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EFFECTS of ROW and DRILL SPACING on YIELD and MARKET GRADE FACTORS of PEANUTS

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EFFECTS of ROW and DRILL SPACING on YIELD and MARKET GRADE FACTORS of PEANUTS

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ROW AND DRILL spacings that provide optimum plant populations help produce maximum yields of peanuts, *Arachis hypogaea* L.

In recent years, many farmers have adopted closer row and drill spacings for peanuts. The improved land preparation, cultivation, and weed control practices often associated with close-row patterns have proved to be beneficial in weed and disease control *(2,6)*. Recently published information on the effect of spacing of peanuts in the Southeast is meager.

Peanut row and drill spacings have been studied in production areas where varieties with different plant growth characteristics have been grown under various management procedures. Although Spanish peanuts were not included in this study, their erect growing habit is thought to be responsible for the more favorable yield response to closer row and drill spacings than those of the Virginia type. Several early workers *(5,8,10,12)* in Alabama, Arkansas, Florida, and Georgia reported increased yields of Spanish peanuts in rows less than 36 inches apart.

In recent tests in Florida, Lipscomb et al. *(9)* obtained higher pod yield from 'Dixie Spanish' peanuts when grown in 12-, 18-, and 24-inch rows than when grown in 36-inch rows. Row width had no significant effect on yield or market grade of the large-seeded, Virginia-type or the small-seeded, runner market-type. Average yields in these tests were between 3,450 and 4,080 pounds per acre.

In early tests in North Carolina *(15)*, the large-seeded 'Jumbo Runner' variety with prostrate growing habit produced the highest yield in 36-inch rows with an average plant drill spacing of 8 inches. Both Virginia Bunch and 'Improved Spanish 2B,' with erect habit of growth, yielded more with a 4-inch drill spacing in rows as close as 18 or 24 inches than wider spacings. Later studies in North Carolina *(1,13)* showed higher yields for the large-seeded, erect-growing 'NC2' variety in 24-inch rows than in 36-inch rows.

More recent results in North Carolina *(3)* with the NC2 variety with an erect growth habit indicated that an increase in yield was obtained by decreasing the drill spacing from 24 to 3 inches and by decreasing row widths from 36 to 12 inches. Greater and more consistent increases in yield were obtained by reducing row width than by increasing the number of plants within the row. Response to row width varied with yield level. At lower yield levels, increases from closer rows were appreciable, but when the yield level reached about 3,600 pounds per acre, no yield advantage from rows closer than 36 inches was apparent.

In Virginia, Duke and Alexander *(4)* compared 'Virginia Bunch 46-2' and 'Virginia 56R' in 12-, 18-, and 36-inch rows on plots of equal size. Row width had no effect on yield of the runner variety. In 2 out of 3 years the bunch variety yielded more in closer rows, but the average for the 3 years showed no advantage for this variety for rows closer than 36 inches.

Using irrigation and chemical weed control without cultivation in Florida, Harris et al. *(7)* reported increased yields of both large-seeded Virginia Runner G26 and small-seeded Early Runner varieties grown in narrow rows. However, plot arrangements in this study gave a border effect advantage for close rows. In recent years, Sheppard *(14)* in Georgia has advocated production procedures using close rows for peanuts, but he emphasized closer row spacing from a cultural standpoint only. A recent report by Norden and Lipscomb *(11)* gave evidence that peanuts of similar growth habit but of different genetic background may respond differently in various row spacings.

MATERIALS AND METHODS

Peanut spacing studies were conducted from 1960 through 1964 at the Wiregrass Substation, Headland, Alabama. Two peanut varieties, Early Runner and Virginia Bunch 67, marketed as southeastern runner market-type, were used in the study. A large-seeded Virginia market type, Virginia Runner G26, was included in the last 3 years. Row spacings were 4 rows, 12 inches; 3 rows, 18 or 24 inches; and 2 rows, 36 inches apart, centered between tractor wheels on plots 72 inches wide. Plots were either 30 or 35 feet long. In 1960 and 1961, 3-row plots were spaced 24 inches apart, but this was changed to 18 inches in subsequent years, so that the space between outside rows of continguous plots was a uniform 36 inches. Row spacing patterns are given in Figures 1 and 2. Any bias that might have resulted from 3-row arrangement in 1960 and 1961 would have favored the 3-row treatment. Future references to the 3-row treatment in the text and in tables identifies this treatment as 18-inch row width. In 1960, 1961 and 1964, plots were seeded to obtain a plant approximately every 4 inches in the row. In 1962 and 1963 drill spacings of 3.0, 4.5 and 6.0 inches were obtained by planting thick and thinning to desired drill spacing within 1 week following seedling emergence. Plant populations in the different row and drill spacings are given in Table 1. A factorial design was used with each variable completely randomized in each of six replications.

Land preparation included turning the soil 9 inches deep with a moldboard plow equipped with a coulter-jointer adjusted to cover surface litter to a depth of 5 to 9 inches. Plowing was immediately prior to fertilization and planting. Fertilizer was applied broadcast in amounts recommended by the Alabama Agricultural Experiment Station's Soil Testing Laboratory, Auburn, Alabama, and was disked into the upper few inches of the soil. Gypsum was applied at the early blossom stage in a 12-inch band over the row area at the rate of 500 pounds per acre.

Peanut seed were planted on a level surface with conventional planters mounted on a three-point hitch tractor frame. To ensure complete weed control, two weed control applications were made.

TABLE 1. PLANT POPULATIONS FOR THREE ROW AND THREE DRILL SPACING COMBINATIONS, 1962-1963

Row spacing and number of rows between 72-inch tractor wheel spacing		Approximate plant populations per acre for three drill spacings		
Row spacing	Number of rows	3 inches	4½ inches	6 inches
In.	*No.*	*(1,000)*	*(1,000)*	*(1,000)*
12	4	116	79	58
18	3	87	58	43
36	2	58	39	29

In the first application 4,6 dinitro-o-secondary butyl-phenol (DNBP) was applied as recommended for sprayed pre-emergence treatment. To further aid in controlling weeds, a 3-pound-per-acre post-emergence application of sodium 2,4-dichlorophenoxy-ethyl sulfate (sesone) was sprayed on the plots in a broadcast spray application 10 days after the plants emerged. Except for the tractor wheel area, the 4-, 3-, and 2-row plots, Figure 1, were cultivated 0, 1, and 2 times, respectively. The tractor wheel area between plots was given a shallow cultivation when necessary to control weeds. Plots were dusted with DDT-sulfur mixture or sprayed with DDT-Dithane for insect and *Cercospora* sp. leafspot control. Each variety was dug with conventional harvesting

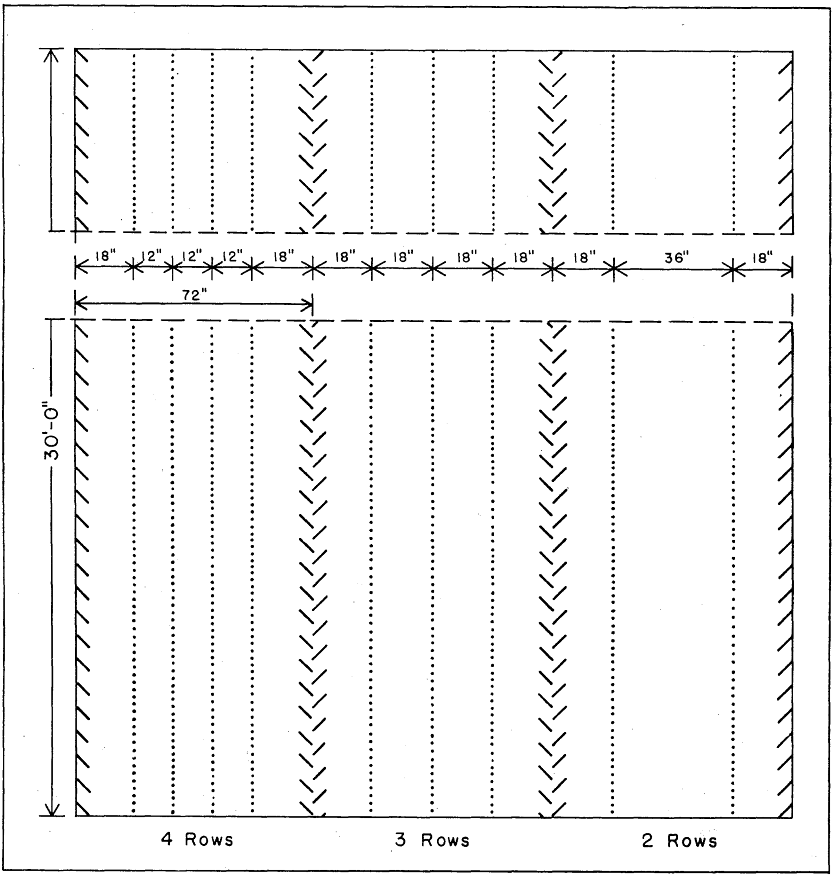

FIG. 1. Row spacing pattern between 72-inch tractor wheel middles.

FIG. 2. Virginia Runner G26 planted in 4 rows 12 inches apart, left, and 2 rows 36 inches apart, right.

equipment at the time of optimum pod maturity. Pod yield and market grade data were recorded after curing and picking.

Data were evaluated by analysis of variance procedure and Duncan's Multiple Range Test was used to determine differences among treatments.

RESULTS AND DISCUSSION

Results of these tests are presented in Tables 2, 3, and 4, and in Figure 3. When varieties were averaged over the test period, neither the yield nor market grade factors for any of the three peanut varieties were influenced by differences in row widths used in these tests, Figure 3. Some years erect-growing Virginia Bunch 67 tended to yield higher at closer row spacings, but for the test as a whole, pod yields of this variety from the row spacings were not significantly different. No significant interactions were found between varieties and row widths.

In 1962 and 1963, when both row and drill spacing variables were used, a significant interaction for yield occurred between row width and drill spacings, Table 3. The 6-inch drill- and 18-inch row-spacing combination gave a lower yield than closer or wider row combinations with the 6-inch drill spacing. No plausible explanation can be given for this response.

Table 2. Yield and Market Grade Data for Early Runner, Virginia Bunch 67, and Virginia Runner G26 Peanut Varieties Grown in Three Row and Three Drill Spacings, 1962-1963

Spacing	Pounds of pods/acre				Shelling percentages			
	Early Runner	Va. Bunch 67	Va. Runner G26	Av.	Early Runner	Va. Bunch 67	Va. Runner G26	Av.
	Lb.	*Lb.*	*Lb.*	*Lb.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*
Row width (inches)								
4-12*	2,075a†	2,157a	2,444a	2,225a	73a	72a	71a	72a
3-18	2,012a	2,150a	2,513a	2,225a	73a	72a	71a	72a
2-36	2,219a	2,088a	2,510a	2,272a	73a	71a	70a	71a
Drill spacing (inches)								
3	2,168a	2,212a	2,500a	2,293a	73a	72a	71a	72a
4½	2,053a	2,053a	2,517a	2,208a	73a	72a	71a	72a
6	2,084a	2,129a	2,451a	2,221a	73a	72a	71a	72a

Spacing	**Seed riding 15/64-inch slotted screen**				**Seed/100 g.**			
	Pct.	*Pct.*	*Pct.*	*Pct.*	*No.*	*No.*	*No.*	*No.*
Row width (inches)								
4-12	90a	91a	93a	91a	182a	164a	139a	162a
3-18	90a	91a	93a	91a	184a	166a	137a	162a
2-36	90a	91a	93a	91a	187a	164a	141a	164a
Drill spacing (inches)								
3	90a	91a	93a	91a	183a	166a	136a	162a
4½	89a	91a	93a	91a	187a	165a	141a	164a
6	90a	91a	93a	91a	183a	163a	140a	162a

* 4-12 equals 4 rows spaced 12 inches on a plot 72 inches wide.
† Means in vertical columns with same letter for variables not different at 0.05 level.

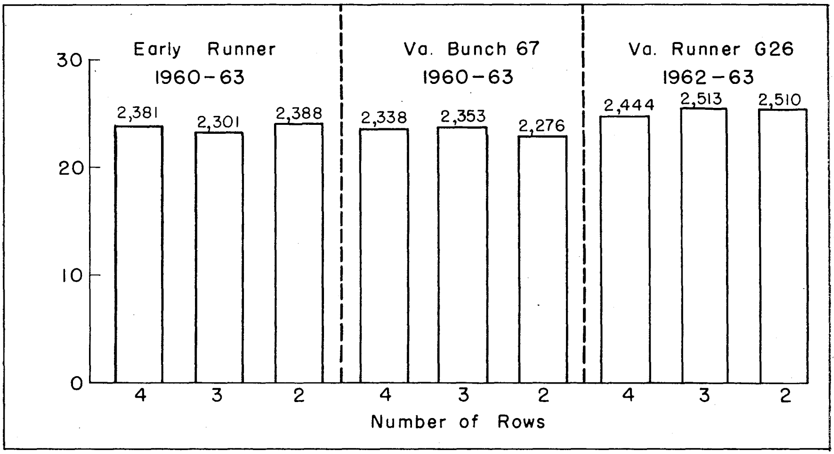

FIG. 3. Yield of peanut varieties grown in 3-row spacings; 4, 3, 2 rows were spaced 12, 18, and 36 inches apart, respectively on area 72 inches wide.

A significant year-by-drill-spacing interaction for yield resulted from a low yield for the 4.5-inch spacing in 1962, and for the 6-inch spacing in 1963, Table 4. No explanation can be offered for this differential response.

No other significant interactions were found for yield, shelling percentage, proportion of seed riding 15/64-inch slotted screen, or seed per 100 g. that rode the screen. Lowest average yield was 2,060 pounds per acre for the 6-inch plant spacings in 18-inch rows. Highest average yield was 2,344 pounds per acre for 3-inch plant spacing in 18-inch rows. Highest and lowest yields were in 18-inch rows with approximately 14 per cent increase for 3-inch plant spacing over 6-inch spacings. This pattern of yield response for the 3- and 6-inch plant spacings was not evident in the 12- or 36-inch row width.

TABLE 3. YIELD FOR THREE PEANUT VARIETIES GROWN IN THREE ROW AND THREE DRILL SPACINGS, 1962-1963

Row spacing	Drill spacings (inches) Pod yield per acre		
	3	4½	6
In	*Lb.*	*Lb.*	*Lb.*
12	2,271a*	2,126a	2,277a
18	2,344a	2,271a	2,060b
36	2,264a	2,226a	2,327a

* Means for row or drill spacings with same letter not significantly different at 0.05 level.

TABLE 4. YIELD FOR THREE PEANUT VARIETIES GROWN IN THREE DRILL SPACINGS, 1962-1963

Drill spacing	Pod yield per acre	
	1962	1963
In.	*Lb.*	*Lb.*
3	2,240a*	2,346a
4½	2,111b	2,305a
6	2,261ac	2,183bc

* Means for spacing or years with same letter not different at 0.05 level.

Yield level in these tests varied from year to year, but varieties responded in a similar manner to the different spacing treatments. Average pod yield for the different treatments ranged from 3,170 pounds per acre in 1961 to 1,874 pounds per acre in 1962 for Early Runner; from 2,977 pounds per acre in 1961 to 1,767 pounds per acre in 1960 for Virginia Bunch 67; and from 2,572 pounds per acre in 1962 to 2,178 pounds per acre in 1964 for Virginia Runner G26. Average yield in all tests was 2,340 pounds per acre for Early Runner, 2,275 for Virginia Bunch 67, and 2,465 for Virginia Runner G26. Average pod yield for all varieties in the study was 2,360 pounds per acre.

Under the conditions of these tests, no average advantages or disadvantages in yield, shelling percentage, proportion of seed that rode a 15/64-inch screen, or seed size based on seed per 100 g. resulted from growing Early Runner, Virginia Bunch 67, or Virginia Runner G26 peanuts in rows closer than 36 inches apart, or in uniform drill spacings closer than 6 inches. These results for row spacing are similar to results of recent tests with prostrate- and erect-growing varieties of peanuts of similar botanical type in Virginia and Florida *(4,9)*, and in North Carolina *(3)* when yield levels were high.

Although close-row arrangements did not produce yield advantages in these tests, the close-row procedure may be beneficial as a cultural method. A close-row arrangement often offers better weed and disease control, and may require less cultivation, which is often necessary to control weeds.

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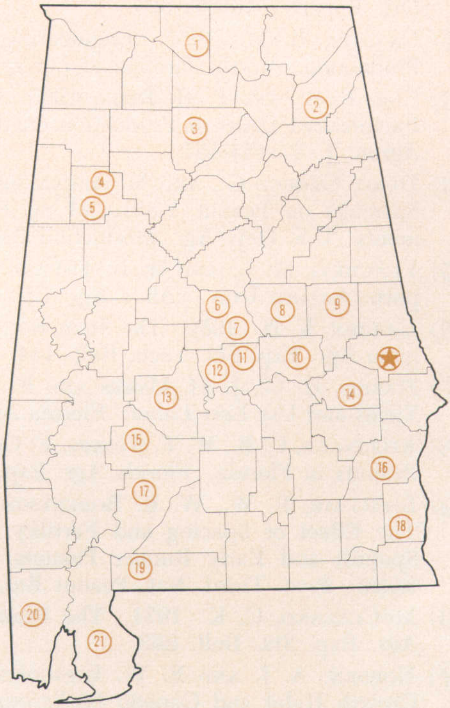

Research Unit Identification

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3. North Alabama Horticulture Substation, Cullman.
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