EFFECTS OF PLANT POPULATION, PLANTING DATE AND IRRIGATION ON THE YIELD AND GRADE OF TWO PEANUT VARIETIES

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CHAPTER I

INTRODUCTION

Historically, Oklahoma growers have grown non-irrigated peanuts in rows spaced from 36 to 42 inches apart. The convenience of using the same equipment to plant and cultivate peanuts, cotton, corn and other row crops has probably been an important factor influencing the spacing between rows.

In recent years approximately one-fourth of the peanut acreage in Oklahoma has been irrigated. Experience has shown that with irrigation and adequate fertility, yields may be greatly increased with an increase in plant population. Growers have tried various row spacings but they are in a quandary concerning the spacing to use for best results.

Peanut populations may be varied by changing the row width and plant spacing in the row. In recent years peanut growers have attempted to increase yields by increasing the rate of seeding in the row. Preliminary studies in Oklahoma indicated that a wide range of seeding in the row can be tolerated without influencing yield. However, proper spacing stands in the row is necessary for consistent yields.

Questions have also arisen among Oklahoma peanut growers regarding date of planting, as to whether it is more profitable to plant early and be faced with a weed problem or plant late and chance the possibilities of lower quality peanuts due to hazardous weather conditions

during harvest.

No research information is available for Oklahoma concerning the effect of plant population and time of planting on the yield and quality of Spanish peanuts under non-irrigated and irrigated conditions.

The objectives of the present research were to study the influence of row spacing, plant spacing, and date of planting on the yield and grade of Argentine and Spantex peanuts in non-irrigated and irrigated tests.

CHAPTER II

REVIEW OF LITERATURE

Row spacing, seeding rate and planting date studies for bunch, runner, and Spanish peanuts have been reported by several investigators. The results vary with the type of peanut grown and the area where the studies were conducted. The spacing and planting date studies reported herein deal primarily with the Spanish type peanut.

Spacing Studies

Sturkie and Williamson (21) summarized spacing studies in 1950, and concluded that the best yields for Spanish peanuts were obtained from rows spaced 18 to 24 inches apart with 4 to 6 inches between plants. The influence of spacing on peanut quality was not reported.

Early peanut spacing studies conducted near Nacogdoches and Lubbock, Texas were reported by Mc Ness (13). At the former location mean yields for 18- and 36-inch row spacings were 960 and 900 pounds of peanuts per acre while respective hay yields were 1080 and 1180 pounds per acre. Plant spacings of 6, 9, 12, 15 and 18 inches in rows 36 inches apart were studied near Lubbock. The six-inch spacing between plants produced the highest mean yields of peanuts and forage for the six years and as the spacing between plants increased mean yields decreased.

The highest mean yields were obtained with plants spaced six inches

apart for experiments in South Texas using a 36-inch row spacing and 6, 9, 12, 18 and 24 inches between plants according to Stansel (19).

Early spacing studies by Bennett (1) in Arkansas involved rows spaced 24 and 36 inches apart with plants spaced 4, 6, 8, 12 and 18 inches apart within the row. Mean yields for the 24-inch spacing between rows were 22 percent higher than the 36-inch spacing. He suggested that rows 30 inches apart with plants 8 to 9 inches apart should be used for Arkansas.

In later studies Mc Clelland (10, 11) compared the 30- and 36-inch spacing between rows using spacings of 6 - 9, 10 - 12 and 15 - 16 inches between plants from 1925-1930 and spacing of 8, 12 and 16 inches between plants during the period between 1931 and 1941. Mean yields were approximately five percent higher in favor of the 30-inch row spacing and approximately 20 percent higher for the plants spaced 6, 8 or 9 inches apart in the drill during 1925-1930. Conversely, the mean yields between 1931 and 1941 were slightly higher for the 36-inch than for the 30-inch row width. The yield from spacings of eight inches between plants was higher than spacings of 12 and 16 inches.

West (22) reported two studies dealing with the spacing of Spanish peanuts in Mississippi. One used row spacings of 18, 24, 30 and 36 inches between rows with 4, 8 and 12 inches between plants in the row. Another study used 24, 30 and 36 inches between rows with spacings of 6, 12 and 18 inches between plants in the row. The close spacing of 24 by 6 and 18 by 4 inches which produced the highest yields, tended to shade the middles for late season weed control and encourage upright growth which reduced the number of "pops."

The results of spacing studies conducted in Alabama involving the

row widths 18, 24, 30 and 36 inches and plant spacing in the row of 4, 8 and 12 inches were reported by Funchess and Tisdale (3). The mean yield for the 18-inch row spacing was 212 to 540 pounds of peanuts per acre more than the 24-, 30- and 36-inch row spacings. The mean yield for the spacing of four inches between plants was 878 and 889 pounds of peanuts per acre more than spacings of 8 and 12 inches between plants.

Studies by Higgins and Bailey (5) involved small shriveled seed from "pegs" and number one seed from mature pods which were each seeded 3 and 6 inches apart in the row. Plants from the seed of "pegs" benefited more from close spacing than the number one shelled seed but mean yields for both types of seed were 12 to 25 percent higher for the 3-inch than for the 6-inch plant spacings.

Row and plant spacing investigations conducted near Tifton, Georgia between 1930-1936 were reported by Parham (17). He used row widths of 6, 18, 24, 30 and 36 inches with a spacing of six inches between plants and, with the row width of 36 inches, varied the spacing between plants 3, 6, 12, 18 and 24 inches. The mean yields for spacings of 6 by 6, 18 by 6 and 24 by 6 inches were similar but considerably higher than the other treatments. Gore (4) and Parham (17) stated that rows spaced 24 to 30 inches apart with hills 4 to 6 inches apart were probably the most practical for Spanish peanuts in Georgia. The narrower rows required large amounts of seed and were difficult to cultivate.

Sturkie and Williamson (21) in communications with Gregory and Nelson (15) reported that the best yields in North Carolina were obtained with rows 18 inches apart and plants four inches apart in the row. For light sandy soils, Nelson (15) reported that 18-inch row spacings produced 13 and 28 percent more peanuts, respectively, than

the 27- and 36-inch spacings. He also reported that changing the plant spacing in the drill from 4 to 12 inches had very little effect on yield. The yields of runner or bunch type peanuts were increased 1000 to 1200 pounds per acre in North Carolina by reducing the row width from 36 to 18 inches according to York and Godfrey (23). The North Carolina Peanut Production Guide (16) recommends that farmers use row widths 27 to 30 inches apart and space the seed 4 to 6 inches apart in the drill for Spanish peanuts.

North Carolina workers (2, 12, 24) have suggested methods of planting, cultivating or harvesting peanuts in narrow rows. Rows alternately spaced 17 and 23 inches apart may be cultivated using a tricycle type medium-sized tractor according to Mc Cranie and Giles (12), and rows uniformly spaced 18 inches apart may be cultivated with a light four-wheeled tractor with the treads adjusted to 36 inches. A four-wheeled tractor set 72 inches apart can handle two 36-inch rows or three 24-inch rows according to York, et al. (24). These workers and Cannon (2) reported that tricycle type tractors with the rear wheels spaced 80 inches apart may be used to plant, cultivate, and harvest four rows alternating 12 and 28 inches apart.

Studies by Killinger, et al. (6) were conducted using Spanish peanuts during 1928 and 1929 in Florida with spacings of 3, 6 and 9 inches between plants in rows spaced 30 inches apart. The mean yield for the treatment with 3 inches between plants was 21.6 and 36.3 percent higher than the treatments with 6 and 9 inches between plants.

Miller (14) recognized that changing the plant spacings under a disease and insect control program may substantially increase the yields of peanuts in Virginia.

Shear and Miller (18) studied the yield and quality of Jumbo Runner peanut plants spaced 6 by 6, 9 by 9 and 12 by 12 inches apart. The various spacings had no effect on the percentage of fancy and extra large seed. The shelling percentage was highest for the 6-inch and lowest for the 12-inch spacing. The yields were highest for the 6-inch spacing. Practical considerations against using close spacings include the large quantities of seed required for planting and the difficulties of effectively applying fungicides for controlling diseases.

Time of Planting Studies

The optimum planting date for peanuts varies with such factors as latitude, soil, rainfall distribution, weeds and growing season. Conditions likely to exist during the harvest period such as high temperature or wet and freezing conditions are also factors regulating the planting date.

Sturkie and Williamson (21) state in summary that peanut yields could be increased by early planting. They suggested that the best planting date is probably two weeks after the average date of the last killing frost as the peanut plant is capable of withstanding considerable cold.

Mc Ness (13) recommended planting in April and May for Texas. In East Central Mississippi, West (22) reported that the April 15 planting averaged 22.8 and 26.4 percent more peanuts per acre, respectively, than May 15 and June 15 plantings. Higher yields were obtained from plantings made April 1 to May 15 in Southern Alabama and May 1 to May 25 in Northern Alabama according to Sturkie (20).

Spanish peanuts were planted at 15-day intervals between March 15

and June 1 near Tifton, Georgia (7). The March 15 planting had the highest mean yield for the ten year period from 1934-1943, however, the mean yield was only 50 - 53 pounds higher than the April 1 and April 15 planting. Yields dropped markedly for the May 15 and June 1 plantings.

For a three year period 1941-1943 the mean yields for the April and May plantings in North Carolina were 41.6 and 38.3 percent higher than for the June planting date according to Sturkie and Williamson (21) in communications with Gregory in 1948.

Irrigation Studies in Oklahoma

Peanut quality may be improved by irrigating during prolonged soil moisture stresses and low quality is not necessarily caused by irrigation during any given growing season according to Matlock (9).

The mean yield and quality of Spanish peanuts were improved over that of the non-irrigated, low and medium levels of irrigation according to Matlock, Garton and Stone (8).

CHAPTER III

MATERIALS AND METHODS

Five tests involving specific cultural treatments were conducted in 1960 on the Agronomy Research Stations near Paradise and Perkins. Three tests were located on the Paradise Research Station on a Norge loam soil. These tests were planted May23, June 3, and June 13 and henceforth will be referred to as test 1, test 2 and test 3, respectively. Two tests were planted June 17 on the Perkins Research Station on a Teller fine sandy loam soil. The irrigated experiment was designated as test 4 and the non-irrigated as test 5.

Soil samples taken from the test areas 0-6 inches deep were analyzed by personnel of the Soil Testing Laboratory, Agronomy Department. Results for the samples from the Paradise Station indicated that the soil was acid and low in nitrogen, phosphorous and potassium. The samples from the test area near Perkins indicated an acid soil, low in nitrogen and phosphorous and low to medium in potassium. A rye cover crop was planted on the Paradise location in the fall of 1959. One-hundred pounds per acre of 10-20-10 fertilizer was applied to the rye cover crop. Then approximately 80 pounds per acre of ammonium nitrate were drilled on the rye crop immediately before plowing. An application of 200 pounds of 16-39-0 was drilled on the test areas near Perkins prior to plowing.

Each of the five tests contained the following 18 treatments.

Two varieties - Argentine and Spantex; three row widths - 20-, 30- and 40-inches between rows; and three seeding rates - 2.4, 4.8 and 9.6 seed per foot. A randomized block design with three replications was used for each test.

Breeders' seed was used in the tests. The mean size of seed was 1175 seed per pound for Argentine and 1580 seed per pound for Spantex. Laboratory tests indicated a germination of approximately 90 percent.

Each treatment consisted of a four-row plot 19 feet long with three feet between alleys. The numbers of seed for each row were determined on the basis of 90 percent germination and were then counted and packeted. The plots were marked with ten-inch row markers attached to a bar on a small tractor. The correct row spacings for the various treatments were selected and planted with a v-belt single row hand planter.

Weeds and grass were controlled by hand weeding and with a Chore Master power cultivator. Tests 1, 2 and 3 were sprayed with DDT for thrips and rednecked peanut worms on June 20. The plots of tests 4 and 5 were sprayed with a Dithane and DDT mixture on July 20 for Cercospora leafspot and rednecked peanut worm control.

Soil moisture percentages were determined with a neutron moisture probe. Readings were taken at each of two locations in tests 4 and 5. Sections of galvanized pipe five feet long and 1.5 inches in diameter were located in the row and placed vertically in the soil with the lower extremity four and one-half feet beneath the surface at the following locations:

Location a - plot number 320, test 4, Spantex, 30-inch rows with 9.6 seed per foot.

Location b - plot number 711, test 4, Spantex, 40-inch rows with

4.8 seed per foot.

Location c - plot number 311, test 5, Spantex, 20-inch rows, with 9.6 seed per foot.

Location d - plot number 722, test 5, Spantex, 40-inch rows, with 4.8 seed per foot.

Three lines of four-inch irrigation pipe were laid out approximately 30 feet apart and risers two feet long were located 30 feet apart along each line. This arrangement provided a uniform water coverage for the irrigated test. Test 4 was irrigated when the soil moisture tension in the 6-12 inch root zone reached approximately one-third atmosphere. This corresponds to a soil moisture content of approximately 12 percent (Table I). The test received 2.5 inches of supplemental water on each of four intervals, August 5 and 6, August 16, September 3 and 4 and September 13, and 1.58 inches on September 20. The dates and the mean moisture percentage determined from neutron probe readings for tests 4 and 5 are shown in Table II.

Plants in 16 feet of the center portion of each of the second and third rows for the plot were pulled by hand, shaken, and counted. Test 1 was dug on October 17, test 2 on October 22, test 3 on October 29 and test 4 and 5 on November 11.

The plants were allowed to dry in the field before threshing with a stationary Lilliston Picker modified for nursery plot work. Tests 1, 2 and 3 were threshed November 4 and test 4 and 5 on November 18. The peanuts for each plot in tests 1, 2 and 3 were cleaned November 25 and weighed November 28. Peanut samples from tests 4 and 5 were cleaned November 26 and weighed December 3.

TABLE I.--The soil moisture tension and corresponding soil moisture percentages determined for each of four locations at four one-foot depth intervals on the areas of tests 4 and 5, Perkins Agronomy Research Station, 1960[1]

Depth (Inches)	Moisture Percentage (Weight Basis)								Mean % Moisture	
	15 Atmos. Tension				1/3 Atmos. Tension					
	Loc. a	Loc. b	Loc. c	Loc. d	Loc. a	Loc. b	Loc. c	Loc. d	15 atmos.	1/3 atmos.
0-12	6.2	5.6	4.5	4.4	14.5	13.3	11.5	10.2	5.1	12.1
13-24	8.2	7.3	6.7	6.2	18.3	16.6	15.6	14.2	7.1	16.2
25-36	6.7	6.5	6.2	7.3	18.4	14.9	12.7	15.7	6.7	15.4
37-48	4.8	4.8	4.3	7.2	11.1	10.9	8.4	13.2	5.3	10.9

[1]Dr. John F. Stone, Agronomy Department, Oklahoma State University, recommended the procedures for securing samples and calculated the soil moisture tensions and their corresponding soil moisture percentages. Tension data were obtained with the pressure-membrane type apparatus.

TABLE II.--The mean soil moisture percentages (volume basis) determined from neutron probe readings taken at two locations in each of tests 4 and 5, Perkins Agronomy Research Station, 1960.

Date	Test No.	Mean Moisture Percentage (Volume Basis)[1] Depths (inches) 6	12	18	24	30	36	42	48
July 11	4	17.0	21.0	22.0	21.5	18.9	17.4	16.2	19.0
July 11	5	17.6	20.0	20.6	19.4	20.8	17.4	15.8	16.8
July 16	4	13.8	18.1	21.2	21.2	--	--	--	--
July 16	5	13.0	17.6	19.6	19.8	--	--	--	--
July 19	4	18.5	18.0	20.2	20.5	18.2	16.8	16.5	18.5
July 19	5	17.8	17.5	19.0	20.2	20.0	17.2	15.5	17.5
Aug. 2	4	11.2	15.8	18.8	19.8	17.8	16.2	15.8	16.2
Aug. 2	5	11.0	15.5	17.2	18.5	19.2	18.2	16.2	15.8
Aug. 8	4	18.8	15.8	16.8	18.8	17.2	16.0	15.2	16.5
Aug. 8	5	8.0	11.8	14.2	15.2	18.0	16.2	15.8	15.2
Aug. 14	4	9.0	12.5	14.8	16.0	15.2	14.2	14.0	16.0
Aug. 14	5	7.0	11.2	13.2	15.5	17.5	16.5	15.0	15.2
Aug. 17	4	22.0	15.5	16.0	17.0	16.8	15.2	14.8	15.2
Aug. 17	5	6.2	10.5	12.8	14.2	16.5	15.5	14.5	15.0
Aug. 22	4	12.7	14.5	15.5	16.8	15.2	14.5	14.0	15.2
Aug. 22	5	6.7	10.5	12.0	13.2	15.8	14.5	13.5	14.5
Aug. 31	4	12.0	14.2	15.0	16.2	15.2	13.5	13.8	14.5
Aug. 31	5	12.2	11.2	12.2	12.8	14.8	14.2	12.8	14.2
Sept. 3	4	8.5	12.2	14.8	15.5	14.2	13.0	12.8	14.2
Sept. 3	5	9.5	10.5	11.8	13.0	15.0	14.0	13.0	13.5
Sept. 12	4	7.2	11.8	13.2	13.8	12.2	11.2	12.2	14.8
Sept. 19	4	14.8	12.2	13.8	14.2	11.5	11.2	11.5	14.0
Sept. 19	5	5.2	9.0	10.2	10.8	12.2	11.0	10.2	13.0

[1]Each figure represents the mean of two locations.

Representative pod samples of one pound were taken for grading from replications I and III for each treatment in each test. The percentages of sound mature kernels (SMK) other kernels, damaged kernels, and shelling were determined for each of the 180 samples by personnel of the State Federal Inspection Service at Durant, Oklahoma.

The percentage of sound mature kernels represented those kernels remaining above a 15/64-inch slotted sieve after the damaged kernels had been removed. Other kernels represented the percentage of undamaged kernels passing through a 15/64-inch slotted sieve. The percentage of No. 1 kernels was determined by dividing the sound mature kernels by the total amount of kernels.

The analyses of variance for each of the five tests were calculated by means of the IBM 650 Computer at the Computing Center, Oklahoma State University.

CHAPTER IV

RESULTS AND DISCUSSION

Rainfall

The rainfall for 1960 between May 1 and November 19 was 24.08 inches for the Paradise Station. In 1960 the Perkins Station received 24.69 inches of rainfall from May 1 to November 19.

The rainfall data are summarized by 7-day intervals for the period May 1 through November 19 for the Paradise and Perkins Stations in Table III. Daily rainfall during the growing season is shown in Appendix Table I. The number of 7-day intervals during the growing season from May 22 to October 29 with less than 0.5 inch rainfall was 10 and 12, respectively, for the Perkins and Paradise Stations.

Considerable rain fell on the plots following the digging operation and before picking. This amounted to 4.60 inches for test 1, 1.32 inches for test 2, 1.38 inches for test 3 and 0.24 inch for tests 4 and 5. The plants for each plot row were turned with the pods upright and were moved to facilitate drying before threshing.

Variety Effects

The mean peanut yields for Argentine were 17.4, 8.7, 18.0, 20.2 and 6.0 percent higher than the mean yields of Spantex for tests 1, 2, 3, 4 and 5, respectively. The mean yield for Argentine for the five tests was 2083 pounds of peanuts per acre compared with 1758 pounds for Spantex (Table IV). The analyses of variance for each of the five tests are

TABLE III.--Rainfall for Paradise and Perkins Agronomy Research Stations by 7-day intervals for the period from May 1 to November 19, 1960.

Date	Paradise Rainfall (inches)	Perkins Rainfall (inches)
May 1-7	2.63	2.80
May 8-14	0.00	0.00
May 15-21	1.65	2.05
May 22-28	1.28	1.21
May 29-June 4	0.61	0.17
June 5-11	1.63	0.76
June 12-18	0.05	0.23
June 19-25	0.80	0.93
June 26-July 2	0.00	0.00
July 3-9	1.40	1.38
July 10-16	0.54	0.13
July 17-23	4.48	3.73
July 24-30	0.12	2.11
July 31-Aug. 6	0.00	0.00
Aug. 7-13	0.00	0.00
Aug. 14-20	0.92	0.62
Aug. 21-27	1.68	0.52
Aug. 28-Sept. 3	0.00	0.00
Sept. 4-10	0.11	0.02
Sept. 11-17	0.00	0.00
Sept. 18-24	0.37	0.57
Sept. 25-Oct. 1	0.23	0.63
Oct. 2-8	0.00	0.00
Oct. 9-15	0.44	0.77
Oct. 16-22	3.28	3.10
Oct. 23-29	1.08	2.33
Oct. 30-Nov. 5	0.24	0.39
Nov. 6-12	0.00	0.00
Nov. 13-19	0.54	0.24
Total	24.08	24.69

TABLE IV.--Summary for the mean yields of peanuts of varieties, row spacings, and seeding rates for the five cultural tests conducted at Paradise and Perkins Agronomy Research Stations, 1960.

Treatment / Variety	Mean Yield of Peanuts (Pounds per Acre)					
	Test 1	Test 2	Test 3	Test 4	Test 5	Test 1-5
Argentine	2082	1620	1975	3393	1344	2083
Spantex	1719	1479	1619	2709	1263	1758
Row Spacing (Inches)						
20	2061	1919	1863	3377	1412	2126
30	1915	1327	1780	3004	1266	1858
40	1726	1401	1749	2770	1233	1776
Seeding Rate (No. per Foot)						
2.4	2004	1522	1837	3083	1293	1948
4.8	1964	1613	1830	3197	1385	1998
9.6	1733	1513	1725	2872	1233	1815
Test Mean	1900	1550	1797	3051	1304	1920

shown in Table V. The variances for varieties indicated significant differences among varieties at the 1 % level for tests 1, 3 and 4. The variance for varieties in tests 2 and 5 did not differ significantly. The coefficients of variation for tests 1, 2, 3, 4 and 5 were 20.1, 26.5, 14.0, 24.4 and 27.7 percent, respectively.

The mean percentage of No. 1 kernels for the five tests was 94.3 for Argentine and 87.8 for Spantex (Table VI). The quantities of No. 1 kernels for Argentine were 4.1, 10.6, 11.6, 1.9 and 4.3 percent higher than for Spantex for tests 1, 2, 3, 4 and 5, respectively.

The moisture stress during the fruiting period for tests 2 and 3 reduced the size of the Spantex seed sufficiently for 13.4 percent to pass through the 15/64-slotted sieve compared with 4.4 percent for Argentine (Table VI).

The mean percentages of sound mature kernels were similar for Argentine and Spantex except for tests 2 and 3 where the amounts for Argentine were 7.1 and 7.3 percent higher than Spantex.

The mean percentage of damaged kernels ranged from 0.7 to 2.0 and were similar for Argentine and Spantex (Table VI).

The difference for the shelling percent for Spantex ranged from 1.0 to 2.3 percent higher than Argentine for the five tests.

Row Spacing Effects

The mean peanut yields for the 20-inch spacing between rows were 146, 592, 83, 373 and 146 pounds per acre higher than the 30-inch row, respectively, for tests 1, 2, 3, 4 and 5 (Table IV). The mean yields for the 20-inch rows were 335, 518, 114, 607 and 179 pounds per acre higher than the 40-inch rows for tests 1, 2, 3, 4 and 5, respectively. The 20-

TABLE V.--Analyses of variance for peanut yields harvested for three tests on the Paradise Agronomy Research Station and two tests on the Perkins Agronomy Research Station, 1960.

Source	d.f.	Mean Squares				
		Test 1	Test 2	Test 3	Test 4	Test 5
Total	108					
Reps.	2	122,365.0	59,075.0	449,965.0**	853,810.0	453,690.0*
Treatment	17					
Var. (V)	1	3,543,910.0**	539,230.0	3,426,470.0**	12,669,490.0**	177,633.0
Spac. (S)	2	1,017,540.0**	3,745,290.0**	123,930.0	3,373,345.0**	325,255.0
Rate (R)	2	769,725.0*	110,425.0	141,145.0	982,525.0	211,516,5
V x S	2	48,475.0	201,275.0	134,485.0	191,985.0	93,231.5
V x R	2	176,830.0	11,335.0	53,190.0	104,345.0	135,188.5
S x R	4	226,637.5	118,535.0	212,097.5*	342,270.0	172,377.2
V x S x R	4	65,220.0	53,247.5	25,785.0	270,805.0	94.240.5
Error	34	149,056.2	170,309.4	64,232.6	556,552.9	111,597.6
Sample Error	54	44,815.0	50,177.4	56,184.8	120,150.7	20,476.7
C.V. %		20.17	26.52	13.99	24.36	27.70

*Indicates a significance at the 5 % level.

**Indicates a significance at the 1 % level.

TABLE VI.--Mean percentages of No. 1 kernels, SMK, other kernels, damage and shelling for varieties, row spacing and seeding rate, 1960.

Grading Factors	Varieties		Row Spacing (inches)			Rate (Seed per Foot)			Test Mean
	Argentine	Spantex	20	30	40	2.4	4.8	9.6	
Test 1									
No. 1 Kernels	95.8	90.7	92.9	93.3	93.5	94.2	94.0	91.5	93.2
SMK	74.6	72.0	72.9	73.7	73.3	73.8	73.8	71.8	73.3
Other Kernels	2.1	6.4	4.5	4.2	4.1	3.4	3.8	5.5	4.2
Damage	1.2	0.9	1.1	1.1	1.0	1.2	0.8	1.2	1.0
Shelling	77.8	79.3	78.5	78.9	78.4	79.0	78.4	78.4	78.6
Test 2									
No. 1 Kernels	92.5	81.9	85.2	87.3	89.0	89.0	88.0	84.7	87.2
SMK	71.4	64.1	66.5	67.7	69.2	69.8	68.5	65.2	67.8
Other Kernels	4.4	13.4	10.4	9.3	7.1	7.5	8.2	10.9	8.9
Damage	1.4	0.7	1.2	0.6	1.5	1.2	1.1	0.9	1.0
Shelling	77.2	78.2	78.0	77.8	77.3	78.4	77.6	77.1	77.7
Test 3									
No. 1 Kernels	93.0	81.4	84.2	86.6	90.8	88.9	88.1	84.6	87.2
SMK	70.7	63.6	65.2	66.9	69.9	68.6	68.0	65.0	67.2
Other Kernels	4.4	13.4	11.0	9.6	6.3	7.2	8.2	11.4	8.9
Damage	0.8	1.2	1.2	0.9	1.1	1.4	1.1	0.6	1.0
Shelling	76.1	78.0	76.9	77.3	76.9	77.2	77.2	76.8	77.0
Test 4									
No. 1 Kernels	97.1	95.2	96.2	96.1	96.2	96.0	96.4	96.0	96.2
SMK	71.9	71.8	71.4	72.4	72.0	72.2	71.2	71.9	71.8
Other Kernels	1.8	3.4	2.6	2.8	2.6	2.8	2.3	2.8	2.6
Damage	0.2	1.7	0.2	0.2	0.2	0.2	0.2	0.1	1.0
Shelling	74.0	75.4	74.2	75.2	74.8	75.2	74.2	74.8	74.7

TABLE VI.--Continued

Grading Factors	Varieties		Row Spacing (inches)			Rate (Seed per Foot)			Test Mean
	Argentine	Spantex	20	30	40	2.4	4.8	9.6	
Test 5									
No. 1 Kernels	93.2	88.9	89.6	91.1	92.6	91.4	91.2	90.6	91.1
SMK	68.8	68.9	68.2	69.3	71.0	69.8	69.2	69.6	68.8
Other Kernels	3.0	6.8	6.4	4.9	3.6	4.4	4.7	5.8	4.9
Damage	2.0	1.7	1.7	1.8	2.0	2.1	2.0	1.5	1.8
Shelling	75.2	77.5	76.2	76.0	76.7	76.4	75.8	76.8	76.4
Test 1-5									
No. 1 Kernels	94.3	87.8	89.6	90.9	92.5	91.8	91.6	89.5	91.1
SMK	71.8	67.9	68.8	70.0	71.1	70.8	70.2	68.7	69.8
Other Kernels	3.2	8.7	7.0	6.2	4.7	5.1	5.4	7.2	6.0
Damage	1.1	1.0	1.1	0.9	1.2	1.2	1.0	0.9	1.0
Shelling	76.1	77.7	76.8	77.0	76.8	77.2	76.7	76.8	76.4

inch spacing produced 268 and 350 pounds per acre more peanuts than the 30- and 40-inch row spacing, respectively.

The analyses of variance indicated a highly significant difference among the row spacings for tests 1, 2 and 4. The mean yields for row spacings did not differ significantly at the 5 % level of significance for tests 3 and 5 (Table V).

The critical fruit development period occurred 70-80 days after planting. Moisture conditions during the critical fruit development periods were good for tests 2 and 4 but poor for tests 1, 3 and 5. The higher yields for the narrow rows were probably influenced by the availability of moisture during the fruit development period.

Though the mean yields of peanuts were higher for the narrow row spacing the percentages of No. 1 kernels, and sound mature kernels were lower and the small shriveled kernels were slightly higher for the 20-inch spacing than for those of the two wider row spacings.

The mean percentage of damaged kernels ranged from 0.6 to 2.0 percent and did not differ materially among row spacings or among the five tests. For the individual tests, the highest percentages of No. 1 kernels and sound mature kernels and lowest percentages of other kernels were obtained for tests 1 and 4. The mean percentages of No. 1 kernels and sound mature kernels for the 30- and 40-inch row spacings were very similar but higher than those for the 20-inch row spacing (Table VI). An exception to this trend occurred with the irrigated test 4, where the percentages of No. 1 kernels, sound mature kernels and other kernels were about equal for each of the row spacings.

The mean shelling percentages for the three row spacings in each of the tests were similar except for the irrigated test 4 which was

consistently lower.

Seeding Rate Effects

The rate of seeding in the row did not materially influence the mean peanut yields in 1960. The mean yields for each of the row spacings are shown in Table IV. The mean yields for the medium seeding rate of 4.8 seed per foot were slightly higher than those of the 2.4 and 9.6 rates in tests 2, 4 and 5. The analyses of variance indicated a significant difference at the 5 % level among seeding rates only for test 1 (Table V). In test 1 the primary difference was for the low mean yield at the 9.6 rate in comparison with the 2.4 and 4.8 rates.

The percentages of No. 1 kernels and sound mature kernels were slightly higher and the other kernels slightly lower for the rates of 2.4 seed per foot than for the rates of 4.8 and 9.6 seed per foot. However, the mean percentages were similar for the rates of 2.4 and 4.8 seed per foot. The rate of 9.6 seed per foot consistently had fewer No. 1 and sound mature kernels and more other kernels than the low and medium rates in each test except test 4. The supplemental irrigation for test 4 apparently improved the grade of the peanuts in the higher seeding rates.

The mean percentages of damaged kernels were lowest for test 4 and highest for test 5 while differences for tests 1, 2 and 3 were small.

Plant Population

The number of plants per acre determined at digging time and the percent survival for the varieties, spacings and seeding rates for each of the five tests are shown in Table VII.

The number of seeds planted in each 20.8 feet of plot row was 49, 98 and 196, respectively, for the seeding rates 2.4, 4.8 and 9.6 seed

TABLE VII.--Mean number of peanut plants per acre calculated from plant counts for each plot and the percentage of plants surviving for the various treatments in each of five tests at the Paradise and Perkins Agronomy Research Stations, 1960.

Test Number	Row Spacing: 20 (Inches)				30 (Inches)				40 (Inches)			
	No. Plants per Acre[1]		Plant Survival (Percent)[2]		No. Plants per Acre[1]		Plant Survival (Percent)[2]		No. Plants per Acre[1]		Plant Survival (Percent)[2]	
	Argentine	Spantex	Argentine	Spantex	Argentine	Spantex	Argentine	Spantex	Argentine	Spantex	Argentine	Spantex
					Seeding Rate of 2.4 Seed per Foot							
1	63,578	68,142	102	109	44,867	49,223	108	118	32,050	33,685	103	108
2	64,067	59,176	103	95	41,055	40,511	99	97	34,993	29,657	112	95
3	69,772	57,872	112	93	46,609	41,382	112	99	35,402	29,025	113	93
4	61,948	57,546	99	92	35,937	38,986	86	94	26,981	31,232	86	100
5	66,838	72,055	107	116	40,620	45,520	98	109	29,679	33,685	95	108
Mean	65,241	62,958	105	101	41,818	43,124	101	103	31,821	31,457	102	101
					Seeding Rate of 4.8 Seed per Foot							
1	109,223	116,233	88	93	77,537	75,903	93	91	55,433	59,031	87	94
2	129,601	117,700	104	94	76,012	76,448	91	92	57,232	61,684	92	99
3	118,516	103,844	95	83	87,664	68,934	105	83	59,848	56,578	96	90
4	106,778	101,072	86	81	62,944	75,141	76	90	52,326	51,754	84	83
5	121,939	109,712	98	88	66,159	66,750	79	80	55,024	59,440	88	95
Mean	117,211	109,712	94	88	74,063	72,635	89	87	55,973	57,697	89	92
					Seeding Rate of 9.6 Seed per Foot							
1	204,590	185,028	82	74	133,076	127,631	80	77	100,810	95,659	80	76
2	214,371	238,824	86	96	145,926	136,887	88	82	102,288	107,681	82	86
3	200,841	204,916	80	82	135,580	141,243	81	85	100,320	101,219	80	81
4	187,147	184,213	75	74	122,730	126,651	74	76	108,332	92,961	87	74
5	222,848	217,143	89	87	118,637	114,632	71	69	108,332	116,753	87	93
Mean	205,959	206,025	82	83	131,190	129,409	79	78	104,016	102,855	83	82

[1]The calculations were based on the mean number of plants in 16 feet of plot counted at digging time.

[2]The percent survival was determined by comparing the mean number of seed planted with the mean number of plants harvested.

per foot. In planting the seed for each plot were distributed evenly on the v-belt of the planter but a uniform distribution in the soil was not obtained. The number of plants harvested per foot ranged from 2.1 to 2.8, 3.6 to 5.0 and 7.0 to 8.9, respectively, for the planting rates of 2.4, 4.8 and 9.6 seed per foot.

The mean number of Argentine plants per acre for the five tests was 65,241, 41,818 and 31,821, respectively, for the 20-, 30- and 40-inch row spacings. For Spantex the mean number of plants per acre was 62,958, 43,124 and 31,458 for the respective row widths. The mean percentages of plants surviving the growing season for the low rate ranged from 101 to 105 for the five tests. The percent survival was higher than 100 percent because of the irregular distribution of the seeds. There was excellent survival at the low seeding rate for each row spacing.

The mean number of Argentine plants per acre for the five tests at the medium seeding rate was 117,211, 74,063 and 55,973, respectively, for the 20-, 30- and 40-inch row spacings. Spantex averaged 109,712, 72,635 and 57,697 plants per acre for the respective row spacings.

The mean percentages of plants that survived ranged from 87 to 94 for the medium rate of planting in five tests. The survival ranged from 9 to 16 percent lower for the rate of 4.8 seed per foot than for the 2.4 rate.

The mean numbers of Argentine plants per acre for the five tests were 205,959, 131,190 and 104,016, respectively, for the 20-, 30- and 40-inch row spacings. The mean numbers of Spantex plants per acre were 206,025, 129,049 and 102,855, respectively, for the 20-, 30- and 40-inch row spacings.

The mean percentages of plants that survived ranged from 78 to 83

for the high rate of planting in the five tests. The high rate had fewer plants to survive than the low and medium rates. The plant survival ranged from 18 to 25 percent lower for the rate of 9.6 seed per foot than the 2.4 rate. The plant survival was generally lower for test 4 than for the other tests.

As would be expected, the analyses of variance for each test indicated a highly significant difference among seeding rates (Table VIII). Variety variance for test 3 indicated a highly significant difference between varieties. The plant populations for Spantex for the 20- and 30-inch rows were relatively low while those for Argentine were relatively high.

The coefficients of variation for the mean number of plants in the 16 feet plots were 16.24, 14.04, 9.06, 15.81 and 10.61 percent, respectively, for tests 1, 2, 3, 4 and 5 (Table VIII).

Interaction Effects

The mean squares of peanut yields and number of plants for the interactions- variety x spacing, variety x rate, and variety x spacing x rate were not significantly different with the exception of variety x rate for the number of plants in test 3 (Tables V, VIII). The data indicate that the mean peanut yields for variety, spacing and rate behaved independently of one another.

The mean yields for both Argentine and Spantex were highest for the 20-inch row spacings with the greatest difference, being in test 4. The lowest mean yields for both varieties were obtained for 9.6 seed per foot except for Spantex in test 2, and Argentine in test 5 (Table IX).

An inspection of the grading results shown in Table X indicates that Spantex exhibited larger differences among row spacings and seeding

TABLE VIII.--Analyses of variance for the number of plants harvested from 16 feet of plot row for three tests on the Paradise Agronomy Research Station and two tests on the Perkins Agronomy Research Station, 1960

Source	d.f	Mean Squares				
		Test 1	Test 2	Test 3	Test 4	Test 5
Total	108					
Reps.	2	117.5	49.0	107.5	116.0	1,476.0**
Treatment	17					
Var. (V)	1	18.0	1.0	569.0**	8.0	114.0
Spac. (S)	2	18.5	260.5	63.0	112.0	35.0
Rate (R)	2	56,861.5**	81,681.5**	67,100.5**	61,894.5**	83,165.5**
V x S	2	5.5	62.5	9.5	287.0	200.5
V x R	2	328.0	139.5	409.5**	179.0	30.5
S x R	4	10.5	124.8	17.8	109.8	76.0
V x S x R	4	36.5	254.8	71.8	178.0	89.8
Error	34	166.3	138.4	50.1	139.4	75.8
Sample Error	54	140.4	71.4	45.4	48.4	63.2
C.V. %		16.24	14.04	9.06	15.81	10.61

**Indicates a significance at the 1 % level.

TABLE IX.--Summary for the mean yields of peanuts for variety x row spacing, variety x seeding rate and row spacing x seeding rate for the five tests conducted at Paradise and Perkins Agronomy Research Station, 1960

	Mean Yields of Peanuts (Pounds per Acre)					
	Test 1	Test 2	Test 3	Test 4	Test 5	Test 1-5
Variety and Row Spacing (Inches)						
Argentine						
20	2200	2066	2083	3800	1496	2329
30	2119	1325	1986	3330	1320	2016
40	1926	1469	1857	3050	1218	1904
Spantex						
20	1922	1772	1642	2955	1328	1924
30	1710	1330	1574	2678	1212	1701
40	1526	1334	1641	2491	1249	1648
Variety and Rate (Seed/Ft.)						
Argentine						
2.4	2265	1590	2016	3410	1266	2109
4.8	2094	1702	2046	3600	1477	2184
9.6	1885	1567	1864	3170	1290	1955
Spantex						
2.4	1743	1453	1658	2756	1321	1786
4.8	1834	1524	1614	2795	1294	1812
9.6	1581	1459	1586	2574	1176	1675
Row Spacing (Inches) / Rate (Seed/Ft.)						
20 / 2.4	2322	1983	1970	3572	1516	2273
30 / 2.4	1875	1260	1868	3072	1196	1854
40 / 2.4	1816	1322	1673	2605	1168	1717
20 / 4.8	2079	1858	1923	3415	1522	2159
30 / 4.8	2003	1471	1841	3201	1372	1978
40 / 4.8	1810	1510	1724	2976	1262	1856
20 / 9.6	1782	1917	1695	3144	1198	1947
30 / 9.6	1867	1251	1630	2740	1230	1744
40 / 9.6	1551	1372	1851	2731	1271	1755

TABLE X.--Mean percentages of No. 1 kernels, SMK, other kernels, damage and shelling for variety x row spacing and variety x seeding rate, 1960.

Grading Factors	Variety and Row Spacing (Inches)						Variety and Seeding Rate (Seed per Ft.)					
	Argentine			Spantex			Argentine			Spantex		
	20	30	40	20	30	40	2.4	4.8	9.6	2.4	4.8	9.6
Test 1												
No. 1 Kernels	95.5	96.1	95.7	90.3	90.5	91.3	96.6	96.5	94.2	91.8	91.5	88.8
SMK	74.0	75.5	74.2	71.8	71.8	72.3	75.5	75.2	73.0	72.2	72.3	70.5
Other Kernels	2.5	2.0	1.8	6.5	6.3	6.3	1.5	1.7	3.2	5.3	6.0	7.8
Damage	1.0	1.0	1.5	1.2	1.2	0.3	1.2	1.0	1.3	1.2	0.7	1.0
Shelling	77.5	78.5	77.5	79.5	79.3	79.2	78.2	77.8	77.5	79.7	79.0	79.3
Test 2												
No. 1 Kernels	91.8	92.9	92.8	78.7	81.7	85.3	92.5	92.6	92.3	85.4	83.3	77.1
SMK	71.2	71.8	71.3	61.8	63.5	67.0	72.3	71.7	70.3	67.2	65.0	60.2
Other Kernels	5.0	4.8	3.3	15.7	13.7	10.8	4.3	4.0	4.8	10.7	12.5	17.0
Damage	1.3	0.7	2.2	1.0	0.5	0.7	1.5	1.7	1.0	0.8	0.5	0.8
Shelling	77.5	77.3	76.8	78.5	78.3	77.8	78.2	77.3	76.2	78.7	78.0	78.0
Test 3												
No. 1 Kernels	91.1	93.2	94.7	77.4	80.0	86.9	93.2	92.3	93.6	84.6	83.9	75.7
SMK	70.0	71.2	72.0	60.3	62.5	67.7	70.8	70.5	71.2	66.3	65.5	58.8
Other Kernels	5.7	4.5	3.2	16.2	14.7	9.3	3.8	5.2	4.3	10.5	11.2	18.5
Damage	1.0	0.7	0.8	1.3	1.0	1.3	1.3	0.7	0.5	1.5	1.5	0.7
Shelling	76.0	76.3	76.0	77.8	78.3	77.8	76.0	76.3	76.0	78.3	78.0	77.7

TABLE X.--Continued.

Grading Factors	Variety and Row Spacing (Inches)						Variety and Seeding Rate (Seed per Ft.)					
	Argentine			Spantex			Argentine			Spantex		
	20	30	40	20	30	40	2.4	4.8	9.6	2.4	4.8	9.6
Test 4												
No. 1 Kernels	96.8	97.5	97.0	95.5	94.7	95.5	97.2	97.0	97.0	94.7	95.9	95.1
SMK	71.7	72.5	71.7	71.0	72.2	72.3	71.8	71.5	72.5	72.5	71.7	71.3
Other Kernels	2.0	1.8	2.0	3.3	3.7	3.2	1.8	1.8	2.2	3.8	2.8	3.5
Damage	0.3	0.0	0.2	0.0	0.3	0.2	0.2	0.3	0.0	0.2	0.2	0.2
Shelling	74.0	74.3	73.8	74.3	76.2	75.7	73.8	73.7	74.7	76.5	74.7	75.0
Test 5												
No. 1 Kernels	92.9	93.2	93.6	86.2	89.0	91.6	92.8	93.5	93.4	90.1	88.9	87.7
SMK	69.7	69.8	70.8	66.8	68.8	71.2	69.8	69.8	70.7	69.8	68.5	68.5
Other Kernels	3.7	3.0	2.5	9.0	6.8	4.7	2.8	3.2	3.2	6.0	6.2	8.3
Damage	1.7	2.0	2.3	1.7	1.7	1.8	2.5	1.7	1.8	1.7	2.3	1.2
Shelling	75.0	74.8	75.7	77.5	77.3	77.7	75.2	74.7	75.7	77.5	77.0	78.0
Test 1-5												
No. 1 Kernels	93.6	94.6	94.8	85.6	87.2	90.2	94.4	94.4	94.1	89.3	88.7	84.9
SMK	71.3	72.2	72.0	66.3	67.8	70.1	72.0	71.7	71.5	69.6	68.6	65.9
Other Kernels	3.8	3.2	2.6	10.1	9.0	6.9	2.8	3.2	3.5	7.3	7.7	11.0
Damage	1.1	0.9	1.4	1.0	0.9	0.9	1.3	1.1	0.9	1.1	1.0	0.8
Shelling	76.0	76.2	76.0	77.5	77.9	77.6	76.3	76.1	76.0	78.1	77.3	77.6

rates than Argentine. Both varieties tended to show an increase in the percentages of No. 1 and sound mature kernels and fewer other kernels as the row spacing increased and seeding rate decreased. Spantex tended to be more sensitive in its reaction to plant competition than Argentine.

The variances for the interaction of spacing rate for yield and number of plants were not significantly different except for the peanut yields in test 3 (Tables V, VIII).

The yield data for the seeding rate of 9.6 seed per foot for test 3 do not follow the pattern for the other tests. The 40-inch row spacing in test 3 fot the high seeding rate had an exceptionally high mean yield.

For the various row spacings and seeding rates, there was a tendency for the 20-inch spacing to produce more peanuts than the 30- and 40-inch row spacings.

The grading results shown in Table XI indicate that the trend for a higher grade at the 40-inch row spacing was more evident as the seeding rate in the row increased.

Date of Planting Effects

The mean peanut yields, whether grouped by varieties, row spacings or seeding rates, were highest for the May 23 planting (test 1) and lowest for the June 3 planting (test 2) except for the 20-inch row spacing (Table IV). The mean peanut yields were 1900, 1550 and 1797, respectively, for the May 23 (test 1), June 3 (test 2) and June 13 (test 3) plantings. The mean peanut yields for the 18 treatments shown in Appendix Tables II, III, IV were higher for test 1 with eight exceptions. These exceptions for Argentine were the seeding rate of 4.8 seed per foot with 20- and 40-inch row spacings, and the seeding rate of 9.6

TABLE XI.--Mean percentages of No. 1 kernels, SMK, other kernels, damage and shelling for row spacing and seeding rate, 1960.

Grading Factors	Seeding Rate (Seed per Foot)								
	2.4			4.8			9.6		
	Row Spacing (Inches)								
	20	30	40	20	30	40	20	30	40
Test 1									
No. 1 Kernels	94.3	94.6	93.7	94.6	92.8	94.8	89.8	92.6	92.0
SMK	73.8	74.8	74.5	74.8	73.5	73.0	70.2	72.8	72.2
Other Kernels	3.0	3.5	3.8	4.2	4.2	3.0	6.2	4.8	5.5
Damage	1.5	0.8	1.2	0.0	1.5	1.0	1.8	1.0	0.8
Shelling	78.2	79.0	79.5	79.0	79.2	77.0	78.2	78.5	78.5
Test 2									
No. 1 Kernels	88.3	88.8	89.7	88.2	86.6	89.0	79.2	86.4	88.4
SMK	69.8	69.8	69.8	69.0	66.5	69.5	60.8	66.8	67.2
Other Kernels	8.0	8.0	6.5	8.5	9.5	6.8	14.5	10.2	8.0
Damage	1.2	0.8	1.5	0.8	0.8	1.8	1.5	0.2	1.0
Shelling	79.0	78.5	77.0	78.2	76.8	77.0	76.8	77.2	77.2
Test 3									
No. 1 Kernels	85.8	90.2	90.6	86.2	87.8	90.3	80.7	81.8	91.6
SMK	66.2	69.8	69.8	66.5	68.0	69.3	61.8	63.0	70.2
Other Kernels	9.2	6.2	6.0	9.0	8.5	7.0	14.5	14.0	5.8
Damage	1.8	1.2	1.2	1.5	1.0	0.8	0.2	0.2	1.2
Shelling	77.2	77.2	77.0	77.0	77.5	77.0	76.5	77.2	76.8

TABLE XI.-- Continued

Grading Factors	Seeding Rate (Seed per Foot)								
	2.4			4.8			9.6		
	Row Spacing (Inches)								
	20	30	40	20	30	40	20	30	40
Test 4									
No. 1 Kernels	95.9	96.7	95.3	95.5	96.6	97.3	97.0	95.0	96.2
SMK	71.5	73.2	71.8	70.0	72.2	72.5	72.5	71.5	71.8
Other Kernels	3.0	2.5	3.0	2.8	2.2	2.0	2.2	3.5	2.8
Damage	0.0	0.0	0.5	0.5	0.2	0.0	0.0	0.2	0.0
Shelling	74.5	75.5	75.2	73.2	74.8	74.5	74.8	75.2	74.5
Test 5									
No. 1 Kernels	89.8	92.1	92.5	90.4	91.4	91.8	88.4	89.8	93.5
SMK	68.2	70.2	71.0	68.5	69.0	70.0	68.0	68.2	72.0
Other Kernels	5.8	4.2	3.2	5.2	5.0	3.8	8.0	5.5	3.8
Damage	2.0	1.8	2.5	2.0	1.5	2.5	1.0	2.2	2.2
Shelling	76.0	76.2	76.8	75.8	75.5	76.2	77.0	76.5	77.0
Test 1-5									
No. 1 Kernels	90.8	92.4	92.4	91.0	91.0	92.6	87.0	89.1	92.4
SMK	69.9	71.6	71.4	69.8	70.7	70.4	66.6	68.4	70.9
Other Kernels	5.8	4.9	4.5	6.0	5.9	4.5	9.1	7.6	5.2
Damage	1.7	0.9	1.2	1.0	1.0	1.2	0.9	0.8	0.6
Shelling	77.0	77.4	77.2	75.8	76.8	76.6	76.6	77.0	76.8

seed per foot with 20- and 40-inch row spacings. The exceptions for Spantex were the seeding rates of 2.4 with 30- and 40-inch row spacings and the seeding rate of 9.6 with 20- and 40-inch row spacings.

In general, the May 23 planting had higher mean percentages of No. 1 and sound mature kernels and fewer other kernels than the June 3 and June 13 plantings. The percentages of damaged kernels and shells were similar for tests 1, 2 and 3 (Table VI, and Appendix Tables II, III, IV). The percentages of No. 1 sound mature and other kernels were also similar for tests 2 and 3.

The data indicate that the yield and grade of peanuts were improved with the early planting in 1960.

Irrigation vs Non-Irrigation

The total rainfall from planting to harvest at Perkins was 17.33 inches. Test 4 was sprinkler irrigated five times for a total of 11.58 inches of supplemental water.

The irrigated test 4 produced 2.34 times more peanuts per acre than the non-irrigated test. The mean peanut yields were 3051 pounds per acre for the irrigated test 4, and 1304 pounds per acre for the non-irrigated test 5. The mean peanut yields for Argentine were 3393 pounds per acre compared to 2709 pounds per acre for Spantex in the irrigated test 4. In the non-irrigated test 5, mean peanut yields were 1344 pounds per acre for Argentine and 1263 pounds per acre for Spantex. The 20-inch row spacing produced more peanuts than the 30- or 40-inch row spacings for both tests 4 and 5 (Table IV).

Argentine in 20-inch rows at 4.8 seeds per foot produced the highest yield of 4097 pounds per acre for test 4. Argentine in 20-inch rows

at 2.4 seeds per foot produced the highest yield of 1642 pounds per acre for test 5.

The mean percent of No. 1 kernels was 96.2 percent for test 4 and 91.0 percent for test 5. The mean percentages of No. 1 kernels were 97.1 percent for Argentine and 95.2 percent for Spantex in the irrigated test 4. The mean percentages of No. 1 kernels in the non-irrigated test 5 were 93.2 for Argentine and 87.8 for Spantex. The 40-inch row spacing produced slightly more than the 30- and 20-inch row spacings in test 5, while test 4 showed little difference in the percentages of No. 1 kernels (Table VI).

The mean percent of sound mature kernels was 71.8 percent for test 4 and 68.8 percent for test 5. The percentages of sound mature kernels were higher for the irrigated test 4 than the non-irrigated test 5 for varieties, row spacings and seeding rates. The percent of sound mature kernels was slightly higher for the 30-inch row spacing than the 40- and 20-inch row spacing in test 4. Test 5 showed that the 40-inch row spacing had a higher percentage of sound mature kernels than the 30- and 20-inch row spacing (Table VI).

Test 4 had 46 percent as many other kernels as test 5. The mean percent of other kernels for Argentine was about half as much as Spantex for both test 4 and 5. The 30-inch row spacing was slightly higher in the percentage of other kernels in test 4 than the 20- and 40-inch row spacings. The mean percentage of other kernels in test 5 followed a pattern where the 40-inch row spacing was the lowest and the 20-inch row spacing the highest. The mean percentages of other kernels for seeding rates were equal for 2.4 and 9.6 seed per foot but lower for 4.8 seed per foot in test 4. For percent of other kernels, test 5 was

low at the seeding rate of 2.4 seed per foot and high at the rate of 9.6 seed per foot.

The percent of damaged kernels was slightly higher for test 5 than test 4. Spantex had 1.5 percent more damaged kernels than Argentine in test 4. The percentages of damaged kernels in test 4 indicated little difference for row spacings and seeding rates (Table VI).

The shelling percent was slightly higher for test 5 than test 4. The shelling percentages were 75.4 percent for Spantex and 74.0 percent for Argentine in the irrigated test 4. The shelling percentages for the non-irrigated test 5 were 77.5 percent for Spantex and 75.2 percent for Argentine. There was little difference in shelling percentages among row spacings and seeding rates (Table VI).

CHAPTER V

SUMMARY AND CONCLUSIONS

The peanut cultural study in 1960 consisted of five tests. Three of these tests were located on the Paradise Agronomy Research Station. These tests were planted at ten-day intervals beginning May 23 (test 1) than on June 3 (test 2) and June 13 (test 3). Two tests, one irrigated (test 4) and one non-irrigated (test 5) were planted on the same date, June 17, at the Agronomy Research Station near Perkins. Test 4 was sprinkler irrigated five times for a total of 11.58 inches of supplemental water. Each of the five tests consisted of 18 treatments. These included two varieties, Argentine and Spantex; three row widths with 20-, 30- and 40-inches between the rows; and three seeding rates of 2.4, 4.8 and 9.6 seed per foot.

The mean peanut yields and the number of plants harvested were determined for each plot row and analyzed statistically. The grades were determined from samples taken from two replications of each treatment.

The results indicated Argentine produced the highest peanut yield which differed 325 pounds per acre from the yield of Spantex. Argentine also had a higher percentage of No. 1 kernels and sound mature kernels, and was lower in percent of other kernels than was Spantex regardless of spacing or row width. The shelling percent for Argentine was slightly lower than for Spantex.

The 20-inch row spacing produced 268 and 350 pounds per acre more clean peanuts than 30- and 40-inch row spacings.

The reverse was true for percentage of No. 1 kernels and sound mature kernels. The plots with 40- and 30-inch row spacings had more No. 1 and more sound mature kernels and fewer other kernels than 20-inch row spacing. The mean peanut yield for the seeding rate of 4.8 seed per foot was 50 pounds per acre higher than the 2.4 seed per foot and 183 pounds per acre higher than the 9.6 seed per foot.

The percent of No. 1 and sound mature kernels were higher for the seeding rate of 2.4 seed per foot than the 4.8 and 9.6 seed per foot. There were also fewer other kernels for the 2.4 seed per foot.

The May 23 planting averaged 103 and 350 pounds per acre more clean peanuts than the June 3 and June 13 plantings. The percentages of No.1 and sound mature kernels were also higher for the May 23 planting and there was a smaller percentage of other kernels. However, the June 3 and June 13 plantings were about the same with respect to the percentage of No. 1 kernels, sound mature kernels and other kernels.

The irrigated test produced 2.34 times as many peanuts per acre than the non-irrigated test at the same location. The irrigated test had a higher percentage of No. 1 kernels and sound mature kernels, and a lower percentage of other kernels than the non-irrigated test.

On the basis of the five tests conducted in 1960 the following conclusions are made:

1. The varieties responded similarly to row spacing and seeding rate.
2. Row spacing and variety had the greatest effect on yield. Mean peanut yields were higher for the 20- and 30-inch row spacings but peanut grades were lower. Argentine yields and grades were higher than Spantex.

3. Yields and peanut grades were similar for the seeding rate of 2.4 and 4.8 seed per foot but both were higher than the rate of 9.6 seed per foot.
4. The May 23 planting date had higher peanut yields and peanut grades than the June 3 and June 13 planting dates.
5. The mean peanut yields for the irrigated test were more than double that of the non-irrigated test. The irrigated plots graded superior to those of the non-irrigated plots.

Further plant population studies on peanuts are needed to establish the precise plant spacing and date of planting that will give optimum yield and grade.

Since the varieties responded similar to row spacing and seeding rate, one variety could be used for future studies with the same row spacing and seeding rate used in this study.

A more precise method of planting would provide for a more uniform distribution of seed in the row.

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A P P E N D I X

APPENDIX TABLE I.--Daily rainfall for Paradise and Perkins Agronomy Research Stations for the period from planting to harvest for the Paradise and Perkins Stations, 1960.

Date	Paradise Rainfall (Inches)	Date	Perkins Rainfall (Inches)
May 4	.35	June 1	.13
May 5	1.88	June 2	.04
May 6	.40	June 5	.22
May 18	.77	June 6	.40
May 19	.24	June 7	.09
May 20	.64	June 8	.05
May 25	.52	June 12	.22
May 28	.76	June 16	.01
May 29	.61	June 20	.45
June 6	1.54	June 24	.48
June 7	.02	July 4	1.25
June 8	.07	July 5	.13
June 13	.05	July 13	.13
June 20	.18	July 17	1.05
June 23	.62	July 22	.92
July 3	1.25	July 23	1.76
July 6	.15	July 25	2.00
July 13	.54	July 27	.07
July 17	.50	July 30	.04
July 21	.09	Aug. 19	.59
July 22	1.96	Aug. 20	.03
July 23	1.93	Aug. 24	.52
July 27	.03	Sept. 9	.02
July 30	.09	Sept.18	.06
Aug. 18	.92	Sept.21	.09
Aug. 24	.04	Sept.23	.36
Aug. 26	1.64	Sept.24	.06
Sept. 9	.11	Sept.26	.63
Sept.20	.10	Oct. 13	.76
Sept.21	.18	Oct. 14	.01
Sept.23	.07	Oct. 18	3.00
Sept.24	.02	Oct. 19	.10
Sept.26	.23	Oct. 25	.45
Oct. 13	.44	Oct. 28	.06
Oct. 18	3.28	Oct. 29	1.82
		Oct. 30	.39
		Nov. 15	.24

APPENDIX TABLE II.--Mean yields and percentages of No. 1, sound mature, others and damaged kernels and mean shelling percentages for the 18 treatments in test 1 planted May 23 on the Paradise Agronomy Research Station 1960

Variety and Row Spacing (Inches)	Rate Seed/Ft.	Mean Plants Harvested/Ft.	Mean Yield Lbs./Acre	Mean No. 1 Kernels (Percent)	Mean SMK (Percent)	Mean Other Kernels (Percent)	Mean Damage (Percent)	Mean Shelling (Percent)
Argentine								
20	2.4	2.4	2608	96.8	74.5	1.5	1.0	77.0
30	2.4	2.6	2078	97.4	77.0	1.5	0.5	79.0
40	2.4	2.4	2110	95.5	75.0	1.5	2.0	78.5
20	4.8	4.2	2167	97.4	76.5	2.0	0.0	78.5
30	4.8	4.5	2198	94.9	75.0	2.0	2.0	79.0
40	4.8	4.3	1617	97.3	74.0	1.0	1.0	76.0
20	9.6	7.9	1824	92.2	71.0	4.0	2.0	77.0
30	9.6	7.6	2082	96.1	74.5	2.5	0.5	77.5
40	9.6	7.7	1751	94.2	73.5	3.0	1.5	78.0
Spantex								
20	2.4	2.6	2036	91.8	73.0	4.5	2.0	79.5
30	2.4	2.8	1672	91.8	72.5	5.5	1.0	79.0
40	2.4	2.6	1522	91.9	74.0	6.0	0.5	80.5
20	4.8	4.4	1990	91.8	73.0	6.5	0.0	79.5
30	4.8	4.3	1808	90.6	72.0	6.5	1.0	79.5
40	4.8	4.5	1703	92.2	72.0	5.0	1.0	78.0
20	9.6	7.1	1740	87.4	69.5	8.5	1.5	79.5
30	9.6	7.3	1652	89.2	71.0	7.0	1.5	79.5
40	9.6	7.3	1352	89.9	71.0	8.0	0.0	79.0

APPENDIX TABLE III.--Mean yields and percentages of No. 1, sound mature, others and damaged kernels and mean shelling percentages for 18 treatments in test 2 planted June 3 on the Paradise Agronomy Research Station, 1960.

Variety and Row Spacing (Inches)	Rate Seed/Ft.	Mean Plants Harvested/Ft.	Mean Yield Lbs./Acre	Mean No. 1 Kernels (Percent)	Mean SMK (Percent)	Mean Other Kernels (Percent)	Mean Damage (Percent)	Mean Shelling (Percent)
Argentine								
20	2.4	2.5	2042	92.2	72.0	4.5	1.5	78.0
30	2.4	2.3	1283	93.0	73.5	5.0	0.5	79.0
40	2.4	2.7	1446	92.2	71.5	3.5	2.5	77.5
20	4.8	5.0	2066	92.9	72.5	4.5	1.0	78.0
30	4.8	4.4	1481	91.5	70.0	5.0	1.5	76.5
40	4.8	4.4	1560	93.5	72.5	2.5	2.5	77.5
20	9.6	8.1	2091	90.2	69.0	6.0	1.5	76.5
30	9.6	8.4	1211	94.1	72.0	4.5	0.0	76.5
40	9.6	7.8	1401	92.7	70.0	4.0	1.5	75.5
Spantex								
20	2.4	2.2	1925	84.4	67.5	11.5	1.0	80.0
30	2.4	2.3	1236	84.6	66.0	11.0	1.0	78.0
40	2.4	2.3	1198	87.2	68.0	9.5	0.5	78.0
20	4.8	4.5	1650	83.4	65.5	12.5	0.5	78.5
30	4.8	4.4	1461	81.8	63.0	14.0	0.0	77.0
40	4.8	4.7	1461	84.6	66.5	11.0	1.0	78.5
20	9.6	9.2	1742	68.2	52.5	23.0	1.5	77.0
30	9.6	7.8	1292	78.8	61.5	16.0	0.5	78.0
40	9.6	8.2	1344	84.2	66.5	12.0	0.5	79.0

APPENDIX TABLE IV.--Mean yield and percentages of No. 1, sound mature, others and damaged kernels and mean shelling percentage for the 18 treatments in test 3 planted June 13 on the Paradise Agronomy Research Station, 1960

Variety and Row Spacing (Inches)	Rate Seed/Ft.	Mean Plants Harvested/Ft.	Mean Yield Lbs./Acre	Mean No. 1 Kernels (Percent)	Mean SMK (Percent)	Mean Other Kernels (Percent)	Mean Damage (Percent)	Mean Shelling (Percent)
Argentine								
20	2.4	2.6	2224	91.4	69.5	5.0	1.5	76.0
30	2.4	2.7	2047	93.5	72.0	3.5	1.5	77.0
40	2.4	2.7	1778	94.6	71.0	3.0	1.0	75.0
20	4.8	4.5	2208	89.2	68.0	7.0	1.0	76.0
30	4.8	5.0	2075	92.8	71.0	5.0	0.5	76.5
40	4.8	4.6	1854	94.8	72.5	3.5	0.5	76.5
20	9.6	7.7	1816	92.7	70.5	5.0	0.5	76.0
30	9.6	7.8	1837	93.4	70.5	5.0	0.0	75.5
40	9.6	7.6	1940	94.8	72.5	3.0	1.0	76.5
Spantex								
20	2.4	2.2	1715	80.2	63.0	13.5	2.0	78.5
30	2.4	2.4	1690	87.0	67.5	9.0	1.0	77.5
40	2.4	2.2	1568	86.6	68.5	9.0	1.5	79.0
20	4.8	4.0	1639	83.2	65.0	11.0	2.0	78.0
30	4.8	3.9	1608	82.8	65.0	12.0	1.5	78.5
40	4.8	4.3	1594	85.8	66.5	10.5	1.0	77.5
20	9.6	7.8	1574	68.7	53.0	24.0	0.0	77.0
30	9.6	8.1	1423	70.2	55.5	23.0	0.5	79.0
40	9.6	7.8	1762	88.3	68.0	8.5	1.5	77.0

APPENDIX TABLE V.--Mean yield and percentages of No. 1, sound mature, others, and damaged kernels and mean shelling percentages for the 18 treatments in irrigated test 4 planted June 17 on the Perkins Agronomy Research Station, 1960.

Variety and Row Spacing (Inches)	Rate Seed/Ft.	Mean Plants Harvested/Ft.	Mean Yield Lbs./Acre	Mean No. 1 Kernels (Percent)	Mean SMK (Percent)	Mean Other Kernels (Percent)	Mean Damage (Percent)	Mean Shelling (Percent
Argentine								
20	2.4	2.4	4097	97.2	72.5	2.0	0.0	74.5
30	2.4	2.1	3372	98.6	73.5	1.0	0.0	74.5
40	2.4	2.1	2761	95.8	69.5	2.5	0.5	72.5
20	4.8	4.1	3964	95.2	69.5	2.5	1.0	73.0
30	4.8	3.6	3496	97.9	72.0	1.5	0.0	73.5
40	4.8	4.0	3339	98.0	73.0	1.5	0.0	74.5
20	9.6	7.2	3338	97.9	73.0	1.5	0.0	74.5
30	9.6	7.0	3121	95.9	72.0	3.0	0.0	75.0
40	9.6	8.3	3049	97.2	72.5	2.0	0.0	74.5
Spantex								
20	2.4	2.2	3046	94.6	70.5	4.0	0.0	74.5
30	2.4	2.2	2772	94.8	73.0	4.0	0.0	77.0
40	2.4	2.4	2449	94.8	74.0	3.5	0.5	78.0
20	4.8	3.9	2867	95.8	70.5	3.0	0.0	73.5
30	4.8	4.3	2906	95.3	72.5	3.0	0.5	76.0
40	4.8	3.9	2912	96.6	72.0	2.5	0.0	74.5
20	9.6	7.0	2951	96.0	72.0	3.0	0.0	75.0
30	9.6	7.3	2358	94.0	71.0	4.0	0.5	75.5
40	9.6	7.1	2412	95.2	71.0	3.5	0.0	74.5

APPENDIX TABLE VI.--Mean yields and percentages of No. 1, sound mature, others and damaged kernels and mean shelling percentages for the 18 treatments in dryland test 5 planted June 17 on the Perkins Agronomy Research Station, 1960.

Variety and Row Spacing (Inches)	Rate Seed/Ft.	Mean Plants Harvested/Ft.	Mean Yield Lbs./Acre	Mean No. 1 Kernels (Percent)	Mean SMK (Percent)	Mean Other Kernels (Percent)	Mean Damage (Percent)	Mean Shelling (Percent)
Argentine								
20	2.4	2.6	1443	92.6	69.5	3.0	2.5	75.0
30	2.4	2.3	1249	93.2	70.0	3.0	2.0	75.0
40	2.4	2.3	1107	92.7	70.0	2.5	3.0	75.5
20	4.8	4.7	1642	93.3	69.5	3.5	1.5	74.5
30	4.8	4.3	1454	93.8	69.5	3.5	1.0	74.0
40	8.8	4.2	1335	93.3	70.5	2.5	2.5	75.5
20	9.6	8.6	1402	92.7	70.0	4.5	1.0	75.5
30	9.6	8.3	1258	92.7	70.0	2.5	3.0	75.5
40	9.6	8.3	1212	94.8	72.0	2.5	1.5	76.0
Spantex								
20	2.4	2.8	1590	87.0	67.0	8.5	1.5	77.0
30	2.4	2.6	1143	91.0	70.5	5.5	1.5	77.5
40	2.4	2.5	1229	92.3	72.0	4.0	2.0	78.0
20	4.8	4.2	1402	87.6	67.5	7.0	2.5	77.0
30	4.8	4.7	1290	89.0	68.5	6.5	2.0	77.0
40	4.8	4.5	1188	90.2	69.5	5.0	2.5	77.0
20	9.6	8.3	994	84.0	66.0	11.5	1.0	78.5
30	9.6	8.1	1203	87.0	67.5	8.5	1.5	77.5
40	9.6	8.9	1330	92.2	72.0	5.0	1.0	78.0

APPENDIX TABLE VII.--Mean yield and percentages of No. 1, sound mature, others and damaged kernels and mean shelling percentages for the 18 treatments summarized for tests 1-5 on the Paradise and Perkins Agronomy Research Stations, 1960.

Variety and Row Spacing (Inches)	Rate Seed/Ft.	Mean Plants Harvested/Ft.	Mean Yield Lbs./Acre	Mean No. 1 Kernels (Percent)	Mean SMK (Percent)	Mean Other Kernels (Percent)	Mean Damage (Percent)	Mean Shelling (Percent)
Argentine								
20	2.4	2.5	2483	94.0	71.6	3.2	1.3	76.1
30	2.4	2.4	2006	95.1	73.2	2.8	0.9	76.9
40	2.4	2.4	1840	94.2	71.4	2.6	1.8	75.8
20	4.8	4.5	2409	93.6	71.2	3.9	0.9	76.0
30	4.8	4.4	2141	94.2	71.5	3.4	1.0	75.9
40	4.8	4.3	2001	95.4	72.5	2.2	1.3	76.0
20	9.6	7.9	2094	93.1	70.7	4.2	1.0	75.9
30	9.6	7.8	1902	94.4	71.8	3.5	0.7	76.0
40	9.6	7.9	1870	94.7	72.1	2.9	1.1	76.1
Spantex								
20	2.4	2.4	2063	87.6	68.2	8.4	2.1	77.9
30	2.4	2.5	1702	89.8	69.9	7.0	0.9	77.8
40	2.4	2.4	1593	90.6	71.3	6.4	1.0	78.7
20	4.8	4.2	1910	88.4	68.3	8.0	1.0	75.7
30	4.8	4.3	1815	87.9	68.2	8.4	1.0	77.6
40	4.8	4.4	1692	89.9	68.2	6.8	1.1	77.1
20	9.6	7.9	1800	80.9	62.6	14.0	0.8	77.4
30	9.6	7.7	1586	83.8	65.1	11.7	0.9	77.9
40	9.6	7.9	1640	90.0	69.7	7.4	0.6	77.5

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Candidate for the Degree of

Master of Science

Thesis: EFFECTS OF PLANT POPULATION, PLANTING DATE AND IRRIGATION ON THE YIELD AND GRADE OF TWO PEANUT VARIETIES

Major Field: Agronomy (Field Crops)

Biographical:

Personal Data: Born October 26, 1934, northeast of Norman, Oklahoma, the son of Stanley G. and Mahala Lee Matlock.

Education: Attended elementary school at Pleasant Hill near Norman, Oklahoma. Graduated from Norman High School May, 1953. Undergraduate and graduate study at Oklahoma State University, 1953-1954 and 1957-1961.

Experience: Born and reared on a farm; served in the United States Army, 1954-1957; employed part-time by Agronomy Department at Oklahoma State University, 1953-1954 and 1957-1961.

Member of: Agronomy Club and 1959 Collegiate Crops Team.