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Comparison of Peanut Meal, Cotton Seed Meal, Velvet Bean Meal, Ammonium Sulphate, and Nitrate of Soda, as Fertilizers for Corn and Cotton

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By

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COMPARISON OF PEANUT MEAL, COTTON SEED MEAL, VELVET BEAN MEAL, AMMONIUM SULPHATE, AND NITRATE OF SODA, AS FERTILIZERS FOR CORN AND COTTON

By E. F. Cauthen

CORN

This publication records the relative fertilizing effects of nitrate of soda, ammonium sulphate, cotton seed meal, peanut meal, and velvet bean meal used as shown in experiments made on the Alabama Experiment Station farm at Auburn, and covering a period of two years. The 1917 test was made on a gravelly loam upland soil, and the 1918 test on a deep sandy soil very low in plant food. In the first test, corn was planted June 20th following a crop of wheat, and in the second test it was planted in March on poor sandy weed land.

The amount of nitrogen furnished from the different materials was practically the same for all plots, the amount of fertilizer required to furnish equal amounts of nitrogen or ammonia varying from 80 pounds of sulphate of ammonia to 400 pounds of velvet bean meal per acre. The peanut meal and velvet bean meal contained the ground hulls of the pods. In addition to the nitrogenous fertilizer, 240 pounds of acid phosphate per acre was applied at planting time in both tests with corn. One fourth of the nitrogenous fertilizer was applied at planting time, and the remaining three fourths put on as a side application to the growing corn when the plants were about knee high.

TABLE 1.—*Relative Effects of Nitrogen from Different Sources for Corn*

Kind of fertilizer	Amount per acre	Yield per acre		Average yield per acre	Gain from nitrogenous fertilizers
		1917	1918		
	Lbs.	Bu.	Bu.	Bu.	Bu.
Nitrate of soda	100	26.0	17.5	21.8	7.5
Ammonium sulphate	80	25.1	17.6	21.4	7.1
Cotton seed meal	200	24.3	14.0	19.2	4.9
Peanut meal	310	25.7	16.0	20.9	6.6
Velvet bean meal	400	21.3	11.4	16.4	2.1
No nitrogen	---	19.4	9.1	14.3	--

The average gains for the different forms of fertilizer varies from 2.1 bushels of corn from velvet bean meal to 7.5 bushels from nitrate of soda. Eighty pounds of sulphate of ammonia produced nearly the same average increase as 100 pounds of nitrate of soda. Equal amounts of nitrogen in peanut meal in comparison with practically equal amounts of nitrogen in cotton seed meal increased the yield 1.7 bushels of corn per acre, but neither meals were as effective as nitrate of soda or ammonium sulphate.

For the purpose of comparison, the availability of nitrogen in nitrate of soda is assumed as 100 per cent. Measuring then the availability of nitrogen in the materials by the average yield of corn for two years, the approximate avaliability of the nitrogen is as follows:

In ammonium sulphate	94 per cent
In peanut meal	84 per cent
In cotton seed meal	65 per cent
In velvet bean meal	28 per cent

Assuming the cost of nitrate of soda at $100.00 per ton, ammonium sulphate at $120.00, cotton seed meal at $55.00, peanut meal at $50.00, and velvet bean meal at $25.00 per ton, and the value of corn at $1.50 per bushel, the profit from the use of the different materials is as follows:

100 lbs. nitrate of soda	$6.25 per acre
80 lbs. ammonium sulphate	5.85 per acre
200 lbs. cotton seed meal	1.85 per acre
310 lbs. peanut meal	2.15 per acre
400 lbs. velvet bean meal (Loss)	—1.85 per acre

COTTON

Approximately equal amounts of nitrogen in cotton seed meal, peanut meal, velvet bean meal, and nitrate of soda were applied to cotton in 1917 and 1918. The tests were made on a sandy loam of medium fertility on the Experiment Station farm at Auburn. The 1918 test followed the 1917 test plot for plot, and probably received some of the residual effect of the corresponding fertilizer on the same plot of the first test.

A mixture of 160 pounds of acid phosphate and 20 pounds of sulphate of potash per acre was applied with the nitrogenous fertilizer. All fertilizer was applied before planting.

The yield of seed cotton is given in the following table:

TABLE II.—*Relative Effects of Nitrogen from Different Sources for Cotton*

Kind of fertilizer	Amount per acre	Yield per acre		Average yield per acre*
		1917	1918	
	Lbs.	Lbs.	Lbs.	Lbs.
Nitrate of soda	140	823	1312	1068
Cotton seed meal	351	825	1178	1002
Peanut meal	452	779	1161	970
Velvet bean meal	754	550	1132	841
No nitrogen	---	---	1076	----

In the above table it is noticed that nitrate of soda gave the largest yield. It was followed closely by cotton seed meal and peanut meal, there being only 3 per cent difference between the two meals. Velvet bean meal gave the lowest yield.

For comparison, the availability of nitrate of soda is assumed at 100 per cent. The nitrogen in the several fertilizing materials then shows the following relative effectiveness for cotton:

Nitrate of soda	100 per cent
Cotton seed meal	93.8 per cent
Peanut meal	90.9 per cent
Velvet bean meal	78.7 per cent

Assuming the cost of the fertilizing materials at the following price per ton: nitrate of soda, $100 per ton; cotton seed meal, $55.00; peanut meal, $50.00, and velvet bean meal, $25.00 per ton; and the value of seed cotton at 10 cents per pound, the profit from the use of the different materials is as follows:

140 lbs. nitrate of soda (in the 1918 test)	$23.60 per acre
351 lbs. cotton seed meal	10.20 per acre
452 lbs. peanut meal	8.50 per acre
754 lbs. velvet bean meal	5.60 per acre

The results from the same materials under corn and cotton show that nitrate of soda per unit of nitrogen is the most effective fertilizer and that it is closely followed by ammonium sulphate. Between peanut meal and cotton seed meal there is not much difference. Velvet bean meal gave better results when used under

cotton than when used under corn. The cotton plant which received all of its fertilizer before planting, has a longer growing period than the corn plant, to which three fourths of the nitrogen was applied late as a side application; therefore, the cotton plant was able to utilize a larger per cent of the nitrogen in the slowly nitrifying velvet bean meal than the corn plant.

ANALYSIS FOR FERTILIZING CONSTITUENTS OF PEANUT MEAL, VELVET BEAN MEAL, AND COTTON SEED MEAL*

Peanut Meal Containing Some Hulls

Phosphoric acid	1.10 per cent
Nitrogen	4.69 per cent
Nitrogen equivalent to ammonia	5.70 per cent
Potash	1.36 per cent

Peanut Meal Without Hulls

Phosphoric acid	2.02 per cent
Nitrogen	6.12 per cent
Nitrogen equivalent to ammonia	7.44 per cent
Potash	2.42 per cent

Velvet Bean Meal Containing Some Hulls

Phosphoric acid	.72 per cent
Nitrogen	2.78 per cent
Nitrogen equivalent to ammonia	3.38 per cent
Potash	1.37 per cent

Cotton Seed Meal for Fertilizer
(Average of Many Analyses)

Phosphoric acid	2.44 per cent
Nitrogen	5.65 per cent
Nitrogen equivalent to ammonia	6.86 per cent
Potash	1.50 per cent

*Made by Chemical Department of Alabama Polytechnic Institute.