Partners in Progress
PEANUTS

Peanut Research at OSU 2005

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-1013

OSU

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Table of Contents

Foreword

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PEANUTS

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

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

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

Robert L. Westerman,
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.

A Partnership Turns 40!

June 28, 1965…Gov. Henry Bellmon has just signed into law the Oklahoma Peanut Act authorizing the establishment of the Oklahoma Peanut Commission. Soon after, a series of educational meetings in conjunction with Oklahoma State University Cooperative Extension, were held throughout the state's major peanut producing areas to seek peanut farmer nominees to serve on the new Commission's board.

The law established three production districts. Nominating meetings were held in each; Eakly (Caddo County), Holdenville (Hughes County), and Shawnee (Pottawatomie County). From the 30 producers nominated, Gov. Bellmon selected and appointed the following inaugural board: Jim Kubicek, Shawnee; Charles Snyder, Prague; Carroll Smith, Lookeba; Jimmy Rogers, Ft. Cobb; Joe Pace, Holdenville; and E.D. Allen, Hendrix.

The Commission was charged by the Legislature to collect producer assessments and use the funds to conduct programs of research, education, and promotion of peanuts. The Board chose Kubicek as its first chairman, Smith as vice-chair, and Rogers, secretary. They enlisted the assistance of a member of the OSU agricultural economics staff, Jim Tomlinson, to serve as the acting executive.

Thus, the beginning of a 40 year partnership with OSU was born!

The average peanut yield from 1960 to 1965 was only 1574 lbs/A. The average price was $227/ton; and the predominate peanut grown in the state was Spanish. Oklahoma had about 6600 producers in 1965, growing peanuts in 50 of the state's 77 counties. Leaf spot management, weed control, variety improvement, and production practices were the order of the day.

The Commission initially invested $40,000 in peanut research at OSU. Within two years, the University fully assembled its peanut improvement team and assigned Leland Tripp as the state Extension peanut specialist. The initial check-off grants provided the University with irrigation equipment and funds for research:

- Peanut diseases (Wadsworth)
- Variety Development (Matlock, Mason, and McMillen)
- Weed Control (Santelmann)
- Determining Maturity (Mason)
- Soil Fertility (Morrill and Tucker)
- Nematode Management (Morrison)
- Water Requirements (Stone, Matlock, and Garton)

So here we are, four decades later, the partnership has definitely proven its worth. OSU scientists have used producer funding of nearly $2 million to develop a dozen improved varieties, scores of new chemical and technological discoveries, management protocols, and even a novel peanut product. The pay off…average yields in Oklahoma have set records the past two years, more than doubling that of 1965.

The Oklahoma Peanut Commission wishes to congratulate Oklahoma State University for 40 years of excellence in this partnership and salute the current Peanut Improvement Team: John Damicone, Phil Mulder, Case Medlin, Nurhan Dunford, Hassan Melouk, and Kelly Chenault. The results of their 2005 producer funded peanut research are contained in this report and worthy of thorough review.

Mike Kubicek
Executive Secretary
Oklahoma Peanut Commission

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

P.G. Mulder, J.P. Damicone, C.R. Medlin, J.K. Nickels, and S.K. Seuhs
Department of Entomology and Plant Pathology

2005 progress made possible through OPC and NPB support

- Studies conducted using three variations in tillage practices showed significantly fewer thrips populations were recovered from peanuts grown under conventional tillage conditions than in strip-tillage.
- For the first year of this multi-year study, increases in secondary arthropod pests (white grubs) became evident across the study area; however, no significant differences in damage or infestation levels were revealed.
- During two of the three late-sampling periods, foliar arthropod populations were significantly greater under reduced or no-tillage conditions than under conventional practices.
- Although weed populations across the various tillage systems did not differ, a significant increase in the numbers of volunteer peanuts was noted in reduced and no-tillage situations.
- No significant difference in nematode populations was observed across the three tillage systems; however, a noticeable trend of increasing populations was evident in the reduced tillage system.
- A significantly greater level of infection by southern blight was seen in peanuts grown under conventional practices as opposed to those grown under reduced or no-tillage situations.
- No significant differences in yield were revealed between any of the peanuts grown under conventional or reduced tillage situations; however, peanuts grown in no-till conditions had significantly lower grades than those grown under conventional or strip-tillage conditions.

Introduction

In 2005, long-term studies initiated at the Ft. Cobb Research Station to observe changes in disease, insect, and weed complexes over time were continued. The objective of these studies was to assist Oklahoma growers in developing more economic management strategies for conventional and conservation tillage practices in peanut production. Studies were conducted on large plots approaching 72 ft wide by 130 ft long, to be representative of what growers would experience in adopting reduced tillage practices. Peanuts were planted on 11 May, 2005. No insecticides were applied during this study. Standard practices for disease and weed control were used and are outlined in subsequent sections of this report.

Materials and Methods

A soil test was taken at the beginning of the season. Roundup® herbicide (1 qt/A) was applied as a burn down on 14 April, 2005 to remove winter weeds. On 28 April, 100 lbs of 18-46-0 were applied across the test area. In the conventional treatment plots, a disc implement was run over the area once on 9 May. On the same day, Prowl® (2.4 pt/A) was broadcast over the conventional-tilled plots and incorporated by disking the field in two directions. All remaining tillage systems received a preemergent tank-mix treatment of Prowl® (2.4 pt/A) that was watered in (irrigation) but not incorporated. On 11 May all peanuts were planted. After planting, all plots received 0.5 inch of irrigation. On 15 May a second burn down of Roundup® was applied. On 15 June a tank mix of Cadre® (1.44 oz/A) plus Butyrac® (1 pt/A) plus crop oil (1qt) was applied for weed control. No insecticides were applied to any of the plots throughout this trial. Relative to disease control, a program of Headline® (9 oz/A), followed by Folicur® (7.2 oz/A), Bravo® (1.5 pt/A), and a final application of Folicur® (7.2 oz/A) was applied to reduce the threat of leaf spot and/or southern blight. Peanuts were dug on 21 October and harvested on 24 October, 2005.

Arthropod Monitoring and Weed Populations

Once damage became apparent, thrips populations were monitored on three separate occasions. Ten quadrifoliate leaves were pulled from each plot and placed in 70% ethyl alcohol (ETOH) for transportation to the laboratory. Leaves were carefully separated and rinsed in an ETOH solution and the liquid strained for larvae and adults. On 29 July, foliar damage (dieback of terminal growth) was observed and grubs were identified as the causative agent. Damage assessments were made and counts taken to identify differences in numbers between treatments and to account for any possible yield loss. Grub counts were made on 1 August by sifting through three, 1 ft wide by 3 ft long by 4 inches deep sections of soil within each plot. In addition, on 29 July damaged plant counts were made across every row of each plot by simply counting the number of affected plants within each plot. In addition to grubs, defoliating caterpillars were also assessed using a standard 15-inch insect sweep net. On 8, 19, and 30 August, 10 sweeps across 10 rows in each plot were taken to monitor for defoliating caterpillars or other pest populations (grasshoppers, leafhoppers, etc.).

Peanut volunteer plants and weed counts were taken shortly after planting. Volunteer counts were taken on two separate occasions throughout the trial, while weed counts were taken once. Volunteer counts were taken once, before a field implement with sweeps was run through the plots and once afterward by taking an average of five quadrates per plot. Weed assessments were made by taking an average of the number of weeds found in a 45 sq ft area within each treatment and replication, then averaging across all replications for the total per treatment.

Disease Evaluation

The effects of tillage on levels of disease were evaluated. Levels of foliar disease such as leaf spot were low. Ratings of southern blight incident were taken once, while ratings of Sclerotenia were taken twice during the test. Sclerotinia numbers increased late in the season and were assessed by counting the number of 6-inch row segments with symptoms and/or signs of disease in the middle four rows of each plot on 30 August and 16 September, 2005.

Plot Design and Analysis

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

Results and Discussion

Information found in Table 1 presents results from monitoring insect populations encountered in the tillage test at Ft. Cobb. Thrips were the main problem noticed throughout the season. Populations of defoliating caterpillars, leafhoppers, and grasshoppers were monitored; however, numbers of these insects and their effects on the peanuts were negligible. Table 1 also depicts yield and grade analyses. To reiterate, no insecticides were applied throughout this test. During the early sampling period, high numbers of thrips were seen across all treatments. On the second sampling date, thrips populations declined and a significant difference was identified between thrips numbers in conventional tillage versus those recovered in peanuts grown under no-tillage conditions. No differences in thrips populations were observed in the final sample. In addition, no significant differences in yield were identified between the three treatments. Grades averaged around 73% total sound mature kernels, with a significantly lower grade observed in the no-till treatment compared to peanuts grown under the other two tillage systems.

Table 2 presents results from an assessment made of white grub, *Phyllophaga* spp., damage that was observed across the test site. No significant differences in plant damage, grub numbers, or defoliators were found across the treatments during the two assessment periods. Results from sweeps taken in August to assess additional arthropod populations are depicted in Tables 3-5. Throughout the monitoring period, no significant differences were noted in the numbers of leafhoppers sampled within each tillage treatment (Table 3). Similarly, during the first and last sampling dates, no significant differences in numbers of threecornered alfalfa hoppers were detected; however, during the second sampling period, significantly more threecornered alfalfa hoppers were recovered in peanuts grown under no-till conditions than in those within strip or conventional tillage situations (Table 4). In addition to these differences, on the last sampling date, significantly more defoliating caterpillars were recovered

Table 1. Mean Number of Thrips Recovered from Tillage Study at the Caddo Research Station, Ft. Cobb, 2005.

Treatment	Mean Number of Thrips/10 Quadrifoliate Leaves							
	3 June		10 June		18 June		Yield	Grade
	Mean Total Larvae	Mean Total Thrips	Mean Total Larvae	Mean Total Thrips	Mean Total Larvae	Mean Total Thrips	lbs/A	% SMK[1]
Strip-Till	147.8 a[2]	184.5 a	38.0 ab	49.0 a	9.3 a	19.0 a	2795 a	74 a
No-Till	189.0 a	219.3 a	31.8 a	45.0 ab	9.5 a	20.0 a	2793 a	71 b
Conv. Till	173.8 a	205.3 a	19.3 b	28.5 b	9.8 a	20.0 a	2961 a	73 a

1 SMK = Sound mature kernels.

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

Table 2. Mean Grub Damage and Numbers Recovered from Tillage Study at the Caddo Research Station, Ft. Cobb.

Treatment	Mean Grub Damage Assessment and Defoliators		
	29 July	1 August	1 August
	Mean Total Plant Damage	Mean Total Grubs Recovered	Mean Total Defoliators Recovered
Strip-Till	36.2 a[1]	3.5 a	.5 a
No-Till	59.2 a	5.2 a	.7 a
Conventional Till	31.0 a	4.0 a	1.0 a

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

Table 3. Mean Number of Potato Leafhoppers at the Ft. Cobb Peanut Research Station, 2005.

Treatment	Potato Leafhoppers 10 Sweeps/Plot		
	8 August	19 August	30 August
Strip-Till	0.8 a[1]	0.0 a	10.8 a
No-Till	0.5 a	0.8 a	11.3 a
Conventional Till	0.3 a	0.0 a	14.0 a

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

Table 4. Mean Number of Threecornered Alfalfa Hoppers at the Ft. Cobb Peanut Research Station, 2005.

Treatment	Threecornered Alfalfa Hopper 10 Sweeps/Plot		
	8 August	19 August	30 August
Strip-Till	5.3 a[1]	1.0 b	6.0 a
No-Till	3.5 a	3.3 a	5.5 a
Conventional Till	4.0 a	0.8 b	3.8 a

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

Table 5. Mean Number of Defoliating Caterpillars at the Ft. Cobb Peanut Research Station, 2005.

Treatment	Defoliating Caterpillars 10 Sweeps/Plot		
	8 August	19 August	30 August
Strip-Till	0.5 a[1]	1.5 a	4.3 a
No-Till	0.0 a	0.5 a	1.8 b
Conventional Till	0.5 a	0.8 a	1.8 b

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

in peanuts grown under a strip-tillage environment than in those grown under conventional or no-tillage conditions (Table 5).

Information in Table 6 presents results from agronomic evaluations on volunteer and weed presence. No significant differences were found in the weed counts. Horse nettle was the main weed identified. Volunteer numbers were somewhat higher in peanuts grown under no-tillage conditions; however, no significant differences in weed populations were observed during the study.

Information in Table 7 presents results from nematode counts and disease ratings. Nematode samples were taken on two separate occasions, but no significant differences between tillage treatments were found. Disease ratings for Sclerotinia were taken twice, while southern blight was assessed only once. The average percent damage per treatment for Sclerotinia was determined. With the exception of significantly greater levels of southern blight infection in conventionally grown peanuts compared to those in strip-tillage conditions, no significant differences were observed.

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

Table 6. Agronomic Evaluations on Weeds and Volunteer Peanuts at the Tillage Study, Caddo Research Station, Ft. Cobb, 2005.

Treatment	Volunteers Avg/4.5 sq ft[1] 26 May	Volunteers Avg/4.5 sq ft[2] 7 July	Weeds Avg/45 sq ft[3] 3 August
Strip-Till	5.2 a[4]	1.6 a	0.6 a
No-Till	3.3 ab	1.6 a	0.2 a
Conventional Till	2.4 b	0.3 b	1.0 a

1 Average of 5 quadrates, before sweeps (vegetative).
2 Average of 5 quadrates, after sweeps (flower).
3 Readings were taken in 45 sq ft areas in each rep, then averaged for the total per treatment. Evaluations were made on all weeds, with the most common weed being horse nettle.
4 Means, within columns, followed by the same letter are not significantly different (ANOVA, LSD: P=0.05).

Table 7. Disease Ratings of Nematodes, Southern Blight, and Sclerotinia Blight at the Tillage Study, Caddo Research Station, Ft. Cobb, 2005.

Treatment	Nematodes		30 August		16 September
	Total #/100cc 5 April	Total #/100cc 5 July	Avg % SCL[1]	Avg % SBL[2]	Avg % SCL[1]
Strip-Till	104 a[3]	164 a	1.4 a	.7 a	2.5 a
No-Till	71 a	143 a	1.6 a	.91 ab	2.4 a
Conventional Till	56 a	107 a	2.5 a	1.2 b	3.1 a

1 SCL = Sclerotinia blight.
2 SBL = Southern blight.
3 Means, within columns, followed by the same letter are not significantly different (ANOVA, LSD: P=0.05).

Management of Sclerotinia and Southern Blights in Oklahoma Peanuts

H.A. Melouk, USDA-ARS
J.P. Damicone, Department of Entomology and Plant Pathology

2005 progress made possible through OPC and NPB support

- Results showed that breeding lines TX994313 and TX994374 with the high oleic acid trait, had similar yields as Tamrun 96.
- Carver and ANorden, cultivars from Florida, had high pod yields in the two locations where Sclerotinia blight was absent but not where Sclerotinia blight was a problem. Both cultivars are as susceptible or more than the susceptible cultivar, Okrun.
- The incidents of Sclerotinia blight in cultivars from Georgia were similar to that of Tamrun 96, but had pod yields below that of of Tamrun 96. Georgia 03L had the lowest incidence of Sclerotinia blight in the runner study.
- Tamrun 96 and Tamrun OL 02, the standard runner cultivars grown in Oklahoma, had consistently high pod yields at all three locations (Caddo, Grady, and Beckham counties).
- The advanced Spanish breeding lines with the high oleic acid trait, TX996612 and TX996784, had pod yields and resistance to Sclerotinia blight similar to Tamspan 90.
- The Virginia type cultivars that had the lowest incidence of Sclerotinia blight were Perry and the Oklahoma cultivar, Jupiter.
- Fourteen-germplasm entries and the Valencia entries were resistant to Sclerotinia blight and are possibly new sources of Sclerotinia blight resistance to use in the development of Sclerotinia resistant cultivars.

Although peanut acres in Oklahoma have declined in recent years, the peanut crop remains an important economic crop for those who choose to grow it. A major problem for Oklahoma peanut production is to grow the crop profitably. Yield limiting factors such as diseases, adverse weather conditions, weeds, and insects lower production and/or cost money to control. Irrigation, chemical control, and tillage practices are some of the methods used to control these yield-limiting factors, but often become cost prohibitive. The foundation of any successful crop production system is a good variety that has high yields, excellent quality, and pest resistance. A good peanut-breeding program focuses on enhanced yields, enhanced quality, crop adaptation, and pest resistance.

The major emphasis of this research project was to develop and evaluate peanut cultivars that are disease resistant with the main emphasis on Sclerotinia blight. The second objective was to evaluate newly released peanut cultivars developed in Georgia and Florida for their Sclerotinia blight resistance and their ability to adapt to an Oklahoma environment. Peanut cultivars and breeding lines were also evaluated for their reaction to other major peanut diseases such as southern blight, early leaf spot, pod rot, tomato spotted wilt virus, and Verticillium wilt. The advanced breeding lines and cultivar studies consisted of 18 runner type entries, eight Spanish type entries, and five Virginia type cultivars. These two studies had identical entries and were located at Erick (Beckham County) and at the Caddo Research Station near Ft. Cobb (Caddo County). The third study consisted of only the runner type entries (similar to the other locations except GP1 was not planted) and was located near Chickasha (Grady County). A different type of tillage practice was implemented at each location. The reduced tillage practice of row-till was implemented at Erick, conventional-flat tillage at Chickasha, and conventional-raised beds at Ft. Cobb.

At Chickasha, the grower's program was used to control diseases, weeds, and insects. That study was planted on 17 May and harvested on 18 October. At Erick, the herbicide program consisted of pre-emergent application of Valor® on Spanish type peanuts, preemergent application of Strongarm® on the runner and Virginia type peanuts, and all peanut types received a preemergent application of Seaquence-Touchdown®. A post planting herbicide application of Cobra® was made in June to the entire study. Fungicides used to control early leaf spot were applied according to the leaf spot advisory for a total of three applications. Headline® was applied on 6 July, Abound® was applied on 9 August, and Bravo/Tilt® was applied on 23 August. This study was planted on 12 May and harvested 10 October.

At the Caddo Research Station the herbicide program consisted of a preplanting application of Prowl® and the leaf spot fungicide program was based on the leaf spot peanut advisory. The first fungicide application of Headline® was made 6 July, followed with two applications of Folicur® on 26 July and 10 August. An application of Bravo® was made on 25 August to finish the season. The advanced breeding line and cultivar study and the peanut germplasm study were planted on 11 May. The Spanish type peanut study and the germplasm study were harvested on 7 October and the runner and Virginia type peanuts were harvested 18 October. All three locations were irrigated with pivot irrigation systems.

In 2005, early leaf spot, Sclerotinia blight, and pod rot were the prominent peanut diseases evaluated. Other peanut diseases were sporadic and were recorded but not sited in this report.

This project was divided into four studies: advanced runner breeding lines and cultivars; advanced Spanish breeding lines and cultivars; Virginia type cultivars; and identify and select new resistant sources from peanut germplasm to Sclerotinia blight. The purpose of this project was to compare yield, quality, and disease resistant components of several advanced breeding lines and peanut germplasm to varieties currently being grown in Oklahoma under various environments and disease situations.

Performance of Advanced Runner Breeding Lines and Cultivars in 2005

Data from the advanced runner breeding line and cultivar study showed that TX994313 and TX994374 breeding lines with the high oleic acid trait are similar to the standard, Tamrun 96. The data showed that TX994313 had tolerance to Sclerotinia blight similar to Tamrun 96 and SW Runner but yields slightly lower than Tamrun 96 and Tamrun OL 02. TX994313 had a higher grade, fewer seeds per oz, higher 100 seed weight, and a higher percent of seeds riding the 21/64 screen than the standard cultivar Okrun. Percent incidence of early leaf spot infection of TX994313 and TX994374 was similar to other runner cultivars in the study. TX994313 had a low percent incidence of pod rot similar to Tamrun 96 and Tamrun OL 01.

One of the Florida cultivars, Carver, had the highest yield in the two locations where Sclerotinia blight was not present. However, at Ft. Cobb in the Sclerotinia blight field, Carver had a low yield and a significantly higher percent incidence of Sclerotinia blight disease than the susceptible standard, Okrun. A similar trend was also apparent for another Florida cultivar, ANorden.

The cultivars from Georgia had a percent incidence of Sclerotinia blight similar to Tamrun 96, but had pod yields below Tamrun 96. Georgia 03L had the lowest incidence of Sclerotinia blight in the runner type peanut study and the highest percent incidence of pod rot at Beckham County.

Tamrun 96, Tamrun OL 01, and Tamrun OL 02, the standard runner cultivars grown in Oklahoma, had consistently high pod yields at all three locations. Data collected from the 2005 runner peanut breeding lines and cultivar study are shown in Tables 1-5.

Table 1. Comparison of Pod Yields in the Advanced Runner Peanut Breeding Lines and Cultivar Study, Caddo, Grady, and Beckham counties, 2005.

	Yield lbs/A			
Breeding Line	Caddo [1]	Grady[1]	Beckham[1]	Average
Okrun	3303 (10)[2]	2822 (11)	3276 (6)	3134
Tamrun 96	3802 (2)	3648 (3)	3385 (4)	3612
SW Runner	3576 (4)	2187 (17)	1779 (18)	2514
Georgia Green	3476 (7)	2496 (15)	3176 (8)	3049
Flavor Runner 458	3058 (13)	2496 (15)	2922 (12)	2825
Tamrun OL 01	3775 (3)	3213 (5)	3194 (7)	3394
Tamrun OL 02	3812 (1)	2977 (7)	3303 (5)	3364
Andru II	2831 (16)	2786 (12)	2723 (16)	2780
AP3	2877 (15)	2940 (8)	2750 (15)	2857
Carver	3104 (12)	4265 (1)	3757 (1)	3709
ANorden	2577 (17)	3158 (6)	3467 (3)	3067
TX 994374	3430 (9)	3857 (2)	2931 (11)	3406
TX 994313	3521 (5)	3478 (4)	3639 (2)	3546
Georgia Hi OL	3467 (8)	2895 (9)	3040 (9)	3134
Georgia 02C	3512 (6)	2614 (13)	2850 (9)	2992
Georgia 03L	3512 (6)	2605 (14)	2877 (13)	2998
Georgia 04S	3213 (11)	2886 (10)	2641 (17)	2913
GP-1	2904 (14)	—	2967.5 (10)	—
PR > F	< 0.0001	0.0011	< 0.0001	
LSD 0.05	454	863	471	

[1] Plots in Caddo County were located at the Caddo Research Station; plots in Grady County were located at the Arthur Kell farm near Chickasha, OK; and plots located in Beckham County were located at the Eloy Deloung farm near Erick, OK.

[2] Number in parenthesis indicates rank in that column.

Table 2. Comparison of Percent Incidence of Sclerotinia Blight in the Advanced Runner Peanut Breeding Lines and Cultivar Study, Caddo Research Station, Ft. Cobb, 2005.

	Percent Sclerotinia Blight[1]		
Breeding Line	30 August	13 September	29 September
Okrun	22.8	42.8	55.3
Tamrun 96	10.3	17.2	20.6
SW Runner	11.3	19.1	22.8
Georgia Green	19.7	32.2	43.1
Flavor Runner 458	24.7	42.2	64.7
Tamrun OL 01	21.7	29.1	36.6
Tamrun OL 02	28.8	44.7	68.4
Andru II	31.6	40.3	55.0
AP3	17.8	24.7	39.1
Carver	33.4	43.8	70.6
ANorden	25.6	43.4	72.2
TX 994374	28.4	41.3	51.6
TX 994313	11.6	23.8	35.6
Georgia Hi OL	9.9	14.8	21.6
Georgia 02C	11.3	17.5	29.4
Georgia 03L	7.5	5.9	14.1
Georgia 04S	10.3	19.4	27.5
GP-1	25.0	39.1	57.8
PR > F	< 0.0001	< 0.0001	< 0.0001
LSD 0.05	12.4	12.1	16.2

[1] Percent Sclerotinia blight was determined by dividing the number of infection loci by the number of potential infection loci and multiplying by 100. An infection locus is defined as an area of disease symptoms equal to or less than 6 inches long in a standard row.

Table 3. Comparison of Percent Incidence of Early Leaf Spot and Percent Defoliation in the Advanced Runner Peanut Breeding Lines and Cultivar Study, Beckham and Grady counties, 2005.

	Beckham County[1]	Grady County[1]			
Breeding Line	Percent Leaf Spot 13 September	Percent Leaf Spot 30 August	Percent Defoliation 30 August	Percent Leaf Spot 13 October	Percent Defoliation 13 October
Okrun	0.3	2.3	0.0	47.5	32.5
Tamrun 96	1.1	10.0	1.8	63.8	57.5
SW Runner	31.8	50.0	7.8	83.5	70.0
Georgia Green	1.4	2.3	0.5	55.0	35.0
Flavor Runner 458	0.3	12.8	1.3	37.5	25.0
Tamrun OL 01	0.6	7.8	1.3	48.8	47.5
Tamrun OL 02	0.6	5.5	1.3	57.5	42.5
Andru II	0.6	1.8	0.0	62.5	47.5
AP3	0.1	0.8	0.0	37.5	27.5
Carver	0.1	4.0	0.3	40.0	25.0
ANorden	1.1	1.3	0.0	42.5	35.0
TX 994374	0.8	1.0	0.0	50.0	32.5
TX 994313	0.3	3.5	0.0	42.5	35.0
Georgia Hi OL	0.8	7.5	1.3	57.5	32.5
Georgia 02C	1.8	3.5	0.0	50.0	22.5
Georgia 03L	0.3	0.8	0.0	37.5	30.0
Georgia 04S	2.9	4.0	0.5	55.0	35.0
GP-1	0.6	—	—	—	—
PR > F	0.0001	<0.0001	0.1916	0.1991	0.0009
LSD 0.05	7.8	12.9	NS[2]	NS[2]	19.8

[1] Plots located in Beckham County were located at the Eloy Deloung farm near Erick, OK and plots in Grady County were located at the Arthur Kell farm near Chickasha.

[2] NS = Difference in breeding lines and cultivars are not significant (P=0.05).

Table 4. Comparison of Percent Incidence of Pod Rot in the Advanced Runner Breeding Lines and Cultivar Study, Beckham County, 2005.

Breeding Line	Percent Pod Rot [1]
Okrun	11.3
Tamrun 96	4.0
SW Runner	15.8
Georgia Green	36.9
Flavor Runner 458	33.4
Tamrun OL 01	10.1
Tamrun OL 02	2.9
Andru II	15.2
AP3	3.4
Carver	13.8
ANorden	16.0
TX 994374	13.1
TX 994313	4.1
Georgia Hi OL	10.8
Georgia 02C	7.9
Georgia 03L	40.4
Georgia 04S	2.0
GP-1	24.3
PR > F	0.0002
LSD 0.05	17.6

[1] Percent incidence of pod rot was determined by counting plants within a foot of row that had discolored pods and dividing by total row feet.

Table 5. Comparison of Peanut Seed Quality Factors in the Advanced Runner Breeding Lines and Cultivar Study, Caddo, Grady, and Beckham counties, 2005.

Breeding Line and Location	Average Percent								100 Seeds wt (g)
	> 21/64[1]	>18/64	>16/64	OK[1]	DK[1]	Hulls	**TSMK[1]**	Seeds/oz[2]	
Okrun									
Grady Co	22.9	40.7	9.1	2.8	0.2	23	**74**	43.5	56.5
Caddo Co	30.0	30.1	5.8	4.2	3.7	24	**68**	39.0	60.5
Beckham Co	16.0	36.3	15.0	6.1	0.3	24	**70**	45.0	52.7
Tamrun 96									
Grady Co	32.0	33.5	8.2	2.3	0.1	23	**75**	44.5	57.1
Caddo Co	32.2	25.5	6.2	5.0	2.0	25	**68**	40.0	57.5
Beckham Co	30.6	29.5	10.2	3.2	0.0	24	**73**	42.5	55.4
SW Runner									
Grady Co	15.6	42.0	13.9	3.1	0.1	25	**72**	53.0	44.6
Caddo Co	17.6	40.4	10.2	5.0	1.2	24	**70**	46.5	48.5
Beckham Co	14.5	37.2	16.0	4.9	0.7	25	**69**	49.0	46.0
Georgia Green									
Grady Co	15.8	45.1	11.9	2.5	0.0	23	**75**	50.0	49.0
Caddo Co	15.2	32.6	9.2	8.2	2.2	23	**67**	47.0	49.5
Beckham Co	18.9	40.3	11.2	4.6	0.8	23	**72**	47.5	50.3
Flavor Runner 458									
Grady Co	28.8	38.9	7.9	1.7	0.3	22	**76**	44.5	57.3
Caddo Co	20.0	29.5	9.5	6.8	2.3	23	**68**	40.5	53.5
Beckham Co	17.3	40.3	11.8	4.7	0.3	23	**72**	42.0	53.3

Table continued on next page.

Partners in Progress PEANUTS

Table 5. (Continued) Comparison of Peanut Seed Quality Factors in the Advanced Runner Breeding Lines and Cultivar Study, Caddo, Grady, and Beckham counties, 2005.

Breeding Line and Location	Average Percent > 21/64[1]	>18/64	>16/64	OK[1]	DK[1]	Hulls	**TSMK[1]**	Seeds/oz[2]	100 Seeds wt (g)
Tamrun OL 01									
Grady Co	34.3	33.9	5.8	1.1	0.2	24	**75**	36.5	68.1
Caddo Co	41.8	17.3	3.5	3.5	6.7	25	**65**	34.0	71.0
Beckham Co	43.8	20.6	6.7	2.1	0.5	24	**74**	38.5	65.0
Tamrun OL 02									
Grady Co	14.8	44.5	13.1	2.2	0.0	24	**74**	43.0	54.1
Caddo Co	25.6	24.1	6.2	5.0	3.7	25	**67**	36.5	62.0
Beckham Co	20.6	37.6	11.6	3.6	0.1	25	**71**	44.0	55.6
Andru II									
Grady Co	21.0	40.1	10.4	2.4	0.0	24	**74**	45.0	59.5
Caddo Co	18.8	32.0	6.2	6.9	4.2	24	**64**	43.0	55.0
Beckham Co	14.3	38.4	14.3	4.2	0.1	25	**70**	45.5	52.6
AP3									
Grady Co	31.8	30.4	7.1	3.1	0.1	27	**70**	44.5	55.8
Caddo Co	20.9	25.9	11.2	6.0	3.0	28	**63**	38.5	61.5
Beckham Co	39.3	23.7	5.9	2.9	0.3	27	**70**	42.5	58.1
Carver									
Grady Co	8.1	46.6	14.3	3.5	0.2	26	**70**	41.5	57.9
Caddo Co	20.9	25.9	11.2	6.2	6.0	25	**63**	36.5	59.5
Beckham Co	16.1	37.8	14.3	5.4	0.3	25	**69**	41.0	56.9
ANorden									
Grady Co	19.2	42.4	10.8	2.3	0.0	24	**74**	45.5	56.1
Caddo Co	22.3	27.3	8.4	5.7	1.7	23	**69**	40.0	57.5
Beckham Co	16.7	36.8	12.5	5.4	0.3	25	**69**	42.5	53.5
TX 994374									
Grady Co	31.0	33.0	7.0	1.9	0.0	26	**72**	39.0	61.6
Caddo Co	37.3	16.3	5.7	3.5	7.9	26	**63**	37.0	64.0
Beckham Co	27.2	29.8	11.0	3.8	0.3	25	**71**	44.0	56.1
TX 994313									
Grady Co	36.7	30.7	8.1	1.8	0.3	22	**76**	41.0	60.1
Caddo Co	31.8	23.8	7.7	5.7	5.0	22	**67**	37.0	59.5
Beckham Co	29.7	31.8	9.5	4.9	0.4	22	**73**	42.0	56.9
Georgia Hi OL									
Grady Co	53.0	15.8	4.2	1.3	0.1	23	**76**	36.5	72.3
Caddo Co	50.7	12.4	1.5	3.0	2.0	22	**73**	31.5	78.5
Beckham Co	45.5	17.4	4.3	1.4	0.5	24	**74**	37.5	66.3
Georgia 02C									
Grady Co	30.1	31.7	9.4	2.3	0.0	25	**73**	45.5	54.0
Caddo Co	36.9	24.8	3.7	3.2	2.2	21	**73**	41.0	59.0
Beckham Co	32.3	29.3	8.2	3.5	0.5	23	**73**	46.0	52.8
Georgia 03L									
Grady Co	30.1	38.9	11.1	3.2	0.0	28	**69**	42.0	58.1
Caddo Co	37.1	25.6	4.5	3.5	1.0	26	**70**	39.0	62.5
Beckham Co	29.7	25.8	8.4	4.0	1.4	29	**66**	43.5	58.3
Georgia 04S									
Grady Co	17.2	33.1	21.5	5.6	0.1	27	**68**	61.0	36.2
Caddo Co	8.7	33.9	11.6	6.7	2.0	23	**68**	56.0	40.0
Beckham Co	6.0	33.0	22.8	8.4	0.1	27	**65**	52.5	38.1
GP1									
Grady Co	—	—	—	—	—	—	**—**	—	—
Caddo Co	17.3	29.5	7.9	8.4	3.7	24	**64**	38.0	58.5
Beckham Co	20.8	36.5	12.6	3.5	0.6	23	**73**	45.0	54.6

[1] 21/64, 19/64, and 16/64 = screen sizes; OK = other kernels; DK = damaged kernels; TSMK = Total sound mature kernels plus sound splits (grade).
[2] Seeds per oz was determined by number of seeds riding the 21/64 screen.

Performance of the Advanced Spanish Breeding Lines and Cultivars in 2005

The advanced Spanish breeding lines and cultivar studies were located at Erick (Beckham County) and at the Caddo Research Station (Caddo County). Each location had identical entries.

Early leaf spot was the prominent disease on peanuts at the Beckham County location. The plots were sprayed three times according to the peanut leaf spot advisory. Percent leaf spot infection was high in the Spanish type cultivars but not in the runner and Virginia type cultivars. This suggests that the leaf spot advisory used for runners was not as effective for the Spanish type peanuts.

The advanced Spanish breeding lines with the high oleic acid trait, TX996612 and TX996784, had pod yields similar to Tamspan 90. All the cultivars and lines had acceptable amount of Sclerotinia blight tolerance with the line of AT-98-99-14 having the highest percent incidence. A major disadvantage to TX996612 was the heavy hull weights that resulted in low grades.

Pronto is an old cultivar that was brought back in 2004 to be sold as a commercial variety. In 2004 and 2005, Pronto had the best overall grade, a low percent incidence of Sclerotinia blight similar to Tamspan 90, but had low yields. Data collected from the 2005 Spanish peanut breeding lines and cultivar study are shown in Tables 6-9.

Table 6. Comparison of Pod Yields in the Advanced Spanish Peanut Breeding Line and Cultivar Study, Caddo and Beckham counties, 2005.

Breeding Line or Cultivar	Caddo[1]	Beckham[1]	Average
Pronto	2713 (7)[2]	1470 (7)	2091
Spanco	3367 (6)	1779 (6)	2573
Tamspan 90	3603 (2)	1806 (5)	2704
Olin	3421 (5)	1897 (3)	2659
AT-98-99-14	3458 (4)	1960 (2)	2709
TX 996784	3567 (3)	2033 (1)	2800
TX 996612	3675 (1)	1888 (4)	2785
R-268	2087 (8)	1243 (8)	1665
PR > F	< 0.0001	0.0035	
LSD 0.05	369	373	

1 Plots located in Caddo County were at the Caddo Research Station and Beckham County plots were located at Eloy Deloung farm near Erick, OK.

2 Number in parenthesis indicates rank in that column.

Table 7. Comparison of Percent Incidence of Sclerotinia Blight in the Advanced Spanish Peanut Breeding Line and Cultivar Study, Caddo Research Station, 2005.

Breeding Line or Cultivar	Percent Sclerotinia Blight[1]		
	30 August	13 September	29 September
Pronto	1.6	3.8	8.1
Spanco	2.8	8.1	11.6
Tamspan 90	1.6	4.7	6.3
Olin	3.1	5.3	6.3
AT-98-99-14	5.3	12.2	19.1
TX 996784	2.2	4.1	5.6
TX 996612	3.8	5.6	13.8
R-268	2.2	10.3	18.1
PR > F	0.3909	0.0430	0.0217
LSD 0.05	NS[2]	5.7	9.1

[1] Percent Sclerotinia blight was determined by dividing the number of infection loci by the number of potential infection loci and multiplying by 100. An infection locus is defined as an area of disease symptoms equal to or less than 6 inches long in a standard row.

[2] NS = Differences in breeding lines and cultivars are not significant (P=0.05).

Table 8. Comparison of Percent Incidence of Early Leaf Spot and Percent Defoliation in the Advanced Spanish Breeding Line and Cultivar Study, Beckham County, 2005.

Breeding Line or Cultivar	Percent Early Leaf Spot 19 September
Pronto	37.5
Spanco	57.5
Tamspan 90	37.5
Olin	30.0
AT-98-99-14	47.5
TX 996784	43.8
TX 996612	27.5
R-268	7.8
PR > F	0.0017
LSD 0.05	19.4

Table 9. Comparison of Peanut Seed Quality Factors in the Advanced Spanish Peanut Breeding Line and Cultivar Study, Beckham and Caddo counties, 2005.

Breeding Line and Location	Average Percent > 19/64[1]	>17/64	>15/64	OK[1]	DK[1]	Hulls	TSMK[1]	Number Seeds/oz[2]	100 Seeds wt (g)
Pronto									
Caddo Co	32.2	26.3	7.9	3.5	2.5	23	**71**	52.0	46.0
Beckham Co	38.0	23.6	7.5	2.7	0.9	23	**73**	59.5	44.9
Spanco									
Caddo Co	32.8	20.2	8.0	4.0	4.5	24	**68**	50.5	45.5
Beckham Co	39.2	22.9	7.4	1.7	0.4	24	**74**	57.0	45.4
Tamspan 90									
Caddo Co	37.2	22.1	6.2	3.0	2.0	25	**70**	55.0	45.0
Beckham Co	38.6	23.8	7.0	1.9	0.6	24	**73**	60.5	43.3
Olin									
Caddo Co	36.7	19.3	6.0	4.5	1.8	25	**69**	54.0	44.0
Beckham Co	48.6	16.7	4.1	2.3	0.3	24	**74**	54.5	49.0
AT-98-99-14									
Caddo Co	27.6	21.9	9.5	5.5	4.0	25	**66**	51.5	43.0
Beckham Co	30.7	26.4	11.2	3.2	0.6	24	**73**	58.5	39.3
TX 996784									
Caddo Co	28.6	25.1	9.5	3.7	2.0	26	**68**	53.5	44.0
Beckham Co	37.4	26.2	6.3	1.6	0.7	25	**73**	59.0	43.9
TX 996612									
Caddo Co	33.7	21.7	7.4	3.0	1.5	29	**67**	58.0	43.0
Beckham Co	36.3	24.7	5.6	2.5	0.4	28	**69**	63.0	42.6
R-268									
Caddo Co	29.7	19.9	6.0	4.1	4.1	33	**59**	52.5	45.0
Beckham Co	31.8	20.6	8.2	3.2	1.8	32	**63**	58.5	43.5

1 19/64, 17/64, and 15/64 = screen sizes; OK = other kernels; DK = damaged kernels; TSMK = Total sound mature kernels plus sound splits (grade) and is in the bold numbers.
2 Seeds per oz was determined by number of seeds riding the 19/64 screen.

Performance of the Virginia Peanut Type Cultivars in 2005

The Virginia type cultivars that had the lowest incidence of Sclerotinia blight were Perry and the Oklahoma cultivar, Jupiter. Perry and Jupiter had the best pod yield at Ft. Cobb while Brantly and Gregory had the best pod yield in Beckham County. There were a lot of damaged kernels at Ft. Cobb probably due to pod rot. Data from the 2005 Virginia peanut cultivar study are shown in Tables 10-13.

Table 10. Comparison of Pod Yields in the Virginia Peanut Cultivar Study, Beckham and Caddo counties, 2005.

Cultivar	Caddo [1]	Beckham[1]	Average
Jupiter	2604 (2)[2]	2977 (5)	2791
Virugard	2559 (3)	3149 (3)	2854
Gregory	2450 (4)	3331 (2)	2891
Brantly	2133 (5)	3494 (1)	2813
Perry	3194 (1)	3131 (4)	3162
PR > F	0.0470	0.1454	
LSD 0.05	651	NS[3]	

[1] Studies located in Caddo County were at the Caddo Research Station and Beckham County plots were located at Eloy Deloung farm near Erick, OK.
[2] Number in parenthesis indicates rank in that column.
[3] NS = Differences in breeding lines and cultivars are not significant (P=0.05).

Table 11. Comparison of Percent Incidence of Sclerotinia Blight in the Virginia Type Peanut Cultivar Study, Caddo Research Station, 2005.

	Percent Sclerotinia Blight[1]		
Cultivar	30 August	13 September	29 September
Jupiter	11.9	25.0	28.1
Virugard	29.7	40.9	56.6
Gregory	19.1	35.3	52.2
Brantly	27.8	42.8	55.9
Perry	11.3	24.4	33.8
PR > F	0.0317	0.0960	0.0003
LSD 0.05	13.6	NS[2]	11.7

[1] Percent Sclerotinia blight was determined by dividing the number of infection loci by the number of potential infection loci and multiplying by 100. An infection locus is defined as an area of disease symptoms equal to or less than 6 inches long in a standard row.
[2] NS = Differences in breeding lines and cultivars are not significant (P=0.05).

Table 12. Comparison of Percent Incidence of Early Leaf Spot and Percent Incidence of Pod Rot in the Virginia Type Peanut Cultivar Study, Beckham County, 2005.

Cultivar	Percent Leaf Spot 13 September	Percent Pod Rot[1] 10 October
Jupiter	2.0	11.9
Virugard	1.8	7.7
Gregory	0.3	30.5
Brantly	0.8	9.3
Perry	0.1	35.9
PR > F	0.1819	0.0114
LSD 0.05	NS[2]	17.7

[1] Percent incidence of pod rot was determined by counting plants within a row foot that had discolored pods and dividing by total row feet.

[2] NS = Differences in breeding lines and cultivars are not significant (P=0.05).

Table 13. Comparison of Peanut Seed Quality Factors in the Virginia Type Peanut Cultivar Study, Beckham and Caddo counties, 2005.

Breeding Line and Location	Average Percent >21/64[1]	>19/64	>15/64	OK[1]	DK[1]	Hulls	**TSMK[1]**	Number Seeds/oz[2]	100 Seeds wt (g)
Jupiter									
Caddo Co	38.4	17.1	4.0	2.0	8.0	28	**62**	30.0	72.5
Beckham Co	48.7	15.2	3.7	0.9	2.0	27	**70**	32.0	77.8
Virugard									
Caddo Co	35.1	23.1	4.4	3.4	8.4	23	**65**	34.5	67.0
Beckham Co	36.5	29.1	6.7	2.0	0.6	24	**74**	38.0	65.0
Gregory									
Caddo Co	37.2	10.4	2.7	3.2	10.9	31	**55**	26.5	85.5
Beckham Co	50.5	12.4	3.2	1.1	2.8	28	**68**	33.0	80.2
Brantly									
Caddo Co	48.5	6.9	2.0	1.8	7.8	28	**62**	25.0	95.5
Beckham Co	51.2	13.1	5.2	0.7	1.1	27	**71**	30.0	81.3
Perry									
Caddo Co	47.5	16.0	3.0	2.0	3.8	25	**69**	28.5	81.5
Beckham Co	42.7	18.9	6.8	1.9	0.4	28	**70**	33.0	75.8

[1] 21/64, 19/64, and 15/64 = screen sizes; OK = other kernels; DK = damaged kernels; TSMK = Total sound mature kernels plus sound splits (grade) and is in bold numbers.

[2] Seeds per oz was determined by number of seeds riding the 21/64 screen.

Performance of Peanut Germplasm in 2005

The peanut germplasm trial was located in the high Sclerotinia blight disease area at the Caddo Research Station near Ft. Cobb. These plots were treated similarly as previously described for the other studies at Ft. Cobb. All of the germplasm entries, Valencia A, and Valencia C had a Sclerotinia blight incidence statistically similar to the resistant runner variety, Southwest Runner. The germplasm entries of R-101, R-152, and R-213 had the lowest Sclerotinia blight incidence and the highest Sclerotinia blight incidence of 63% was obtained from the susceptible cultivar, Okrun. The runner type breeding lines of TX994374 and TX994313 and the runner cultivars of Okrun and SW Runner had the highest pod yields (4011 to 3276 lbs/A) in the study. The highest yields among the germplasm entries were R-140, R-179, and R-213 with yields of 3122, 2965, and 2959 lbs/A, respectively. These entries also had high yields in 2003 and 2004. The lowest yield in the study was 2024 lbs/A. Valencia A and Valencia C were resistant to Sclerotinia blight but had low yields from 2200 to 2300 lbs/A and ranked near the middle of the study. Grades from the germplasm entries in this study were in the 50s with two germplasm entries grading in the 60s. The entry R-213 had the highest grade among the germplasm entries for the third year in a row. In summary, all of the germplasm entries and the Valencia entries have resistance to Sclerotinia blight, but had yields and grades that were lower than the standard cultivars. Data collected from the 2005 germplasm study are shown in Tables 14 and 15.

Table 14. Comparison of Percent Incidence of Sclerotinia Blight and Pod Yields in the Peanut Germplasm Study, Caddo Research Station, Ft. Cobb, 2005.

	Percent Sclerotinia Blight[1]			
Entry	30 August	13 September	29 September	Yield lbs/A
R-88	2.8	11.6	24.4	2060 (17)2
R-93	2.2	7.8	11.3	2115 (15)
R-98	2.2	8.8	15.9	2314 (10)
R-101	0.3	3.8	5.0	2024 (19)
R-116	2.5	10.0	14.7	2160 (13)
R-124	5.0	10.0	16.3	2214 (11)
R-137	1.9	9.1	15.0	2178 (12)
R-140	3.8	7.2	14.7	3122 (5)
R-152	2.2	5.0	6.9	2768 (8)
R-179	5.0	8.4	11.3	2965 (6)
R-189	2.2	5.9	11.9	2078 (16)
R-213	1.6	4.7	9.1	2959 (7)
R-228	4.7	9.1	15.3	2051 (18)
R-268	2.5	8.4	15.3	2150 (14)
Okrun	15.9	34.1	62.5	3276 (4)
SW Runner	4.7	11.3	14.4	3494 (3)
Valencia A	2.5	9.1	20.9	2396 (9)
TX994374	3.8	18.1	32.2	4011 (1)
Valencia C	0.9	6.9	14.7	2214 (11)
TX 994313	3.4	14.7	27.8	3911 (2)
Pr>F	0.0001	0.0001	0.0001	0.0001
LSD 0.05	4.9	9.5	14.0	339

[1] Percent Sclerotinia blight was determined by dividing the number of infection loci by the number of potential infection loci and multiplying by 100. An infection locus is defined as an area of disease symptoms equal to or less than 6 inches long in a standard row.

[2] Number in parenthesis indicates rank in that column.

Table 15. Comparison of Peanut Seed Quality Factors in the Peanut Germplasm Study, Caddo Research Station, Ft. Cobb, 2005.

Breeding Line and Location	Average Percent >21/64[1]	>19/64	>15/64	OK[1]	DK[1]	Hulls	**TSMK[1]**	Number Seeds/oz[2]	100 Seeds wt (g)
R-88	28.6	13.8	6.8	6.0	8.5	34	52	52.0	46.0
R-93	36.8	10.5	4.0	2.8	11.3	33	53	45.5	53.5
R-98	28.5	17.8	9.0	4.5	3.5	35	57	52.5	44.0
R-101	25.8	19.0	8.3	7.3	1.0	38	54	48.5	48.0
R-116	38.7	13.2	5.7	3.2	4.2	33	60	48.0	50.0
R-124	14.1	25.9	13.1	8.1	1.5	36	54	55.5	41.5
R-137	19.5	18.8	11.3	10.0	1.8	38	50	52.0	43.0
R-140	25.8	20.4	11.4	5.6	1.3	35	58	52.5	43.0
R-152	32.1	17.0	5.8	4.3	2.3	37	57	45.5	53.5
R-179	26.0	19.5	9.0	5.5	0.8	38	56	49.5	48.5
R-189	47.2	7.0	2.2	1.5	7.0	33	58	41.0	62.0
R-213	46.2	11.2	4.0	3.0	2.7	29	65	48.5	53.0
R-228	30.4	18.3	6.5	4.3	3.8	33	59	53.0	45.5
R-268	27.6	19.1	6.5	4.8	4.8	34	56	51.5	46.0
Okrun[3]	25.8	27.5	5.8	4.5	1.5	24	70	40.0	58.0
SW Runner[3]	15.3	39.8	8.8	6.0	1.3	24	69	48.5	48.0
Valencia A	29.1	24.3	8.3	3.3	6.8	27	63	52.5	45.5
TX994374[3]	39.8	15.0	3.8	5.5	4.2	28	62	35.0	68.5
Valencia C	26.6	24.6	10.2	3.0	6.7	27	63	54.0	44.0
TX 994313[3]	34.8	19.6	6.3	7.3	5.3	23	65	36.5	63.5

[1] 19/64, 17/64, and 15/64 = screen sizes; OK = other kernels; DK = damaged kernels; TSMK = Total sound mature kernels plus sound splits (grade).

[2] Seeds per oz was determined by number of seeds riding the 19/64 screen.

[3] Denotes runner type cultivars that were graded using 21/64, 18/64, and 16/64 screens.

Cooperation in these studies was provided by Doug Glasgow, USDA-ARS; Jerald Nickels and Bruce Greenhagen, Plant and Soil Sciences; Bobby Weidenmaier, Mike Brantes, and Jerry Howell, Caddo Research Station at Ft. Cobb.

Biology and Epidemiology of Peanut Soilborne Pathogens in Oklahoma

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2005 progress made possible through OPC and NPB support

- Fifteen weed species were found to be equally susceptible to both *Sclerotinia minor* and *Sclerotium rolfsii* as the cultivar Okrun.
- Four weed species (pitted morningglory, sickle pod, crownbeard, and jimsonweed) were capable of causing an increase in disease incidence when Okrun was grown in the same soil as the previously infected weeds.
- Five weed species (crownbeard, eclipta, jimsonweed, pitted morningglory, and sickle pod) were capable of causing an increase in the number of viable sclerotia in the soil.
- One weed species (pitted morningglory) responded to *S. minor* similar to Okrun in the formation of infection cushions.

Pressure from soilborne diseases limits yields and increases production costs to Oklahoma peanut growers. Sclerotinia blight, caused by the fungus Sclerotinia minor, and southern blight, caused by the fungus *Sclerotium rolfsii*, are the most economically damaging peanut diseases in Oklahoma. The causal pathogen, S. minor, is capable of surviving in field soils in the form of sclerotia for several years even in the absence of peanut plants. Also, peanut seeds harvested from diseased peanut plants can carry the fungus therefore providing a potential vehicle for spreading the disease. Eclipta, which has become a well-established weed pest in irrigated Oklahoma peanut fields, can be infected with the Sclerotinia fungus and thus provides an additional mode for maintaining the fungus in field soils in the absence of peanut plants. Also, *S. rolfsii* has a wide host range that includes weed species. Therefore, the objective of this research is to explain the role of weed species in maintaining *S. minor* and *S. rolfsii* in field soils. Results of this research are important in developing effective integrated strategies for managing these two important diseases.

Screening of Weed Species for Susceptibility to *Sclerotinia minor* and *Sclerotium rolfsii*

Fifteen weed species from eight families and the cultivar Okrun and SW Runner were evaluated for their susceptibility to *S. minor and S. rolfsii* under greenhouse conditions. Inoculated plants were left in the humidity chambers for about 20 days to allow formation of sclerotia to determine sclerotial density per 5 cm segments of plant stem. Susceptibility to the pathogens was determined based on calculations for rate of lesion expansion, area under lesion expansion curve (AULEC), and sclerotial formation on weeds and their viability.

All 15-weed species exhibited some degree of susceptibility to both pathogens. In the experiment with *S. minor*, all species except tall and ivyleaf morningglories and citronmelon were not significantly different from the control in the AULEC values (Table 1). All species of weeds allowed for the production of sclerotia in numbers that were either not significantly different from Okrun peanuts or significantly higher (Table 1). When the same experiment was conducted using *S. rolfsii*, all weed species had either no significant difference or significantly higher AULEC values than Okrun (Table 1). With the exception of citronmelon, spurred anoda, and Venice mallow all weeds allowed for the production of sclerotia in numbers that were not significantly different from Okrun (Table 1).

Incidence of Southern Blight and Sclerotinia Blight of Okrun Peanuts Grown in Soil Previously Planted to *S. rolfsii*- and *S. minor*-Infected Weeds and Peanuts

Peanut may have increased disease pressure as a result of the increased pathogen inoculum caused by infection of the weed species. This study was conducted to determine if disease incidence is increased when Okrun is grown following the previously infected weeds.

Five weed species were chosen from the original 15 including: crownbeard, eclipta, jimsonweed, pitted morningglory, and sicklepod. These plants were grown in the greenhouse for five or seven weeks in population densities of 1, 4, or 8 plants/ 0.093 m^2. The plants were then inoculated with *S. minor* or *S. rolfsii* in separate

Table 1. AULEC Values from Weed Screening for Susceptibility to *S. minor*.

Species	Mean AULEC	Mean # Viable Sclerotia/5 cm Stem
Tall MG	29.17	1.12
Ivyleaf MG	34.17	3.48
Citronmelon	59.08	4.50
Velvetleaf	107.50	5.54
Kochia	110.58	6.12
Spurred anoda	115.33	7.30
Jimsonweed	134.50	11.33
Crownbeard	135.17	11.45
Hemp sesbania	144.42	11.92
Redroot pigweed	152.17	13.93
Okrun	167.25	14.66
SW Runner	182.67	14.67
Eclipta	182.75	15.67
Venice mallow	222.75	16.50
Pitted MG	227.42	22.00
Sicklepod	286.58	24.72
Cypressvine MG	290.90	28.50

experiments and allowed to complete the disease cycle. Okrun, a susceptible cultivar, was then planted in the same soil that the infected weeds were grown in and disease incidence was monitored weekly until the peanuts were mature. Disease incidence was recorded as percent of plants infected. The control consisted of Okrun peanuts grown in soil not previously inhabited by an infected plant.

In the experiment with *S. minor*, crownbeard, jimsonweed, and pitted morningglory allowed for significantly higher disease incidence than the control (Table 2). Crownbeard actually allowed for a higher disease incidence in Okrun than Okrun grown following Okrun-infected plants (Table 2). Population was also significant, with 8 plants/0.093 m^2 having significantly higher disease incidence than 1 plant/0.093 m^2 (Table 3).

In the experiment with *S. rolfsii*, all species allowed for significantly higher disease incidence than the control. Pitted morningglory and sicklepod were not significantly different from Okrun (Table 4). Population density was also significant with increasing population density having significantly higher percentages of disease incidence as population density increased (Table 5).

Effects of *S. minor*- and *S. rolfsii*-Diseased Weeds on Viable Sclerotial Density (of the blight pathogens) in the Soil

Upon Okrun maturity in the aforementioned disease incidence study, soil samples were taken from each of the bulb pans after the peanuts were harvested to determine the viable sclerotial density of the soil. For the experiment evaluating *S. minor*, a 100 g sample was taken and poured through a sieve to collect any sclerotia that

Table 2. Incidence of Sclerotinia Blight of Okrun Peanuts Grown in Soil Previously Inhabited by *S. minor*-Infected Weeds and Peanuts as Affected by Plant Species.

Species	Mean Disease Incidence (% of Okrun plants infected)	Statistical Separation of Treatments
Control	0	a
Okrun	9.375	ab
SW Runner	10.425	ab
Eclipta	12.5	ab
Sicklepod	12.5	ab
Pitted MG	16.67	bc
Jimsonweed	22.92	bc
Crownbeard	31.25	c

Table 3. Incidence of Sclerotinia Blight of Okrun Peanuts Grown in Soil Previously Inhabited by *S. minor*-Infected Weeds and Peanuts as Affected by Population Density.

Population Density (plants/0.093 m^2)	Mean Disease Incidence (% of Okrun plants infected)	Statistical Separation of Treatments
1	5.8594	a
4	15.63	ab
8	21.88	b

Table 4. Incidence of Southern Blight of Okrun Peanuts Grown in Soil Previously Inhabited by *S. rolfsii*-Infected Weeds and Peanuts as Affected by Plant Species.

Species	Mean Disease Incidence (% of Okrun plants infected)	Statistical Separation of Treatments
Control	0	a
Eclipta	15.625	b
Jimsonweed	16.67	b
Crownbeard	20.83	bc
Sicklepod	22.92	bcd
SW Runner	29.17	bcd
Okrun	34.37	cd
Pitted MG	35.42	d

Table 5. Incidence of Southern Blight of Okrun Peanuts Grown in Soil Previously Inhabited by *S. rolfsii*-Infected Weeds and Peanuts as Affected by Population Density.

Population Density (plants/0.093 m^2)	Mean Disease Incidence (% of Okrun plants infected)	Statistical Separation of Treatments
1	7.03	a
4	22.66	b
8	35.94	c

were present and then carefully sorted by hand. The suspected sclerotia were then plated on potato dextrose agar for viability determination. For the experiment using *S. rolfsii*, each sample weighed into 10 petri plates containing 22.5 g of soil and each was saturated with a 1% methanol solution. The viable sclerotia were stimulated to germinate in the presence of methanol.

In the experiment with *S. minor*, only population density was significant with 8 plants/0.093 m^2 having significantly higher numbers of sclerotia than 1 plant/ 0.093 m^2 (Table 6). In the experiment with *S. rolfsii*, species and population density were significant. All species had higher numbers of sclerotia than the control and jimsonweed, crownbeard, and pitted morningglory all had significantly higher numbers of sclerotia than Okrun (Table 7).

Infection Cushion Formation on Weed Species and Peanuts following Inoculation with *S. minor*

S. minor penetration of weed species and peanuts was determined by evaluating the formation of infection cushions on a cellophane membrane. Weeds were grown for five and seven weeks until an adequate root system had developed. An inoculum consisting of mycelial fragment was prepared to be used in this study. The

Table 6. Viable Sclerotial Density of Soil after Presence of *S. minor*-Infected Weeds as Affected by Population Density.

Population Density (plants/0.093 m^2)	Mean Disease Incidence (% of Okrun plants infected)	Statistical Separation of Treatments
1	0.1719	a
4	1	ab
8	1.4688	b

Table 7. Viable Sclerotial Density of Soil after Presence of *S. rolfsii*-Infected Weeds as Affected by Plant Species.

Species	Mean # of Sclerotia/Sample	Statistical Separation of Treatments
Control	0	a
Okrun	3.46	b
SW Runner	5.17	b
Sicklepod	7.92	bc
Eclipta	8.38	bc
Jimsonweed	14.71	c
Crownbeard	15.13	c
Pitted MG	17.17	c

mycelial fragment suspension was then added to 15 g of perlite to form the growth medium. The five-week-old plants (roots and stems) were then removed from the soil and cleaned of all soil and organic matter before placing the roots in a cellophane tube. The tube was sealed at the bottom and tied around the plant stem at the top just above the surface of the perlite inoculum. Plants were then placed in the cups containing the *S. minor* perlite inoculum and allowed to grow in the humidity chambers for five days. After the plants were removed from the humidity chambers, the cellophane sleeve was removed and washed gently to remove any of the growing media that may have adhered to the surface. The cellophane sleeves were cut into single layers and placed on slides where two drops of lactophenol blue dye was added. After two minutes, the excess dye was gently washed off the cellophane, and the infection cushions on the cellophane were counted under a compound microscope. This experiment was conducted twice.

In experiment 1, pitted morningglory had significantly higher numbers of infection cushions than the other weed species, however it did not have as many as Okrun (Table 8). None of the other species were significantly different from the control. Plant age did have a significant difference with the seven-week-old plants containing significantly higher numbers of infection cushions than the five-week-old plants (Table 9).

In experiment 2, a significant interaction occurred between age and species and therefore main effects could not be interpreted. However, jimsonweed, pitted morningglory, and sicklepod all elicited the formation of significantly higher numbers of infection cushions at both ages of plants than the control and were either not significantly different than Okrun or had higher numbers of infection cushions (Table 10).

Table 8. *S. minor* Infection Cushion Counts on Weeds and Peanuts in Experiment 1.

Species	Log (Infection Cushions/cm^2+1)
Control	0.00 a
Jimsonweed	0.06 a
Eclipta	0.13 a
Crownbeard	0.27 ab
Sicklepod	0.35 ab
Pitted MG	0.72 b
SW Runner	1.20 c
Okrun	1.22 c

Table 9. ***S. minor*** **Infection Cushion Counts Reported by Plant Age in Experiment 1.**

Plant Age (weeks)	Log (Infection Cushions/cm^2+1)
5	0.34 a
7	0.65 b

Table 10. ***S. minor*** **Infection Cushion Counts on Weeds and Peanuts in Experiment 2.**

Species	Plant Age (weeks)	Log (Infection Cushions/cm^2+1)
Control	5	0 a
Control	7	0 a
Crownbeard	7	0.1 a
Eclipta	5	0.35 ab
Eclipta	7	0.39 ab
Crownbeard	5	0.07 abc
Jimsonweed	7	0.75 bcd
Pitted Morningglory	5	0.85 bcd
Pitted Morningglory	7	0.88 bcd
Southwest Runner	5	1.12 cde
Sicklepod	7	1.28 def
Jimsonweed	5	1.68 efg
Okrun	7	1.86 eg
Okrun	5	1.88 eg
Southwest Runner	7	1.92 eg
Sicklepod	5	2.01 g

Field Studies for Control of Peanut Diseases

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2005 progress made possible through OPC and NPB support

- The performances of both Omega® and Endura® for control of Sclerotinia blight were similar when applied preventively (before symptoms appeared) or on demand (after symptoms first appeared).
- The Sclerotinia blight resistance of entries selected from the USDA-ARS Core Collection of peanut germplasm was verified for a second year by the lack of a yield response to high rates of the fungicide Omega®.
- In Tillman and Beckham counties, yield responses to fungicides such as Abound® and Folicur® for control of soilborne diseases were not observed.
- The declining control of early leaf spot with Folicur®, observed at some locations in previous years, was not related to formulation. However, the addition of a non-ionic surfactant improved leaf spot control for both old and new Folicur® formulations.
- Reduced fungicide programs, consisting of three to five applications timed according to the calendar or the Early Leaf Spot Advisory Program, continued to be effective.

In 2005 seven field trials were completed that addressed the management of important peanut diseases in Oklahoma. The management strategies that were evaluated included chemical control and disease-resistant varieties. Efforts were made to develop and demonstrate a range of input levels for the fungicide programs. The diseases studied included early leaf spot, web blotch, southern blight, Sclerotinia blight, and limb rot. Hassan Melouk and Ken Jackson, USDA-ARS in Stillwater; and Jerald Nickels and Bruce Greenhagen, Department of Plant and Soil Sciences, provided cooperation in these studies. Appreciation is expressed to Eloy Deloung (Beckham County) and Joe D. White (Tillman County), who provided time and resources as on-farm cooperators for the trials at Erick and Davidson, respectively. Bobby Weidenmaier, Jerry Howell, and Mike Brantes at the Caddo Research Station; and Rocky Walker and Brian Heid, at the Plant Pathology Farm in Stillwater also are acknowledged for their valuable support and cooperation that made the trials at the research stations a success.

The 2005 field studies served several purposes. The first was to identify and refine better strategies for managing diseases. The second was to use the trials sites as demonstrations to show growers firsthand the benefits of disease management in peanut production. Trial sites at the Caddo Research Station and Beckham County were showcased during annual fall field tours. Results from 2005 are summarized in this report. In interpreting the results, small differences in treatment values should not be overemphasized. Least significant difference (LSD) values are shown at the bottom of most tables. Unless two values differ by at least the LSD value shown, little confidence can be placed in the superiority of one treatment or variety over another.

In 2005, weather was generally favorable for the development of the crop and diseases. Warm temperatures and dry conditions in May favored rapid stand establishment. However, preirrigation was necessary for planting at most locations. Rainfall levels and temperatures were generally average in June and July, but rainfall was above normal and temperatures below normal in August, which favored crop set and development. Leaf spot was a problem statewide. Sclerotinia blight appeared in late August, a month later than in 2004. Warm dry weather during September limited late-season development of Sclerotinia blight, which ended up at below normal levels. Yield losses from Sclerotinia blight and leaf spot occurred in most trials where these diseases were targeted. Southern blight was not a problem in plots, but a few growers were affected. The dry fall also limited limb rot development. The dry conditions in September and October facilitated an early harvest. Yields were excellent where leaf spot was controlled and grades were good at all locations except Perkins.

Sclerotinia Blight

Sclerotinia blight remains a destructive disease in Oklahoma. It occurs in all areas of the state except in far southwestern productions areas. Trials on management of Sclerotinia blight were conducted at the Caddo Research Station. The trials focused on evaluating variety response to fungicide programs and identifying new sources of resistance, which may be useful in breeding programs for variety improvement.

Variety response to fungicide programs

Two fungicides are now registered for use on peanuts that are highly effective in the control of Sclerotinia blight. However, the high cost of both Omega® and Endura® has limited their usage. Previous research has shown that economic returns from Omega® are generally positive for susceptible varieties such as Okrun and break-even for moderately resistant cultivars such as Tamrun 96 and Tamrun OL 01. Economic returns are almost always negative for Omega® use on resistant varieties such as Tamspan 90 and Southwest Runner. The objective of this study was to evaluate fungicide programs with Omega® and Endura® on popular runner cultivars that often show moderate resistance to Sclerotinia blight. An additional objective was to compare demand programs, where the first application is made after the disease first appears, to preventive programs. Delaying the first application may allow growers to get by with a single application.

Fungicide programs consisted of two applications of Endura® made preventively or on demand. In the preventive programs, a second application was made either 14 or 30 days after the first. For the demand program, a second application followed 21 days after the first. Preventive programs with Omega® consisted of two applications at 60 and 90 days after planting at 1 or 1.5 pt/A. Demand programs consisted of two application at 1 pt/A, or single applications at 1.5 and 2 pt/A. Another program consisted of a preventive application of Endura® followed by Omega® at 1 pt/A 30 days later. Fungicide programs were applied to Georgia Green, Tamrun 96, and Tamrun OL 02.

Sclerotinia blight was first observed in the field in early August and the demand application was made on 9 August. The disease appeared one month later than in 2004, but at a time more typical over the last seven to 10 years. The disease progressed in untreated plots to reach an average of 5% on 29 August, 32% on

22 September, and 50% on 17 October just prior to harvest. Disease pressure at this location was moderate compared to previous years. Warm and dry conditions during September and October limited late-season disease development. The fungicide programs performed similarly on each variety so the results of the trials are presented and discussed for the averages over varieties and fungicide programs. Levels of disease were similar for the three varieties (Table 1). All fungicide programs reduced levels of Sclerotinia blight compared to the untreated check, although better disease control with the fungicide programs was expected given the moderate disease pressure. Using the preventive program, the best disease control was provided by Omega® at 1.5 pt/A. Other preventive and demand programs with Omega®, Endura®, and the combination of Omega® and Endura® provided similar levels of disease control.

Yields were high in this trial and were at or near 4000 lbs/A in untreated check plots (Table 1). On average, yields were higher for Tamrun 96 and Tamrun OL 02 than for Georgia Green. All fungicide programs increased yield compared to the check. Yield increases ranged from 1200 lbs/A for the preventive Omega® programs to about 700 lbs/A for the demand program with Endura®. Overall, fungicide programs provided similar yield responses and there was little difference between disease control and yield among demand and preventive programs. Crop value per acre was also increased for all treatments compared to untreated check plots (Table 1). Increases in crop value ranged from $119/A for the demand program with Omega® to $200/A for the preventive programs with Omega® and Endura®. Fungicide costs of $45/pt for Omega® and $6/oz for Endura® were used to estimate partial economic returns (crop value minus chemical costs) for each treatment. Partial economic returns exceeded the value of untreated check for each fungicide program except the Endura®/Omega® combination program. Partial economic returns were greatest for the preventive Omega® program at 1 pt/A ($116/A) and the demand program with Omega® at 1.5 pt/A ($96/A).

Results for this trial were different compared to those reported in recent years. Despite the early appearance of disease and the favorable weather for rapid disease

Table 1. Control of Sclerotinia Blight on Runner Peanut Varieties with Fungicide Programs at the Caddo Research Station, 2005.

Treatment and Rate/A	Timing[1]	Georgia Green	Tamrun 96	Tamrun OL 02	Mean[2]
		Sclerotinia blight (%)			
Omega® 4F 1.5 pt	P1, P2	16.7	15.5	16.0	16.1 d[3]
Omega® 4F 1.0 pt	P1, P2	34.2	29.2	32.0	31.8 bc
Omega® 4F 1.0 pt	D1, D2	35.0	28.0	42.0	35.0 b
Omega® 4F 1.5 pt	D1	27.0	31.5	26.2	28.2 bc
Omega® 4F 2.0 pt	D1	34.0	22.0	17.5	24.5 cd
Endura® 70WG 10.0 oz	D1, +21d	28.7	31.2	21.5	27.2 bc
Endura® 70WG 10.0 oz	P1, +14d	21.2	25.5	20.0	22.2 cd
Endura® 70WG 10.0 oz	P1, +30d	29.7	21.2	21.0	24.0 cd
Endura® 70WG 10.0 oz	P1				
Omega® 4F 1.0 pt	P2	29.7	20.0	26.0	25.2 cd
Check	-	50.0	44.7	53.5	49.4 a
Mean[4]		36.5 a[5]	34.8 a	34.5 a	

Table 1 Continued. Control of Sclerotinia Blight on Runner Peanut Varieties with Fungicide Programs at the Caddo Research Station, 2005.

Treatment and Rate/A	Timing[1]	Georgia Green	Tamrun 96	Tamrun OL 02	Mean[2]
		Yield (lbs/A)			
Omega® 4F 1.5 pt	P1, P2	4959	5227	5401	5196 a
Omega® 4F 1.0 pt	P1, P2	5227	5155	5227	5203 a
Omega® 4F 1.0 pt	D1, D2	4763	4915	4733	4804 abc
Omega® 4F 1.5 pt	D1	4879	5031	4988	4966 ab
Omega® 4F 2.0 pt	D1	4407	5336	4937	4893 ab
Endura® 70WG 10.0 oz	D1, +21d	4138	5075	4951	4721 bcd
Endura® 70WG 10.0 oz	P1, +14d	5126	4929	5082	5046 ab
Endura® 70WG 10.0 oz	P1, +30d	4966	5539	5126	5210 a
Endura® 70WG 10.0 oz	P1				
Omega® 4F 1.0 pt	P2	4530	4951	5024	4835 abc
Check	-	3971	4240	3949	4053 e
Mean		4525 a	4876 a	4782 a	
		Crop Value ($/A)[6]			
Omega® 4F 1.5 pt	P1, P2	893	932	960	928 a
Omega® 4F 1.0 pt	P1, P2	941	919	929	930 a
Omega® 4F 1.0 pt	D1, D2	858	877	841	858 abc
Omega® 4F 1.5 pt	D1	878	897	886	887 ab
Omega® 4F 2.0 pt	D1	793	952	877	874 ab
Endura® 70WG 10.0 oz	D1, +21d	745	905	880	843 bcd
Endura® 70WG 10.0 oz	P1, +14d	923	879	903	902 ab
Endura® 70WG 10.0 oz	P1, P2	894	988	911	931 a
Endura® 70WG 10.0 oz	P1				
Omega® 4F 1.0 pt	P2	816	883	893	864 abc
Check	-	715	756	702	724 e
Mean		815 b	870 a	850 a	

1 P = preventive program started before symptoms appeared on P1 = 27 July. A second application was made either 30 days later on P2 = 29 August, or 14 days later on +14d = 9 August. D = Demand program started after symptoms first appeared on D1 = 9 August. Some demand programs received a second application 21 days later on +21d = 29 August, or 30 days later on D2 = 16 September.

2 Treatment average.

3 Values in a column followed by the same letter are not statistically different at P=0.05 according to Fisher's Least Significant Difference Test.

4 Variety average.

5 Values in a row followed by the same letter are not statistically different at P=0.05 according to Fisher's Least Significant Difference Test.

6 Loan rate value based a grade of 74 for Georgia Green and 73 for Tamrun 96 and Tamrun OL 02.

increase during mid-season, yields for the untreated check were good. Georgia Green also performed better relative to Tamrun 96 than in previous trials. Yield responses to fungicide programs for Tamrun 96 have been break-even in previous trials.

Evaluation of new fungicides for control of Sclerotinia blight

Two experimental fungicides were evaluated in comparison to Omega® and Endura®. V-10116 was applied at four rates from 2.6 to 5 fl oz/A on a 14-day schedule beginning in mid-July. AR-1021 was tested at 2 lbs/A at 60 and 90 days after planting, similar to preventive programs with Omega® and Endura®. Levels of Sclerotinia blight for V-10116 and AR-1021 did not differ from the untreated check while two applications of Omega® and Endura® provided 70% and 60% disease control, respectively.

New sources of resistance to Sclerotinia blight

The core collection, a subset of the USDA peanut germplasm collection comprising 745 entries, was screened for reaction to Sclerotinia blight in the field from 2001 to 2003. From this screening, 10 entries with the best combination of resistance and yield were selected for further evaluation. The objective of this study was to verify the resistance of these entries using the fungicide Omega® as a tool for measuring yield loss to Sclerotinia blight. Based on previous experience with the resistant varieties Tamspan 90 and Southwest Runner, one would expect minimal yield response to the fungicide for the resistance entries. In 2004, 10 elite entries (Table 2) were tested for their response to the fungicide Omega®. In 2004, results followed expectations. Large yield

Table 2. Plant Characteristics and Disease Reactions (2001-2004) of Selected Entries from the Core Collection and Reference Varieties Evaluated in 2005.

Entry (origin)	Maturity (1-6)[1]	Plant Type (1-6)[2]	Sclerotinia blight (%)[3]	Pepper spot (%)[3]	Web blotch (%)[3]
92 (Bolivia)	3	5	MR	R	R
103 (Bolivia)	4	5	R	R	R
128 (Ecuador)	3	4	MR	R	R
184 (Argentina)	2	5	R	S	MR
208 (Bolivia)	3	3	MR	R	MR
273 (Malawi)	3	4	R	MR	S
426 (Brazil)	2	5	R	S	MR
562 (PR China)	2	5	R	S	MR
582 (Agrentina)	3	3	MR	R	MR
804 (Madagascar)	3	4	MR	R	R
Okrun	4	2	S	R	R
Southwest Runner	4	2	R	S	S
Tamspan 90	2	5	R	S	S
Tamrun 96	4	2	MS	R	S
Georgia Green	4	2	S	MR	MR
Tamrun OL 01	4	2	MS	?	MR
Tamrun OL 02	4	2	MS	?	MR

[1] 1 = early, 5 = late
[2] 1 = very flat, 6 = very erect
[3] R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible.

increases were observed for susceptible and moderately resistant check varieties such as Okrun and Georgia Green, while yield increases were minimal for Tamspan 90, Southwest Runner, and the 10 germplasm entries. This trial was repeated in 2005 to verify the 2004 results.

In 2005, entries and reference varieties with known reactions to Sclerotinia blight were grown in four-row replicated plots at the Caddo Research Station. Within each plot, two rows received two applications of the fungicide Omega® at 1.5 pt/A while the other two rows were left untreated.

Sclerotinia blight was observed a month later in 2005 compared to 2004 and the disease reached only moderate levels. The fungicide Omega® reduced levels of Sclerotinia blight compared to the untreated check for all of the reference cultivars except Tamspan 90 (Table 3). Omega® generally provided excellent disease control on the reference varieties. Disease levels were low in all 10 core entries (less than 10%), and Omega® did not statistically reduce their level of disease except for entry 804. For the reference cultivars, yield responses to Omega® were less in 2005 compared to 2004. Omega® statistically increased the yields of Okrun, Georgia Green, and Tamrun OL 02 but not the other reference cultivars. Yield responses ranged from 600 lbs/A for Okrun and Tamrun OL 02 to 1000 lbs/A for Georgia Green. Omega® did not statistically increase yields of any of the core entries except for 103. The yield increase for entry 103 was only about 150 lbs/A, yet it was statistically significant. As in 2004, entry 103 had the highest yield among the core entries.

Table 3. Disease and Yield Responses of Selected Entries from the Core Collection and Reference Varieties to Omega®.

Entry	Sclerotinia blight (%)		Yield (lbs/A)		Grade
	Check[1]	Omega®[2]	Check	Omega®	(%TSMK)[3]
92	9.2	3.3	2662	2553	67
103	0.8	0.0	3714	3872[5]	68
128	5.8	1.7	3013	3110	70
184	2.1	0.8	2323	2347	67[4]
208	1.2	0.8	2650	2819	69
273	3.7	1.2	2880	3061	71[4]
426	2.9	1.2	1948	2384	65[4]
562	1.7	1.7	3158	3315	73
582	2.9	2.5	2251	2396	66
804	7.9	1.2[5]	2614	2783	68
Okrun	46.7	12.5[5]	3690	4283[5]	76
Southwest Runner	10.4	1.2[5]	4259	4501	72
Georgia Green	32.1	5.4[5]	3666	4658[5]	75
Tamrun 96	27.1	3.7[5]	4368	4961	75
Tamrun OL 01	35.0	4.6[5]	3884	4247	75
Tamrun OL 02	46.2	6.7[5]	4211	4816[5]	74
Tamspan 90	5.0	2.5	3424	3521	73[4]
LSD (P=0.05)[6]	9.5	4.6	389	424	

1 Sub-plots not treated with fungicide for Sclerotinia blight.
2 Sub-plots treated with Omega® at 1.5 pt/A on 29 July and 30 August.
3 Percent total sound mature kernels.
4 The entry was graded as Spanish, others graded on runner screens.
5 Statistical difference between the untreated check and Omega® treatment within an entry.
6 Least significant difference among entries within the column.

The fungicide Omega® was used at maximum rate as a tool to measure yield loss due to Sclerotinia blight in core entries selected for resistance to Sclerotinia blight. The resistance to Sclerotinia blight in the core entries was verified by the lack of a statistically significant yield response for all but one of the entries in each year. In comparison, yield responses to Omega® in most of the reference varieties were large. Tamspan 90 and Southwest Runner continued to show good resistance and a lack of a yield response to Omega®. In an attempt to improve the Sclerotinia resistance of high oleic runner varieties, core entries 103 and 273 have been crossed with Tamrun OL 02 as part of the USDA-ARS breeding program in Stillwater.
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Southern Blight, Limb Rot, and Pod Rot

Southern blight, limb rot, and pod rot are damaging soilborne diseases that can occur statewide. Southern blight appears to be declining in importance as acreage along the Red River in southern Oklahoma declines. A moderate level of resistance to these diseases occurs in Tamspan 90 and Tamrun 96, but effective management relies on the use of fungicide. Fungicide programs are recommended in fields with a history of damage from southern blight and limb rot. Folicur®, Abound®, and Moncut® have provided good to excellent control of these diseases. Headline® is also registered for use on southern blight and limb rot, but control of southern blight has not been comparable to the other products. Data on limb rot control with Headline® has not been developed. Except for Moncut®, which must be tank-mixed with another fungicide, these fungicides are also effective against foliar diseases. Pod rot control has relied on planting resistant varieties and avoiding highly susceptible varieties such as Florunner, AT-1, and NC-7. OSU data on pod rot control with fungicides has been inconclusive. However, many growers are using Abound® to control this disease. Research is still needed to asses the benefits and economic returns from using these fungicides.

Evaluation of reduced fungicide programs and timing of Abound® applications

Reduced fungicide programs consisting of four, mid-season applications, were applied to Jupiter, a Virginia-type variety in a Tillman County field with a history of southern blight and pod rot. Folicur® was alternated with either Abound® or Headline® at 12 and 15 fl oz. Abound® was applied twice at 18.4 and 12.3 fl oz, or single applications at 18.4 fl oz were made on 15 July or 1 August. Moncut® was applied twice at 0.7 lb/A and the experimental fungicide V-10116 was tested at 3.5 and 5 fl oz/A. Fungicide programs for soilborne disease were compared to Bravo® applied to control just leaf spot and an untreated check.

Generally disease pressure was low at this site. Leaf spot did not develop and levels of pod rot were low (Table 4). Jupiter has partial resistance to pod rot, which may have limited this disease. Aspergillus crown rot, normally an early season problem, developed late in the season, killing a few plants. None of the fungicide programs affected levels of Aspergillus crown rot. Limb rot developed by harvest, but it apparently developed late in the season because it caused minimal damage. All of the fungicide programs reduced limb rot compared to the untreated check. However, Bravo® alone was also effective. Normally Bravo® has little or no activity on this disease. Headline® was very effective on limb rot. Abound® reduced limb rot, but was not as effective as in previous trials where it provided almost complete control. Yields were very high in this trial as the untreated check yielded more than 6000 lbs/A. The low rate of V-10116 was the only treatment that had statistically higher yield than the untreated check. However, the increase in yield was not associated

Table 4. Effect of Fungicide Programs for Southern Blight, Limb Rot, and Pod Rot on the Virginia-Type Variety Jupiter at the White Farm, Davidson, 2005.

Treatment & Rate/A (timing)[1]	Crown rot (%) 8 Sep	Pod rot (%) 5 Oct	Limb rot (%) 5 Oct	Yield (lbs/A)	Crop Value ($/A)[2]
Headline® 2.08E 15.0 fl oz (1,3) Folicur® 3.6F 7.2 fl oz (2,4)[3]	2.5	2.7	7.5	6194	1075
Abound® 2.08F 18.4 fl oz (1,3) Folicur® 3.6F 7.2 fl oz (2,4)[3]	2.5	0.9	10.0	6292	1092
Headline® 2.08E 12.0 fl oz (1,3) Folicur® 3.6F 7.2 fl oz (2,4)[3]	2.7	0.9	7.5	6455	1123
V-10116 50WD 3.42 fl oz (1-4)	2.2	1.6	13.5	6841	1188
V-10116 50WD 5.0 fl oz (1-4)	1.5	0.2	11.2	6096	1058
Abound® 2.08F 18.4 fl oz (1,3) Bravo® Ultrex 82.5DF 1.4 lbs (2,4)	5.0	1.4	10.1	6469	1123
Abound® 2.08F 12.3 fl oz (1,3) Bravo® Ultrex 82.5DF 1.4 lbs (2,4)	1.2	0.9	11.0	6116	1062
Abound® 2.08F 18.4 fl oz (1) Bravo® Ultrex 82.5DF 1.4 lbs (2,3,4)	1.2	0.4	6.5	6704	1164
Abound® 2.08F 18.4 fl oz (2) Bravo® Ultrex 82.5DF 1.4 lbs (1,3,4)	1.5	0.9	9.1	6534	1134
Bravo® Ultrex 82.5DF 1.4 lbs + Moncut® 70DF 0.7 lb (1,3) Bravo® Ultrex 82.5DF 1.4 lbs (2,4)	0.5	0.6	13.7	5972	1037
Bravo® Ultrex 82.5DF 1.4 lbs (1-4)	0.5	1.9	14.4	6312	1096
Check	3.0	1.4	26.9	6214	1079
LSD (P=0.05)[4]	NS	NS	5.4	496	86

1 Application numbers 1 to 4 correspond to the spray dates of 1 = 13 July, 2 = 27 July, 3 = 10 August, and 4 = 24 August.

2 Crop value based on an average grade of 70% TSMK. ELK (extra large kernels) premiums were not determined.

3 The adjuvant Induce® was added at 0.125% of the total spray volume.

4 Least significant difference, NS = treatment effect not significant at P=0.05.

with disease control. Because of the low disease pressure, fungicide programs for soilborne disease control were not beneficial in this 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 to 700 lbs/A. However, losses exceeding 1000 lbs/A are possible in years when weather favors severe disease development and vines become completely defoliated. Foliar diseases can be effectively controlled where a full-season fungicide program that consists of six sprays per season is used. However, reduced fungicide programs that are effective and utilize fewer sprays per season are needed to reduce the costs of peanut production. The objectives of the research on foliar diseases are to identify new chemistries for control of foliar diseases and to develop effective reduced application programs.

Evaluation of fungicide programs

Fungicide programs were evaluated for control of early leaf spot on Tamspan 90 at the Agronomy Research Station in Perkins. Experimental fungicides evaluated were JAU 6476 and V-10116.

JAU 6476 is in the same fungicide family as Folicur®. Full-season programs that consisted of six applications were made on 14-day intervals. A standard treatment of Bravo® was compared to treatments consisting of Abound®/Bravo®, Headline®/Bravo®, Folicur®/Bravo®, JAU 6476/Bravo®, JAU 6476+Folicur®, and new and old Tilt®/Bravo® formulations. The performance of Folicur® on early leaf spot has declined at this location for several years. Similar observations have recently been made in other states and the manufacturer has suggested that formulation changes in Folicur® production are likely to blame. Therefore 2005 ('05), 2004 ('04), and early 1990s (BAY HWG 1608) formulations were compared with and without the adjuvant Induce®. Finally a reduced fungicide program consisting of Headline® and Tilt®/Bravo® applied in alternation when recommended by the Early Leaf Spot Advisory Program (http://agweather.mesonet.org) was evaluated in comparison to the same fungicides applied according to the calendar.

Pressure from early leaf spot was severe at this location as evidenced by the nearly complete defoliation of untreated check plots. About 30% leaf spot was observed at the time of the first application and the disease was difficult to control throughout the season. Eight inches of rain fell in August and dews were abundant in September, which favored disease development. All spray programs reduced leaf spot compared to untreated check (Table 5). However, levels of leaf spot were unusually high for spray programs such as the full-season Bravo® and Tilt®/Bravo® programs that normally provide excellent leaf spot control. The most effective fungicide programs included Tilt®/Bravo®-Headline®, and JAU 6476 applied alone or in combination with Folicur®. The high rate of V-10116 was similar in performance to Bravo®. The new Tilt®/Bravo® formulation (4.3SE) was similar in performance to the old formulation. All of the Folicur® formulations performed similarly, but the addition of the adjuvant Induce® improved Folicur® performance.

Yields exceeded 3000 lbs/A for most treatments, but grade was low (62% TSMK). Despite the high levels of leaf spot for many of the fungicide programs, all had yields greater than the untreated check that only yielded about 2100 lbs/A. Yield increases ranged from nearly 1600 lbs/A for Tilt®/Bravo® - Headline® programs applied according to the calendar and the advisory program, to about 800 lbs/A for the '05 Folicur® program without Induce®. Despite the low grades, increases in crop value above the untreated check were sufficient to exceed the costs of the fungicide programs that used registered fungicide whose price is known.

Evaluation of reduced fungicide programs in Beckham County

Peanuts in the newer production areas of southwestern Oklahoma have not experienced much pressure from soilborne diseases. Sclerotinia blight has not become established in Beckham, Greer, and Jackson counties. While southern blight and limb rot have been observed, the use of fungicide programs in previous trials for these diseases has not resulted in significant yield responses. However, early leaf spot has been a problem in fields where peanuts are cropped continuously. In 2003 and 2004, excellent control of early leaf spot followed a reduced calendar program consisting of three applications made on 14-day intervals beginning on 1 August. The objective of this study was to verify the effectiveness of the reduced calendar program in comparison with applications made when recommended by the Early Leaf Spot Advisory Program (http://agweather.mesonet.org). Folicur®, Abound®, and high rates of Headline® were also included for control of soilborne diseases such as limb rot and southern blight had they occured.

The trial was conducted in a field of Tamrun OL 02 peanuts near Erick. Fungicide programs applied according

Table 5. Effect of Fungicide Programs on Control of Early Leaf Spot on the Peanut Cultivar Tamspan 90 at the Agronomy Research Station, Perkins, 2005.

	6 October			
Treatment & Rate/A (timing) [1]	Early leaf spot (%)	Defoliation (%)	Yield (lbs/A)	Crop Value ($/A)[2]
Check	100.0	97.5	2134	333
V-10116 50WD 1.73 oz (1-6)[3]	94.1	77.1	3180	497
V-10116 50WD 3.42 oz (1-6)[3]	83.3	64.6	3325	519
Bravo® Ultrex 82.5DF 1.4 lb (1,3,5,6) Abound® 2.08F 18.5 fl oz (2,4)	82.9	66.2	3463	541
Bravo® Ultrex 82.5DF 1.4 lb (1-6)	80.8	64.6	3100	484
Tilt® 3.6E 2 fl oz + Bravo® Ultrex 82.5DF 0.9 lb (1,6)	73.3	53.3	3318	518
Tilt®/Bravo® 4.3SE 1.5 pt	73.3	52.5	3151	492
Bravo® Ultrex 82.5DF 1.4 lb (1,6) Folicur® 3.6F ('05) 7.2 fl oz (2-5)	84.6	72.5	2956	457
Bravo® Ultrex 82.5DF 1.4 lb (1,6) BAY HWG 1608 3.6F 7.2 fl oz (2-5)	86.3	74.6	3049	476
Bravo® Ultrex 82.5DF 1.4 lb (1,6) Folicur® 3.6F ('04) 7.2 fl oz (2-5)	87.1	72.9	3383	528
Bravo® Ultrex 82.5DF 1.4 lb (1,6) BAY HWG 1608 3.6F 7.2 fl oz (2-5)[4]	66.6	53.3	3245	507
Bravo® Ultrex 82.5DF 1.4 lb (1,6) Folicur® 3.6F ('04) 7.2 fl oz (2-5)[4]	65.0	51.6	3477	543
Bravo® Ultrex 82.5DF 1.4 lb (1,6) Folicur® 3.6F ('05) 5.3 fl oz + JAU 6476 4F 2.38 fl oz	47.1	27.5	3456	540
Bravo® Ultrex 82.5DF 1.4 lb (1,6) JAU 6476 4F 5.7 fl oz (2-5)	70.0	23.3	3332	520
Tilt®/Bravo® 4.3SE 1.5 pt (1,3,5) Headline® 2.08E 6.0 fl oz (2,4,6)	59.2	23.7	3761	587
Tilt®/Bravo® 4.3SE 1.5 pt (A1,A3,A5) Headline® 2.08E 6.0 fl oz (A2, A4)	74.5	58.7	3703	578
LSD (P=0.05)[5]	11.6	12.9	470	73

1 Application numbers (1-6) correspond to the application dates for the 14-day calendar program of 28 June, 12 July, 26 July, 9 August, 25 August, and 8 September. A1 to A5 correspond to the application dates for the Early Leaf Spot Advisory Program of 28 June, 18 July, 9 August, 25 August, and 19 September.
2 Based on an average grade of 62% TSMK.
3 The adjuvant Induce® was added at 0.125% of the total spray volume.
4 The adjuvant Induce® was added at 0.1% of the total spray volume.
5 Least significant difference.

to the reduced calendar and advisory programs consisted of Tilt®/Bravo® applied alone, or alternated with Headline® at 6 and 9 fl oz. Treatments for soilborne diseases included alternations of Folicur® with Abound®, and Headline® at 12 and 15 fl oz applied according to the calendar. In order to minimize the interference of leaf spot with the soilborne fungicide programs, Bravo® was applied in June when recommended by the advisory program.

Early leaf spot developed to severe levels at this location. Untreated check plots had more than 90% leaf spot and were 80% defoliated (Table 6). Rodent damage to plots was severe and yields

Table 6. Effect of Fungicide Programs on Control of Early Leaf Spot on the Peanut Cultivar Tamrun OL 02 at the Deloung Farm, Erick, 2005.

Treatment & Rate/A (timing)[1]	27 September Early leaf spot (%)	27 September Defoliation (%)	Yield (lbs/A)	Crop Value ($/A)[2]
Tilt®/Bravo® 4.3SE 1.5 pt (2-4)	24.5 bc[3]	13.7 c	3499 c	624 c
Headline® 2.08E 6 fl oz (2,4) Tilt®/Bravo® 4.3SE 1.5 pt (3)	7.5 d	6.6 cd	3586 bc	640 bc
Headline® 2.08E 9 fl oz (2,4) Tilt®/Bravo® 4.3SE 1.5 pt (3)	11.8 d	3.7 d	3935 a	702 a
Bravo® Ultrex 82.5 DF 1.4 lb (1) Folicur® 3.6F 7.2 fl oz (2,4)[4] Abound® 2.08E 18.5 fl oz (3)	16.2 cd	5.0 d	3928 a	700 a
Bravo® Ultrex 82.5 DF 1.4 lb (1) Folicur® 3.6F 7.2 fl oz (2,4)[4] Headline® 2.08E 12 fl oz (3)	14.6 d	1.6 d	3826 ab	682 ab
Bravo® Ultrex 82.5 DF 1.4 lb (1) Folicur® 3.6F 7.2 fl oz (2,4)[4] Headline® 2.08E 15 fl oz (3)	11.7 d	3.3 d	3644 abc	650 abc
Tilt®/Bravo® 4.3SE 1.5 pt (A1-A3)	27.5 b	27.1 b	3477 c	620 c
Headline® 2.08E 6 fl oz (A1,A3) Tilt®/Bravo® 4.3SE 1.5 pt (A2)	5.9 d	2.2 d	3492 c	623 c
Headline® 2.08E 9 fl oz (A1,A3) Tilt®/Bravo® 4.3SE 1.5 pt (A2)	6.5 d	7.5 cd	3521 c	628 c
Check	65.0 a	80.8 a	2955 d	527 d
LSD (P=0.05)[5]	10.5	7.7	301	54

1 Application numbers 1-4 correspond to spray dates for the calendar program of 1 = 6 July, 2 = 1 August, 3 = 15 August, and 4 = 31 August. Application numbers A1-A3 correspond to the spray dates for the Early Leaf Spot Advisory Program of 6 July, 9 August, and 31 August.
2 Crop value based on an average grade of 73% TSMK.
3 Values in a column followed by the same letter are not statistically different at P=0.05 according to Fisher's Least Significant Difference Test.
4 The adjuvant Induce® was added at 0.1% of the total spray mixture.
5 Least significant difference.

were adjusted to account for row lengths damaged and missing. Soilborne diseases such as limb rot, pod rot, and southern blight were not observed before or after digging. Three applications were made according to the Early Leaf Spot Advisory Program. All fungicide programs reduced levels of leaf spot and defoliation compared to the control. Headline® at 6 and 9 fl oz resulted in improved leaf spot control when alternated with Tilt®/Bravo® for both the calendar and advisory programs compared to Tilt®/Bravo® alone. There was no difference in disease control between the 6 and 9 fl oz rates of Headline® for either the calendar or advisory program. While soilborne diseases did not develop, leaf spot control was excellent for programs with high rates of Headline® and Abound® alternated with Folicur®. All fungicide programs increased yield compared to the untreated check. Yield responses ranged from 500 to 900 lbs/A. Plots were harvested early (7 October), and yield responses may have been greater with a later harvest date. Increases in crop values for the fungicide programs ranged from $100 to $170/A, and exceeded the cost of the spray programs.

Seedling Diseases

Evaluation of fungicide seed treatments for stand establishment

Seedling disease is usually not a problem in peanut production because fungicide seed treatments such as Vitavax® PC and Tops®/Vitavax® PC are applied to commercial seed and provide effective disease control and stand establishment. A trial was conducted at the Agronomy Research Station in Perkins on the variety Tamrun OL02in which the experimental seed treatments KNF 4332, L1492-A, L1493-A, and L1494-A were evaluated in comparison to Vitavax® PC and Tops®/Vitavax® PC on the variety Tamrun OL 02.

All of the seed treatments improved plant stand compared to untreated seed that had an emergence of only 0.3 plants/ft. Emergence for the seed treatments ranged from 2 to 2.5 plants/ft and did not differ among treatments. Seed treatments drastically increased yield, from only 1000 lbs/A for the untreated check to more than 4500 lbs/A for the seed treatments, which performed similarly. The experimental seed treatments appeared to be viable alternatives but not improvements over the standard treatments of Vitavax® PC and Tops®/Vitavax® PC. The results also demonstrated the value of fungicide seed treatment to peanut production.

Research and Demonstration of Conservation Tillage Practices Combined with Weed Control Options for Controlling ALS[1] Resistant Palmer Amaranth and Other Problem Weeds in Oklahoma Peanut Production Areas

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2005 progress made possible through OPC and NPB support

- OSU researchers have confirmed acetolactate synthase (ALS) resistant Palmer amaranth in Caddo, Tipton, and Beckham counties and suspect the problem to be much more widespread across western Oklahoma.
- Reformulation of pendimethalin from Prowl® EC to Prowl® H_2O did not significantly alter the herbicidal performance.
- Altering current strip tillage systems to include Lilliston rolling baskets for incorporation of pendimethalin (Prowl®) did not significantly improve the herbicide's performance for controlling ALS resistant pigweed.
- Currently, the most successful herbicide programs for controlling ALS resistant Palmer amaranth in peanuts incorporates metolachlor (Dual®), dimethenamid (Outlook®), or flumioxazin (Valor®) applied as a preemergent treatment, followed by acifluorfen (Blazer®), lactofen (Cobra®), or paraquat (Gramoxone® Max) tank mixed with dimethenamid (Outlook®) once the preemergent application breaks and pigweeds begin to emerge during the growing season.
- Fields with significant ALS resistant Palmer amaranth infestations in 2005 at harvest time (such that seed were produced) should benefit by rotating to alternative crops such as *herbicide tolerant* cotton, wheat, or winter canola for at least one production year. Every action for controlling this weed during these cropping seasons should be used to lower the soil seed bank of this problem weed.

[1] ALS = Acetolactate Synthase

Palmer amaranth (*Amaranthus palmeri*) populations across western Oklahoma are developing resistance to acetolactate synthase (ALS) inhibiting herbicides. Palmer amaranth is one of the most troublesome weeds in Oklahoma peanut production today due to its rapid growth rate, high competitiveness, long germination period, and high seed production potential. Prior to it developing resistance to the ALS inhibiting herbicides and the adaptation of no-till production systems, imazapic (Cadre®) [applied postemergent] and/or pendimethalin (Prowl®) [applied preplant incorporated (PPI)] were commonly used for its control. With these issues in mind, we established on-farm and research station based trials near Tipton, Erick, and Ft. Cobb to evaluate ALS resistant pigweed control in no-till and strip-till systems with various levels of herbicides imposed. Herbicide incorporation was accomplished through irrigation in the no-till plots and with Lillisten units mounted on the strip-till unit. Herbicide treatments included pendimethalin (Prowl® EC and Prowl® H_2O) applied PPI within the tilled zone of the strip-till unit or preemergent (PRE) and applied alone or with metolachlor (Dual® II Magnum), flumioxazin (Valor®), diclosulam (Strongarm®), and dimethenamid (Outlook®). Postemergence herbicides included paraquat (Gramoxone® Max), lactofen (Cobra®), bentazon (Basagran®), and aciflourfen (Blazer®). Metolachlor and dimethenamid controlled at least 94% of the weeds until seven weeks after application and then at least 90% in strip-till and no-till plots after this period. Split applications of metolachlor, (PRE followed by early postemergent to the crop) controlled 88% of the Palmer amaranth season long. Applying metolachlor tank mixed with paraquat after weed emergence controlled at least 93% of the Palmer amaranth season long. Tank mixing bentazon with metolachlor plus paraquat, increased crop safety over metolachlor plus paraquat alone, but also reduced pigweed control. Lactofen controlled at least 93% of the small (less than 10-cm tall) pigweeds, provided inadequate control of larger weeds, and caused minimal injury to the crop.

Partners in Progress
PEANUTS

Variety, Inoculation, and Volunteer Peanut Control Results for Oklahoma Peanut Producing Regions

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Department of Plant and Soil Sciences

2005 progress made possible through OPC and NPB support

- Two new runner varieties and two advanced runner lines produced yields at or above the standard checks (Okrun, Tamrun 96, and Tamrun OL 01). Grades ranged from 1% to 5% less than or equivalent to Tamrun 96. Two Spanish advanced lines provided yields equal to Tamspan 90. Grades varied from equal to 4% to 5% lower than Tamspan 90.
- Advanced lines with the potential as variety releases from various plant breeders were evaluated relative to commercial varieties.
- New peanut inoculants are continually being developed and tested due to the very fragile nature of the rhizobium used for peanut inoculant. All inoculation treatments increased yields greater than 550 lbs/A above the untreated control.
- In a peanut following peanut successive reduced tillage program, volunteer peanuts become a major weed problem. Excellent control of volunteer peanuts was obtained using a hooded sprayer and a Roundup® plus AMS (1 qt + 2 lbs/A) application.

Variety Tests

Due to the potential hard seed problem in some of the current varieties grown, an extensive variety-testing program was undertaken in 2005. Some new Georgia and Florida lines were selected, based on early maturity and disease resistances, to be included in the variety-testing program. As in 2004, advanced peanut lines were included in the tests so Oklahoma producers can compare the new breeding lines with familiar commercial varieties. All variety tests were conducted under an extensive pest management program. The objective was to prevent as much outside influence from pest (weed, disease, and insect) pressures on yield and grade as possible. The results were presented by county because the variety times location interaction was significant (Tables 1-4). 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.

The runner varieties, Carver and ANorden, consistently yielded at or above the standard checks (Okrun, Tamrun 96, and Tamrun OL 01); however, their grades ran 1% to 5% lower (Tables 1-4). The high disease trial, reported in Biology and Epidemiology of Peanut Soilborne Pathogens in Oklahoma on page 22, indicated that Carver and ANorden were very susceptible to Sclerotinia blight. The advanced runner lines, TX 994313 and TX 994374, produced yields that were equal to or better than the standard check varieties and provided grades equivalent to Tamrun 96. Most of the newer Georgia and Florida varieties did not perform well in the Oklahoma trials this year.

The advanced Spanish lines, TX 996784 and TX 996612, yielded equivalent to Tamspan 90 (Tables 1, 2, and 4). TX 996784 had grades equal to Tamspan 90 but TX 996612 was 4% to 5% lower in grade. AT 98-99-14 also provided yields and grades equal to Tamspan 90 but was more susceptible to southern blight than all the other Spanish-type varieties and lines tested.

All of the newer Virginia varieties produced yields and grades similar to Jupiter except Gregory, which had 2% to 8% lower grades (Tables 1 and 2).

Uniform Peanut Performance Test

The Uniform Peanut Performance Test is composed of runner- and Virginia-type advanced lines with the potential to become variety releases from plant breeders in the United States. Commercial check varieties are included for comparison purposes (Table 5).

Peanut Inoculation Test

The peanut inoculation test (Table 6) was conducted on land in a sorghum followed by peanut rotation system. Milo was planted in 2004 and no fertilizer was applied in 2005 prior to test initiation. All treatments with the exception of the untreated control were in-furrow applications. A pest management program kept diseases, insects, and weeds to a minimum throughout the growing season.

Yields ranged from 4102 to 5173 lbs/A. All inoculation treatments increased yields more than 550 lbs/A above the untreated control. RhizoFlo® granular (5173 lbs/A, 76% TSMK) and Optimize® Lift liquid (5046 lbs/A, 77% TSMK) produced the highest yields and grades with an approximate yield increase of 1000 lbs/A over the untreated control.

The testing of peanut inoculation in Oklahoma has consistently provided a 200- to 300-lb/A yield increase.

Volunteer Peanut Control Test

Volunteer peanuts have become a major obstacle in a consecutive peanut reduced tillage program. Early development of diseases, insects, weeds, and contamination (volunteer peanuts), as well as changes in equipment, cultural practices, and harvest can also be serious obstacles.

A test was designed to evaluate the effects of various treatments on volunteer peanut control (Table 7). Excellent control of volunteer peanuts was accomplished using a hooded sprayer to apply Roundup® (1 and 2 qt/A) plus AMS (2 lbs/A) and Liberty® Link (20 and 40 oz/A) plus AMS (2 lbs/A) over the volunteers. All the Goal® and tank mixes with Liberty® and Gramoxone® provided very poor control of the volunteers. Future research needs to be conducted to evaluate the influence that chemical and mechanical volunteer peanut control may have on yield.

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Partners in Progress PEANUTS

Table 1. Peanut Variety and Advanced Lines Test Results, Beckham County, 2005.

Variety or line	Yield (lbs/A)[2]	Grade (% TSMK)[2,3]
***Runner*[1]**		
Carver	3757	69
TX 994313	3639	73
ANorden	3467	69
Tamrun 96	3385	73
Tamrun OL 02	3303	72
Okrun	3276	70
Tamrun OL 01	3194	74
Georgia Green	3176	72
GA Hi OL	3040	74
GP-1	2968	73
TX 994374	2931	71
Flavor Runner 458	2922	73
GA 03L	2877	66
GA 02C	2850	73
AP3	2750	70
Andru II	2723	70
GA 04S	2641	65
SW Runner	1779	70
LSD 0.05	471	2
***Spanish*[1]**		
TX 996784	2033	73
AT 98-99-14	1960	73
OLin	1897	74
TX 996612	1888	69
Tamspan 90	1806	73
Spanco	1779	74
Pronto	1470	73
R-268	1243	63
LSD 0.05	373	2
***Virginia*[1]**		
Brantley	3494	71
Gregory	3331	68
ViruGard	3149	74
Perry	3131	70
Jupiter	2977	70
LSD 0.05	NS	4

[1] Market type.

[2] Runner average – 3038 lbs/A, 71% TSMK; Spanish average – 1759 lbs/A, 71% TSMK; Virginia average – 3216 lbs/A, 70% TSMK.

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

Table 2. Peanut Variety and Advanced Lines Test Results, Caddo County, 2005.

Variety or line	Yield (lbs/A)[2]	Grade (% TSMK)[2,3]
Runner[1]		
GA 02C	3703	76
Carver	3675	68
Okrun	3585	71
Tamrun OL 02	3576	68
GP-1	3449	70
TX 994374	3376	71
Tamrun 96	3276	73
TX 994313	3167	72
ANorden	3095	72
SW Runner	3095	68
GA 03L	2949	71
Tamrun OL 01	2904	70
Flavor Runner 458	2868	71
Andru II	2768	70
GA 04S	2695	71
GA HI OL	2586	73
AP3	2496	68
Georgia Green	2350	72
LSD 0.05	575	3
Spanish[1]		
TX 996612	2614	68
TX 996784	2523	72
Tamspan 90	2496	72
AT 98-99-14	2387	70
OLin	2196	68
Spanco	2142	71
Pronto	1870	70
R-268	1334	64
LSD 0.05	326	2
Virginia[1]		
Perry	3503	74
Jupiter	3185	74
Gregory	3158	66
Brantley	2959	71
ViruGard	2795	77
LSD 0.05	NS	2

1 Market type.

2 Runner average – 3090 lbs/A, 71% TSMK; Spanish average – 2195 lbs/A, 69% TSMK; Virginia average – 3120 lbs/A, 72% TSMK.

3 % TSMK = Percent total sound mature kernels.

Table 3. Peanut Variety and Advanced Lines Test Results, Grady County, 2005.

Variety or line	Yield (lbs/A)[2]	Grade (% TSMK)[2,3]
Runner[1]		
Carver	4265	70
TX 994374	3857	72
Tamrun 96	3648	75
TX 994313	3485	76
Tamrun OL 01	3213	75
ANorden	3158	74
Tamrun OL 02	2977	74
AP3	2940	70
GA Hi OL	2895	76
GA 04S	2886	68
Okrun	2822	74
Andru II	2786	74
GA 02C	2614	73
GA 03L	2605	69
Flavor Runner 458	2496	76
Georgia Green	2496	75
SW Runner	2187	72
LSD 0.05	864	3

1 Market type.
2 Runner average – 3019 lbs/A, 73% TSMK.
3 % TSMK = Percent total sound mature kernels.

Table 4. Peanut Variety and Advanced Lines Test Results, Tillman County, 2005.

Variety or line	Yield (lbs/A)[2]	Grade (% TSMK)[2,3]
***Runner*[1]**		
Carver	6661	68
Georgia Green	6398	71
Tamrun OL 02	6189	71
GA 03L	6135	68
ANorden	6071	71
TX 994313	6062	75
GA HI OL	6053	75
TX 994374	5944	68
Tamrun OL 01	5935	71
AP3	5872	68
Andru II	5754	67
GA 04S	5654	67
Tamrun 96	5572	67
Okrun	5500	71
Flavor Runner 458	5500	70
GA 02C	5382	72
SW Runner	5318	70
GP-1	4792	69
LSD 0.05	744	3
***Spanish*[1]**		
TX 996612	4674	63
Tamspan 90	4519	68
TX 996784	4456	68
OLin	4438	68
Spanco	3930	67
Pronto	3766	70
AT 98-99-14	3639	68
R-268	3349	61
LSD 0.05	NS	2

1 Market type.
2 Runner average – 5822 lbs/A, 70% TSMK; Spanish average – 4096 lbs/A, 67% TSMK.
3 % TSMK = Percent total sound mature kernels.

Table 5. Uniform Peanut Performance Test Results, Ft. Cobb Research Station, 2005.

Variety or line	Market Type[1]	Yield (lbs/A)	Grade (% TSMK)[2]	Seed Weight (g/100 seeds)	Percent Virginia Pods
GA 012534	Va.	4054	74.2	76.0	87.1
TX 033607	Ru.	3945	71.4	52.4	28.1
GA 011568	Ru.	3920	76.3	61.1	55.3
N0103T	Va.	3884	71.8	82.7	83.7
VT 003069	Va.	3860	72.1	92.7	88.2
UF 04327	Lg. Ru.	3860	68.0	67.6	80.8
Florunner[3]	Ru.	3848	72.5	52.2	26.4
GA 011514	Lg. Ru.	3787	72.9	64.0	74.0
UF 03326	Lg. Ru.	3787	68.7	66.9	74.3
UF 03325	Lg. Ru.	3739	75.5	65.1	49.0
TX 033630	Ru.	3666	72.9	61.8	54.0
TX 034145	Ru.	3570	74.9	67.1	65.2
NC 7[4]	Va.	3352	68.8	75.4	82.4
N02006	Va.	3352	68.6	88.6	89.2
N03090T	Va.	3182	72.7	90.4	87.2
CRSP14	Lg. Ru.	2904	73.4	64.2	83.5
CRSP08	Lg. Ru.	2602	70.2	63.6	71.7
LSD 0.05		588	3.3	4.9	5.7

1 Market type as proposed by participating breeder. Va. = Virginia, Ru. = Runner, Lg. Ru. = Large Runner.
2 % TSMK = Percent total sound mature kernels.
3 Check for Runner lines.
4 Check for Virginia lines.

Table 6. Peanut Inoculation Test Results, Ft. Cobb Research Station, 2005.

Treatment	Rate	Yield (lbs/A)	Grade (%TSMK)[1]
RhizoFlo® granular	(5.4 lb/A)	5173	76
Optimize® Lift liquid	(15 oz/A)	5046	77
BUEXP-P2 granular	(5.4 lb/A)	4701	75
BUEXP-P1 liquid cold pack	(18.7 oz/A)	4656	75
Vault liquid cold pack	(18.7 oz/A)	4656	74
Untreated Control		4102	76
LSD 0.05		490	1

1 % TSMK = Percent total sound mature kernels.
Planting Date – 18 May, 2005.
Digging Date – 20 October, 2005.
Growing Season – 155 Days.
Average Yield – 4722 lbs/A; Untreated 4102 lbs/A; Treated 4846 lbs/A (744 lbs/A increase).

Table 7. Volunteer Peanut Control Test Results, Ft. Cobb Research Station, 2005.

Treatment	Rate	% Control
Untreated Check		0
Roundup® Ultra Max + AMS (1X rate)	1 qt/A + 2 lbs/A	97
Roundup® Ultra Max + AMS (2X rate)	2 qt/A + 2 lbs/A	100
Liberty® + AMS (1X rate)	20 oz/A + 2 lbs/A	92
Liberty® + AMS (2X rate)	40 oz/A + 2 lbs/A	97
Goal® + Induce® (1X rate)	4 pt/A + 0.5 v/v[1]	31
Goal® + Induce® (2X rate)	8 pt/A + 0.5 v/v	31
Roundup® Ultra Max + Goal® + AMS	1 qt/A + 2 pt/A + 2 lbs/A	87
Liberty® + Goal® + AMS	20 oz/A + 2 pt/A + 2 lbs/A	35
Gramoxone® + Goal® + Induce®	1 qt/A + 2 pt/A + 0.5 v/v	30
LSD 0.05		3

[1] v/v = Volume per volume

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