NO-TILL vs CONVENTIONAL TILLAGE FOR PEANUT vs ROW SPACING AND IRRIGATION

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ABSTRACT

Optimal plant population and irrigation are two methods of increasing yields of row crops. This study was to evaluate the peanut (Arachis hypogaea L.) yield advantage of no-till and conventional tillage methods at differing row spacings and under irrigated and nonirrigated conditions. Research was conducted at the North Fla. Res. and Educ. Ctr. at Quincy, FL on a Norfolk sandy loam soil. Row spacings studied were 15 and 30 inches, and irrigation regimes were no-irrigation and irrigation at three tensiometer levels (20, 60, and 100 cb) during 1981,1982, and 1983. The 15-inch row spacing significantly outyielded the 30-inch row spacing in 1981. In general, no advantage was found between no-till and conventional tillage. The best signal for scheduling irrigation on peanut seems to be 60 and 100 cb, depending on the weather.

INTRODUCTION

One method of increasing yield of row crops is to use optimal plant population that can he achieved by modification of farming equipment. Optimal in-row spacing in peanut has been reported as 4.6 plant/ft by Chin Choy et al. (1982) for maximum yield and quality.

Knauft et al. (1981) found 16 inches the best row spacing over 8- or 32-inch row spacings that were in his experiment, Chin Choy et al. (1982) found that the 10-inch row spacing gave the highest yield, which was the narrowest row spacing in his study. Hauser and Buchanan (1981) found that the narrower row spacings (8- and 16-inch) yielded 14% higher than the 32-inch row spacing. They showed that the 8- and 16-inch row spacings reduced sicklepod DM yields 53 and 28%, respectively.

A second method for increasing peanut yields is by irrigation. Yield enhancement is most evident in arid and semi-arid regions, but irrigation may or may not be valuable in the more humid areas of the Southeast. Coffelt et al. (1985) found irrigation increased peanut in Virginia. Wilson and Stansell (1983) found that water stress during the last 40 to 75 days of the peanut season contributed to atlatoxin contamination of peanut kernels.

The objective of this study was to evaluate the yield advantage of no-till and conventional tillage methods at differing row spacings and under irrigated and nonirrigated conditions.

MATERIAIS AND METHODS

All peanut studies reported herein were conducted at the North Fla. Res. and Educ. Ctr. on a Norfolk sandy loam soil (fine-loamy, siliceous, thermic, Typic Kandiudult).

Cultural practices used on Florunner peanut for 1981, 1982, and 1983 are shown in Table 1. Peanut irrigation dates and amounts of irrigation water applied are shown in Table 2. Rainfall distribution in relation to irrigations for the growing seasons are shown in Figures 1, 2, and 3.

The experimental design of the row spacing experiment was randomized complete block with four replications and the three irrigation experiments were split-plot arrangements with four replications per treatment. The main plots were tillage methods and the subplots were irrigation treatments assigned at random.

RESULTS AND DISCUSSION

The peanut results cannot be discussed without first describing the weather for the years of 1981,1982, and 1983 (Fig. 1, 2, and 3). The 1981 peanut growing season was very dry. Only 10 inches of rainfall occurred. Thirteen irrigations were scheduled on the 20-cb irrigation treatment or 12.8 inches of irrigation for the season. The 1982 peanut growing season was wet, but contained two dry periods from day 145 to 176 and day 238 to 259. Ten irrigations were applied (4.5 inches of irrigation) for the season to the wettest treatment (20 cb) during the two dry periods. Nine irrigations were scheduled on the 20-cb irrigation treatment (5.2 inches of irrigation) for the 1983 growing

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Table 1. Cultural practices used on Florunner peanut in 1981, 1982, and 1983 at Quincy, FL.

Date			
1981	1982	1983	
5 June	19 May	3 June	Planted inoculated Florunner seed at 45,000 seed/A with Temik at 15 lb/A, Paraquat at 1 1/2 pt/A, and Prowl at 1 lb ai/A
9 June	26 May	9 June	Cracking
			30 days after planting, Bravo was sprayed on a 2-week schedule until 2 weeks before harvest.
			Fertilizer was applied according to soil test results.
			Herbicides (i.e., Poast, Butoxone, Lasso, and Basagran) were applied as needed during the season.
12 Oct	1 Oct	19 Oct	Peanuts inverted.
14 Oct	4 Oct	26 Oct	Peanuts harvested.

season. A dry period did occur from day 260 to 275 where irrigation was needed.

In 1981, an experiment was conducted to measure the yield advantage of narrow rows on peanuts. Population densities were maintained at approximately 45,000 plants/A in the narrow- and wide-row treatments. The 15-inch row spacing yielded significantly more peanuts than the 30-inch row spacing (Table 3). Peanut yields between conventional and no-till planting methods were not significantly different.

An irrigation study with four water regimes was conducted in 1981, 1982, and 1983 with a row spacing of 30 inches and a population density of approximately 45,000 plants/A The dry 1981 season resulted in two significant groupings (Table 4). The 0 irrigation and 20-cb regime were not significantly different, indicating that the 20-cb irrigation signal ovenvatered the peanuts. The 60- and 100-cb regimes were not significantly different, but both yielded significantly more peanuts than the 0 irrigation and 20-cb regimes.

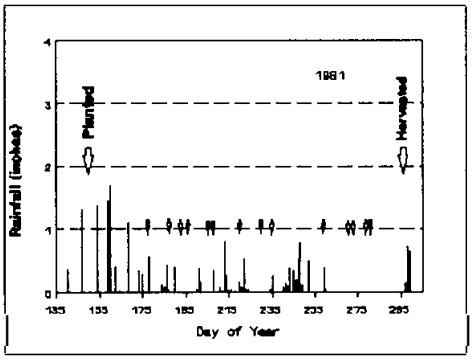
The 1982 peanut growing season was wet (29 inches rainfall), except for the two short periods mentioned previously. Peanut yield was greatest with 0 irrigation, indicating ovenvatering for all irrigation treatments (Table 5). The 100-, 60-, and 20-cb regimes were not significantly different.

The 1983 peanut growing season received 22 inches of rainfall, which occurred primarily during the first part of the growing season followed by a dry period from day 255 to harvest. The greatest peanut yields were at the 100-cb water regime and 0 irrigation and were not significantly different, but both were significantly different from the 20- and 60-cb water regimes (Table 6), indicating that 20- and 60-cb irrigation signals ovenvatered the peanut crop.

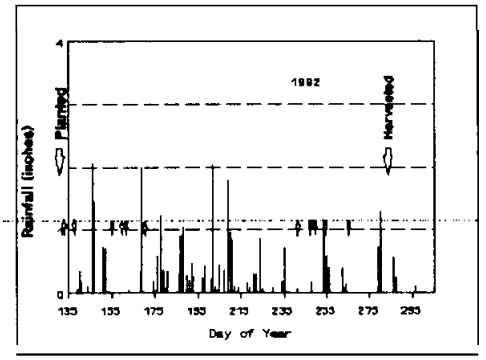
The peanut yield between no-till and conventional tillage methods were not significantly different in 1981 or 1983. The peanut yields for no-tillage was significantly greater than conventional tillage during the wet year of 1982, which may indicate no-tillage allowed more runoff.

Table 2. Peanut irrigation dates and amounts of irrigation water applied during 1981, 1982, and 1983 at Quincy, FL.

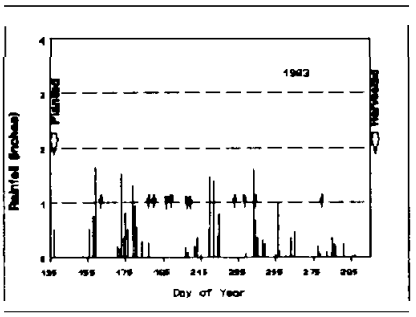
1981				1982				1983			
	Water Regimes				Water Regimes				Water Regimes		
Date	20-cb (acre-inch)	60-cb (acre-inch)	100-cb (acre-inch)	Date	20-cb (acre-inch)	60-cb (acre-inch)	100-cb (acre-inch)	Date	20-cb (acre-inch)	60-cb (acre-inch)	100-cb (acre-inch)
30 June	1.00	--	--	21 May	0.25	0.25	0.25	16 June	0.50	--	--
8 July	1.00	--	--	25 May	0.25	0.25	0.25	8 July	0.50	--	--
14 July	1.00	--	--	10 June	0.50	--	--	12 July	0.50	0.50	--
17 July	1.00	--	1.00	14 June	0.33	--	--	18 July	0.50	--	0.50
25 July	0.75	0.75	--	16 June	0.33	--	--	20 July	0.50	0.50	--
28 July	1.00	--	--	24 June	0.33	--	--	25 July	0.50	--	--
7 Aug	1.00	--	--	27 Aug	0.50	--	--	28 July	--	0.50	0.50
17 Aug	1.00	1.00	--	1 Sept	0.75	0.75	--	19 Aug	0.50	--	--
21 Aug	1.00	1.00	1.00	3 Sept	--	--	0.75	24 Aug	0.75	0.75	--
11 Sept	1.00	--	--	7 Sept	0.75	--	--	29 Aug	--	--	0.50
22 Sept	1.00	1.00	1.00	17 Sept	0.50	--	--	30 Sept	1.00	0.50	1.00
25 Sept	1.00	--	--								
26 Sept	--	1.00	--								
1 Oct	1.00	--	1.00								
ΣSeason	12.75	4.75	4.00		4.49	1.25	1.25		5.25	2.75	2.50



Fqure 1. Rainfall during the 1981 peanut growing season in relation to rainfall and irrigation amounts and dates of events. Arrows identify irrigations.



Fqure 2. Rainfall during the 1982 peanut growing season in relation to rainfall and irrigation amounts and dates of events. Arrows identify irrigations.



Fqure 3. Rainfall during the 1983 peanut growing season in relation to rainfall and irrigation amounts and dates of events. Arrows identify irrigations.

Table 3. Influence of row spacing with near constant population densities of 45,000 plants/A on peanut yields under no-till and conventional conditions (Quincy, FL), 1981.

Row Spacing	Yield (lb/A) No-till	Conventional	Average
15"	3462	3940	3701 a
30"	3049	3348	3199 b
Avg. lb/A	3256	3644 NS	NS

Table 4. Influence of four water regimes on peanut yields at 30-inch row spacing and a population density of 45,000 plants/A under no-till and conventional conditions (Quincy, FL), 1981.

Water[1] Regime	Yield (lb/A) No-till	Conventional	Average
0 irrig	2882	3257	3070 b
100 cb	3624	3960	3792 a
60 cb	3648	3832	3824 a
20 cb	2868	3359	3114 b
Avg. lb/A	3256 ns	3602 ns	

[1] Rainfall during growing season = 10.0 inches.

Table 5. Influence of four water regimes on peanut yields under no-till and conventional conditions (Quincy, FL), 1982.

Water[1] Regime	Yield (lb/A) No-till	Conventional	Average
0 irrig	**4233**	**4123**	**4178** a
100 cb	**3675**	**3284**	**3470** b
60 cb	**3633**	**3201**	**3417** b
20 cb	**3738**	**3361**	**3350** b
Avg. lb/A	**3820** a	**3492 b**	

[1] Rainfall during growing season = **29** inches.

Table 6. Influence of four water regimes on peanut yields under no-till and conventional conditions, (Quincy, FL), 1983.

Water[1] Regime	Yield (lb/A) No-till	Conventional	Average
0 irrig	**3340**	**3289**	**3314** a
100 cb	**3384**	**3356**	**3370** a
60 cb	**3105**	**2563**	**2834** b
20 cb	**2468**	**2893**	**2680** b
Avg. Ib/A	**3074** ns	**3025** ns	

[1] Rainfall during growing season 22 inches.

ACKNOWLEDGEMENTS

Our thanks to B.T. Kidd, Biological Scientist II, and E. Brown, Senior Technician, North Fla Res. and Educ. Ctr., Univ. of Fla., Quincy, FL, for plot preparation and management, data collection, computer processing, and data illustration.

REFERENCES

Chin Choy, E.W., J.F. Stone, RS. Matlock, and G.N. McCouley. 1982. Plant population and irrigation effects on Spanish peanuts (Arachis hypogeaea L.). Peanut Sci. 973-76.

Coffelt, TA., F.S. Wright, and D.L. Hallock. 1985. Performance of three Chinese peanut cultivars under irrigated and nonirrigated conditions in Virginia. Peanut Sci. 12:62-64.

Hauser, E.W., and G.A. Buchanan. 1981. Influence of row spacing, seeding rates, and herbicide systems on the competitiveness and yield of peanuts. Peanut Sci. 8:74-81.

Knauft, D.A., GI. Norden, N.F. Norden, and Beninati. 1981. Effects of intra-row spacing on yield and market quality of peanut (Arachis hypogaea L.) genotypes. Peanut Sci. 8:110-112.

Wilson, D.M., and J.R. Stansell. 1983. Effect of irrigation regimes on aflatoxin contamination of peanut pods. Peanut Sci. 10:54-56.