THE INFLUENCE OF CERTAIN PRE-EMERGENCE HERBICIDES ON WEED CONTROL AND THE YIELD, STAND, GROWTH AND QUALITY OF PEANUTS

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Bachelor of Science

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Stillwater, Oklahoma

1955

Submitted to the faculty of the Graduate School of
the Oklahoma Agricultural and Mechanical College
in partial fulfillment of the requirements
for the degree of
MASTER OF SCIENCE
August, 1957

THE INFLUENCE OF CERTAIN PRE-EMERGENCE HERBICIDES ON WEED CONTROL AND THE YIELD, STAND, GROWTH AND QUALITY OF PEANUTS

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ACKNOWLEDGMENTS

The author wishes to express sincere gratitude to Dr. Ralph S. Matlock and Professor W. C. Elder for their advice and helpful criticisms throughout the course of this study and to Dr. Wayne Huffine, Dr. Robert Reed, and Professor Frank F. Davies for their helpful criticisms in preparing the final manuscript of this thesis. Special thanks are extended to the Carbon Carbide Chemical Company for providing funds which partially covered the cost of this experiment. I also wish to express my appreciation to Mr. Merle H. Niehaus who proofread the final copy and to Miss Carole Hoover for typing the manuscript.

TABLE OF CONTENTS

LIST OF TABLES

Table Page

Appendix Tables

I.

INTRODUCTION

The acreage controls on peanuts and the high cost of labor have placed emphasis on the necessity of finding a more economical method of controlling annual grasses and other weeds. Grasses and weeds in peanuts utilize valuable moisture, nutrients and light needed to produce the peanut crop and also add to the production and harvesting problems. The conventional method of controlling crabgrass (Digitaria sanguinalis L.) is a costly and time consuming operation in the peanut producing areas of the United States.

The introduction of new chemicals and weed control techniques presents the possibility of controlling weeds with limited cultivation. The use of herbicides as pre-emergence sprays would reduce the amount of cultivation necessary by the peanut farmer. This method of controlling weeds in peanuts is a new practice which has not been used extensively in Oklahoma. Previous research has shown that peanut plants are variable in their tolerance to some types of chemicals, therefore necessitating the screening of promising herbicides in weed control experiments.

The objective of these experiments was to study several of the more promising herbicides, to determine their effect upon peanut stand, vigor, and yield, and to evaluate their relative value for weed control.

II.

LITERATURE REVIEW

There seems to be a very close correlation between yield and the degree of weed control in peanuts. This holds true regardless of the method of controlling weeds. The better the weed control the greater the increase in yield (3)[1].

The chemical, in order to be desirable, must not adversely affect the peanut plant or materially delay its growth. In general the chemicals that give the best weed control also seem to reduce the vigor of the plant in its early stages of growth (6). This stunting effect is an undesirable factor encountered when using some herbicides (1).

Planting depth and rolling the soil before application of the herbicide seems to have no effect on amount of weed control or seedling vigor of the plants according to Chappel and Duke (8). Chappel (5) reported that the time of application may influence the degree of weed control. The amount of rainfall immediately following herbicide application may result in less weed control and more damage to peanuts according to Burt (4).

Boyle and Hammons (2) reported that peanuts planted in a well prepared seedbed, which was treated with Crag-1 Herbicide, at 3 pounds per acre and not cultivated gave higher yields and had less Sclerotium blight and root rot than the non-treated cultivated peanuts. Chappel (7)

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[1]Numbers in parentheses refer to Literature Cited.

found that peanuts produced without cultivation when weeds were controlled by chemicals had comparable yields, had fewer sting nematodes and less leaf spot than peanuts with normal cultivation. Some herbicides have proved fairly effective in other tests in reducing the amount of Sclerotium blight and the sting nematode (9).

Witherspoon and Rodgers (22) found that most herbicides gave satisfactory control of grass and weeds for the first 3 to 5 weeks, however, there was no observable difference between the treated and untreated plots after 8 weeks.

Tests in Georgia in 1952, 1953 and 1954 generally indicate that SES (Crag-1) is the best chemical currently available in that area (19). However, Burt (3), Helms (11), Helms and Rodgers (12), Scholl and Searcy (15), Upchurch (20), Rea (13), and Westmoreland and Klingman (21) reported that they obtained slow emergence, lack of vigor and reduced yields when using SES (Crag-1). According to Upchurch (20) the substituted urea herbicides as a group seem to be excessively toxic to peanuts when applied at rates sufficiently heavy to control annual grasses and other weeds. Scholl and Searcy (15) found that Di-nitro did not affect the yield of peanuts and neither did it control the weeds. Searcy (17) later reported that the use of Di-nitro seemed to stimulate the peanut plants as they appeared to be healthier and larger than the peanuts in other plots. Rodgers, Burt and Mixon (14) have recommended the use of Di-nitro as an effective and efficient pre-emerge. The vigor of the plants was affected by 2,4-D (2,4-Dichlorophenoxyacetic acid) up to 45 days after application, but when used immediately after planting it did not affect the stand (12, 16, 20, and 21). Unsatisfactory results were reported when using CIPC /Isopropy N-(3 Chlorophenyl) Carbamate/ in pre-emergence

weed control experiments (3, 5, and 22). Burt (3) and Helms (11) reported good weed control when Karmex was used as a pre-emerge. There is incomplete agreement concerning the tolerance of peanuts to Karmex and to derivatives of N-1-naphthyl phthalmic acid (5, 11, 19, 20, and 22). Various workers (3, 11, and 16) seem to agree that peanuts are tolerant to DNOSBP (4,6-dinitro ortho secondary butyl phenol) at rates as high as 9 to 12 pounds per acre. The above workers also reported no reduction in yield and fair control of weeds when using DNOSBP.

III.

MATERIALS AND METHODS

Peanut pre-emergence weed control studies were conducted at the following locations in 1955 and 1956: Perkins Agronomy Farm, Stratford Peanut Farm, Bokchito, and near Atwood on the C. H. Black farm. An irrigated pre-emerge test was planted on the Carroll Smith farm near Lookeba in 1955.

The randomized block design used contained three replications in 1955 and four replications in 1956. The two row plots for each treatment were 50 feet long in 1955 and 19 feet long in 1956. The row spacings varied at the different locations between 38 and 42 inches. The 1955 tests were planted in moist soil with the equipment available at the location. The tests in 1956 were planted under excellent moisture conditions. Both furrow and flat planted studies were conducted at Perkins and Stratford in 1956. The peanuts were planted in a shallow furrow in the Atwood test while the test at Bokchito was planted flat. The varieties used in these tests were as follows: Spantex at Perkins and Lookeba, Spanish 18-38 at Stratford and Common Spanish at Atwood and Bokchito. Each test was planted at the rate of 3 to 5 viable seed per foot.

The eight treatments used in 1955 consisted of various rates of five different herbicides and two different types of checks. The treatments and rates (acid equivalent) per acre were: (a) Crag-1 (Sodium 2,4-dichlorophenoxy ethyl sulfate) at $1\frac{1}{2}$, 3 and $4\frac{1}{2}$ pounds, (b) Alanap-1

(N-1-naphthyl phthalamic acid) at 6 pounds, (c) Alanap-3 (Sodium N-1-naphthyl phthalamate) at 6 pounds, (d) Karmex /3,(3,4-dichlorophenyl)-1,-1-dimethyl urea/ at 1 pound, (e) CIPC /Isopropyl N-(3 Chlorophenyl) Carbamate/ at 4½ pounds. The check-hoed treatment was hoed after the initial grass and weed counts were made while in the check-not-hoed plots the weeds were not removed except as a result of normal cultivation.

The 1956 tests included eight treatments consisting of two rates of each of three herbicides and two types of checks. The treatments and the rates (acid equivalent) per acre were: (a) Crag-1 at 1½ and 3 pounds, (b) Alanap-3 at 4 and 6 pounds, (c) Sesin 30E (Sodium 2,4-dichlorphenoxy ethyl benzoate) at 1½ and 3 pounds. The two checks were the same as those used in 1955.

Each of the herbicides was applied with a knapsack sprayer using 40 pounds of pressure per square inch. Applications were made in a 12-inch band over the row immediately after planting except at Atwood in 1956. In the latter case the herbicides were applied five days after planting but before emergence of the peanuts. To insure that the proper concentrations were used the percentage of actual active material needed to cover the area was calculated, measured and mixed with one gallon of water for application.

Weed counts were made 21 to 27 days following application of herbicides and before the first cultivation. Grasses and other weed counts were made from a random section of each plot ranging from 12 to 20 feet long and one foot wide. Herbicidal effect was determined by comparing the mean number of grass and weed plants in the check-not-hoed plots with those of the treated plots. Multiple range tests, showing the mean number of crabgrass plants in the sampled area were calculated following

the method proposed by Duncan (10).

The amount of injury was estimated for each plot at approximately three week intervals beginning 21 to 27 days after application. This was accomplished by observing the relative amount of injury on the treated plots and comparing them with the check plots.

The number of peanut plants per plot was determined 21 to 27 days after application and again at harvest for the 1956 tests. Analyses of variance (18) were calculated for the number of plants per plot for the early counts and the harvest counts.

At maturity the peanut plants were dug, counted, shaken and allowed to dry in windrows. One foot was trimmed from each end of the two rows at harvest to avoid border effect. After drying the peanuts were threshed cleaned and weighed. Acre yields were calculated by dividing the plot yields by the fraction of an acre occupied by each plot. Yields were not taken in 1956 tests at Perkins and Bokchito due to extreme moisture stress during the fruit development period. Analyses of variance or multiple range tests were calculated for yields obtained in 1955 and 1956.

The eight samples from each of the treatments at Atwood in 1956 were sent to Durant for grading by Floyd Gunter of the State-Federal Inspection Service. Size determinations were made on the sound mature kernels of each sample.

IV.

RESULTS AND DISCUSSION

There was a wide variation in the results obtained in 1955 peanut pre-emerge tests. Heavy rainfall immediately after application seemingly concentrated the herbicides near the germinating seed causing considerable injury to the peanut plants in tests at Lookeba and Stratford. Some vegetative injury was noted on the young seedlings at Atwood, Bokchito, and Perkins, but little reduction in yield occurred when the vegetative injury lasted only 3 to 5 weeks.

The reduction in yield at Lookeba for the Karmex, Alanap-1, and CIPC treated plots was significantly greater than that of the other herbicides (Table I). There was no significant yield difference at Perkins among the herbicide treated plots; however, the yields of the check-not-hoed plots were significantly lower than the other treatments (Table II). There was no significant difference in yield among the treatments in the 1955 Stratford test. No analyses were made for the yield data at Bokchito because of missing data.

Where annual weeds were a major problem, good herbicidal effect was obtained (Tables III, IV, and V). Alanap-1 was the only herbicide that damaged Johnson grass (Sorghum halepense, L.) in the Bokchito test, and here it had only a temporary effect.

Observations at all locations in 1955 showed that Crag-1, $1\frac{1}{2}$ pounds; Alanap-1, 6 pounds; Karmex, 1 pound; and CIPC, $4\frac{1}{2}$ pounds per acre reduced growth of the peanut plants as much as 10 percent, while Crag-1,

TABLE I

MULTIPLE RANGE TEST OF RANKED MEAN PEANUT YIELDS IN THE PRE-EMERGENCE TEST AT LOOKEBA, 1955

Treatment	Karmex 1 lb/A	Alanap-1 6 lbs/A	CIPC 4½ lbs/A	Crag-1 4½ lbs/A	Check not-hoed	Crag-1 1½ lbs/A	Check hoed	Crag-1 3 lbs/A
Mean[1]	1278.2	1362.2	1679.4	1772.7	2037.1	2186.3	2279.6	2388.5

[1]Pounds of clean air-dry peanuts per acre.

Note: Any two means not underscored by the same line are significantly different.
Any two means underscored by the same line are not significantly different.
A solid line underscore indicates similarity at the 5% probability level.

TABLE II

MULTIPLE RANGE TEST OF RANKED MEAN PEANUT YIELD IN THE PRE-EMERGENCE TEST AT PERKINS, 1955

Treatment	Check not-hoed	CIPC 4½ lbs/A	Check hoed	Crag-1 1½ lbs/A	Crag-1 4½ lbs/A	Alanap-1 6 lbs/A	Karmex 1 lb/A	Crag-1 3 lbs/A	Alanap-3 6 lbs/A
Mean[1]	427.8	496.0	514.6	530.1	579.7	588.4	592.1	595.2	604.5

[1]Pounds of clean, air-dry peanuts per acre.

Note: Any two means not underscored by the same line are significantly different. Any two means underscored by the same line are not significantly different. A solid line underscore indicates similarity at the 5% probability level.

TABLE III

MULTIPLE RANGE TEST OF RANKED MEAN GRASS COUNTS
IN 20 FEET OF ROW IN THE STRATFORD TEST, 1955

Treatment	Alanap-1 6 lbs/A	Crag-1 4½ lbs/A	Karmex 1 lb/A	CIPC 4½ lbs/A	Crag-1 3 lbs/A	Crag-1 1½ lbs/A	Check not-hoed
Mean[1]	0.84	0.84	1.13	1.39	1.56	2.05	3.36

[1]Data transformed to $\sqrt{X+0.5}$

Note: Any two means not underscored by the same line are significantly different.
Any two means underscored by the same line are not significantly different.
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A broken line underscore indicates similarity at the 1% probability level.

TABLE IV

MULTIPLE RANGE TEST OF RANKED MEAN GRASS COUNTS
IN 20 FEET OF ROW IN THE BOKCHITO TEST, 1955

Treatment	Crag-1 4 lbs/A	CIPC 4½ lbs/A	Crag-1 3 lbs/A	Karmex 1 lb/A	Alanap-1 6 lbs/A	Crag-1 1½ lbs/A	Check hoed	Check not-hoed
Mean[1]	2.45	3.57	3.66	5.28	5.76	7.75	14.44	15.30

[1] Data transformed to $\sqrt{X+0.5}$

Note: Any two means not underscored by the same line are significantly different.
Any two means underscored by the same line are not significantly different.
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A broken line underscore indicates similarity at the 1% probability level.

TABLE V

MULTIPLE RANGE TEST OF RANKED MEAN GRASS COUNTS
IN 20 FEET OF ROW IN THE PERKINS TEST, 1955

Treatment	Crag-1 4 lbs/A	Alanap-1 6 lbs/A	Crag-1 3 lbs/A	Karmex 1 lb/A	Alanap-3 6 lbs/A	Crag-1 1½ lbs/A	CIPC 4½ lbs/A	Check not-hoed
Mean[1]	0.84	1.09	1.25	1.38	1.77	1.85	2.45	3.83

[1]Data transformed to $\sqrt{X+0.5}$

Note: Any two means not underscored by the same line are significantly different.
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at 3 and 4½ pounds gave a 25 to 40 percent stunting effect. After approximately eight weeks the peanuts had outgrown the observable effect of Karmex, Alanap, and CIPC, but the Crag-1 effect remained throughout the season.

Karmex killed some of the young plants at all locations but the stands of the plants in the other treatments were not affected. CIPC caused a reduction in yield in all tests and Karmex caused a severe reduction in yield at Lookeba (Tables I and II). These herbicides were not included in the 1956 tests.

The prolonged drought during the summer and fall of 1956 had a severe effect on the peanut crop and caused the results of this study to be somewhat inconclusive. The variation in results could be attributed to several factors, including soil differences and moisture availability among locations. It seems very possible that the extremely low soil moisture and high temperatures influenced plant growth on different soil types.

At Atwood approximately eight inches of water were added during July and August with a sprinkler irrigation system. The check-not-hoed plots in two of the replications were so grassy at harvest that it was impossible to obtain accurate yield data.

Several days of very hot dry weather caused the peanuts to be slow in emerging at Bokchito. Sixteen days after planting the area received over two inches of rainfall and much of this water stood in the rows for two days. Five days after this rain the peanuts were still emerging. Grass and weed counts were made, but due to the continuous drought stress no further notes were taken and the test was not harvested for yield data.

Good peanut stands were obtained at Stratford and Perkins in both the furrow and flat planted tests. The peanuts and weeds in these plots suffered severe retardation in growth after June 22 due to the continuous drought which lasted throughout the summer.

Peanut yields were extremely low at Stratford but yields were intermediate at the Atwood location (Table VI). The mean yields from the flat planting were slightly higher than those from the furrow planting at Stratford. Though the yields at Stratford and Atwood were too low for adequate evaluation, there was a tendency for the Sesin 30E treatment at the 1½ and 3 pound rates to compare favorably with the check-hoed plots. The analyses of variance of peanut yields for the Atwood and Stratford tests are shown in Table VII. The treatments in the flat and furrow planted tests at Stratford were not significantly different. There was a highly significant difference among the treatments in the Atwood test. The mean yield of the check-hoed plots ranges from 403.9 to 843.2 pounds higher than those for the Crag-1 and Alanap-3 treatments (Table VI).

A summary of the analyses of variance for the number of peanut plants after emergence and at harvest for Perkins, Stratford and Atwood are shown in Table VIII. There were no significant differences among treatments for plant counts at any of the locations in 1956 except for the early count in the furrow planted test at Stratford. Though the treatments in the early count of the furrow planted test at Stratford were significantly different, the counts made at harvest in the same test did not differ significantly. The data indicate that peanut stands were not generally affected by the herbicides used in each of the tests (Appendix Table I).

TABLE VI

MEAN YIELD FOR EACH HERBICIDAL TREATMENT AND CHECKS AT STRATFORD AND ATWOOD, 1956

Pounds of Peanuts Per Acre

Treatment	Stratford		Atwood	Average	Relative percentage of check
	Furrow	Flat	Furrow		
Check-hoed	68.4	148.6	1814.6	677.2	100
Check-not-hoed	64.7	100.1	- - [1]	- -	- -
Crag-1, 3 lbs/A	100.2	132.5	971.4	401.3	59
Crag-1, 1½ lbs/A	122.7	162.6	1410.7	565.3	83
Alanap-3, 6 lbs/A	60.3	187.4	1212.6	486.7	72
Alanap-3, 4 lbs/A	129.4	101.2	1194.3	474.9	70
Sesin 30E, 3 lbs/A	97.9	124.9	1814.6	679.1	100
Sesin 30E, 1½ lbs/A	58.1	142.1	1619.7	606.6	90

[1]Grassy plots prevented accurate evaluation of yield.

TABLE VII

ANALYSES OF VARIANCE OF PEANUT YIELDS AT ATWOOD AND FOR THE FURROW AND FLAT TESTS AT STRATFORD, 1956

		STRATFORD		ATWOOD
Source	d.f.	Flat planted MS	Furrow planted MS	MS
Total	31			
Replication	3	61,645.58**	16,916.67**	267,614.00*
Treatment	7	3,518.04	3,280.98	479,693.93**
Error	21	7,367.09	1,703.72	63,070.44

*Exceeds 5% level of significance.

**Exceeds 1% level of significance.

TABLE VIII

ANALYSES OF VARIANCE OF PEANUT PLANT COUNTS AT THREE LOCATIONS AFTER EMERGENCE AND AT HARVEST[1], 1956

MEAN SQUARES

		PERKINS				STRATFORD				ATWOOD	
		FLAT		FURROW		FLAT		FURROW		FURROW	
Source	df.	Early	Harvest	Early	Harvest	Early	Harvest	Early	Harvest	Early	Harvest
Total	31										
Replication	3	.03	334.58*	.37	293.21	.79**	185.58	.41*	77.11	.46	180.38
Treatment	7	.02	200.71	.24	62.63	.16	54.78	.40*	88.17	.27	122.84
Error	21	.01	84.42	.18	192.76	.11	97.73	.13	143.11	.27	147.28

[1]For the emergence or early plant counts in 12 feet of each plot the data were transformed using $\sqrt{X+0.5}$. The harvest count calculations were based on the number of plants in the harvested area of each plot.

*Exceeds 5% level of significance.

**Exceeds 1% level of significance.

Multiple range tests for the grass and weed counts made 21 days after application in the Bokchito test are shown in Tables IX and X. Weed and grass growth at Bokchito in the herbicide treated plots was reduced below that of the check, but the middles were covered with a heavy growth of crabgrass, rough buttonweed (Diodia teres) and pigweed (Amaranthus spp.). Alanap-3 at the 4 and 6 pound rates and Sesin 30E at the 3 pound rate significantly reduced the number of weed seedlings below that of the other treatments. All of the herbicides reduced the number below that of the check in the Bokchito test.

Good control of crabgrass in the Perkins flat planted test was noted with all herbicides except the 1½ pound rate of Crag-1 (Table XII). Both Alanap-3 and Sesin 30E gave slightly better control of grass in the flat planted than in the furrow planted test, while there was no apparent difference in the degree of control with Crag-1 (Tables XI, XII and Appendix Table II).

Control of crabgrass at Stratford was good with all herbicides. There was no apparent difference in the degree of control in the flat and furrow planted tests (Tables XIII, XIV and Appendix Table II).

The multiple range test for the number of grass plants at Atwood is shown in Table XV. Both rates of Alanap-3 and Sesin 30E gave more complete control of grass than the rates of Crag-1 and the checks.

The results obtained from Crag-1, Alanap-3 and Sesin 30E in the 1956 tests are discussed below.

Weed and grass counts at all locations made 21 to 27 days after application showed that Crag-1 gave at least fair control of crabgrass; however, these plots became infested with grass to some extent within five weeks. Both rates reduced growth severely throughout the season

TABLE IX

MULTIPLE RANGE TEST OF RANKED MEAN GRASS COUNTS 21 DAYS AFTER APPLICATION IN THE BOKCHITO TEST, 1956

Treatment	Alanap-3 6 lbs/A	Alanap-3 4 lbs/A	Sesin 30E 3 lbs/A	Crag-1 3 lbs/A	Sesin 30E 1½ lbs/A	Crag-1 1½ lbs/A	Check not-hoed	Check hoed
Mean[1]	1.58	1.83	2.08	2.23	2.68	3.10	3.78	4.10

[1]Data transformed to $\sqrt{X+0.5}$

Note: Any two means not underscored by the same line are significantly different.
Any two means underscored by the same line are not significantly different.
A solid line underscore indicates similarity at the 5% probability level.
A broken line underscore indicates similarity at the 1% probability level.

TABLE X

MULTIPLE RANGE TEST OF RANKED MEAN WEED COUNTS 21 DAYS AFTER APPLICATION IN THE BOKCHITO TEST, 1956

Treatment	Alanap-3 4 lbs/A	Sesin 30E 3 lbs/A	Alanap-3 6 lbs/A	Crag-1 3 lbs/A	Sesin 30E 1½ lbs/A	Crag-1 1½ lbs/A	Check hoed	Check not-hoed
Mean[1]	2.38	2.60	2.80	5.35	5.40	8.55	9.80	11.13

[1]Data transformed to $\sqrt{X+0.5}$

Note: Any two means not underscored by the same line are significantly different.
Any two means underscored by the same line are not significantly different.
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TABLE XI

MULTIPLE RANGE TEST OF RANKED MEAN GRASS COUNTS IN THE FURROW PLANTED TEST
27 DAYS AFTER APPLICATION AT PERKINS, 1956

Treatment	Sesin 30E 3 lbs/A	Alanap-3 4 lbs/A	Crag-1 1½ lbs/A	Alanap-3 6 lbs/A	Crag-1 3 lbs/A	Check hoed	Sesin 30E 1½ lbs/A	Check not-hoed
Mean[1]	4.68	5.28	5.88	5.95	6.10	6.77	7.65	10.90

[1]Data transformed to $\sqrt{X+0.5}$

Note: Any two means not underscored by the same line are significantly different.
Any two means underscored by the same line are not significantly different.
A solid line underscore indicates similarity at the 5% probability level.

TABLE XII

MULTIPLE RANGE TEST OF RANKED MEAN GRASS COUNTS IN THE FLAT PLANTED TEST
27 DAYS AFTER APPLICATION AT PERKINS, 1956

Treatment	Sesin 30E 3 lbs/A	Alanap-3 6 lbs/A	Sesin 30E 1½ lbs/A	Alanap-3 4 lbs/A	Crag-1 3 lbs/A	Check not-hoed	Crag-1 1½ lbs/A	Check hoed
Mean[1]	2.00	2.73	3.30	5.05	5.55	6.73	8.80	9.45

[1]Data transformed to $\sqrt{X+0.5}$

Note: Any two means not underscored by the same line are significantly different.
Any two means underscored by the same line are not significantly different.
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A broken line underscore indicates similarity at the 1% probability level.

TABLE XIII

MULTIPLE RANGE TEST OF RANKED MEAN GRASS COUNTS IN THE FURROW PLANTED TEST AT STRATFORD, 1956

Treatment	Crag-1 1½ lbs/A	Crag-1 3 lbs/A	Alanap-3 6 lbs/A	Alanap-3 4 lbs/A	Sesin 30E 1½ lbs/A	Sesin 30E 3 lbs/A	Check hoed	Check not-hoed
Mean[1]	0.70	0.70	0.70	1.25	1.30	1.43	1.70	3.28

[1]Data transformed to $\sqrt{X+0.5}$

Note: Any two means not underscored by the same line are significantly different.
Any two means underscored by the same line are not significantly different.
A solid line underscore indicates similarity at the 5% probability level.

TABLE XIV

MULTIPLE RANGE TEST OF RANKED GRASS COUNTS IN THE FLAT PLANTED TEST AT STRATFORD, 1956

Treatment	Crag-1 1½ lbs/A	Alanap-3 4 lbs/A	Sesin 30E 1½ lbs/A	Sesin 30E 3 lbs/A	Alanap-3 6 lbs/A	Check hoed	Check not-hoed	Crag-1 3 lbs/A
Mean[1]	0.70	1.08	1.28	1.33	1.35	1.68	2.15	2.50

[1]Data transformed to $\sqrt{X+0.5}$

Note: Any two means not underscored by the same line are significantly different.
Any two means underscored by the same line are not significantly different.
A solid line underscore indicates similarity at the 5% probability level.

TABLE XV

MULTIPLE RANGE TEST OF RANKED MEAN GRASS COUNTS IN THE FLAT PLANTED TEST AT ATWOOD, 1956

Treatment	Alanap-3 6 lbs/A	Alanap-3 4 lbs/A	Sesin 30E 3 lbs/A	Sesin 30E 1½ lbs/A	Check not-hoed	Crag-1 1½ lbs/A	Crag-1 3 lbs/A	Check hoed
Mean[1]	2.03	2.98	3.45	3.70	5.00	5.48	7.15	7.30

[1]Data transformed to $\sqrt{X+0.5}$

Note: Any two means not underscored by the same line are significantly different.
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and the plants were only one-half the size of the check four weeks after application. The difference in the degree of control of crabgrass between the two rates of Crag-1 was not significant, but the 3 pound rate caused a greater reduction in yield (Table VI). The mean yields of the harvested plots treated at the 1½ and 3 pound rates were 17 and 41 percent below the check, respectively (Table VI). Crag-1 at 1½ pounds per acre in addition to its stunting effect and subsequent reduction in yield, did not significantly reduce the grass count below that of the check-hoed.

Alanap-3 at 4 and 6 pounds per acre gave good grass control at all locations and the control lasted throughout the season, however, the yield was lower than that of the check-hoed (Table VI). The 6 pound rate gave yields 28 percent below that of the check-hoed while the 4 pound rate was 30 percent lower. A slight stunting effect was observed for both rates but the plants, during their early stages of growth, showed a tendency to wilt excessively during the hot part of the day.

Sesin 30E at 1½ and 3 pounds per acre, gave very good control of grass at all locations. This control lasted throughout the season with no apparent effect on the peanut plants. The yields at all locations harvested compared favorably with the check. The mean yield per acre for the 3 pound treatment was slightly higher than the check and the mean yield for the 1½ pound rate was slightly lower than the check (Table VI).

The data obtained on various quality factors from each treatment in the Atwood test are shown in Table XVI. The shelling percentages ranged from 70 to 75 percent. These percentages were similar except for the Sesin 30E at the 3 pound rate. The low shelling value for the

TABLE XVI

SUMMARY OF VARIOUS QUALITY FACTORS FOR PEANUT SAMPLES FROM EACH TREATMENT IN THE ATWOOD TEST

	PERCENTAGE					PERCENTAGE OF SMK HELD ON SLOTTED METAL SCREENS OF FOLLOWING WIDTHS:				% WITHIN
	SHELLED KERNELS	SMK	SSK	FM	MOISTURE	21/64-in	19/64-in	17/64-in	15/64-in	4/64-in
Check-hoed	75	60	15	3	3	0.7	9.8	30.8	58.6	89.4
Check-not-hoed	75	62	13	1	4	6.1	28.1	32.0	33.8	65.8
Crag-1, 1½ lbs/A	75	61	14	1	4	2.9	11.7	39.0	46.5	85.5
Crag-1, 3 lbs/A	74	56	18	5	4	3.5	11.7	40.2	44.6	84.8
Sesin 30E, 1½ lbs/A	75	62	13	1	4	0.7	15.4	42.9	40.9	83.8
Sesin 3CE, 3 lbs/A	70	62	8	1	4	3.1	14.9	36.5	45.5	82.0
Alanap-3, 6 lbs/A	73	56	17	2	4	2.5	16.6	46.9	34.0	80.9
Alanap-3, 4 lbs/A	73	54	19	1	3	1.3	11.9	44.3	42.5	86.8

latter was caused by the small amount of small shriveled kernels (SSK). The percentage of sound mature kernels (SMK) for Sesin 30E at 1½ and 3 pounds, Crag-1 at 1½ pounds per acre and the check-hoed and check-not-hoed treatments were uniformly high. The percentage of sound mature kernels for Alanap-3 at 4 and 6 pounds and Crag-1 at 3 pounds per acre ranged from four to eight percent lower than those for the remaining treatments. The data indicate that Alanap-3 at the 4 and 6 pound rates and Crag-1 at the 3 pound rate stunted peanut plants, reduced peanut yields, and produced fewer sound mature kernels and more small shriveled kernels than did the other treatments in the Atwood test. These results were not in complete agreement with those observed by Searcy (17) who reported no effect on the percentage of sound mature kernels from pre-emergence sprays.

There were other factors influencing quality which did not vary appreciably among the treatments. No loose skinned kernels or damaged kernels were found in the samples graded. The amount of foreign material (FM) ranged from one to five percent. The moisture percentages of the shelled kernels ranged from three to four percent.

The size of the sound mature kernels for the check-not-hoed treatment had a wide range of variation as shown by the low percentage of kernels held within a size range of 4/64-inch. The other treatments had a comparable percentage of sound mature kernels held on each slotted screen as well as a comparable percentage falling within 4/64-inch.

V.

SUMMARY

The influence of several pre-emergence herbicides on weed control and peanut growth was studied in tests at Perkins, Stratford, Atwood, and Bokchito in 1955 and 1956 and near Lookeba in 1955.

There was a wide variation in the results obtained in 1955 pre-emerge tests. Some vegetative injury was noted on the young seedlings, but little reduction in yield occurred when the vegetative injury lasted only three to five weeks. The yields for all of the herbicidal treated plots at Perkins were significantly higher than the untreated check-not-hoed plots. The annual weeds and grasses were effectively controlled by herbicidal treatment. The reduced growth and vigor noted on the Crag-1 treated plots remained throughout the season, however, the mean yield of the plots treated with 3 pounds per acre were superior to the other treatments in 1955.

The prolonged drought during the summer and fall of 1956 had a severe effect on the peanut crop. All of the herbicides gave good early control of grass and other weeds and the peanut stands were not generally reduced as a result of herbicidal effect at Atwood, Stratford, and Perkins. The Perkins and Bokchito tests were not harvested for yield because of retardation of growth due to severe drought stress.

Crag-1 reduced peanut plant growth and yield in the 1956 tests. A comparison of the 1955 and 1956 data indicates that Crag-1 gave more complete weed control and higher peanut yields in the more favorable

season during 1955.

Alanap-3 gave good grass control at each location, but the yields were slightly lower than that of the check. A slight reduction in growth was noted on the plants but this was temporary.

Sesin 30E gave very good control of grass with no apparent effect on the plant vigor and yield. The yields at all locations compared favorably with the check-hoed.

The percentage of sound mature kernels, small shriveled kernels, foreign material, moisture and percentage of kernels held on slotted metal screen were determined for each treatment in the Atwood test. There was a tendency for both rates of Alanap-3 and Crag-1 at 3 pounds per acre to have fewer sound mature kernels and more small shriveled kernels than the other treatments. There was no appreciable variation in other quality factors.

The data indicate that Sesin 30E and Alanap-3 have promise as pre-emergence sprays for peanuts, however, further tests are necessary to determine optimum rates.

LITERATURE CITED

1. Albert, E. O. Tolerance of peanuts to various pre-emergence herbicides. Proc. 9th Annual Southern Weed Conf. Pp. 36-39. 1956.

2. Boyle, L. W. and Hammons, R. O. Cultural practices with respect to peanut yields and control of southern blight and root rot. Ga. Agri. Exp. Sta. Mimeo. Series N. S. 31. Dec., 1956.

3. Burt, E. O. Pre-emergence weed control in peanuts. Proc. 8th Annual Southern Weed Conf. Pp. 127-129. 1955.

4. _____. Pre and post-emergence herbicides in peanuts. Proc. 9th Annual Southern Weed Conf. Pp 40-47. 1956.

5. Chappel, W. E. Weed control in Virginia Jumbo Runner peanuts. Proc. 8th Annual Southern Weed Conf. Pp. 136-142. 1955.

6. _____. Screening tests on peanuts, soybeans and castor beans in 1955. Proc. 9th Annual Southern Weed Conf. Pp. 57-60. 1956.

7. _____. Some effects of pre and post-emergence herbicide treatments on peanuts. Proc. 9th Annual Southern Weed Conf. Pp. 48-53. 1956.

8. _____ and Duke, G. B. The effects of rollers and depth of planting on peanuts and weeds sprayed with 2,4-dichlorophenoxyethyl sulfate. Proc. 9th Annual Southern Weed Conf. Pp. 54-56. 1956.

9. _____ and Miller, L. I. The effect of certain herbicides on plant pathogens. Plant Disease Reporter. Jan. 15, 1956.

10. Duncan, D. B. Multiple range and multiple F tests. Biometrics 11:1-42. 1955.

11. Helms, Clyde E. Jr. Weed control in peanuts. Proc. 8th Annual Southern Weed Conf. Pp. 130-136. 1955.

12. _____ and Rodgers, E. G. Herbicidal influences on Dixie Runner peanuts and existing weed populations. Proc. 6th Annual Southern Weed Conf. Pp. 143-149. 1953.

13. Rea, H. E. The control of weeds in corn and peanuts. Proc. 8th Annual Southern Weed Conf. Pp. 143-147. 1955.

14. Rodgers, E. G., Burt, E. O., and Mixon, A. C. Chemical weed control in peanut fields. Fla. Agri. Ext. Service, Circ. 146 Jan., 1956.

15. Scholl, J. M. and Searcy, V. S. Effect of chemical pre-emergence weed control treatments on stands of weeds and stands and yields of peanuts. Proc. 2nd Annual Southern Weed Conf. Pp. 40-42. 1949.

16. Searcy, V. S. Effects of a pre-emergence chemical application on peanuts planted at various spacings. Proc. 5th Annual Southern Weed Conf. Pp. 116-117. 1952.

17. _____. The influence of chemicals on weeds and on stands, yields, and percentage sound, mature kernels of peanuts when applied as pre-emergence sprays. Proc. 6th Annual Southern Weed Conf. Pp. 138-141. 1953.

18. Snedecor, G. W. Statistical Methods. Iowa State College Press. Ames, Iowa. 5th Edition. 1956.

19. Thompson, Jack T., Hauser, Ellis W., and Stacy, S. V. Three years results on the use of chemicals to control weeds in peanuts under Georgia conditions. Proc. 8th Annual Southern Weed Conf. Pp. 118-122. 1955.

20. Upchurch, Robert P. Field experiments conducted in North Carolina during 1953 and 1954 relating to weed control in peanuts. Proc. 8th Annual Southern Weed Conf. Pp. 110-114. 1955.

21. Westmoreland, W. G. and Klingman, G. C. Peanuts pre-emergence weed control. Proc. 6th Annual Southern Weed Conf. Pp. 150-155. 1953.

22. Witherspoon, A. G. and Rodgers, E. G. Comparative "Pre-merge" pre-emergence and post-emergence treatments for control of annual weeds in peanut fields. Proc. 7th Annual Southern Weed Conf. Pp. 151-153. 1954.

APPENDIX

APPENDIX TABLE I

MEAN NUMBER OF PEANUT PLANTS PER FOOT AFTER EMERGENCE AND AT HARVEST, 1956

Treatment	PERKINS				STRATFORD				ATWOOD		AVERAGE
	FLAT		FURROW		FLAT		FURROW				
	Early	Harvest	Early	Harvest	Early	Harvest	Early	Harvest	Early	Harvest	
Check-hoed	3.02	3.24	3.06	3.45	2.77	2.77	2.33	1.98	2.47	2.28	2.74
Check-not-hoed	3.25	3.60	3.33	3.11	2.75	2.67	2.54	2.03	2.27	2.07	2.76
Crag-1, 1½ lbs/A	3.45	3.32	3.31	3.24	2.52	2.77	1.95	2.00	1.75	1.92	2.62
Crag-1, 3 lbs/A	3.62	3.49	3.79	3.35	2.45	2.52	1.77	1.86	2.41	2.10	2.74
Sesin 30E, 1½ lbs/A	3.50	3.77	3.04	3.28	2.41	2.81	2.37	2.08	2.35	2.43	2.80
Sesin 30E, 3 lbs/A	3.39	3.73	2.98	3.22	2.89	2.53	2.10	2.07	2.25	2.39	2.76
Alanap-3, 6 lbs/A	3.02	3.32	3.06	3.36	2.83	2.64	2.50	2.23	2.58	2.22	2.78
Alanap-3, 4 lbs/A	3.04	3.30	3.12	3.09	2.73	2.79	2.25	2.33	2.04	2.08	2.68
Average	3.28	3.47	3.21	3.26	2.66	2.68	2.22	2.07	2.28	2.18	2.73

APPENDIX TABLE II

MEAN NUMBER OF GRASS AND WEED PLANTS IN 12 FEET OF ROW AT SEVERAL LOCATIONS, 1956

Treatment	PERKINS		STRATFORD		ATWOOD	BOKCHITO		AVERAGE
	Flat	Furrow	Flat	Furrow		Grass	Weeds	
Check-hoed	98.25	52.25	3.75	3.75	55.00	16.75	102.00	47.39
Check-not-hoed	46.75	130.25	6.00	13.00	28.75	14.00	144.75	54.79
Crag-1, 1½ lbs	91.25	36.50	0.00	00.00	32.50	10.75	97.00	38.29
Crag-1, 3 lbs	32.50	38.50	9.50	00.00	53.50	5.50	36.75	25.18
Sesin 30E 1½ lbs	12.50	59.75	1.50	1.25	15.00	7.00	34.25	18.75
Sesin 30E 3 lbs	5.00	23.00	1.75	2.50	18.00	4.00	8.25	8.93
Alanap-1, 6 lbs	8.00	36.25	1.50	00.00	4.50	2.50	9.50	8.89
Alanap-1, 4 lbs	25.50	34.00	.75	1.25	10.75	3.00	6.25	11.64
Average	39.97	51.43	2.96	2.91	27.25	7.94	54.84	27.73

[1]Annual grasses and broadleaf weeds were counted separately at Bokchito.

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