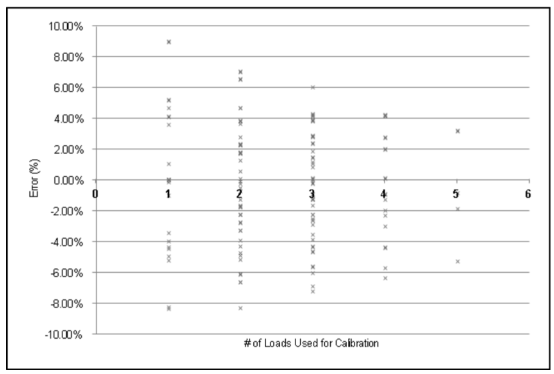

Figure 7. Number of loads used for calibration and the overall error for the runner type.

Conclusions

This study supports previous research demonstrating the feasibility of using an optical cotton yield monitor to accurately measure peanut yield. Similar to other crops, calibration is very important when using this type of monitor with a peanut crop. Results show at least four calibration loads should be used to minimize error. Furthermore, the yield monitor should be recalibrated for different peanut types. Preliminary data supports the need for calibration by type and moisture content does not play a large role in the error incurred within types but could still be a concern. A producer can accurately post calibrate peanut yield to the net weight obtained from a buy point and use this information for better management of his fields in the future.

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