Partners in Progress
PEANUTS

Peanut Research at OSU 2019

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 the
U.S. Department of Agriculture - Agricultural Research Service

P-1059

AG RESEARCH

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Foreword

Oklahoma State University has a long-standing partnership with the Oklahoma Peanut Commission and the peanut producers of this state. Peanut acreage and production in Oklahoma have been increasing over the last several years. New varieties, disease resistance and fungicide programs developed by OSU and the USDA-ARS have aided the peanut industry. 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 Research at OSU 2019* report highlights significant accomplishments in research and Extension programming that have been supported in partnership with the OPC and the National Peanut Board. With all the work that has been accomplished, it is important to recognize that much more 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 peanut producers in Oklahoma.

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

Keith Owens
Assistant Vice President and 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.

Enhancing Peanut Production Profitability through Research and Extension

Low commodity prices continue to plague agriculture at both the state and national levels. Prices received by Oklahoma producers for some crops are below the cost of production. While profit margins are tight, peanuts remain an exception to this trend.

In 2019, Oklahoma peanut growers planted 15,000 acres, which was the same as 2018. The largest acreage in recent years was the 19,000 acres that were planted in 2017. Oklahoma peanut plantings are heavily dependent on contracts being offered to growers. Large plantings in the southeastern U.S. and national production exceeding combined domestic and export demand continue to limit contract availability in Oklahoma. This situation is expected to continue for the foreseeable future.

The 2019 growing season was characterized by generally favorable weather followed by good maturing conditions. By late September, producers were anticipating good yields of high-quality peanuts. However, freezing temperatures occurred on Oct. 12, which was three to four weeks earlier than the average first freeze date for the state's peanut producing area in southwest Oklahoma. This event effectively shut down the peanut maturing process causing producers to proceed with harvest much earlier than desired. When the first freezing temperatures came, little of the crop had been harvested and from that point forward, growers battled wet and cold weather conditions until harvest was completed. Yields in 2019 averaged 3,700 pounds per acre on 15,000 harvested acres.

Peanut prices are such that growers must carefully manage inputs in every production phase. Despite tight margins, peanuts can still produce a profit for efficient growers and with the prospects for the overall farm economy to remain sluggish, peanuts will continue to be favored by those having experience and commitment to the crop.

The results of Oklahoma State University and USDA-ARS research programs continue to provide essential information for producers during a challenging time. Recent peanut variety releases by USDA-ARS at the Peanut Improvement Center in Stillwater have been welcomed by producers and the industry. Due to their high yielding ability, outstanding quality and disease resistance, recently released varieties OLé and Lariat are positively impacting the Oklahoma peanut industry and the state's agricultural economy as well. The availability of Contender, a new high-oleic Virginia type variety, will provide an additional tool for Oklahoma growers.

Similarly, OSU and USDA-ARS research programs are providing growers with much-needed answers for yield-robbing disease and weed problems. Partial funding for this research is being provided through the National Peanut Board (NPB) and the Oklahoma Peanut Commission (OPC).

The NPB is a grower-funded national research, promotion and education checkoff program with growers from 10 states submitting funds and, in turn, receiving research and promotion funds back in those states. As part of an ongoing partnership, in FY19 the OPC teamed with OSU and USDA-ARS to submit research proposals to the NPB. NPB provided $14,000 in research funding for OSU and USDA-ARS. Funded research projects were: (1) Integrated Management of Peanut Diseases and (2) Evaluation of Advanced Breeding Lines and Current Peanut Varieties across Oklahoma. Results of those research projects are of great interest to Oklahoma producers and are presented in this report.

An additional positive note is that the national peanut industry is benefiting from increasing per capita peanut consumption. For Oklahoma to benefit from this good news, growers must continue to have access to research based results and recommendations as they make production decisions. The OPC will continue to team with OSU and USDA-ARS which will provide critical assistance and NPB which will deliver essential resources. All have a commitment to a robust peanut industry in the state and Oklahoma's peanut growers are very appreciative of that fact.

Oklahoma's peanut producers and the OPC are proud of their long and productive history with OSU, USDA-ARS and NPB and look forward to the future shared benefits of continuing this partnership.

Ron Sholar
Executive Director
Oklahoma Peanut Commission

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2019 Oklahoma Peanut Variety Trials

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2019 progress made possible through OPC and NPB support

- **Performance of runner varieties depended on location but averages across locations in 2019 indicate that cultivars Lariat and Tamrun OL11, along with advanced ARS breeding line ARSOK R47A, were the top entries in value per acre.**
- **Significant differences among Spanish entries across locations and years indicate that the small-seeded, runner-type cultivars AT98-99 and Span17 were the top yielders in 2019.**
- **The Virginia cultivar ACI351 was the top yielder across locations in 2019, followed closely by cultivars Jupiter and Contender, as well as advanced breeding line NCEX17.**

Peanut production in Oklahoma is generally located in three geographical regions across the state: southwestern, west central and far west. Each region differs from the others in environmental and biological stressors that affect crop production, so the same peanut cultivar will likely perform differently in each growing region. Therefore, the Oklahoma Peanut Variety Trials are conducted in each region annually and are designed to test the performance of commonly grown cultivars and potential cultivar releases against each other. A record early, hard freeze in early October 2019 prematurely halted crop development and greatly contributed to lower-than-average yields, grades and overall quality of all trial entries. Data collected from trials in 2019 are not indicative of the average performance of trial entries. Excessive rainfall in October 2019 also led to delayed harvest of all trials and may have resulted in a drop in yield due to loss in the field as compared to past years. Results of these annual trials can serve as a guide for producers when choosing a cultivar to plant.

Variety Trial Methods

All entries (cultivars and advanced breeding lines) in the Oklahoma Peanut Variety trials were high-oleic with the exception of the Virginia-type cultivar Jupiter. The following entries were included in all locations in 2019: 16 runner-types: Cultivars Flavor Runner 458, Georgia 09B, Georgia 14N, Tamrun OL11, Lariat, and Webb and breeding lines ARSOK R47A, ARSOK R90-12, ARSOK R91-2, ARSOK R92-13, ARSOK R93-1, ARSOK R93-10, ARSOK R94-4, ARSOK R96-3, ARSOK R96-7 and ARSOK R96-8; seven Spanish-types: cultivars AT98-99, OLé, Tamnut OL06, Schubert, and Span17 and breeding lines ARSOK S88-2 and ARSOK S96-5; 14 Virginia

types: Cultivars ACI 351, Contender, Florida Fancy, Jupiter, Sullivan, VENUS and Wynne, and breeding lines NCEX1, NCEX2, NCEX7, NCEX17, NCEX19, NCEX20 and NCEX22.

All variety trials 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 results were separated by location because the interaction between variety and location was significant. Averages across locations and years were included to give producers a better estimate of line performance. Since the varieties and advanced lines response differed by location, growers may find the data for the county closest to their location to be the most useful in selecting a variety or varieties to grow. All test plots were planted using two 36-inch rows that were 15 feet long. Plots were seeded at a rate of five seeds per row foot (139,392 seeds per acre). Trials were conducted using randomized, complete block design with four replications. The entire plot was dug, then thrashed two to three days later. Peanuts were placed in a dryer until moisture reached 10%. Percent total sound mature kernels (% TSMK) were determined on a 200-gram sample from each plot. Analysis of variance (ANOVA) and significance (LSD) were analyzed SAS (ver. 9.1).

Value per acre was determined by converting estimated plot yields to tons per acre and using the 2019 contract price values for each market type (runner = $475 per ton; Spanish = $450 per ton; and Virginia = $525 per ton). No adjustments were made for damaged kernels or concealed damage. Virginia value per acre ($/A) may be underestimated, as grade is not as large a factor for in-shell peanuts, however the extra large kernels (ELK) bonus was added in the final value per acre figure. Calculations of value per acre are based on yield and grade only and do not include possible input costs. The following formula was used: value per acre = yield (tons per acre) × contract price (value per ton) × grade.

Interpreting Data

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 there is a 95 percent probability 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 pounds per acre 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 the confidence that variety X really is higher yielding than variety Y is less 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 management conditions similar to those of the trials. The relative yields of all peanut varieties are affected by crop management and by environmental factors including soil type, summer conditions, soil moisture, disease and insects.

2019 Caddo County Peanut Variety Trial

Location: Ft. Cobb, OK
Oklahoma Agricultural Experiment Station
Planted: May 17, 2019
Dug: Oct. 11, 2019
Threshed: Oct. 14, 2019

The trial was planted May 17, 2019. A conventional till seedbed was used and managed for foliar and soilborne disease throughout the season. Average yield for the runner test was 3,598 pounds per acre and average grade was 68% TSMK (Table 1) with entries Lariat and ARSOK R47A having statistically higher yields compared to other genotypes tested. Statistical differences in yield and grade were seen among entries, but overall yields and grades were much lower than in immediate past years.

Among the Spanish entries tested, the average yield and grade were 3,545 pounds per acre and 64% TSMK, respectively, again much lower than in past years. In Caddo County, slight statistical differences among entries were reported for yield, with cultivar OLé having the highest yield at 3,921 pounds per acre. Grades were much lower than in past years and statistical differences were reported with the small-seeded runner growth habit cultivars AT98-99 and Span17 both grading highest at 72% and 70% TSMK, respectively.

Entries in the Virginia test averaged 3,662 pounds per acre with an average grade of 66% TSMK. Statistical differences were reported for yield and grade. Among the breeding lines tested, NC-17EX yielded comparably with released cultivars at 3,896 pounds per acre and had one of the top grades at 70% TSMK. Jupiter and Contender were the top-yielding cultivars, followed by ACI351 and VENUS. Sullivan and Florida Fancy were the worst performing cultivars, along with the breeding line NCEX19.

Table 2 contains Caddo County yield and grade data for 2018 and 2019. Average yield among runner entries for the two-year period was 4,803 pounds per acre, while the average grade was 72% TSMK. Cultivar Lariat and breeding line ARSOK-R47A were the top yielders over the two-year period at 5,754 pounds per acre and 5,578 pounds per acre, respectively. Statistical differences in yield and grade were seen among runner entries. Significant differences in yield were not found among all Spanish entries over the two years. Numerically cultivar OLé was the top yielder among Spanish entries averaging 5,064 pounds per acre. No statistical differences were reported for Spanish entry average grades over the two-year period. The average yield for Virginia entries in 2018-2019 was 4,996 pounds per acre, but no statistical differences in yield were seen among entries. Breeding line NCEX17 was numerically the top yielder over years, averaging 5,360 pounds per acre. Cultivars Contender and Jupiter were the top yielding at 5,348 and 5,360 pounds per acre, respectively. Statistical differences for average grade among Virginia-type entries were reported, with the average % TSMK reported at 69.

2019 Custer County Variety Trial

Location: Thomas, OK
Les Crall Farms
Planted: May 16, 2019
Dug: Oct. 18, 2019
Threshed: Oct. 21, 2019

The trial was planted May 16, 2019, into a conventional till seedbed and managed for weeds as well as foliar and soilborne disease throughout the season. The average yield for the runner test (Table 3) was 3,176 pounds per acre

Table 1. Yield, grade, average seed weight, seed size distribution and value per acre for entries at the Caddo County (OAES, Ft. Cobb) peanut variety trial in 2019.[1]

Entry	Yield (lb/A)	% of Trial Average	Grade[2] (%TSMK)	SdWt/100[3] (g)	ELK[4] (%)	MED[4] (%)	No.1[4] (%)	Value[5] ($/A)
Runner[6]								
Lariat	4,526 a	126	72 a	63 c-e	28 f	51 ab	10 b-d	774
ARSOK R47A	4,260 ab	118	62 cd	62 de	27 fg	52 ab	10 b-d	627
ARSOK R92-13	4,066 bc	113	72 a	67 b	42 cd	39 cd	7 e-g	695
Tamrun OL11	3,908 b-d	109	72 a	56 fg	22 g	53 ab	13 b	668
ARSOK R94-4	3,884 b-d	108	69 a-c	66 bc	48 c	35 d	5 fg	636
ARSOK R93-1	3,691 c-e	103	67 a-d	61 de	45 c	37 d	7 e-g	587
ARSOK R91-2	3,691 c-e	103	63 cd	67 b	44 cd	47 a-c	10 b-d	552
Webb	3,679 c-e	102	64 cd	60 ef	34 ef	47 a-c	10 b-d	559
ARSOK R96-7	3,679 c-e	102	65 b-d	64 b-d	56 b	25 e	6 fg	568
ARSOK R96-8	3,679 c-e	102	65 b-d	74 a	70 a	26 e	4 g	568
ARSOK R93-10	3,558 d-f	99	69 a-c	60 de	33 ef	44 b-d	8 d-f	583
ARSOK R90-12	3,316 e-g	92	71 ab	63 c-e	32 ef	48 a-c	8 d-f	559
Flavor Runner 458	3,231 fg	90	69 a-c	45 i	8 h	55 a	20 a	529
Georgia 09B	3,086 g	86	69 a-c	55 g	43 cd	40 cd	13 b	506
Georgia 14N	3,001 g	83	72 a	52 h	30 ef	42 cd	12 bc	513
ARSOK R96-3	2,311 h	64	61 d	61 de	37 de	39 cd	8 d-f	335
Mean	3,598		68	61	38	42	9	
CV	8		6	4	13	15	24	
LSD (0.05)	396		6	4	7	9	3	
Spanish[6]								
OLé	3,921 a	111	61 cd	47 bc	57 b	29 c	10 c	568
ARSOK S96-5	3,896 a	110	65 b-d	54 a	72 a	11 d	6 d	601
ARSOK S88-2	3,594 ab	101	59 d	44 d	48 bc	32 bc	13 bc	504
AT98-99	3,485 ab	98	72 a	45 cd	36 de	37 b	15 ab	596
Schubert	3,461 ab	98	66 a-c	45 cd	27 e	49 a	18 a	543
Span17	3,267 b	92	70 ab	49 b	50 bc	32 bc	10 c	543
Tamnut OL06	3,195 b	90	60 cd	43 d	40 cd	37 b	14 a-c	455
Mean	3,545		64	47	47	32	12	
CV	11		7	4	15	14	24	
LSD (.05)	550		6	3	10	6	4	
Virginia[6]								
Jupiter	4,162 a	114	66 a	78 ef	54 e-g	29 cd	7 ab	760
Contender	3,993 ab	109	67 a	85 d	62 b-e	26 c-e	4 d-f	746
ACI351	3,908 a-c	107	66 a	92 c	68 ab	21 e-g	4 d-f	724
NCEX17	3,896 a-c	106	70 a	91 c	63 b-d	25 d-f	4 d-f	759
VENUS	3,884 a-c	106	64 ab	71 g	46 g	38 a	9 a	684
NCEX1	3,703 b-d	101	53 b	93 bc	64 b-d	25 d-f	3 ef	557
NCEX20	3,666 b-e	100	69 a	93 bc	65 b	19 fg	3 ef	706
NCEX7	3,594 c-e	99	69 a	102 a	74 a	18 g	2 f	698
Wynne	3,545 de	97	66 a	80 de	57 c-f	26 c-e	8 a	650
NCEX2	3,449 de	94	68 a	97 b	64 b-d	16 g	3 e-f	654
NCEX22	3,436 de	94	69 a	92 bc	55 ef	31 bc	5 c-e	655
Florida Fancy	3,352 e	92	70 a	66 h	51 fg	36 ab	7 a-c	646
Sullivan	3,340 e	91	68 a	74 fg	56 d-f	30 b-d	6 b-d	629
NCEX19	3,340 e	91	68 a	93 bc	65 b	19 fg	3 ef	634
Mean	3,662		66	86	60	26	5	
CV	6		13	4	9	17	35	
LSD (.05)	335		12	5	8	6	2	

[1] Values within the same column followed by the same letter are not significantly different at P = .05; ns = non-significant.
[2] % TSMK = Percent total sound mature kernels.
[3] SdWt/100 = Weight of 100 SMK.
[4] ELK= % Kernels riding a 21.5/64-inch X 1-inch slotted screen for Virginia and 21/64-inch X 3/4-inch screen for runner and Spanish; MED=% Kernels
[5] Calculated based on peanut market-type contract price 2019. ELK bonus added for Virginias.
[6] Market Type.

Table 2. Yield, grade, average seed weight and value per acre for entries averaged across years at the Caddo County (OAES, Ft. Cobb) peanut variety trial in 2018-2019.[1]

Entry	*Yield (lb/A)*	*% of Trial Average*	*Grade[2] (%TSMK)*	*SdWt/100[3] (g)*	*Value[4] ($/A)*
Runner[5]					
Lariat	5,754 a	120	75 a	67 b-e	1,025
ARSOK R47A	5,578 ab	116	69 b-d	67 b-e	914
ARSOK R92-13	5,324 ab	111	75 a	72 a-d	948
Webb	5,288 ab	110	67 cd	74 a-c	841
ARSOK R96-8	5,118 a-c	107	71 a-c	77 a	863
Tamrun OL11	5,094 a-c	106	74 a	62 d-f	895
ARSOK R94-4	5,094 a-c	106	73 ab	75 ab	883
ARSOK R93-10	4,731 a-c	99	73 ab	65 d-f	820
ARSOK R90-12	4,707 a-c	98	74 a	68 b-e	827
Georgia 09B	4,703 a-c	98	73 ab	60 fg	815
Flavor Runner 458	4,568 a-c	95	73 ab	50 h	792
Georgia 14N	4,320 b-d	90	76 a	56 gh	780
ARSOK R96-7	3,823 cd	80	67 cd	72 a-d	608
ARSOK R96-3	3,139 d	65	65 d	72 a-d	485
Mean	4,803		72	67	
CV	29		7	12	
LSD (.05)	1,381		5	8	
Spanish[5]					
OLé	5,064	104	66	48 b	794
Span17	4,852	100	72	53 a	830
Schubert	4,840	100	68	45 bc	782
ARSOK S88-2	4,815	99	66	44 c	755
Tamnut OL06	4,791	99	68	46 bc	774
AT98-99	4,773	98	72	44 c	816
Mean	4,856		69	47	
CV	31		9	6	
LSD (.05)	1,537 (ns)		6 (ns)	3	
Virginia[5]					
NCEX17	5,360	108	72 a	106 a-c	1,077
Jupiter	5,360	108	68 ab	91 c-e	1,008
Contender	5,348	107	70 a	90 d-f	1,044
VENUS	5,227	105	68 ab	80 ef	983
ACI351	5,081	102	69 ab	98 b-d	979
NCEX1	5,058	101	63 b	111 ab	888
NCEX20	5,021	101	71 a	102 a-d	995
Wynne	4,955	99	68 ab	93 c-e	935
NCEX7	4,870	97	71 a	116 a	965
NCEX2	4,840	97	71 a	102 b-d	951
NCEX19	4,785	96	69 ab	104 a-d	909
Florida Fancy	4,725	95	70 a	77 f	910
NCEX22	4,664	93	70 a	100 b-d	900
Sullivan	4,658	93	69 ab	81 ef	887
Mean	4,996		69	97	
CV	29		10	15	
LSD (.05)	1,451 (ns)		7	14	

[1] Values within the same column followed by the same letter are not significantly different at P = .05; ns = non-significant.
[2] % TSMK = Percent total sound mature kernels.
[3] SdWt/100 = Weight of 100 SMK.
[4] Calculated based on peanut market-type contract price 2019. ELK bonus added for Virginias.
[5] Market Type.

Table 3. Yield, grade, average seed weight, seed size distribution and value per acre for entries at the Custer County (Les Crall Farms, Weatherford) peanut variety trial in 2019.[1]

Entry	Yield (lb/A)	% of Trial Average	Grade[2] (%TSMK)	SdWt/100[3] (g)	ELK[4] (%)	MED[4] (%)	No.1[4] (%)	Value[5] ($/A)
Runner[6]								
Tamrun OL11	4,247 a	134	73 a	56 fg	26 ef	51 a	14 c-e	736
Georgia 09B	3,835 ab	121	64 bc	55 g	46 b	38 b-d	8 fg	583
Lariat	3,739 a-c	118	71 ab	63 c-e	31 e	46 ab	12 c-f	630
ARSOK R96-8	3,690 a-d	116	64 bc	74 a	65 a	21 e	6 g	561
ARSOK R91-2	3,448 a-e	109	69 a-c	67 b	41 b-d	31 d	9 e-g	565
ARSOK R47-A	3,352 a-e	106	72 a	62 de	36 c-e	39 b-d	12 c-f	573
Flavor Runner 458	3,231 b-e	102	63 c	45 i	6 g	44 ab	28 a	483
ARSOK R93-1	3,134 b-e	99	62 cd	61 de	42 bc	38 b-d	11 d-f	461
ARSOK R93-10	2,952 b-e	93	69 a-c	60 de	32 e	40 b-d	13 c-e	484
ARSOK R92-13	2,928 b-e	92	69 a-c	67 b	30 ef	40 b-d	14 cd	480
ARSOK R96-7	2,892 c-e	91	72 a	64 b-d	44 b	36 b-d	10 d-g	495
ARSOK R94-4	2,892 c-e	91	68 a-c	66 bc	46 b	32 cd	10 d-g	467
Webb	2,780 de	88	66 a-c	60 ef	31 e	40 b-d	13 c-e	436
Georgia 14N	2,626 e	83	68 a-c	52 h	28 ef	38 b-d	20 b	424
ARSOK R90-12	2,541 e	80	64 bc	63 c-e	33 de	42 a-c	14 cd	386
ARSOK R96-3	2,537 e	80	55 d	64 b-d	21 f	36 b-d	16 bc	331
Mean	3,176		67	61	335	38	13	
CV	21		8	4	118	18	24	
LSD (0.05)	932		7	4	9	10	4	
Spanish[6]								
AT98-99	3,727 a	122	67 a	41 cd	35 bc	14 a-c	47 ab	593
Span17	3,472 ab	114	66 a	49 b	30 d	11 b-d	48 a	602
ARSOK S96-5	3,158 a-c	104	66 a	64 a	14 e	8 d	49 a	547
ARSOK S88-2	2,868 bc	94	64 ab	45 bc	36 bc	11 b-d	41 de	482
OLé	2,759 c	90	64 ab	46 bc	32 cd	10 cd	44 bc	464
Schubert	2,687 c	88	67 a	36 d	41 a	16 ab	13 cd	473
Tamnut OL06	2,686 c	88	59 b	36 d	37 ab	17 a	39 e	417
Mean	3,051		65	45	32	13	44	
CV	14		6	12	9	27	5	
LSD (.05)	612		6	8	4	5	3	
Virginia[6]								
ACI 351	4,368 a	120	68 a	89 bc	61 a-c	26 d-f	6 b	826
NCEX19	3,981 ab	110	68 a	90 a-c	65 a-c	22 e-g	5 b	756
NCEX20	3,920 ab	108	63 b	87 c	67 ab	19 fg	6 b	694
Contender	3,897 ab	107	66 ab	79 de	58 b-e	29 c-e	7 b	715
NCEX22	3,835 ab	106	68 a	89 bc	56 c-e	30 b-d	8 ab	722
VENUS	3,641 ab	100	63 b	75 ef	46 f	48 a	5 b	631
NCEX2	3,594 b	99	66 ab	97 a	70 a	20 fg	6 b	667
NCEX7	3,533 b	97	68 a	95 ab	67 ab	20 fg	7 b	672
NCEX17	3,473 b	95	68 a	96 ab	71 a	18 g	6 b	663
Jupiter	3,469 b	95	66 ab	77 e	56 c-f	34 bc	6 b	635
Florida Fancy	3,352 b	92	69 a	62 g	47 f	37 b	11 a	635
Sullivan	3,292 b	91	68 a	70 f	51 ef	34 bc	8 ab	617
NCEX1	3,243 b	89	68 a	85 cd	55 d-f	28 c-e	11 a	610
Wynne	3,243 b	89	67 ab	90 a-c	65 a-c	22 e-g	7 b	607
Mean	3,631		66	84	60	28	7	
CV	15		4	6	11	18	38	
LSD (.05)	751		4	7	9	7	4	

[1] Values within the same column followed by the same letter are not significantly different at P = .05; ns = non-significant.
[2] % TSMK = Percent total sound mature kernels.
[3] SdWt/100 = Weight of 100 SMK.
[4] ELK= % Kernels riding a 21.5/64-inch X 1-inch slotted screen for Virginia and 21/64-inch X 3/4-inch screen for runner and Spanish; MED=% Kernels riding a 18/64-inch screen but falling through a 21.5/64-inch or 21/64-inch screen; No.1=% Kernels riding a minimum grade screen (16/64-inch for runner and Spanish; 15/64 for Virginia) but falling through a 18/64-inch screen.
[5] Calculated based on peanut market-type contract price 2019. ELK bonus added for Virginias.
[6] Market Type.

Table 4. Yield, grade, average seed weight and value per acre for entries averaged across years at the Custer County (Les Crall Farms) peanut variety trial in 2018-2019.[1]

Entry	*Yield (lb/A)*	*% of Trial Average*	*Grade[2] (%TSMK)*	*SdWt/100[3] (g)*	*Value[4] ($/A)*
Runner[5]					
Tamrun OL11	5,294	118	75 a	63 de	943
Georgia 09B	5,130	114	71 ab	61 de	865
Lariat	5,058	112	76 a	67 b-d	913
ARSOK R96-8	4,743	105	68 b	81 a	766
ARSOK R47A	4,483	100	76 a	66 b-d	809
ARSOK R94-4	4,477	99	73 ab	74 ab	776
ARSOK R96-7	4,477	99	75 a	74 ab	797
ARSOK R93-10	4,228	94	73 ab	68 b-d	733
Flavor Runner 458	4,174	93	70 ab	68 b-d	694
Webb	4,167	93	70 ab	66 cd	693
ARSOK R92-13	4,132	92	73 ab	74 ab	716
Georgia 14N	4,108	91	73 ab	56 ef	712
ARSOK R90-12	4,029	90	71 ab	67 b-d	679
Mean	4,500		73	67	
CV	33		9	11	
LSD (.05)	1,508 (ns)		6	8	
Spanish[5]					
AT98-99	4,894 a	120	72	49 b	837
Span17	4,440 ab	109	72	53 a	759
Tamnut OL06	3,914 ab	96	66	42 d	614
OLé	3,896 ab	96	67	42 d	620
Schubert	3,751 ab	92	69	44 cd	615
ARSOK S88-2	3,473 b	85	68	43 d	561
Mean	4,062		69	46	
CV	30		8	8	
LSD (.05)	1,230		6 (ns)	4	
Virginia[5]					
Contender	5,137	108	70	89 c-e	997
VENUS	4,870	106	68	84 e	913
ACI351	4,828	105	70	98 bc	941
Wynne	4,749	104	69	97 b-d	903
NCEX2	4,706	103	68	111 a	885
NCEX1	4,670	102	70	101 ab	900
NCEX7	4,622	102	70	106 ab	903
NCEX17	4,591	100	71	108 ab	906
Sullivan	4,501	99	69	78 ef	870
NCEX19	4,435	99	69	102 ab	855
NCEX20	4,434	97	68	97 b-d	843
NCEX22	4,380	96	69	98 b-d	844
Florida Fancy	4,365	91	70	70 f	849
Jupiter	4,197	88	69	87 c-e	812
Mean	4,607		69	94	
CV	27		6	13	
LSD (.05)	1,236		4	12	

[1] Values within the same column followed by the same letter are not significantly different at P = .05; ns = non-significant.
[2] % TSMK = Percent total sound mature kernels.
[3] SdWt/100 = Weight of 100 SMK.
[4] Calculated based on peanut market-type contract price 2019. ELK bonus added for Virginias.
[5] Market Type.

Table 5. Yield, grade, average seed weight, seed size distribution and value per acre for entries at the Tillman County (White Farms, Davidson) peanut variety trial in 2019.[1]

Entry	Yield (lb/A)	% of Trial Average	Grade[2] (%TSMK)	SdWt/100[3] (g)	ELK[4] (%)	MED[4] (%)	No.1[4] (%)	Value[5] ($/A)
Runner[6]								
ARSOK R47A	5,421 a	117	74 a	65 a-d	37 c-e	41 c-e	10 d-f	953
Lariat	5,360 ab	116	73 ab	63 c-e	39 b-e	36 fg	12 b-d	929
ARSOK R93-1	5,288 a-c	114	73 ab	68 ab	49 ab	25 ij	7 h	917
Georgia 09B	5,094 a-c	110	71 ab	58 fg	43 b-d	38 d-f	8 f-h	859
ARSOK R92-13	4,949 a-c	107	70 b	69 a	40 b-d	33 gh	12 b-d	823
ARSOK R93-10	4,901 a-d	106	72 ab	61 d-f	38 b-e	35 fg	10 c-e	838
Tamrun OL11	4,889 a-d	106	71 ab	60 ef	23 fg	54 a	12 b-d	824
ARSOK R91-2	4,889 a-d	106	70 b	68 ab	47 a-c	37 e-g	7 gh	813
ARSOK R94-4	4,803 a-e	104	72 ab	67 a-c	56 b	29 hi	9 e-g	821
ARSOK R96-7	4,780 a-e	103	65 ef	66 a-c	45 a-c	29 hi	7 gh	738
Georgia 14N	4,659 c-e	101	74 a	53 h	38 b-e	42 cd	9 e-g	819
Webb	4,622 c-e	100	67 bc	60 ef	33 d-f	43 cd	11 b-e	735
Flavor Runner 458	4,223 de	91	66 c	46i	18 g	50 ab	22 a	662
ARSOK R90-12	4,163 e	90	71 ab	65 a-d	36 c-e	50 ab	10 c-e	702
ARSOK R96-8	4,090 e	88	62 d	66 a-c	55 a	21 j	8 f-h	602
ARSOK R96-3	1,839 f	40	53 e	64 gh	28 e-g	46 bc	13 b	231
Mean	4,623		69	62	38	37	10	
CV	11		3	5	21	9	17	
LSD (0.05)	714		3	4	12	5	2	
Spanish[6]								
Span17	5,216 a	127	69 ab	51 a	53 b	29 cd	1 0 c	855
AT98-99	4,997 ab	114	67 bc	47 b	40 c	36 b	1 6 b	795
OLé	4,695 ab	107	64 bc	47 b	58 b	32 bc	9 c	714
ARSOK S88-2	4,404 bc	100	65 bc	43 c	49 bc	30 c	14 b	680
Schubert	3,908 cd	89	58 d	45 bc	28 d	44 a	22 a	538
ARSOK S96-5	3,811 cd	87	72 a	51 a	69 a	12 e	4 d	652
Tamnut OL06	3,787 d	86	62 dc	46 b	42 c	38 b	11 c	558
Mean	4,402		65	47	48	31	12	
CV	9		5	4	13	9	19	
LSD (.05)	597		5	3	9	4	3	
Virginia[6]								
ACI 351	5,833 a	114	62 de	93 b-d	62 a-c	25 bc	7 b-d	1,013
NCEX17	5,615 ab	109	70 a	96 b-d	67 a-c	24bc	3 f	1,098
NCEX20	5,578 a-c	107	70 a	92 d	68 a-c	18 d	5 d-f	1,091
NCEX1	5,542 a-c	106	66 bc	97 b-d	62 a-c	23 c	6 c-f	1,020
Jupiter	5,470 a-d	104	66 bc	93 cd	57 c	16 d	5 d-f	1,002
NCEX19	5,384 b-d	103	70 a	99 a-c	72 ab	26 d	3 f	1,057
NCEX7	5,373 b-d	102	68 ab	95 b-d	64 a-c	25 bc	4 f	1,019
VENUS	5,251 b-e	100	65 cd	94 b-d	60 bc	18 g	7 b-e	952
NCEX2	5,227 c-e	100	68 ab	104 a	76 a	16 d	3 f	1,003
Contender	5,191 c-e	99	67bc	85 e	58 bc	27 a-c	8 a-c	966
NCEX22	5,070 d-f	96	69 ab	99 ab	59 bc	28 a-c	6 c-f	971
Wynne	4,949 ef	94	68 ab	94 b-d	67 a-c	25 bc	3 f	941
Florida Fancy	4,683 fg	89	60 e	61 g	53 c	29 ab	10 a	781
Sullivan	4,296 g	82	68 ab	71 f	53 c	31 a	9 ab	807
Mean	5,247		67	90	63	24	6	
CV	6		3	5	17	14	30	
LSD (.05)	420		3	6	15	5	2	

[1] Values within the same column followed by the same letter are not significantly different at P = .05; ns = non-significant.
[2] % TSMK = Percent total sound mature kernels.
[3] SdWt/100 = Weight of 100 SMK.
[4] ELK= % Kernels riding a 21.5/64-inch X 1-inch slotted screen for Virginia and 21/64-inch X 3/4-inch screen for runner and Spanish; MED=% Kernels riding a 18/64-inch screen but falling through a 21.5/64-inch or 21/64-inch screen; No.1=% Kernels riding a minimum grade screen (16/64-inch for runner and Spanish; 15/64 for Virginia) but falling through a 18/64-inch screen.
[5] Calculated based on peanut market-type contract price 2019. ELK bonus added for Virginias.
[6] Market Type.

Table 6. Yield, grade, average seed weight and value per acre for entries averaged across years at the Tillman County (White Farms, Davidson) peanut variety trial in 2018-2019.[1]

Entry	*Yield (lb/A)*	*% of Trial Average*	*Grade[2] (%TSMK)*	*SdWt/100[3] (g)*	*Value[4] ($/A)*
Runner[5]					
Georgia 09B	5,578 a	112	71 cd	59 de	1,040
Tamrun OL11	5,548 a	111	72 b-d	60 de	1,049
Webb	5,154 a	104	70 de	63 cd	947
ARSOK R92-13	5,130 ab	103	72 b-d	72 ab	970
Georgia 14N	5,130 ab	103	74 a-c	57 e	997
Lariat	5,021 a-c	101	76 a	63 cd	1,002
ARSOK R96-8	4,924 a-c	99	65 f	73 a	840
ARSOK R96-7	4,882 a-c	98	74 a-c	68 bc	948
ARSOK R93-10	4,876 a-c	98	73 a-d	64 cd	934
ARSOK R47A	4,815 bc	97	75 ab	67 bc	948
ARSOK R94-4	4,754 bc	95	70 de	67 bc	874
ARSOK R90-12	4,640 bc	94	71 cd	67 bc	865
Flavor Runner 458	4,283 c	86	68 de	48 f	765
Mean	4,979		72	64	
CV	16		4	8	
LSD (.05)	785		3	5	
Spanish[5]					
Span17	5,177	108	72 a	53 a	978
Tamnut OL06	5,063	105	69 ab	46 bc	917
OLé	5,001	104	68 ab	47 b	893
ARSOK S88-2	4,658	97	67 ab	44 c	819
AT98-99	4,525	94	69 ab	46 bc	820
Schubert	4,465	93	63 b	45 bc	738
Mean	4,815		68	47	
CV	19		8	5	
LSD (.05)	927 (ns)		5	2	
Virginia[5]					
Contender	5,532 a	108	70 ab	84 fg	1,074
VENUS	5,402 a	106	68 a-c	85 e-g	1,012
ACI351	5,366 a	105	63 d	90 d-f	948
NCEX17	5,310 ab	104	72 a	99 a-c	1,050
Jupiter	5,270 ab	103	69 a-c	93 c-e	1,005
Florida Fancy	5,197 ab	102	65 cd	65 h	933
NCEX7	5,191 ab	102	70 ab	103 a	1,015
Wynne	5,088 a-c	100	67 a-d	89 d-f	964
NCEX2	5,040 a-c	99	68 a-c	102 ab	961
NCEX20	5,034 a-c	99	70 ab	95 a-d	984
NCEX19	4,973 a-c	97	66 b-d	94 b-d	920
NCEX22	4,906 a-c	96	69 a-c	98 a-d	945
NCEX1	4,671 bc	91	66 b-d	93 c-e	859
Sullivan	4,519 c	88	70 ab	77 g	886
Mean	5,107		68	91	
CV	13		8	10	
LSD (.05)	646		5	9	

[1] Values within the same column followed by the same letter are not significantly different at P = .05; ns = non-significant.
[2] % TSMK = Percent total sound mature kernels.
[3] SdWt/100 = Weight of 100 SMK.
[4] Calculated based on peanut market-type contract price 2019. ELK bonus added for Virginias.
[5] Market Type.

Table 7. Yield, grade, average seed weight, seed size distribution and value per acre for entries averaged across all locations in the Oklahoma peanut variety trial in 2019.[1]

Entry	Yield (lb/A)	% of Trial Average	Grade[2] (%TSMK)	SdWt/100[3] (g)	ELK[4] (%)	MED[4] (%)	No.1[4] (%)	Value[5] ($/A)
Runner[6]								
Lariat	4,542 a	120	72 a	63 de	33 cd	44 b	11 b-d	777
Tamrun OL11	4,347 ab	114	72 ab	57 g	23 e	53 a	13 bc	743
ARSOK R47A	4,344 ab	114	69 a-d	63 d	33 cd	44 b	10 c-e	712
ARSOK R93-1	4,037 a-c	106	67 c-e	63 d	46 b	33 f-h	8 ef	642
ARSOK R91-2	4,009 a-d	106	67 c-e	67 b	44 b	38 d-f	7 fg	638
Georgia 09B	4,005 a-d	105	68 b-e	56 g	44 b	39 c-f	9 d-f	647
ARSOK R92-13	3,981 a-d	104	70 a-c	68 b	37 c	37 e-g	10 c-e	662
ARSOK R94-4	3,860 a-d	102	70 a-c	66 bc	47 b	32 gh	7 fg	642
ARSOK R96-8	3,819 b-d	101	64 f	71 a	64 a	23 i	6 g	580
ARSOK R93-10	3,803 b-d	100	70 a-c	60 ef	46 b	40 b-e	10 c-e	632
ARSOK R96-7	3,783 b-d	100	69 a-d	64 cd	48 b	30 h	7 fg	620
Webb	3,694 b-d	97	65 ef	60 f	32 cd	43 b-d	11 b-e	570
Flavor Runner 458	3,561 cd	94	66 d-f	45 i	11 f	50 a	23 a	558
Georgia 14N	3,428 cd	90	71 ab	52 h	32 cd	41 b-e	14 b	578
ARSOK R90-12	3,340 d	88	69 a-d	63 d	34 cd	42 b-e	10 c-e	547
ARSOK R96-3	2,229 e	59	56 g	60 ef	29 de	40 b-e	12 bc	296
Mean	3,799		68	61	37	39	11	
CV	23		9	5	20	17	1	30
LSD (0.05)	696		4	3	6		5	3
Spanish[1]								
AT98-99	4,070 a	111	68 a	46 cd	39 d	36 b	15 b	657
Span17	3,911 ab	106	68 a	49 b	51 bc	30 cd	10 de	632
OLé	3,874 ab	105	63 cd	46 c	53 b	29 d	9 e	580
ARSOK S96-5	3,682 a-c	100	67 ab	51 a	68 a	13 e	6 f	586
ARSOK S88-2	3,622 a-c	99	63 cd	43 e	47 c	33 c	13 cd	542
Schubert	3,351 bc	91	64 bc	44 de	30 e	44 a	19 a	509
Tamnut OL06	3,223 c	88	60 d	43 e	39 d	37 b	14 bc	459
Mean	3,676		65	46	47	32	12	
CV	21		7	5	14	12	25	
LSD (.05)	618		4	2	5	3	3	
Virginia[1]								
ACI 351	4,703 a	113	65 a-c	91 cd	64 a-d	24 c-e	5 b-d	853
NCEX20	4,388 ab	105	67 ab	91 cd	67 ab	19 fg	4 d	823
Jupiter	4,367 ab	104	66 a-c	82 e	55 e-g	26 cd	6 b-d	799
Contender	4,360 ab	104	67 ab	82 e	59 d-f	27 c	6 b-d	812
NCEX17	4,328 a-c	104	69 a	94 bc	68 ab	21 e-g	4 dd	835
VENUS	4,259 a-c	102	64 bc	75 f	51 g	37 a	7 bc	754
NCEX19	4,219 a-c	101	68 a	94 bc	67 ab	22 d-f	4 d	803
NCEX7	4,163 a-c	100	68 a	97 ab	67 ab	24 c-e	4 d	792
NCEX1	4,163 a-c	100	62 c	91 cd	60 c-e	25 c-e	7 bc	722
NCEX22	4,114 a-c	98	68 a	93 bc	66 a-c	19 fg	4 cd	782
NCEX2	4,090 a-c	97	67 ab	99 a	70 a	17 g	6 b-d	769
Wynne	3,912 bc	94	67 ab	88 d	63 b-d	24 c-e	6 b-d	731
Florida Fancy	3,795 bc	91	66 a-c	63 g	51 g	34 ab	9 a	691
Sullivan	3,642 c	87	67 ab	72 f	53 fg	32 b	8 ab	674
Mean	4,184		66	87	61	25	6	
CV	21		46	13	21	46		
LSD (.05)	713		45	7	4	2		

[1] Values within the same column followed by the same letter are not significantly different at P = .05; ns = non-significant.
[2] % TSMK = Percent total sound mature kernels.
[3] SdWt/100 = Weight of 100 SMK.
[4] ELK= % Kernels riding a 21.5/64-inch X 1-inch slotted screen for Virginia and 21/64-inch X 3/4-inch screen for runner and Spanish; MED=% Kernels riding a 18/64-inch screen but falling through a 21.5/64-inch or 21/64-inch screen; No.1=% Kernels riding a minimum grade screen (16/64-inch for runner and Spanish; 15/64 for Virginia) but falling through a 18/64-inch screen.
[5] Calculated based on peanut market-type contract price 2019. ELK bonus added for Virginias.
[6] Market Type.

Table 8. Yield, grade, average seed weight and value per acre for entries averaged across all locations and years in the Oklahoma peanut variety trial in 2018-2019.[1]

Entry	*Yield (lb/A)*	*% of Trial Average*	*Grade[2] (%TSMK)*	*SdWt/100[3] (g)*	*Value[4] ($/A)*
Runner[5]					
Tamrun OL11	5,312 a	111	74 a-c	61 e	934
Lariat	5,278 a	110	76 a	66 d	953
Georgia 09B	5,137 ab	107	72 b-d	60 ef	878
ARSOK R47A	4,959 a-c	103	73 a-c	67 cd	860
ARSOK R96-8	4,929 a-c	103	68 f	77 a	796
Webb	4,870 a-c	101	69 ef	68 cd	798
ARSOK R92-13	4,862 a-c	101	73 a-c	73 b	843
ARSOK R94-4	4,775 a-c	99	72 b-d	72 b	817
ARSOK R93-10	4,612 a-c	96	72 b-d	66 d	789
Georgia 14N	4,519 bc	94	75 ab	56 f	805
ARSOK R90-12	4,459 bc	93	72 b-d	67 cd	762
ARSOK R96-7	4,394 c	91	72 b-d	70 bc	751
Flavor Runner 458	4,342 c	90	70 d-f	50 g	722
Mean	4,803		72	66	
CV	27		7	11	
LSD (.05)	728		3	4	
Spanish[5]					
Span17	4,823	105	72 a	53 a	825
AT98-99	4,731	104	71 ab	46 bc	798
OLé	4,654	102	67 c	47 b	741
Tamrun OL06	4,590	100	68 bc	45 cd	741
Schubert	4,352	95	67 c	45 cd	693
ARSOK S88-2	4,316	94	68 bc	44 d	697
Mean	4,578		69	47	
CV	28		8	6	
LSD (.05)	751 (ns)		3	2	
Virginia[5]					
Contender	5,339 a	109	70 ab	87 gh	1,043
VENUS	5,167 ab	105	68 bc	83 hi	984
ACI351	5,092 ab	104	67 bc	96 d-f	953
NCEX17	5,086 ab	104	72 a	104 a-c	1,022
Jupiter	4,942 ab	101	69 a-c	91 fg	943
Wynne	4,931 ab	101	69 a-c	93 e-g	947
NCEX7	4,896 ab	100	70 ab	108 ab	957
NCEX2	4,862 ab	99	69 a-c	109 a	940
NCEX20	4,830 ab	99	70 ab	98 c-e	944
NCEX1	4,800 ab	98	66 c	102 b-d	883
Florida Fancy	4,768 ab	97	68 bc	70 j	894
NCEX19	4,731 ab	96	68 bc	101 cd	887
NCEX22	4,650 b	95	69 a-b	99 c-e	885
Sullivan	4,560 b	93	70 ab	79 j	880
Mean	4,909		69	94	
CV	23		8	13	
LSD (.05)	653		3	7	

[1] Values within the same column followed by the same letter are not significantly different at P = .05; ns = non-significant.
[2] % TSMK = Percent total sound mature kernels.
[3] SdWt/100 = Weight of 100 SMK.
[4] Calculated based on peanut market-type contract price 2019. ELK bonus added for Virginias.
[5] Market Type.

with an average grade of 67% TSMK. Statistical differences for yield and grade were reported. Numerically, entry Tamrun OL11 was the top performer, averaging 4,247 pounds per acre. Cultivars Lariat, Georgia 09B and several ARS advanced breeding lines were not statistically different from Tamrun OL11 with respect to yield. Breeding line ARSOK R96-3 had the poorest performance at 2,537 pounds per acre. Runner entry yields and grades were lower compared to past years.

Table 3 shows that statistical differences for yield and grade were also seen among Spanish entries, which averaged 3,051 pounds per acre and 65% TSMK. Cultivar AT 98-99 topped the entries in yield and grade at 3,727 pounds per acre and 67% TSMK.

Virginia entries averaged 5,247 pounds per acre and a grade of 67% TSMK. Significant differences in yield were noted among entries. Cultivar ACI351 had the highest yield at 4,368 pounds per acre, while the cultivar Sullivan had the lowest at 4,296 pounds per acre. Grade differences were significant among entries and ranged from 60% to 70% TSMK.

Table 4 contains 2018-2019 two-year averages in Custer County. No statistical differences were seen among runner entries for yield, with the average yield being 4,500 pounds per acre. Among runner entries, Tamrun OL11 was the highest in average yield at 5,294 pounds per acre, followed closely by cultivars Georgia 09B and Lariat, yielding 5,130 and 5,068 pounds per acre, respectively. Breeding line ARSOK R90-12 had the lowest average yield during the two-year period at 4,029 pounds per acre.

Significant differences were seen among Spanish over the two-year period where the average yield was 4,062 pounds per acre and average grade was 68% TSMK. As is expected by small-seeded runner type plants, yields were highest for cultivars AT98-99 and Span17, which averaged 4,894 and 4,440 pounds per acre, respectively. Breeding line ARSOK S88-2 had the lowest average yield at 3,473 pounds per acre.

No statistical differences were reported for Virginia-type entries in 2018-2019 for average yield and grade. Numerically, Contender was the top yielder at 5,137 pounds per acre. Breeding line NCEX17 had the highest average grade for 2018-2019 at 71% TSMK.

2019 Tillman County Variety Trial

Location: Davidson, OK
White Farms
Date Planted: May 15, 2019
Date Dug: Nov. 4, 2019
Date Threshed: Nov. 5, 2019

The trial was planted May 15, 2019, into a conventional till seedbed and managed for foliar and soil-borne disease throughout the season. Table 5 shows the 2019 yield and grade data from Tillman County. Statistical differences were seen among entries. Average yield and grade for the runner test was 4,623 pounds per acre and 69% TSMK. ARSOK R47A had the top yield and grade at 5,421 pounds per acre and 74% TSMK. ARSOK R96-3 was the poorest performer at 1,839 pounds per acre and 53% TSMK.

Spanish entries performed well in Tillman County in 2019, with the average yield being 4,402 pounds per acre and an average grade of 65% TSMK. Span17 was the highest in yield at 5,216 pounds per acre and a grade of 69% TMSK. Tamnut OL06 was poorest in yield at 3,787 pounds per acre and a grade of 62%TMSK.

Average yield and grade in the Virginia-type test was lower than in past years at 4,184 pounds per acre and 66% TSMK. The top yielder was cultivar ACI351 at 5,833 pounds per acre and a grade of 62% TSMK. Grades of Virginia-

type entries ranged from 62 to 70% TSMK and statistical differences were found.

The performance of entries during a two-year period in Tillman County is shown in Table 6. The top performer among runner types was cultivar Georgia 09B which averaged 5,578 pounds per acre and a grade of 72% TSMK. Statistical differences were noted among runner entry yield and grade. Flavor Runner 458 was the poorest performer in two years at 4,283 pounds per acre.

Although no significant differences were seen for yield among Spanish entries, numerically, the top entry over the two-year period was Span17, averaging 5,177 pounds per acre and 72% TSMK. Schubert was the lowest yielder at 4,465 pounds per acre and 64% TSMK.

During the 2018-2019 season, Virginia-types averaged 5,106 pounds per acre in Tillman County with the top performer numerically being cultivar Contender at 5,532 pounds per acre and 70% TSMK. Cultivar Sullivan was the poorest performer over the two-year period averaging 4,519 pounds per acre and 70% TSMK.

Performance Across Locations

Table 7 includes yield and grade data averaged across locations for 2019. Statistical differences for yield and grade were reported for all market types. Among the runner types tested, cultivars Lariat, Tamrun OL11 and breeding line ARSOK R47A were the top yielders, averaging 4,542; 4,347 and 4,344 pounds per acre, respectively. The top yielding Spanish entry across locations was AT98-99 at 4,070 pounds per acre. Tamnut OL06 performed the worst across all locations in 2019, averaging 3,223 pounds per acre. Across locations in 2019, the top Virginia-type entry tested was cultivar ACI351 at 4,703 pounds per acre and 65% TSMK.

Table 8 shows peanut yields and grades averaged across years (2018-2019) and all locations in Oklahoma, along with estimated revenue for each entry. Averaged over years and across locations, the top performing runner entries were cultivars Tamrun OL11 and Lariat with yields of 5,312 and 5,278 pounds per acre, respectively. Flavor Runner 458 averaged 4,342 pounds per acre, making it the poorest performer overall. There were no significant differences noted in yield among Spanish entries over the 2018-2019 period, but the top yielders were the small-seeded runner types Span17 and AT98-99. Significant differences were noted among Spanish entry grades with Span17 and AT98-99 having the highest at 72% and 71% TSMK, respectively. There were significant differences in yield and grade among Virginia entries over the two-year period. Cultivar Contender was the leader in yield, averaging 5,339 pounds per acre, and breeding line NCEX17 topped the entries in average grade at 72% TSMK

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Integrated Management of Peanut Diseases

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2019 progress made possible through OPC and NPB support

- **Levels of soilborne diseases such as Sclerotinia blight, southern blight and pod rot were low in 2019.**
- **A five-week period in July and August with no rain delayed foliar disease development, but fungicide programs increased yields from 450 to 1,230 pounds per acre and crop values from $100 to $280 per acre.**
- **In one trial where web blotch developed to low levels, all treatments except the strobilurin (mode of action group 11) fungicides Abound® and Headline® resulted in good control.**
- **The runner varieties Lariat and Georgia 09B and the Virginia variety Contender were resistant to black hull, while Spanish and other Virginia varieties were susceptible. Black hull did not influence yield but reduced in-shell peanut quality.**
- **The newly registered fungicides Elatus®, Lucento®, Miravis®, Provisol®, Revytek® and Veltyma®; and the older premium fungicides Abound®, Priaxor® and Provost® continued to provide good to excellent disease control, but yield increases above Bravo® alone were less that in previous years when southern blight and or web blotch were more severe.**

Field trials that addressed the management of important peanut diseases in Oklahoma were completed in 2019. The management strategies that were evaluated included chemical control and disease-resistant varieties. Efforts were made to develop and demonstrate a range of input levels for the fungicide programs. The diseases studied included early leaf spot, web blotch, southern blight and Sclerotinia blight. The excellent cooperation of Bobby Weidenmaier and the staff at the Caddo Research Station is greatly appreciated. Additional funding for the trials was provided by BASF, FMC, Syngenta and Valent.

Results from 2019 are summarized in this report. In interpreting the results, small differences in treatment values should not be overemphasized. Statistical analysis at the 95% confidence level is applied to all the trial data. Unless values are statistically different (followed by different letters), little confidence can be placed in the superiority of one treatment or variety over another.

Weather conditions were variable during the peanut-growing season as conditions were wet early, dry during mid-season and wet with a very early freeze in the fall. At the Caddo Research Station, rainfall during the cropping period (May 16 through Oct. 16) totaled 7.16 inches for May, 2.91 inches for June, 1.61 inches for July, 4.70 inches for August, 4.84 inches for September and

0.13 inches for October. Plots received 13 applications of sprinkler irrigation at 0.25 to 1 inch per application that totaled 10.0 inches of water. Rainfall was nearly 7 inches above normal (30-year average) during the cropping season. However, rainfall was 2.0 inches below normal during June and July. Average daily temperatures were from 2 to 3 degrees F below normal each month except for September, which was 4 F above normal. Trials on Sclerotinia blight were conducted on a commercial farm near Hydro. Rainfall from the nearby Oklahoma Mesonet station in Weatherford during the cropping period (May 17 through Oct. 23) totaled 7.28 inches for May, 4.12 inches for June, 3.34 inches for July, 5.1 inches for August, 5.82 inches for September and 0.09 inches for October. Plots received sprinkler irrigation as needed to promote crop development. Rainfall was nearly 10 inches above normal (30-year average) during the cropping season. Average daily temperatures were from 2 to 5 degrees F below normal each month from May through July, nearly normal for August, and was nearly 5 degrees F above normal for September.

The dry conditions in June and July generally delayed foliar disease development and promoted dry weather pests such as two-spotted spider mites. Sclerotinia blight was only a sporadic problem and pod rot was a problem only where very susceptible varieties were grown. The most damaging factor to the 2019 crop was an early freeze on Oct. 12, followed by a second cold snap at the end of the month. Temperatures dropped to 17 degrees F causing extensive freeze damage on peanuts dug after the first freeze. Plots were thrashed before the second freeze so the weather had minimal impact on the trial results reported here.

Sclerotinia blight

Peanut variety and breeding line responses to fungicide for control of Sclerotinia blight

The responses of commercially available peanut varieties and a breeding line to a fungicide program with Omega® for control of Sclerotinia blight was evaluated. The trial was conducted on a commercial farm near Hydro in a field previously cropped to cotton. Entries were planted on May 17. Treatments were applied on a 28-day schedule beginning Aug. 2. Plots were dug and inverted on Oct. 23, windrowed for five days and harvested with a stationary thrasher. Grade was determined from a sample taken from each plot.

Despite the favorable conditions for development of Sclerotinia blight during August and September, the disease did not develop. Black hull (*Thielaviopsis basicola*), which causes a superficial black discoloration of pods that resembles pod rot, was apparent after digging and reached severe levels for some entries. Fungicide treatment had no effect on black hull levels but entries differed in reaction to black hull (Table 9). Spanish and Virginia entries except Contender were susceptible to black hull while Contender and the runner types were resistant. Because Sclerotinia blight did not develop, fungicide treatment had no effect on yield, grade or crop value. Yield and grades were generally high. Lariat, Contender, Jupiter and ACI 351 had the highest yields. Grades were highest for Lariat and Georgia 09B. Crop values were highest for the Virginia entries because of the ELK premiums and higher contract prices.

Evaluation of fungicide programs for control of Sclerotinia blight on runner-type peanuts

Fungicides registered for use on peanuts and the experimental fungicide

Table 9. Disease and yield responses of peanut varieties and breeding lines for control of Sclerotinia blight near Hydro.

	Treatment and rate/A (timing)[1]		
Entry (market type)[2]	*Omega 1.5 pt (1,2)*	*Non-treated check*	*Average[3]*
	Black Hull (%) - October 23		
Lariat (R)	0.9	0.6	0.8 d[5]
Contender (V)	3.1	4.1	3.6 cd
Olé (S)	19.4	16.6	18.0 b
Jupiter (V)	37.2	31.3	34.2 a
Span 17 (S)	16.9	18.8	17.8 b
Georgia 09B (R)	0.0	0.9	0.5 d
ACI 351 (V)	13.4	10.0	11.7 bc
ARSOK-R96-8 (R)	3.4	3.4	3.4 cd
Avgerage[4]	11.8 a[5]	10.7 a	
	Yield (lb/A)		
Lariat (R)	6,658	6,357	6,507 ab[5]
Contender (V)	6,631	7,074	6,853 a
Olé (S)	5,137	4,790	4,964 d
Jupiter (V)	7,083	6,667	6,875 a
Span 17 (S)	6,383	6,118	6,251 bc
Georgia 09B (R)	5,861	6,038	5,950 c
ACI 351 (V)	6,454	6,445	6,450 ab
ARSOK-R96-8 (R)	6,286	6,038	6,162 bc
Avgerage[4]	6,312 a[5]	6,191 a	
	Grade (TSMK%)		
Lariat (R)	75.5	75.0	75.3 a[5]
Contender (V)	73.3	72.3	72.8 b
Olé (S)	69.4	70.3	69.9 c
Jupiter (V)	70.0	70.0	70.0 c
Span 17 (S)	75.3	74.3	74.8 c
Georgia 09B (R)	76.0	75.8	75.9 a
ACI 351 (V)	69.3	71.3	70.3 c
ARSOK-R96-8 (R)	71.0	67.8	69.4 c
Avgerage[4]	72.5 a[5]	72.1 a	
	Value ($/A)[6]		
Lariat (R)	1,643	1,559	1,601 c[5]
Contender (V)	1,995	2,111	2,053 a
Olé (S)	1,181	1,114	1,147 f
Jupiter (V)	2,037	1,918	1,978 ab
Span 17 (S)	1,588	1,505	1,546 cd
Georgia 09B (R)	1,446	1,491	1,469 de
ACI 351 (V)	1,796	1,899	1,848 b
ARSOK-R96-8 (R)	1,446	1,353	1,387 e
Avgerage[4]	1,641 a[5]	1,616 a	

[1] Timings 1 and 2 correspond to preventive fungicide applications on Aug. 2 and Aug. 28, respectively.
[2] R=runner, V=Virginia, S=Spanish.
[3] Averaged over fungicide treatment.
[4] Averaged over entry.
[5] Values in a column or row followed by the same letter are not statistically different at P=0.05.
[6] Based on a contract price (not including a seed bonus) of $525 per ton for Virginia types, $475 per ton for Spanish types, and $475 per ton for runner types. ELK was included in the value of the Virginia types.

Excalia™ were evaluated for control of Sclerotinia blight. The trial was conducted on a commercial farm near Hydro in field previously cropped to cotton. The variety Georgia 09B was planted May 17. Fungicides were applied on 14- or 28-day schedules beginning Aug. 2. Plots were dug and inverted on Oct. 23, windrowed for five days and harvested with a stationary thrasher. Grade was determined from four samples bulked over treatment by each replication.

Despite the favorable conditions for development of Sclerotinia blight during August and September, the disease did not develop (Table 10). Yields and crop values were high, but because of the lack of disease development, treatment effects on yield were not statistically significant.

Foliar Diseases

Evaluation of fungicide programs for control of foliar diseases on Spanish-type peanuts. Fungicides for control of early leaf spot and web blotch were evaluated at the Caddo Research Station in a field previously cropped to peanuts. The variety Olé was planted on May 16. Fungicides were applied on a 14-day schedule or according to the Mesonet Leaf Spot Advisor Program (www.mesonet.org) beginning July 3. Plots were dug and inverted on Oct. 16, windrowed for four days and harvested with a combine equipped with a sacker. Grade was determined from four samples bulked over treatments by replication.

The dry weather in June and July delayed the leaf spot development. Leaf spot appeared in September, reaching nearly 50% defoliation by harvest, a moderate level of disease compared to previous trials at this site (Table 11). All treatments reduced levels of leaf spot and defoliation compared to the non-treated check. Levels of defoliation were 5% or less for all treatments. Southern blight also appeared in September but only reached low levels (less than 1%) and treatment effects on southern blight were not statistically significant. All treatments had higher yields and crop values compared to the non-treated check. The Bravo®/Priaxor®/Folicur® + Bravo® program had the highest yield. Yield and crop value responses relative to the non-treated check ranged from 443 to 922 pounds per acre, and $101 to $209 per acre respectively.

Table 10. Evaluation of fungicides for control of Sclerotinia blight on runner (Georgia 09B) peanuts at Hydro.

Treatment and rate/A (timing)[1]	*Sclerotinia blight (%)*	*Yield (lb/A)*	*Value ($/A)*[2]
Omega® 4F 1 pt (1,3)	0.0	7,214 a[3]	1,747 a
Endura® 70WG 8 oz (1,3)	0.0	6,649 a	1,610 a
Excalia™ 2.84F 2 fl oz (1,2,3)	0.0	5,785 a	1,401 a
Excalia™ 2.84F 2.65 fl oz (1,2,3)	0.0	6,188 a	1,499 a
Quash® 50WG 2.5 oz (1,2,3)	0.0	6,834 a	1,655 a
Elatus® 45WG 7.3 fl oz (1) Miravis® 3.4 fl oz (3)	0.0	5,739 a	1,390 a
Priaxor® 4.17F 8 fl oz (1,2,3)	0.0	6,246 a	1,513 a
Non-treated check	0.0	6,119 a	1,482 a
P>F[4]	-	0.18	0.18

[1] 1 to 3 correspond to the spray dates of 1 = Aug. 2, 2 = Aug. 14 and 3 = Aug. 28.
[2] Based on an average grade of 74% TSMK and a contract price of $475 per ton.
[3] Values in a column followed by the same letter are not statistically different at P=0.05.
[4] Probability of a significant treatment effect.

Table 11. Evaluation of fungicide programs for control of foliar diseases on Spanish (Olé) peanuts at the Caddo Research Station.

Treatment and rate/A (timing)[1]	*Early leaf spot (%)*	*Defoliation (%)*	*Southern blight (%)*	*Yield (lb/A)*	*Value ($/A)*[2]
Non-treated check	85.9 a[3]	47.5 a	0.0 a	3,412 c	773 c
Bravo® 6F 1.5 pt (1,5) Priaxor® 4.17F 8 fl oz (2,4) Bravo® 6F 1.5 pt + Folicur® 3.6F 7.2 fl oz (3)	14.6 cd	0.0 b	0.0 a	4,334 a	982 a
Bravo® 6F 1.5 pt (1,5) Veltyma® 3.3F 8 fl oz (2,4) Bravo® 6F 1.5 pt + Folicur® 3.6F 7.2 fl oz (3)	7.9 d	0.0 b	0.5 a	3,906 b	885 b
Bravo® 6F 1.5 pt (1,5) Provysol ®3.3F 5 fl oz + Priaxor® 4.17F 6 fl oz (2,4) Bravo® 6F 1.5 pt + Folicur® 3.6F 7.2 fl oz (3)	12.1 cd	0.0 b	0.0 a	3,920 b	888 b
Bravo® 6F 1.5 pt (1,5) Revytek® 3.3F 12 fl oz (2,4) Bravo® 6F 1.5 pt + Folicur® 3.6F 7.2 fl oz (3)	13.4 cd	0.4 b	0.5 a	4,000 ab	907 ab
Bravo® 6F 1.5 pt (1,5) Priaxor® 4.17F 8 fl oz (2,4) Bravo® 6F 1.5 pt + Provysol® 3.3F 5 fl oz (3)	5.4 d	0.0 b	0.5 a	4,051 ab	918 ab
Bravo® 6F 1.5 pt (1,5) Priaxor® 4.17F 8 fl oz (2,4) Bravo® 6F 1.5 pt + Provysol® 3.3F 7 fl oz (3)	4.7 d	0.0 b	0.0 a	4,022 ab	911 ab
Alto® 0.83F 5.5 fl oz (1,3,5) Miravis® 1.67F 3.4 fl oz (2,4)	2.9 d	0.0 b	0.8 a	3,884 b	880 b
Alto® 0.83F 5.5 fl oz (A1,A3) Miravis® 1.67F 3.4 fl oz (A2)	32.1 b	1.3 b	0.0 a	3,870 b	877 b
Bravo® 6F 1.5 pt (1-5)	25.4 bc	4.6 b	0.3 a	3,855 b	874 b
P>F[4]	<0.01	<0.01	0.59	<0.01	<0.01

[1] 1 to 5 correspond to the spray dates of 1 = July 3, 2 = July 17, 3 = July 31, 4 = Aug. 14, = Aug. 28 made according to the 14-day program and A1 to A3 correspond to the spray dates of A1 = July 3, A2 = Aug. 14, A3 = Aug. 28 made according to the weather-based program.

[2] Based on an average grade of 68% TSMK and a contract price of $475 per ton.

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

[4] Probability of a significant treatment effect.

Foliar Diseases and Southern Blight

Evaluation of fungicide programs for control of early leaf spot and southern blight on Spanish-type peanuts, Trial 1

Spray programs with registered (Abound®, Elatus®, Folicur®, Miravis® and Priaxor®) and experimental (Escalia™) fungicides for control of foliar diseases and southern blight were evaluated at the Caddo Research Station in a field previously cropped to peanuts. The variety Olé was planted May 16. Treatments were applied on a 14-day schedule beginning July 3. Plots were inoculated with the southern blight fungus (*Sclerotium rolfsii*) by sprinkling millet seed colonized by the fungus along the center two rows of each plot at 50 ml per plot on Aug. 15. Plots were dug and inverted on Oct. 16, windrowed for four days and harvested with a combine equipped with a sacker. Grade was determined from four samples bulked over treatments by replication.

The dry weather in June and July delayed leaf spot development. Leaf spot appeared in September reaching nearly 50% defoliation by harvest, a moderate level of disease compared to previous trials at this site (Table 12). All treatments reduced levels of leaf spot and defoliation compared to the non-treated check. Levels of defoliation were 5% or less for all treatments except Folicur. Southern blight also appeared in September but only reached low levels (less than 5%) and treatment effects on southern blight were not statistically significant. All treatments had higher yields and crop values compared to the non-treated check. Yield and crop value responses relative to the non-treated check ranged from 508 to 1,220 pounds per acre, and $118 to $276 per acre, respectively.

Evaluation of fungicide programs for control of early leaf spot and southern blight on Spanish-type peanuts, Trial 2

The newly registered fungicide Lucento® was evaluated at various timings with Bravo® and Folicur® for control of foliar diseases and southern blight. The trial was conducted at the Caddo Research Station in a field previously cropped to peanuts. The variety Olé was planted on May 16. Treatments were applied on a 14-day schedule beginning July 3 for the five-spray programs and July 17 for the four-spray programs. Plots were inoculated with the southern blight fungus (*Sclerotium rolfsii*) by sprinkling millet seed colonized by the fungus along the center two rows of each plot at 50 ml per plot on July 31. Plots were dug and inverted on Oct. 16, windrowed for four days and harvested with a combine equipped with a sacker. Grade was determined from the average of four samples bulked over treatments by replication.

The dry weather in June and July delayed the leaf spot development. Leaf spot appeared in September reaching nearly 50% defoliation by harvest, a moderate level of disease compared to previous trials at this site (Table 5) All treatments reduced levels of leaf spot and defoliation compared to the non-treated check. Treatments that received five sprays generally had lower levels of leaf spot than the four-spray programs. However, defoliation was 5% or less for all treatments except the four-spray programs of Bravo® alone and the Lucento®/Bravo®/Folicur® program ending with Folicur®. Southern blight also appeared in September but only reached low levels (less than 5%) despite

Table 12. Evaluation of fungicide programs for control of early leaf spot and southern blight on Spanish (Olé) peanuts at the Caddo Research Station, Trial 1.

Treatment and rate/A (timing)[1]	*Early leaf spot (%)*	*Defoliation (%)*	*Southern blight (%)*	*Yield (lb/A)*	*Value ($/A)*[2]
Non-treated check	93.7 a[3]	47.5 a	0.8 a	2,686 c	609 c
Bravo® 6F 1.5 pt (1-5)	26.3 bc	0.8 c	3.8 a	3,194 b	724 b
Bravo® 6F 1.5 pt (1,3,5) Elatus® 45WG 7.3 oz (2,4)	12.1 def	0.0 c	1.8 a	3,906 a	885 a
Bravo® 6F 1.5 pt (1,3,5) Bravo® 6F 1.5 pt + Excalia® 2.8F 2 fl oz (2,4)	25.8 bcd	1.7 bc	4.2 a	3,812 a	864 a
Bravo® 6F 1.5 pt (1,3,5) Bravo® 6F 1.5 pt + Excalia® 2.8F 4 fl oz (2,4)	18.9 cde	0.0 c	3.3 a	3,753 a	851 a
Alto® 0.83F 5.5 fl oz + Bravo® 6F 1.5 pt (1) Elatus® 45WG 7.3 oz + Miravis® 1.67F 3.4 fl oz (2,4) Bravo® 6F 1.5 pt (5)	2.1 f	0.0 c	3.3 a	3,782 a	857 a
Alto® 0.83F 5.5 fl oz + Bravo® 6F 1.5 pt (1) Miravis® 1.67F 3.4 fl oz (2,4) Bravo® 6F 1.5 pt (5)	0.0 f	0.0 c	3.0 a	3,311 b	751 b
Bravo® 6F 1.5 pt (1,4,5) Priaxor® 4.17F 8 fl oz (2,3)	2.9 d	0.0 c	2.5 a	3,746 a	849 a
Bravo® 6F 1.5 pt (1,3,5) Abound® 2.08F 18.5 fl oz (2,4)	7.5 ef	0.0 c	3.3 a	3,862 a	875 a
Bravo® 6F 1.5 pt (1,5) Folicur® 3.6F 7.2 fl oz (2,3,4)	35.4 b	8.4 b	3.3 a	3,376 b	765 b
P>F[4]	<0.01	<0.01	0.29	<0.01	<0.01

[1] 1 to 5 correspond to the spray dates of 1 = July 3, 2 = July 17, 3 = July 31, 4 = Aug. 14, 5 = Aug. 28.
[2] Based on an average grade of 68% TSMK and a contract price of $475 per ton.
[3] Values in a column followed by the same letter are not statistically different at P=0.05.
[4] Probability of a significant treatment effect.

inoculation. Treatment effects on levels of southern blight were not statistically significant. All treatments had higher yields and crop values compared to the non-treated check. Yield and crop value responses relative to the non-treated check ranged from 646 to 1,154 pounds per acre, and $145 to $258 per acre, respectively.

Evaluation of fungicide programs for control of foliar diseases and southern blight on Spanish-type (Olé) peanuts, Trial 3

Spray programs with the newly registered fungicide Lucento® were compared to registered alternatives for control of foliar diseases and southern blight. The trial was conducted at the Caddo Research Station in a field previously cropped to peanuts. The variety Olé was planted on May 16. Treatments were applied on a 14-day schedule beginning July 3. Plots were inoculated with the southern blight fungus (*Sclerotium rolfsii*) by sprinkling millet seed colonized by the fungus along the center two rows of each plot at 50 ml per plot on July 31. Plots were dug and inverted on Oct. 16, windrowed for four days and harvested with a combine equipped with a sacker. Pods were dried and cleaned prior to weighing. Grade was determined from the average of four samples bulked over treatments by replication.

The dry weather in June and July delayed the leaf spot development. Leaf spot appeared in September reaching over 75% defoliation by harvest, a moderate level of disease compared to previous trials at this site (Table 13). All treatments reduced levels of leaf spot and defoliation compared to the non-treated check. Lucento® programs that ended with an application of Bravo® provided the best leaf spot control. Web blotch appeared in October and was highest for Headline® and Abound® treatments. Defoliation levels were low (<10%) for all treatments except the Abound® program. Southern blight also appeared in September but only reached low levels (less than 5%) despite inoculation. Elatus® and Abound® programs had the lowest stem rot. All treatments had higher yields and crop values compared to the non-treated check. Yield and crop value responses relative to the non-treated check ranged from 465 to 1,235 pounds per acre, and $105 to $280 per acre, respectively. None of the treatments caused phytotoxicity symptoms.

Table 13. Evaluation of fungicide programs for control of early leaf spot and southern blight on Spanish (Olé) peanuts at the Caddo Research Station, Trial 2.

Treatment and rate/A (timing)[1]	*Early leaf spot (%)*	*Defoliation (%)*	*Southern blight (%)*	*Yield (lb/A)*	*Value ($/A)*[2]
Non-treated check	99.6 a[3]	72.5 a	0.8 a	2,657 d	593 d
Bravo® 6F 1.5 pt (1-5)	50.0 cd	0.8 c	3.8 a	3,390 bc	757 bc
Lucento® 4.17F 5.5 fl oz (1,3) Bravo® 6F 1.5 pt (2,4,5)	12.9 h	0.4 d	1.8 a	3,811 a	851 a
Bravo® 6F 1.5 pt (1,3,5) Lucento® 4.17F 5.5 fl oz (2,4)	16.7 gh	0.0 d	4.2 a	3,492 bc	780 bc
Bravo® 6F 1.5 pt (1,2,4) Lucento® 4.17F 5.5 fl oz (3,5)	25.8 e-h	0.8 d	3.3 a	3,521 bc	786 bc
Lucento® 4.17F 5.5 fl oz (1,3) Bravo® 6F 1.5 pt (2,5) Folicur® 3.6F 7.2 fl oz (4)	25.0 e-h	0.4 d	3.3 a	3,550 abc	793 abc
Bravo® 6F 1.5 pt (1,3) Lucento® 4.17F 5.5 fl oz (2,4) Folicur® 3.6F 7.2 fl oz (5)	41.7 de	0.0 c	3.0 a	3,311 c	739 c
Bravo® 6F 1.5 pt (1,2) Lucento® 4.17F 5.5 fl oz (3,5) Folicur® 3.6F 7.2 fl oz (4)	16.7 gh	0.8 d	2.5 a	3,615 ab	808 ab
Bravo® 6F 1.5 pt (2-5)	71.7 b	22.1 b	3.3 a	3,340 bc	746 bc
Lucento® 4.17F 5.5 fl oz (2,4) Bravo® 6F 1.5 pt (3,5)	23.8 fgh	1.7 d	3.3 a	3,550 abc	793 abc
Bravo® 6F 1.5 pt (2,4) Lucento® 4.17F 5.5 fl oz (3,5)	40.8 def	4.6 cd	1.5 a	3,478 bc	777 bc
Lucento® 4.17F 5.5 fl oz (2,4) Bravo® 6F 1.5 pt (3) Folicur® 3.6F 7.2 fl oz (5)	60.0 bc	11.6 c	2.3 a	3,303 c	738 c
Bravo® 6F 1.5 pt (2) Lucento® 4.17F 5.5 fl oz (3,5) Folicur® 3.6F 7.2 fl oz (4)	32.5 d-g	1.7 d	2.8 a	3,419 bc	764 bc
P>F[4]	<0.01	<0.01	<0.33	<0.01	<0.01

[1] 1 to 5 correspond to the spray dates of 1 = July 3 , 2 = July 17, 3 = July 31, 4 = August 14, 5 = August 28.
[2] Based on an average grade of 67% TSMK and a contract price of $475 per ton.
[3] Values in a column followed by the same letter are not statistically different at P=0.05.
[4] Probability of a significant treatment effect.

Table 14. Evaluation of fungicide programs for control of early leaf spot and southern blight on Spanish (Olé) peanuts at the Caddo Research Station, Trial 3.

Treatment and rate/A (timing)[1]	*Early leaf spot (%)*	*Web blotch (%)*	*Defoliation (%)*	*Southern blight (%)*	*Yield (lb/A)*	*Value ($/A)*[2]
Non-treated check	100.0 a[3]	0.0 c	76.6 a	3.0 a	2,715 e	613 e
Bravo® 6F 1.5 pt (1-5)	52.5 c	3.8 c	6.6 bcd	3.8 a	3,507 bc	791 bc
Bravo® 6F 1.5 pt (1,3,5) Folicur® 3.6F 7.2 fl oz (2,4)	45.8 cd	3.0 c	5.9 cd	3.0 a	3,441 cd	777 cd
Lucento® 4.17F 5.5 fl oz (1,3) Bravo® 6F 1.5 pt (2,4,5)	17.5 ef	1.3 c	0.0 d	4.2 a	3,681 abc	831 abc
Bravo® 6F 1.5 pt (1,3,5) Lucento® 4.17F 5.5 fl oz (2,4)	10.0 f	0.0 c	0.0 d	1.3 abc	3,811 a	860 a
Bravo® 6F 1.5 pt (1,5) Lucento® 4.17F 5.5 fl oz (2,4) Topguard® EQ 4.3F 8 fl oz (3)	12.9 ef	0.0 c	0.0 d	2.3 ab	3,746 ab	845 ab
Bravo® 6F 1.5 pt (1) Lucento® 4.17F 5.5 fl oz (2,4) Folicur® 3.6F 7.2 fl oz (3,5)	24.2 ef	2.5 c	0.4 d	1.3 abc	3,761 ab	849 ab
Bravo® 6F 1.5 pt (1) Priaxor® 4.17F 8 fl (2,4) Folicur® 3.6F 7.2 fl oz (3,5)	30.4 de	4.3 c	0.4 d	1.0 bc	3,957 a	893 a
Bravo® 6F 1.5 pt (1) Headline® 2.08F 9 fl oz (2,4) Folicur® 3.6F 7.2 fl oz (3,5)	55.0 c	22.5 a	1.2 d	1.5 abc	3,950 a	891 a
Bravo® 6F 1.5 pt (1) Provost® 3.6F 10.7 fl oz (2,4) Folicur® 3.6F 7.2 fl oz (3,5)	62.7 bc	2.5 c	9.6 bc	1.3 abc	3,180 d	718 d
Bravo® 6F 1.5 pt (1) Elatus® 45WG 7.3 fl oz (2,4) Folicur® 3.6F 7.2 fl oz (3,5)	59.8 bc	4.0 c	9.2 bc	0.0 c	3,862 a	872 a
Bravo® 6F 1.5 pt (1) Abound® 2.08F 18.5 fl oz (2,4) Folicur® 3.6F 7.2 fl oz (3,5)	74.2 b	12.5 b	12.9 b	0.0 c	3,855 a	870 a
P>F[4]	<0.01	<0.01	<0.01	0.03	<0.01	<0.01

[1] 1 to 5 correspond to the spray dates of 1 = July 3, 2 = July 17, 3 = July 31, 4 = August 14, 5 = August 28.
[2] Based on an average grade of 67% TSMK and a contract price of $475 per ton.
[3] Values in a column followed by the same letter are not statistically different at P=0.05.
[4] Probability of a significant treatment effect.

Weed Management in Oklahoma Peanut

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Introduction

Weeds are a major production concern for peanut producers throughout Oklahoma. Weeds compete with the peanut crop for sunlight, moisture and nutrients throughout the growing season. Weed management programs are based on the weed species present, however, other factors such as soil type, pH, organic matter and rotational crops must all be considered when making a herbicide recommendation.

The introduction of herbicide technologies like Cadre® and Roundup® revolutionized weed control in many crops. The relative effectiveness and simplicity of these herbicide systems, led many growers to rely solely on one herbicide to control weeds. Herbicide resistance has reduced the effectiveness of many herbicides. Therefore, weed management systems evaluating combinations of herbicides must be evaluated to determine the most effective and economical weed management program. Weed management systems will be investigated to enhance peanut production in Oklahoma.

Materials and Methods

Herbicide trials were established at the Oklahoma State University Caddo Research Station near Fort Cobb, Oklahoma. The Virginia peanut variety Wynne was planted May 15, 2019. All preemergence treatments for all trials were applied immediately after planting. The first trial investigated weed control with Anthem® Flex applied preemergence, cracking and postemergence. Anthem® Flex rates varied from 1.5 to 3.5 fluid ounces per acre. The second trial investigated various weed management programs in peanut. These included PRE applications of EverpreX®, Outlook®, Prowl® H2O, Valor® and Warrant®. These were followed with a Cracking application of either Gramoxone® + Zidua® + Agridex® or Gramoxone® + Storm® + Agridex®. All of these were then followed with a POST application of either EverpreX® + Ultra Blazer® + 2,4-DB + Agridex® or Cadre® + 2,4-DB + Induce®. The third trial investigated peanut tolerance to Zidua® applied at three POST applications: Cracking, Early POST and POST. Zidua® was applied at two rates: 2.5 and 3.5 fluid ounces per acre at each of the three application timings. The final study evaluated the response of peanut to multiple exposures to dicamba and glyphosate. Two rates of Xtendimax® + Roundup® Powermax (0.22 fluid ounces per acre + 0.32 fluid ounces per acre or 0.44 fluid ounces per acre + 0.64 fluid ounces per acre) were applied. These two rates were applied at either 30 + 60 DAP and 30 + 60 + 90 DAP. All trials were evaluated for injury and/or weed control.

Results and Discussion

In the Anthem® Flex trial, the only treatments that controlled Palmer amaranth late season over 95% was Prow® H2O + Valor® PRE followed by Cadre® + Dual Magnum® + Induce®

or Prowl® H2O + Anthem® Flex PRE followed by Gramoxone® + Anthem® Flex + Induce® followed by Cadre® + Induce®. Carpetweed was controlled 100% with all Anthem® Flex combinations.

In the weed management trial, all PRE programs that included EverpreX® or Valor® controlled Palmer amaranth at least 99% late season. The only treatments that controlled Texas panicum at least 99% were those that included Cadre® applied POST. Ivyleaf morningglory control was at least 99% regardless of PRE or POST program. The only treatments that yielded more than 5,000 pounds per acre were when Valor PRE was followed by Gramoxone® + Zidua® early POST and EverpreX® + Ultra Blazer® + 2,4-DB POST or Cadre® + 2,4-DB POST or when Outlook® PRE was followed by Gramoxone® + Zidua® early POST and Cadre® + 2,4-DB POST.

No peanut stand reduction occurred with any application timing or rate of Zidua®. Visual peanut injury was less than 3% with all application timing and rates of Zidua®. There were no effects on peanut yield with any of the Zidua® application timings or rates when compared to the weed-free check.

Peanut exposure to Roundup® + Xtendimax® did not affect peanut stands. When peanut were exposed to two applications (30 and 60 days after planting) of Roundup® + Xtendimax® peanut injury ranged from 10% to 19% throughout the season. When peanut were exposed to an additional application (30, 60 and 90 days after planting) peanut injury ranged from 13% to 21%. However, even with visual injury over 20%, peanut yields were not affected. Peanut yields were over 5,000 pounds per acre and not different than the weed-free check.

Disease Evaluations and Agronomic Traits of Advanced Peanut Breeding Lines in 2019

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

2019 progress made possible through OPC and NPB support

- **A total of 35 breeding lines and reference cultivars (13 runner, eight Spanish/Valencia, and 14 Virginia market types) were evaluated at the Caddo Research Station for agronomic characteristics and soilborne diseases (Sclerotinia blight and pod rot).**
- **Due to above-average fall temperatures and an early freeze, environmental conditions in 2019 were unfavorable for Sclerotinia blight. Moderate levels of pod rot were observed in Virginia entries. Overall, yields and grades were lower in 2019 than in 2018.**
- **Numerically, the top three runner entries for revenue were Lariat ($649 per acre), ARSOK-R94-4 ($640 per acre) and ARSOK-R91-2 ($633 per acre).**
- **For the Spanish entries, ARSOK-S88-2 ($500 per acre) and Schubert ($496 per acre) had the highest crop values. Valencia entries yielded less than Spanish entries.**
- **In the Virginia trial, the three highest entries for crop values and yield were NC17EX ($659 per acre; 3,836 pounds per acre), Jupiter ($600 per acre; 3,848 pounds per acre) and ACI 351 ($587 per acre; 3,521 pounds per acre).**
- **Significant differences in pod sizes were found among the Virginia entries.**
- **Jupiter had the most pod rot (43%) in the advanced breeding line/cultivar trial and pod rot nursery. Virginia entries with significantly less pod rot than Jupiter included NC1EX (19% and 14%), NC2EX (9% and 24%) and NC17EX (18% and 14%).**

A major goal of the ARS peanut research program in Stillwater is to develop and release high-oleic peanut cultivars for the Southwest with improved yield, disease resistance and seed characteristics. In 2019, commercial and advanced breeding lines of runner, Spanish/Valencia and Virginia peanuts were evaluated in small plots at OSU's Caddo Research Station at Fort Cobb. The objectives of these field studies were: 1) to compare advanced or newly released lines to commercially available cultivars for agronomic characteristics (e.g. yield and seed grade) and disease resistance to soilborne diseases; and 2) to evaluate a selection of Virginia entries for pod rot resistance in field where soilborne levels of *Pythium myriotylum*, the pathogen causing peanut pod rot, were promoted by planting susceptible genotypes.

Methods and Field Conditions for Evaluating Advanced Breeding Lines and Cultivars

A total of 35 breeding lines and reference cultivars (13 runner, eight Spanish/Valencia and 14 Virginia market types) were evaluated. Runner and Virginia peanut market types were grown and evaluated separately, but Spanish and Valencia entries were combined in the same field and analyzed together. All advanced breeding lines were high oleic. Each entry was planted at a density of five seeds per foot in plots consisting of two, 15-foot rows with 36-inch beds. A randomized complete block design was used by dividing the field into four sections (blocks) to account for potential disease gradients and environmental variables. All plots were planted May 17 and dug 162 days after planting on Oct. 25. Plots were threshed on Oct. 28.

Fields were inoculated with pure sclerotia of *Sclerotinia minor* at a rate of 0.35 grams per 15-foot row on Sept. 12. Fields were managed for weeds, foliar diseases and southern blight (caused by *Sclerotium rolfsii*) following Extension recommendations, but were not managed for Sclerotinia blight, pod rot or nematodes.

Environmental conditions in 2019 were unfavorable for Sclerotinia blight due to warmer-than-average temperatures in September and a freeze that killed the above-ground vegetation on Oct. 22. Daily average temperatures in August, September and October were 79, 78 and 61 F, respectively (Table 15). Rainfall was notably greater than the 15-year average in May (+6.26 inches) and September (+2.32 inches). Additional water (0.25 to 1 inch) was applied to the plots 13 times between June 3 and Sept. 6 using a center pivot system.

One evaluation for Sclerotinia and southern blights was conducted on Oct. 8, and little disease was observed. Disease incidence was measured by counting the number of 6-inch sections within each plot that had symptoms of Sclerotinia blight and southern blight. Plots were examined for pod rot three days after digging on Oct. 28, and notable levels of disease were observed only in the Virginia entries.

Peanut grades were determined following USDA-AMS guidelines using two 200-gram samples from each plot. One 500-gram sample per plot was used to determine pod sizes in the Virginia entries. Yield was adjusted by factoring in the percentage of the plot area lost for plots in the path of the center pivot wheels. Data were analyzed using one-way ANOVA in

Table 15. Monthly air temperature and rainfall from Mesonet for 2019 field season at the Caddo Research Station, Fort Cobb.

	Air Temperature (°F)		*Rainfall (Inches)*	
Month	*Daily Mean*	*Departure from 15-Year Average*	*Total*	*Departure from 15-Year Average*
May 17 to 31[1]	71.1	-2	7.16	+6.26
June	76.2	-3	2.91	-1.12
July[2]	80.8	-1	1.61	-1.31
August[2]	79.2	N/A	4.70	+1.39
September[2]	77.8	+5	4.84	+2.32
October 1 to 25[1]	60.6	-5	1.34	-1.49

[1] Mean temperature and rainfall are for May 17 (planting date) to May 31 and October 1 to 25 (digging date). Departure from 15-year average includes all days in May and October.
[2] Data not available due to incomplete Mesonet records.

PROC GLIMMIX of SAS (ver. 9.4). The Type I error rate for pairwise comparisons of breeding lines and cultivars was controlled at $\alpha = 0.05$ using the ADJUST=TUKEY option.

Performance of the Runner Market Type Entries

Thirteen runner peanut entries, including the high-oleic cultivars Georgia-09B, Georgia-14N, Lariat and Tamrun OL11 were evaluated (Table 16). Statistical differences were found among runner entries for crop value, yield, and all shelling characteristics except 100-seed weight. Numerically, the top three runner entries for revenue was Lariat ($649 per acre), ARSOK-R94-4 ($640 per acre) and ARSOK-R91-2 ($633 per acre). The lowest crop value and yield were obtained from ARSOK-R96-3 ($338 per acre; 2,481 pounds per acre). Breeding line ARSOK-R90-12 had the highest grade at 71 percent; ARSOK-R96-3 had the lowest grade at 57 percent.

Performance of the Spanish/Valencia Market Type Entries

Two advanced breeding lines of both Valencia and Spanish market types were evaluated in addition to cultivars Valencia C, OLé, Schubert and Span-17. Significant differences among the Spanish and Valencia entries were found for all agronomic characteristics except 100-seed weight (Table 16). Due to their high contract price of $800 per ton (N. Puppala, personal communication), the Valencia entries had the highest crop values despite having significantly lower yields than Spanish entries. Among the Spanish entries, ARSOK-S88-2 and Schubert produced the highest value crops and yield ($500 and $496 per acre; 3,207 and 3,350 pounds per acre, respectively). Span-17 and ARSOK-S96-3 had the highest seed grade, both at 68 percent.

Performance of the Virginia Market Type Entries

A total of 14 Virginia peanut entries were evaluated, including Jupiter and the high-oleic cultivars ACI 351, Contender, Florida Fancy, Sullivan, Wynne and Walton (Tables 17 and 18). The Virginia entries differed statistically in all agronomic qualities except 100-seed weight (Table 17). The crop value of NC17EX ($659 per acre) was significantly greater than of NC22EX, Walton, Contender, Sullivan and Wynne. The highest numerical yields (greater than 3,500 pounds per acre) were obtained from NC17EX, Jupiter and ACI 351. NC17EX and NC7EX had the highest seed grade at 72%, which was significantly greater than grades from Jupiter, Wynne and Sullivan. Significant differences were found among the Virginia entries for all categories of pod sizes (Table 18). The largest super jumbo pods were found in NC2EX (9.7 pods per ounce) and NC19EX and NC17EX (both at 9.9 pods per ounce).

Average Performance over the Past Two Years (2018-2019)

Eight runner, five Spanish and 13 Virginia entries have been evaluated in both 2018 and 2019. In 2018, harvest dates for the runner, Spanish and Virginia plots were 141, 130 and 147 days after planting, respectively. Yields and grades were markedly lower in 2019 than in 2018 (Table 19). When data from the last two years were averaged, significant differences in yield were found among the runner and Virginia entries. Among the runner market types, the lowest yield and grade were obtained from ARSOK-R96-3 (3,014 pounds per acre, 62%). All other runner entries yielded 1,000 pounds more than

Table 16. Yield, grade, and shelling characteristics in advanced runner and Spanish/Valencia breeding lines and commercial cultivars planted at the Caddo Research Station, Fort Cobb on May 17, 2019.[1]

Entry	*Revenue ($/A)[2]*	*Yield (lbs/A)*	*Grade[3]*	*100-Seed (g)*	*ELK (%)[4]*	*Medium (%)[4]*	*Small (%)[4]*	*VDK (%)[4]*	*Hull (%)*
Runner									
Lariat	649a	3,872a	70.6ab	63.7	28.8c-e	32.2a	7.3a-d	0.8a-c	23.7e
ARSOK-R94-4	640a	4,029a	67.0bc	59.0	33.2b-d	22.4d	5.7cd	1.4a-c	27.9bc
ARSOK-R92-13	633a	3,812a	69.9a-c	60.9	34.9b-d	25.4b-d	6.4b-d	1.9a	24.7de
ARSOK-R91-2	630ab	3,848a	68.9a-c	66.2	35.0bc	22.7d	6.4b-d	0.9a-c	26.7c-e
ARSOK-R96-8	604ab	3,824a	66.5c	61.2	45.7a	13.0e	2.9e	1.3a-c	30.9b
ARSOK-R93-1	604ab	3,654ab	69.6a-c	65.5	36.4b	24.2cd	5.3cd	2.0a	25.1c-e
Tamrun OL11	595a-c	3,557a-c	70.5ab	63.9	27.6de	31.2a	9.6a	0.8a-c	24.4e
ARSOK-R90-12	592a-c	3,509a-c	71.1a	61.4	25.2e	32.7a	8.3ab	1.0a-c	23.7e
ARSOK-R95-1	581a-c	3,582a-c	68.3a-c	64.0	27.7de	29.2ab	7.6a-c	0.9a-c	26.4c-e
ARSOK-R93-10	569a-c	3,630ab	66.1c	61.2	25.7e	27.9a-c	8.2ab	1.8ab	27.7cd
Georgia 09B	540bc	3,207bc	70.8ab	62.4	37.0b	24.2cd	4.9de	0.8a-c	24.4e
Georgia-14N	511c	3,037dc	70.8ab	62.9	30.3b-e	30.5a	7.2a-d	0.5c	25.0c-e
ARSOK-R96-3	338d	2,481d	57.3d	66.6	24.5e	22.9d	5.9b-d	0.6bc	37.9a
Spanish/Valencia									
New Mexico-M2 (Val)	671a	2,698ab	62.2b	47.2	32.8b	22.3bc	6.1ab	3.6a	30.9a
New Mexico-M7 (Val)	647ab	2,517b	64.2ab	43.6	34.9b	21.8bc	6.8ab	2.1a-c	30.8a
Valencia C	588a-c	2,405b	60.9b	48.5	33.4b	19.1c	6.7ab	2.8ab	33.1a
ARSOK-S88-2	500bc	3,207ab	65.6ab	48.4	33.2b	23.5b	6.7ab	0.9bc	30.2a
Schubert	496bc	3,350a	62.3b	45.4	21.0c	31.9a	7.5ab	1.4bc	32.9a
OLé	486c	3,187ab	64.2ab	46.0	32.6b	22.6bc	8.0a	0.7c	31.5a
Span-17	486c	2,989ab	68.4a	46.9	38.0b	22.1bc	6.2ab	1.0bc	26.8b
ARSOK-S96-5	446c	2,750ab	68.2a	48.6	44.2a	12.0d	4.9b	2.1a-c	26.6b
Schubert	788	5,239	63.3c	45.0bc	24.9d	1.2	33.0a	0.0	

[1] Market types were analyzed separately and are ordered by highest to lowest contract revenue per acre. Plots dug on October 25 (162 days after planting). Numbers with the same lowercase letter within columns for each market type are not significantly different (= 0.05). No differences among entries if letters absent in column.

[2] Based on the following contract prices per ton: runner and Spanish, $475; Valencia, $800. Calculations do not include deductions for excess splits or damaged and other kernels.

[3] Grade = % total sound mature kernels + sound splits.

[4] Screen sizes: ELK, extra-large kernels, 21/64 for runner, 19/64 for Spanish/Valencia; medium kernels, 18/64 for runner, 17/64 for Spanish/Valencia; small kernels, 16/64 for runner, 15/64 for Spanish/Valencia; VDK, visibly damaged kernels.

Table 17. Yield, grade, and shelling characteristics of advanced Virginia breeding lines and commercial cultivars planted at the Caddo Research Station, Fort Cobb on May 17, 2019.[1]

Entry	*Revenue ($/A)[2]*	*Yield (lbs/A)*	*Grade[3]*	*100-Seed (g)*	*ELK (%)[4]*	*Medium (%)[4]*	*Small (%)[4]*	*VDK (%)[4]*	*Hull (%)*
Virginia									
NC17EX	659a	3,836a	72.3a	79.9	48.8a-c	15.4c-e	2.8ef	0.7b	26.1cd
Jupiter	600ab	3,848a	65.1cd	88.2	42.2c-e	15.5c-e	4.0b-f	2.5a	30.7a-c
ACI 351	587ab	3,521a	70.1a-c	85.4	43.2cd	18.7a-d	5.1a-d	0.8b	27.5a-d
NC1EX	564ab	3,422a	69.4a-d	97.5	43.3b-d	16.2c-e	3.4c-f	2.0ab	27.0a-d
NC7EX	561ab	3,267a	72.3a	92.8	52.9ab	12.5ef	2.9d-f	1.2ab	25.3d
Florida Fancy	559ab	3,352a	70.2a-c	79.9	41.8c-e	20.7a-c	5.3a-c	1.3ab	26.6b-d
NC19EX	553ab	3,364a	69.2a-d	81.8	46.9a-d	12.7ef	3.1c-f	2.1ab	27.5a-d
NC2EX	552ab	3,267a	71.1ab	89.5	56.0a	8.7f	2.1f	1.6ab	26.5b-d
NC20EX	532ab	3,231a	69.4a-d	87.1	47.1a-d	13.9d-f	3.7b-f	1.5ab	27.9a-d
NC22EX	510bc	3,168ab	67.7a-d	78.3	38.1d-f	18.4b-d	4.6a-e	1.6ab	28.9a-d
Walton	509bc	3,159ab	67.8a-d	81.0	37.5d-f	21.8ab	5.4a-c	0.7b	29.6a-d
Contender	504bc	3,170ab	66.9a-d	89.6	39.0d-f	19.0a-d	4.5a-e	1.9ab	29.0a-d
Sullivan	386c	2,488b	65.5b-d	88.2	32.8ef	24.1a	6.5a	1.1ab	31.4ab
Wynne	378c	2,493b	63.8d	92.9	31.4f	20.9a-c	5.7ab	2.0ab	32.0a

[1] Entries sorted from highest to lowest contract revenue per acre. Plots dug on October 25 (162 days after planting). Numbers with the same lowercase letter within columns for each market type are not significantly different ($\alpha = 0.05$). No differences among entries if letters absent in column.
[2] Based on contract price of $525/ton. Calculations do not include deductions for excess splits or damaged and other kernels.
[3] Grade = % total sound mature kernels + sound splits.
[4] Kernel screen sizes: ELK, extra-large kernels, 21.5/64; medium kernels, 18/64; small kernels, 15/64; VDK, visibly damaged kernels

Table 18. Pod size characteristics of advanced Virginia breeding lines and commercial cultivars planted at the Caddo Research Station, Fort Cobb on May 17, 2019.[1]

Entry	*Super Jumbo (no./oz)[2]*	*Jumbo (no./oz)[2]*	*Fancy (no./oz)[2]*	*Pass Through (%)[3]*
Virginia				
NC17EX	9.9ef	13.8bc	20.6ab	4.6d
Jupiter	11.9bc	13.5bc	17.8ab	12.5b-d
ACI 351	11.5b-e	14.6a-c	22.6a	10.6b-d
NC1EX	10.4c-f	13.8bc	18.7ab	14.7a-c
NC7EX	10.5c-f	13.8bc	20.2ab	5.2d
Florida Fancy	14.7a	16.9a	20.3ab	16.0ab
NC19EX	9.9ef	13.3bc	18.5ab	15.0a-c
NC2EX	9.7f	13.4bc	18.0ab	4.5d
NC20EX	10.2d-f	13.6bc	18.0ab	14.9a-c
NC22EX	11.2b-f	13.9bc	18.8ab	8.8b-d
Walton	11.6b-d	14.4a-c	18.1ab	10.4b-d
Contender	11.3b-f	12.4c	16.1b	21.1a
Sullivan	12.7b	14.3a-c	19.0ab	15.7ab
Wynne	11.7b-d	15.9ab	22.1a	6.9cd

[1] Entries sorted from highest to lowest contract revenue per acre from Table 3. Plots dug on October 25 (162 days after planting). Numbers with the same lowercase letter within columns for each market type are not significantly different ($\alpha = 0.05$).
[2] Number of pods per ounce for pods riding slotted screens sized for super jumbo (40/64 x 3-inch slots), jumbo (37/64 x 3-inch slots) and fancy (32/64 x 3-inch slots). Pass-through pods fit through 32/64 x 3-inch screen.
[3] Percentage of pods by weight within each pod size class.

ARSOK-R96-3 and had over 70% in seed grade. In the Spanish entries, differences were observed among entries in seed grade over the two years. ARSOK-S96-5 and Span-17 had higher seed grades than OLé, ARSOK-S88-2 and Schubert. Among the Virginia entries, NC17EX had the highest average yield at 4,695 pounds per acre, which was significantly greater than the yields from ACI 351, Florida Fancy, Wynne and Sullivan. The highest grades (>72 percent) were obtained from NC17EX, NC7EX and Florida Fancy.

Pod Rot Evaluations

For the pod rot nursery, a total of eight Virginia entries (ACI 351, Contender, Jupiter, Sullivan, Wynne, NC1EX, NC2EX and NC17EX) were evaluated in a field where moderately high levels of pod rot were observed in 2017 (Table 20). The NC-EX lines were chosen because they exhibited some disease resistance to Sclerotinia blight in 2018 (Table 19). The field was planted May 17, using a randomized complete block design with one replication per block, except for Jupiter which had two replications per block. Plots were managed for leaf spots, Sclerotinia and southern blights, and were irrigated with 0.25 to 1 inch of water 13 times from June 3 to Sept. 6. To enhance disease, two blocks were inoculated with a cornmeal-and-sand mixture colonized by *Pythium myriotylum* on Aug. 8. Plots were dug on Oct. 25, 162 days after planting, and evaluated for pod rot three days after digging by estimating the percentage of discolored pods.

Moderate levels of pod rot were observed in both the advanced breeding

Table 19. Two-year averages for yield (pounds per acre) and seed grade in advanced breeding lines and commercial cultivars at the Caddo Research Station, Fort Cobb.[1]

	2018-2019		2018			2019		
Entry	*Yield*	*Grade[2]*	*SM[3]*	*Yield*	*Grade[2]*	*PR[3]*	*Yield*	*Grade[2]*
Runner								
Georgia-09B	4,604a	72.6a	61ab	6,002a	74.3a	—	3,207b	70.8a
Lariat	4,506a	72.1a	32cd	5,141ab	73.7a	—	3,872a	70.6a
ARSOK-R90-12	4,435a	73.1a	42a-c	5,360ab	75.2a	—	3,509ab	71.1a
ARSOK-R92-13	4,637a	72.2a	60ab	5,462ab	74.5a	—	3,812a	69.9ab
ARSOK-R93-10	4,404a	70.4a	40a-d	5,179ab	74.7a	—	3,630ab	66.1b
ARSOK-R94-4	4,677a	70.7a	64a	5,324ab	74.4a	—	4,029a	67.0ab
ARSOK-R96-3	3,014b	61.8b	13e	3,601c	66.3b	—	2,481c	57.3c
Tamrun OL11	4,228a	72.4a	37b-d	4,899b	74.3a	—	3,557ab	70.5a
Spanish								
OLé	4,134	66.4b	0	5,082	68.5b	—	3,187	64.2b
S88_2	4,253	66.9b	0	5,300	68.1b	—	3,207	65.6ab
S96_5	3,946	71.0a	2	5,143	73.8a	—	2,750	68.2a
Schubert	4,295	62.8c	0	5,239	63.3c	—	3,350	62.3b
Span-17	4,072	70.9a	10	5,155	73.4a	—	2,989	68.4a
Virginia								
ACI 351	3,904bc	70.0a-c	59ab	4,366	69.8bc	28ab	3,521a	70.1ab
Contender	4,332ab	69.8a-c	49b	5,493	72.7ab	24ab	3,170ab	66.9a-c
Florida Fancy	3,818bc	71.8a	84a	4,283	73.3a	29ab	3,352a	70.2ab
Jupiter	4,253a-c	66.7c	70ab	4,659	68.3c	43a	3,848a	65.1bc
NC1EX	4,240a-c	70.6ab	48b	5,058	71.7a-c	19b	3,422a	69.4a-c
NC17EX	4,695a	72.3a	52b	5,554	72.4ab	18b	3,836a	72.3a
NC19EX	4,114a-c	70.2a-c	73ab	4,856	71.3a-c	13b	3,364a	69.2a-c
NC2EX	4,035a-c	71.2ab	57ab	4,804	71.3a-c	9b	3,267a	71.1ab
NC20EX	4,168a-c	70.0a-c	86a	5,106	70.6a-c	14b	3,231a	69.4a-c
NC22EX	3,938a-c	69.6a-c	64ab	4,707	71.6a-c	9b	3,168ab	67.7a-c
NC7EX	3,957a-c	71.8a	59ab	4,646	71.4a-c	27ab	3,267a	72.3a
Sullivan	3,465c	67.9bc	57ab	4,441	70.3a-c	23ab	2,488b	65.5bc
Wynne	3,588bc	66.9c	63ab	4,683	69.9a-c	24ab	2,493b	63.8c

[1] 2018 plots harvested 130 days after planting (DAP) for Spanish, 141 DAP for runners, and 147 DAP for Virginia. All 2019 plots harvested 162 DAP. Market types were analyzed separately. Numbers with the same lowercase letter within columns for each market type are not significantly different ($\alpha = 0.05$). No differences among entries if letters absent in column.

[2] Grade = % total sound mature kernels + sound splits.

[3] SM, incidence of Sclerotinia blight at the last rating date in 2018. No Sclerotinia ratings taken in 2019 due to unfavorable conditions. PR, percent pod rot estimated 3 days after digging in 2019. Levels of pod rot in 2018 were less than 5%.

Table 20. Pod rot in Virginia entries planted in the advanced breeding line/cultivar disease trial and pod rot nursery at the Caddo Research Station, Fort Cobb, May 17, 2019.[1]

	Pod Rot (%)[2]	
Entry	*Cultivar/Advanced Line Trial*	*Pod Rot Nursery*
Jupiter	42.5a	42.9a
Florida Fancy	28.8ab	—
ACI 351	27.5ab	31.3a-c
NC7EX	26.8ab	—
Wynne	23.8ab	30.0a-d
Contender	23.8ab	37.5ab
Sullivan	22.5ab	15.5c-e
NC1EX	18.8b	14.3de
NC17EX	18.0b	13.5e
NC20EX	14.3b	—
NC19EX	13.0b	—
Walton	13.0b	—
NC22EX	9.3b	—
NC2EX	9.0b	23.8b-e

[1] Plots dug on Oct. 25 (162 days after planting). Numbers with the same lowercase letter within columns for each market type are not significantly different ($\alpha = 0.05$).

[2] Percentage of pods with symptoms of pod rot estimated three days after digging.

line/cultivar trial and in the pod rot nursery (Table 20). Numerically, Jupiter had the most pod rot at 43 percent in both experiments. Entries with significantly less pod rot than Jupiter in both experiments included NC1EX (14 and 19 percent), NC2EX (9 and 24 percent) and NC17EX (14 and 18 percent).

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