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SOIL FERTILITY EXPERIMENTS WITH PEANUTS IN 1967

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A COOPERATIVE RESEARCH PROGRAM between farmers and Auburn University was begun in 1967 to better define soil fertility requirements of peanuts and to improve correlation between fertilizer requirements and soil-test values. The success of the program was made possible by the cooperation of many county Extension personnel.

Experiments were located on farmers' fields after peanuts had emerged to a stand. Each area selected had a uniform stand on reasonably uniform soil. Each farmer fertilized, planted, and handled peanuts within the test-area the same as those in the remainder of the field throughout the growing season. Each selected area was divided into 8 plots, each being 4 rows wide and 100 ft. long. The experimental treatment consisted of topdressing with either calcium, potassium, magnesium, or boron on 4 of the 8 plots, with nothing added to the other 4. Calcium was used as a topdressing at early blooming time and potassium, magnesium, and boron were applied immediately after emergence of seedlings.

Twenty-nine experiments were conducted in 1967 in nine counties (Barbour, Bullock, Coffee, Covington, Dale, Geneva, Henry, Houston, Pike). Seventeen experiments were partially or completely harvested (6 in Geneva, 3 in Covington, 2 each in Bullock, Coffee, Dale, and Pike). Some experimental plots were only partially harvested because of irregular stands in some or because the farmer's harvesting equipment was unsuitable for obtaining accurate yields from small areas.

CALCIUM (Ca) EXPERIMENTS

Six experiments were harvested in which calcium was applied as a topdressing at early blooming; five at a rate of 1,000 lb. of gypsum per acre and one at 500 lb. (This is considered to be in excess of the amount usually needed). Soil-test Ca ranged between low (225 lb./A) and high (484 lb./A), and soil pH ranged between 5.0 and 6.4. Calcium was added either as lime or as gypsum by farmers on the entire test areas of two experiments, but only experimental calcium was added in the other four. Results of the calcium experiments are summarized in Table 1.

The Early Runner variety failed to respond to extra calcium. Two soils initially tested "high" in

TABLE 1. THE EFFECT OF TOPDRESSING CALCIUM AT RATE OF 1,000 POUNDS PER ACRE OF GYPSIUM ON YIELD AND PER CENT SOUND MATURE KERNEL (SMK) OF PEANUTS IN 1967

Farmer	County	Soil type	Soil pH	Soil-test Ca	Yield		SMK	
					No extra Ca	Extra Ca	No extra Ca	Extra Ca
				Lb./A.	*Lb./A.*	*Lb./A.*	*Pct.*	*Pct.*
			Early Runner variety					
G. Hataway	Coffee	Norfolk sandy loam	5.0	254(L)	2,230	1,950	70	70
G. Shields*	Geneva	Norfolk sandy loam	5.3	484(H)	2,560	2,510	74	73
J. Goolsby**	Covington	Tifton sandy loam	6.4	448(H)	3,060	3,020	71	72
			Florigiant variety					
R. E. Bryant	Covington	Tifton sandy loam	5.5	240(L)	1,700	1,910	67	67
H. Thompson	Dale	Norfolk sandy loam	5.2	225(L)	2,850	2,980	73	74
E. C. Brooks	Coffee	Tifton sandy loam	5.4	243(L)	1,600	1,770	71	73

* Farmer added 500 lb. of gypsum per acre to all plots; experimental rate was 500 lb./A.
** Farmer added 1,500 lb. of lime per acre to all plots.

calcium and each received a calcium application by the farmer. Although the third soil contained a "medium" level of calcium, it had a pH probably too low for peanuts. A fact that is frequently misunderstood about soil pH and calcium is that gypsum does *not* neutralize soil acidity but tends to lower soil pH.

Yields of the Florigiant variety were not increased by extra calcium, even though soil-test calcium measured "low" and no calcium was added by the farmers. The extra calcium had no effect on per cent SMK, per cent fancies, or per cent extra large kernel.

POTASSIUM (K) EXPERIMENTS

Four experiments were harvested in which potassium fertilizer was used as topdressing in the row soon after seedling emergence at the rate of 50 lb. per acre of K (60 lb. K_2O). This was in addition to potassium used by farmers, which varied from none to 60 lb. per acre of K(72 lb. K_2O). Soil-test K varied from "low" (52 lb./A) to "high" (129 lb./A). Results of the potassium experiments are summarized in Table 2.

TABLE 2. THE EFFECT OF EXTRA POTASSIUM AT RATE OF 50 POUNDS PER ACRE OF K (60 POUNDS K_2O) ON YIELD AND PER CENT SOUND MATURE KERNEL (SMK) OF PEANUTS IN 1967

Farmer	County	Soil type	Soil-test K	Farmers fert. K*	Yield		SMK	
					No extra K	Extra K	No extra K	Extra K
			Lb./A.	*Lb./A.*	*Lb./A.*	*Lb./A.*	*Pct.*	*Pct.*
			Early Runner variety					
A. Barnes	Geneva	Orangeburg sandy loam	129(H)	35	1,550	1,730	74	74
T. Seay	Geneva	Norfolk sandy loam	102(M)	41	2,530	2,750	74	75
W. L. Piland	Covington	Ruston sandy loam	52(L)	0	1,930	1,660	74	75
			Florigiant variety					
W. F. Morton	Dale	Ruston fine sandy loam	71(M)	60	1,110	1,140	74	74

* Multiply pounds of K by 1.2 to obtain pounds of K_2O.

Extra potassium fertilizer failed to increase yields or affect SMK values of peanuts in any of the experiments, regardless of soil-K level or yield level.

MAGNESIUM (Mg) EXPERIMENTS

Two experiments with magnesium were harvested, both with the Early Runner variety and both in Bullock County. Magnesium sulfate was used as topdressing in the row soon after planting at the rate of 20 lb. per acre of Mg. Results of the magnesium experiments are summarized in Table 3.

Relatively high yields were obtained in both experiments, and extra magnesium had no effect on yield or quality of nuts.

BORON (B) EXPERIMENTS

Five experiments with boron were harvested, three in Geneva County and two in Pike County. Boron was applied as topdressing in the row soon after planting at the rate of 1 lb. per acre of B. Accurate yields were obtained from only two experiments, but accurate measurements of per cent sound mature kernel and "hollow-heart" were obtained from all five experiments. Since boron deficiency appears in peanuts as "hollow-heart," this is an important measurement to make in boron experiments. Results of the boron experiments are summarized in Table 4.

Boron fertilizer did not affect yields in the two experiments harvested for yields, but apparently increased per cent SMK in one experiment (L. Davis farm). Per cent SMK was not affected by boron fertilizer in other experiments. However, boron fertilizer greatly reduced the incidence of hollow-heart. Hollow-heart was identified by splitting a sample of peanuts and visually estimating the presence or absence of hollow-heart in each nut. By this rapid visual procedure, peanuts are considered to be free of boron deficiency and hollow-heart, and the grower is not penalized, if the sample contains less than 1% hollow-heart.

Soil boron and per cent hollow-heart were also determined on all other experiments in 1967. Hollow-heart was found in four other experiments (Brooks, Morton, Piland, and Mitchell farms). It was not

TABLE 3. THE EFFECT OF ADDING MAGNESIUM SULFATE AT THE RATE OF 20 POUNDS PER ACRE OF MG ON YIELD AND PER CENT SOUND MATURE KERNELS (SMK) OF PEANUTS IN 1967

Farmer	County	Soil type	Soil-test Mg	Yield		SMK	
				No Mg	Added Mg	No Mg	Added Mg
			Lb./A.	*Lb./A.*	*Lb./A.*	*Pct.*	*Pct.*
J. R. Mitchell	Bullock	Ruston sandy loam	18(L)	2,860	2,740	75	74
B. East	Bullock	Susquehanna stoney sandy loam	42(H)	2,750	2,850	73	74

found where farmers applied boron to peanuts in 1967.

SUMMARY

Results of experiments in 1967 strongly suggest that peanut yields were limited by factors other than fertilizer rates. In no case did the surface application of gypsum, potassium, magnesium, or boron appreciably increase yields.

Similar experiments on farmers' fields are planned for 1968 in the continuing effort to improve the basis for fertilizer recommendations for peanuts.

TABLE 4. THE 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 IN 1967

Farmer	County	Soil type	Soil-test B	Yield		SMK		Hollow-heart	
				No B	Added B	No B	Added B	No B	Added B
			Lb./A.	*Lb./A.*	*Lb./A.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*
			Early Runner variety						
T. Davis	Geneva	Norfolk sandy loam	0.18	------	------	71	71	0	0
M. Austin	Geneva	Norfolk sandy loam	0.10	2,100	1,980	64	65	2	0
L. Davis	Geneva	Kalmia fine sand	0.07	1,680	1,760	65	72	3	0
			Virginia Bunch 67 variety						
T. Harden	Pike	Orangeburg coarse sand	0.11	------	------	65	62	1	0
			Dixie Runner variety						
M. Barron*	Pike	Orangeburg sand	0.07	------	------	46	48	3	1

* Peanuts exposed to inclement weather for long period between digging and harvesting, resulting in unusually low-quality nuts and much internal damage.