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Soil Fertility Experiments with Peanuts in 1970

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THE COOPERATIVE RESEARCH PROGRAM which was begun in 1967 between farmers and Auburn University Agricultural Experiment Station to better define soil fertility requirements of peanuts and to improve correlation between fertilizer requirements and soil-test values was continued in 1970.

Thirty-one experiments were conducted in 1970 in five counties but, for various reasons, only 22 experiments were harvested (6 each in Dale, Henry, and Pike, 3 in Barbour, and 1 in Houston).

The experimental area on each farm was divided into either 8, 12, or 16 plots, each plot being 4 rows wide and 100 feet long. Each farmer planted, cultivated, dusted or sprayed, and harvested peanuts within all plots the same as those in the remainder of his field. The experimental fertilizer was applied by the researcher. Four plots in each experiment received no treatment; the remaining plots received one of the following treatments: (1) a phosphorus-potassium fertilizer, (2) calcium, or (3) boron.

FERTILIZER (P AND K) EXPERIMENTS

Five experiments were conducted to determine if fertilizer should be applied directly to peanuts. Corn was the preceding crop in four experiments; the fifth experiment was on land which was idle in 1969. Fertilizer was applied broadcast at a rate of 400 pounds per acre of 0-10-20 on four of the eight experimental plots; the other plots received no fertilizer. The fertilizer was "turned under" by the farmer in four experiments; it was applied on turned land in the fifth experiment (Sanders' farm) and then disked in. Two experiments were with the Florigiant variety, two were with Florunner, and one was with Early Runner. Four of the soils tested "high" in phosphorus and one tested "medium"; four tested "medium" in potassium and one tested "low."

The results of these experiments are given in Table 1. Only three of the experiments were harvested for yield; all were harvested for grade measurements. In no case did fertilizer statistically increase yield or grade. The results in 1970 substantiate those found in the 3 previous years: **fertilizer applied directly to peanuts did not increase yield.**

CALCIUM (Ca) EXPERIMENTS

Nine experiments in which calcium was applied as a topdressing at early blooming at a rate of 1,000 pounds per acre of gypsum or basic slag were harvested. Soil-test calcium ranged from 108 pounds per acre (low) to 450 pounds per acre (high), and soil pH ranged from 4.6 to 5.5. Results of the calcium experiments are summarized in Table 2.

Yield was increased in three of the seven experiments with the Florigiant variety. On soils with calcium levels of 108 pounds to 142 pounds per acre (low), yield increases ranged from 480 pounds to

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TABLE 1. EFFECT OF FERTILIZER ON YIELD AND SMK OF FLORIGIANT, FLORUNNER, AND EARLY RUNNER PEANUTS, ALABAMA, 1970

Variety and farmer	County	Soil type	Soil-test values			Yield per acre*		SMK	
			pH	P	K	No fert.	Fert.	No fert.	Fert.
Florigiant				*Lb./A.*	*Lb./A.*	*Lb.*	*Lb.*	*Pct.*	*Pct.*
R. Harris	Dale	Norfolk fine sandy loam	5.1	37(M)	52(L)	2,440	2,630	74	71
G. Croft	Dale	Lakeland loamy sand	6.3	56(H)	61(M)	-------	-------	63	63
Florunner									
G. Croft	Dale	Shubuta fine sandy loam	6.0	76(H)	108(M)	3,990	4,060	71	71
E. Sanders	Henry	Norfolk fine sandy loam	6.1	62(H)	70(M)	-------	-------	73	72
Early Runner									
B. Deloney, Jr.	Dale	Ruston fine sandy loam	5.3	58(H)	64(M)	2,650	2,470	71	71

* Yields are not statistically different.

1,300 pounds per acre. On these three soils, gypsum increased grade (SMK) by 8 to 33 percentage points. On two soils testing "high" and "medium" in calcium the addition of gypsum did not increase yield. On one experiment (Martin farm) with 203 pounds of calcium (low) there was no response to added gypsum. The pH on this experiment was 4.6 and it is believed that low pH rather than calcium was the limiting factor affecting yield.

Virginia 67 variety was planted in one experiment. It was on a soil that tested "low" (189 pounds per acre). Topdressing with gypsum increased yield by 380 pounds per acre and SMK by 6 percentage points.

Early Runner variety was planted in one experiment. It was on a soil testing "medium" (263 pounds per acre). Topdressing with gypsum or basic slag did not increase yield or grade.

Since 1967, 26 experiments in which gypsum was applied as a topdressing have been harvested. The soil-test calcium ranged from 108 pounds per acre (low) to 484 pounds per acre (high). Yields have been increased by adding gypsum only on soils with less than 200 pounds of Ca per acre (low). During the 4 years, there have been only two soils with soil-test calcium of about 200 pounds per acre and below that did not respond to gypsum; one had a pH of 4.9 and the other 4.6. Such low pH values will prevent a favorable effect from the gypsum. Experiments during 1967-1970 have included the common varieties Early Runner, Florigiant, and Virginia Bunch 67. Regardless of variety, gypsum has failed to increase yields on any soil with soil-test calcium much above 200 pounds per acre.

BORON (B) EXPERIMENTS

Eight experiments with boron were harvested. The boron content of these soils ranged from 0.063 pound per acre to a high of 0.135 pound per acre. According to results from prior years, "hollow-heart" could be expected to occur on soils with soil boron levels below 0.14 pound per acre. All eight boron experiments in 1970 had available soil boron levels below this value and were expected to show symptoms of boron deficiency. The data in Table 3 show, however, that "hollow-heart" failed to occur in any experiment. Neither were yields and SMKs affected by boron fertilizer. Since "hollow-heart" did not occur on any of these fields nor any other experimental field in 1970, it is assumed that environmental factors such as amount and distribution of rainfall, especially during the fruiting stages, must have played an important, but little understood role, in the occurrence of "hollow-heart." Boron deficiency has been observed to be more prevalent in dry seasons.

TABLE 2. EFFECT OF TOPDRESSING CALCIUM AT RATE OF 1,000 POUNDS PER ACRE OF GYPSUM OR BASIC SLAG ON YIELD AND PER CENT SOUND MATURE KERNEL (SMK) OF PEANUTS, ALABAMA, 1970

Variety and farmer	County	Soil type	Soil pH	Soil-test Ca	Yield per acre			SMK		
					No Ca	Gypsum	Basic slag	No Ca	Gypsum	Basic slag
Florigiant				*Lb./A.*	*Lb.*	*Lb.*	*Lb.*	*Pct.*	*Pct.*	*Pct.*
H. Etheridge	Henry	Norfolk sandy loam	5.5	450(H)	2,690	2,710	----	62	66	----
R. C. Armstrong	Henry	Norfolk sandy loam	5.2	138(L)	**1,050***	**2,360***	----	**26***	**59***	----
Y. Willoughby	Houston	Troup loamy sand	4.9	142(L)	**1,710***	**2,750***	----	**40***	**70***	----
D. H. Holland	Dale	Ruston sandy loam	5.5	348(M)	2,880	2,780	----	64	66	----
F. Martin	Barbour	Ruston sandy loam	4.6	203(L)	2,560	2,450	----	69	69	----
J. Childers	Barbour	Ruston sandy loam	5.0	108(L)	**1,520***	**2,000***	----	**63***	**71***	----
R. Griffin	Barbour	Ruston sandy loam	5.2	187(L)	2,690	2,970	2,880	68	70	68
Virginia 67										
J. Hartzog	Henry	Orangeburg sandy loam	5.1	189(L)	**1,770***	**2,150***	----	**59***	**65***	----
Early Runner										
D. T. Williams	Henry	Greenville sandy loam	4.7	263(M)	1,970	1,850	2,020	66	65	65

* Increases in yield and percentage SMK on gypsum plots over non-gypsum plots were statistically different.

TABLE 3. EFFECT OF BORON APPLIED AT RATE OF 1 POUND PER ACRE OF B ON YIELD, PER CENT SOUND MATURE KERNEL (SMK), AND PER CENT HOLLOW-HEART OF PEANUTS, ALABAMA, 1970

Variety and farmer	County	Soil type	Soil-test B	Yield per acre		SMK		Hollow-heart	
				No B	Added B	No B	Added B	No B	Added B
Florigiant			*Lb./A.*	*Lb.*	*Lb.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*
L. Shipman	Pike	Cahaba sand	0.063	3,350	3,340	70	71	0.0	0.0
A. H. Thompson	Dale	Susquehanna sandy loam	0.070	----	----	71	71	0.0	0.0
B. Drinkard	Pike	Norfolk sand	0.135	2,520	2,600	77	71	0.0	0.0
Florunner									
M. Flowers	Pike	Norfolk sand	0.101	1,470	1,570	72	73	0.0	0.0
E. Sanders	Henry	Norfolk sandy loam	0.073	----	----	72	75	0.33	0.0
E. McDaniel	Pike	Ruston sandy loam	0.073	1,210	1,200	68	67	0.33	0.25
L. Windham	Pike	Norfolk sand	0.083	1,390	1,390	65	64	0.25	0.25
M. Flowers	Pike	Norfolk sand	0.071			61	60	0.0	0.0