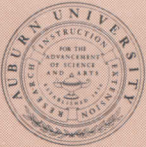


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FERTILIZER USE *and* PRACTICES *by* ALABAMA FARMERS

AGRICULTURAL EXPERIMENT STATION
AUBURN UNIVERSITY

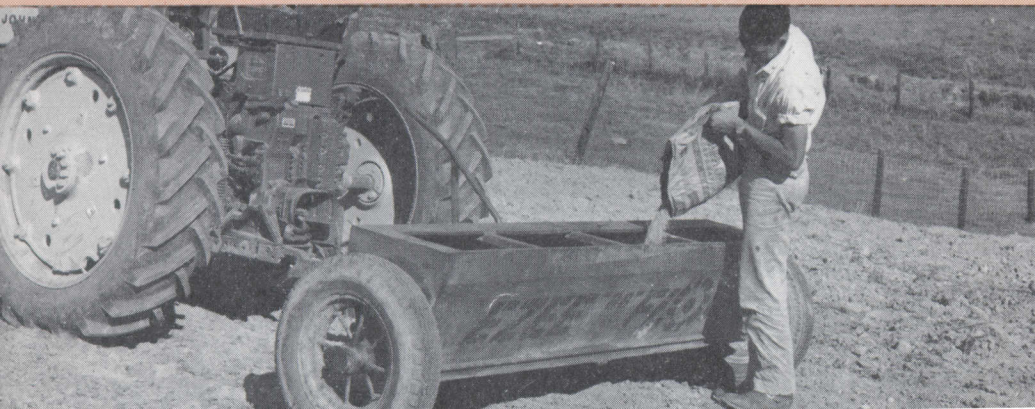


E. V. Smith, *Director*

Auburn, Alabama

In cooperation with

Division of Agricultural Relations
TENNESSEE VALLEY AUTHORITY



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SUMMARY

1. In 1957, 463 farmers in a random sample from 16 Alabama counties purchased an average of 1,990 pounds of N, 2,306 pounds of P_2O_5 , and 2,111 pounds of K_2O per farm. This is the equivalent of 9.2 tons of 4-12-12 fertilizer plus 1.9 tons of ammonium nitrate. As an average, 56 per cent of the open land (cropland used plus open permanent pasture) was fertilized.

2. Farmers more nearly applied recommended rates of fertilizer to cotton than to other crops. In 1957, farmers reporting use of each nutrient on cotton applied an average of 51 pounds of N, 54 pounds of P_2O_5 , and 50 pounds of K_2O per acre. On corn the average was 40, 28, and 23 pounds per acre, respectively, for the three primary nutrients. Hay crops and pastures fertilized received an average of 17 pounds of N, 24 pounds of P_2O_5 , and 24 pounds of K_2O per acre in 1957. Farmers in the Lower Coastal Plain Area (East) used an average of 14 pounds of N, 40 pounds of P_2O_5 , and 52 pounds of K_2O per acre on peanuts.

3. Seventeen per cent of the farmers interviewed had used a high analysis fertilizer (mixed grade containing 30 pounds or more of plant food per 100 pounds of material). Of these, 62 per cent said they preferred it over conventional grades.

4. There was little difference in the percentage of farmers who said they preferred ammonium nitrate and those who preferred nitrate of soda as a source of N. Ninety-four per cent of the 463 farmers said they had used nitrate of soda; 78 per cent had used ammonium nitrate.

5. Seventy-four per cent of all farmers indicated that bulk delivery and spreading of fertilizer were available, whereas 7 per cent said these services were not. Nineteen per cent did not know whether bulk delivery and spreading were available. Less than 1 per cent said they preferred bulk delivery and spreading over conventional methods of handling fertilizer. The average additional cost for bulk delivery and spreading above the cost of the same grade of fertilizer purchased in bags was \$2.70 per ton. This additional cost varied from \$1.50 to \$3.90 per ton among farming areas.

6. Forty-two out of 463 farmers, or 9 per cent, reported having soil tested in 1957. According to the acreages in fields tested and acres of open land on farms included in the study, only 4.8 per cent of the open land was tested. However, based on open land on farms where soil was tested, almost 36 per cent of the acreage was tested. Eleven out of 42 farmers, or 26 per cent, said they did not follow the soil test recommendations.

7. About two out of every five farmers reported a problem in handling and applying fertilizer in 1957. The major problems were "clogging in hopper" and "caking in bag." Less than 1 per cent reported "breaking of bag" as a problem.

8. Fifty-eight per cent of the farmers used credit for fertilizer purchases in the spring of 1957. Only three farmers reported use of credit for fall purchases of fertilizer. Sixty-eight per cent of the farmers borrowed less than \$1,000 primarily for fertilizer purchases. Commercial banks, fertilizer dealers, and landlords were the three most important sources of credit. Farmers who borrowed from landlords paid the highest average annual rate of interest, which was 11.1 per cent. Average annual rates of interest paid to all other sources of credit averaged between 4.9 and 7.3 per cent in 1957.

9. When farmers were asked if they considered cost of fertilizer in connection with decisions on grade and amount to use, 50 per cent replied in the affirmative. Sixty-four per cent of these farmers considered cost per ton, 27 per cent cost per pound of plant nutrients, 5 per cent cost per bag, and 4 per cent the additional cost in relation to expected additional return from use of added amounts of fertilizer. More than half the farmers checked fertilizer prices at more than one place before they purchased.

10. Tradition, habit, and past experience played a major part in the decisions farmers made relative to fertilizer use. When asked how they decided on the grade and in turn on the amount of fertilizer to use, the largest portion of farmers stated they decided on the basis of past grades and amounts used. The same was true with the source of credit from which they obtained funds. They replied that they used the present source because they had borrowed previously from that source.

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FERTILIZER USE *and* PRACTICES *by* ALABAMA FARMERS*

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ALABAMA farmers bought almost 1 million tons of commercial fertilizer during the 1957-58 season. Including lime, expenditures by farmers for fertilizers amounted to nearly 50 million dollars in 1957. Before 1956 fertilizer and lime represented the greatest single cash expenditure by Alabama farmers. Since 1956, expenditures for feed have been somewhat greater than those for fertilizer. Expenditures for fertilizer normally amount to about 20 per cent, or \$1 out of every \$5, of total cash expenditures by Alabama farmers.

In late 1957 a study was begun in cooperation with the Tennessee Valley Authority relative to fertilizer use and practices of Alabama farmers. It was the objective of this study to determine (1) use of credit for fertilizer purchases, (2) current fertilizer practices and amounts and kinds of fertilizer used, (3) acceptance of high analysis fertilizers, and (4) some of the characteristics of farms and farmers affecting fertilizer use and the use of credit for fertilizer purchases.

During the summer of 1958, 463 farmers in 16 counties, Figure 1, were interviewed by trained enumerators. The sample of farmers¹ interviewed was selected at random within farming areas. In addition, 41 fertilizer dealers and 41 credit agency representatives were interviewed. The following report is based primarily on data supplied by the 463 farmers.

* This study was based on data obtained under a research project titled "Credit Effects on Farmers' Demands for Fertilizer in Alabama." The work was executed and financed under terms of a cooperative agreement with the Tennessee Valley Authority.

The cooperation of all farmers and the helpful suggestions of members of the manuscript review committee are acknowledged.

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¹ A farm was defined as an agricultural unit that had at least \$200 income from farm sources in 1957.

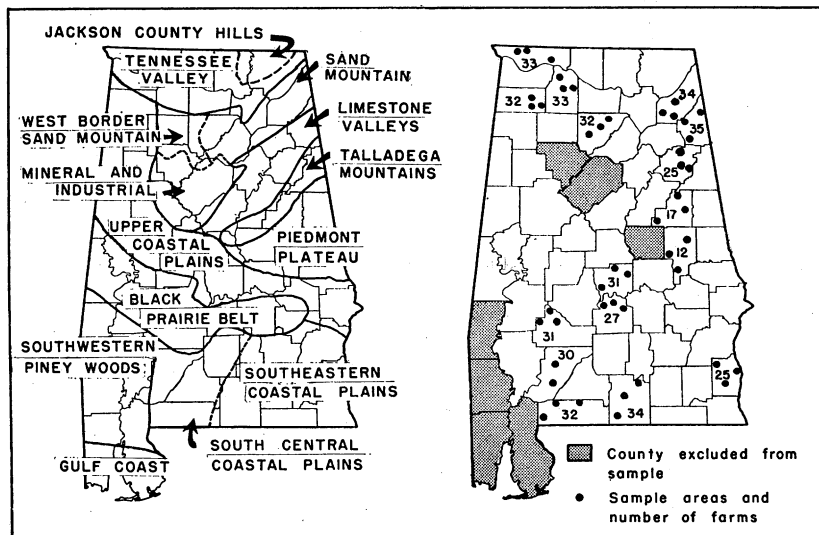


FIGURE 1. Sample of 463 farms by counties according to type of farming areas.

DESCRIPTION of FARMS and FARMERS

The average size of farms for the State sample was 202 acres, Table 1. Size varied from 80 acres in the Sand Mountain to 402 acres in the Black Belt Area. Out of the 202 acres, 105 were

TABLE 1. DESCRIPTION OF FARMS AND FARMERS INCLUDED IN FERTILIZER STUDY, BY FARMING AREAS, ALABAMA, 1957

Farming area	Farms	Average size		Farm Operators			
		Total land	Open land	Average age	Completed 7 grades or more of school	Tenants	Colored
	No.	A.	A.	Yr.	Pct.	Pct.	Pct.
Tennessee Valley.....	66	120	87	48	73	27	4
Sand Mountain.....	66	80	46	51	67	16	0
Limestone Valleys.....	60	160	79	49	60	25	2
Upper Coastal Plain.....	63	121	60	52	63	18	30
Piedmont.....	29	214	71	52	76	28	10
Black Belt.....	59	402	250	52	37	75	85
Lower Coastal Plain (West).....	61	254	98	52	55	29	15
Lower Coastal Plain (East).....	59	299	147	51	59	30	22
STATE.....	463	202	105	51	61	31	21

classified as open land. A breakdown of the average acreage of open land was as follows: 103 acres in field, hay, and pasture crops, 6 acres of which were double cropped; and 8 acres of idle cropland that included any allotted acreage of cotton and corn in Acreage Reserve under the Soil Bank program. There was an average of 94 acres in woods and 3 acres in miscellaneous areas such as lots and farmstead.

Three-fourths of the farmers in the Black Belt Area were tenants, a large proportion of whom were colored. The average age of farm operators was fairly uniform among farming areas; the State average was 51 years.

As an average 61 per cent of the farmers had completed seven or more grades of schooling. However, in the Black Belt Area only 37 per cent had finished seven or more grades. Only 4 per cent of all farm operators had gone beyond the 12th grade.

FERTILIZER PURCHASES and USE

Do most Alabama farmers use commercial fertilizer?

Yes. Only 3 out of 463 farmers said that they had not used commercial fertilizer every year on the farms they operated. In 1957, more than 90 per cent of the farmers included in the study reported buying N, P₂O₅, and K₂O, the primary plant nutrients.²

How many tons of primary plant nutrients did Alabama farmers buy in 1957?

As an average, farmers in the sample bought about 1 ton of each of the three primary plant nutrients in 1957, Table 2. This was the equivalent of 9.2 tons of 4-12-12 fertilizer plus 1.9 tons of ammonium nitrate. Farmers in the Lower Coastal Plain Area purchased the greatest average amount per farm. Farmers in the Piedmont Area purchased the least amount per farm.

The acreage of open land on which fertilizer could be applied varied among farms and farming areas. Therefore, purchases of N, P₂O₅, and K₂O were calculated per acre of open land (cropland used plus open permanent pasture). Farmers in the

² The primary plant nutrients, as generally recognized, are nitrogen (N), phosphorus (P), and potassium (K) and are expressed on the fertilizer bag as N, P₂O₅, and K₂O, respectively. Thus, 100 pounds of 4-12-12 fertilizer contains 4 pounds of N, 12 pounds of P₂O₅, and 12 pounds of K₂O.

TABLE 2. PERCENTAGE OF FARMERS REPORTING PURCHASES AND AVERAGE AMOUNT OF N, P₂O₅, AND K₂O PURCHASED PER FARM, BY FARMING AREAS, ALABAMA, 1957

Farming area	N		P ₂ O ₅		K ₂ O	
	Farmers reporting purchases	Amount	Farmers reporting purchases	Amount	Farmers reporting purchases	Amount
	<i>Pct.</i>	<i>Lb.</i>	<i>Pct.</i>	<i>Lb.</i>	<i>Pct.</i>	<i>Lb.</i>
Tennessee Valley.....	86	1,571	86	1,762	86	1,571
Sand Mountain.....	89	1,884	91	1,248	89	1,080
Limestone Valleys.....	100	1,639	100	1,543	100	1,336
Upper Coastal Plain.....	78	1,168	79	1,162	79	910
Piedmont.....	93	1,070	93	797	93	583
Black Belt.....	92	1,122	95	1,855	95	1,330
Lower Coastal Plain (West).....	95	3,385	95	4,133	95	3,867
Lower Coastal Plain (East).....	86	3,605	88	5,331	88	5,596
STATE.....	90	1,990	91	2,306	90	2,111

TABLE 3. AVERAGE AMOUNT OF PRIMARY PLANT NUTRIENTS PURCHASED PER ACRE OF OPEN LAND, 463 FARMS, BY FARMING AREAS, ALABAMA, 1957

Farming area	Average amount purchased per acre of open land ¹			
	N	P ₂ O ₅	K ₂ O	Total
	<i>Lb.</i>	<i>Lb.</i>	<i>Lb.</i>	<i>Lb.</i>
Tennessee Valley.....	17	19	17	53
Sand Mountain.....	41	28	24	93
Limestone Valleys.....	24	22	19	65
Upper Coastal Plain.....	19	19	15	53
Piedmont.....	17	13	9	39
Black Belt.....	4	7	5	16
Lower Coastal Plain (West).....	35	42	40	117
Lower Coastal Plain (East).....	23	35	36	94
STATE.....	18	22	20	60

¹ Cropland used plus open permanent pasture.

Sand Mountain Area purchased the greatest amount of N, whereas those in the Lower Coastal Plain Area (West) bought the greatest amount of P₂O₅ and K₂O per acre of open land, Table 3. Purchases of K₂O per acre of open land were second highest in the Lower Coastal Plain Area (East) where peanuts were an important crop.

What part of the total open land on farms was fertilized in 1957?

For the State as a whole, 56 per cent of the open acres in the sample were fertilized. In the Piedmont and Black Belt areas,

less than 2 out of every 5 acres of open land were fertilized in 1957.

<i>Farming area</i>	<i>Percentage of open land fertilized</i>
Tennessee Valley.....	69
Sand Mountain.....	70
Limestone Valleys.....	46
Upper Coastal Plain.....	60
Piedmont.....	37
Black Belt.....	29
Lower Coastal Plain (West).....	81
Lower Coastal Plain (East).....	80
STATE.....	56

What grades of mixed fertilizer and kinds of straight fertilizer materials have farmers used?

Based on information supplied by the 463 farmers, more than 90 per cent had used 4-10-7 and nitrate of soda prior to 1958. In addition, 50 per cent or more had used 6-8-4, ammonium nitrate, 4-12-12, muriate of potash, or ordinary superphosphate.

Forty-nine per cent of the farmers reported they had "home mixed" fertilizer prior to 1958. In 1957, however, only nine farmers reported purchasing ingredients and "home mixing" fertilizer.

<i>Fertilizer used</i>	<i>Percentage of farmers who used specified fertilizers prior to 1958</i>
4-10-7.....	95
Nitrate of soda.....	94
6-8-4.....	81
Ammonium nitrate.....	78
4-12-12.....	54
Muriate of potash.....	54
Ordinary superphosphate.....	50
Basic slag.....	49
0-14-14.....	41
6-8-8.....	37
Ammonium nitrate-limestone mixtures.....	27
Ammonium sulfate.....	16
0-12-20.....	10
8-8-8.....	7
0-10-20.....	6
Concentrated superphosphate.....	6
0-20-20.....	5
Anhydrous ammonia.....	4
Nitrogen solutions.....	3
0-16-8.....	2
10-10-10.....	2
14-0-14.....	2
14-14-14.....	2
15-15-15.....	1
13-13-13.....	1
Calcium metaphosphate.....	1

Less than 1 per cent: 4-16-8, 6-12-24, 6-24-24, 8-8-2, 8-20-14, 12-12-12, and di-ammonium phosphate.

What were the most common fertilizers purchased in 1957 and how much did farmers buy?

Sixty per cent of the farmers in the sample purchased 4-10-7 and 33 per cent bought 4-12-12. The average number of tons of 4-12-12 purchased per farm, however, was 50 per cent greater than that of 4-10-7, Table 4.

TABLE 4. PERCENTAGE OF FARMERS REPORTING PURCHASES OF MAJOR FERTILIZERS AND AVERAGE AMOUNT PURCHASED PER FARM REPORTING, BY FARMING AREAS, ALABAMA, 1957

Farming area	Fertilizer							
	4-10-7		4-12-12		Nitrate of soda		Ammonium nitrate	
	Farm-ers re- porting	Amount	Farm-ers re- porting	Amount	Farm-ers re- porting	Amount	Farm-ers re- porting	Amount
	<i>Pct.</i>	<i>Tons</i>	<i>Pct.</i>	<i>Tons</i>	<i>Pct.</i>	<i>Tons</i>	<i>Pct.</i>	<i>Tons</i>
Tennessee Valley...	67	3.9	15	13.0	23	2.5	30	3.1
Sand Mountain.....	50	4.3	53	4.4	32	1.9	33	4.1
Limestone Valleys..	75	4.8	52	4.3	48	2.1	38	3.1
Upper Coastal								
Plain.....	51	4.8	16	2.6	40	1.8	17	2.1
Piedmont.....	66	3.1	17	2.8	45	2.2	28	2.6
Black Belt.....	47	3.4	27	8.4	32	2.3	22	2.3
Lower Coastal								
Plain (West).....	62	7.5	44	15.2	34	2.2	34	4.8
Lower Coastal								
Plain (East).....	68	10.4	32	13.6	49	4.7	44	4.6
STATE.....	60	5.5	33	8.2	37	2.5	31	3.6

What percentage of farmers reported use of liming materials in 1958?³

About one-third of the farmers who returned a mailed questionnaire reported use of lime and/or basic slag on their farms, Table 5. The average amount used per farm reporting was 16 tons of lime and 5 tons of basic slag. Only 48 per cent of the 463 personally interviewed farmers stated they had used lime on their farm prior to 1958. In view of this fact, the proportion reporting use of lime in 1958 appears high. Possibly a higher percentage of farmers who used lime returned the mailed questionnaire than was true for those who did not use lime.

³ Data on purchases of liming materials were obtained by a mailed questionnaire mailed subsequent to field interviews. Four hundred and sixty-three questionnaires were sent and 108, or 23 per cent, were returned.

TABLE 5. PERCENTAGE OF FARMERS REPORTING AND AVERAGE AMOUNT USED PER FARM REPORTING, LIME AND/OR BASIC SLAG, BY FARMING AREAS, ALABAMA, 1958¹

Farming area	Portion of farmers using lime and/or basic slag	Average amount used per farm reporting	
		Lime	Basic slag
		<i>Per cent</i>	<i>Tons</i>
Tennessee Valley.....	40	29	6
Sand Mountain.....	44	11	2
Limestone Valleys.....	44	12	0
Upper Coastal Plain.....	13	6	2
Piedmont.....	40	6	0
Black Belt.....	8	1	0
Lower Coastal Plain (West).....	32	18	0
Lower Coastal Plain (East).....	45	19	7
STATE.....	32	16	5

¹ Based on 108 replies to 463 mailed questionnaires. Questionnaires were mailed subsequent to obtaining the personal interview data in the summer of 1957.

RATES of FERTILIZATION

At what rates did farmers use commercial fertilizers on cotton, corn, hay crops and pasture, and peanuts?

Cotton. Farmers in the study used an average of 51 pounds of N, 54 pounds of P₂O₅, and 50 pounds of K₂O, per acre on cotton in 1957, Table 6. Sand Mountain Area farmers applied the most fertilizer per acre, whereas those in the Upper Coastal

TABLE 6. PERCENTAGE OF FARMERS USING FERTILIZER AND AVERAGE AMOUNT APPLIED PER ACRE ON COTTON, 332 FARMS BY FARMING AREAS, ALABAMA, 1957

Farming area	Fertilizers used on cotton						Total amount of plant nutrients per acre
	N		P ₂ O ₅		K ₂ O		
	Farm-ers reporting	Amount per acre ¹	Farm-ers reporting	Amount per acre ¹	Farm-ers reporting	Amount per acre ¹	
	<i>Pct.</i>	<i>Lb.</i>	<i>Pct.</i>	<i>Lb.</i>	<i>Pct.</i>	<i>Lb.</i>	<i>Lb.</i>
Tennessee Valley.....	100	43	100	44	100	40	127
Sand Mountain.....	100	66	100	70	100	66	202
Limestone Valleys.....	95	60	100	60	100	56	176
Upper Coastal Plain.....	98	41	100	48	100	38	127
Piedmont.....	100	52	100	47	100	39	138
Black Belt.....	98	44	98	50	98	42	136
Lower Coastal Plain (West).....	100	56	100	59	100	55	170
Lower Coastal Plain (East).....	100	47	100	49	100	61	157
STATE.....	99	51	100	54	100	50	155

¹ Amount used per acre on farms reporting use of this nutrient on cotton.

Plain and Tennessee Valley areas used the least. Almost all farmers used all three primary nutrients on cotton.

General fertilizer recommendations⁴ for cotton call for 50 to 60 pounds per acre each of the three primary plant nutrients. Therefore, farmers, on the average, were using amounts of fertilizer within the general recommendations for cotton.

Corn. Farmers used an average of 40 pounds of N, 28 pounds of P₂O₅, and 23 pounds of K₂O per acre on corn in 1957, Table 7.

General fertilizer recommendations for corn are 60 to 90 pounds of N and 30 pounds each of P₂O₅ and K₂O per acre. Based on the foregoing findings, farmers, as an average, were using from two-thirds to less than half the amount of N generally recommended. They were using nearer the recommended rates of P₂O₅ and K₂O.

Hay crops and pastures. Farmers who applied fertilizers to hay and pastures used an average of 17 pounds of N, 24 pounds of P₂O₅, and 24 pounds of K₂O per acre, Table 8. About one out of three farmers applied N and two out of five applied P₂O₅ and K₂O to hay crops and pastures.

Peanuts. Farmers in the Lower Coastal Plain Area (East), who used the three major plant nutrients reported an average

TABLE 7. PERCENTAGE OF FARMERS USING FERTILIZER AND AVERAGE AMOUNT APPLIED PER ACRE ON CORN, 420 FARMS BY FARMING AREAS, ALABAMA, 1957

Farming area	Fertilizer used on corn						Total amount of plant nutrients per acre
	N		P ₂ O ₅		K ₂ O		
	Farm-ers re- porting	Amount per acre ¹	Farm-ers re- porting	Amount per acre ¹	Farm-ers re- porting	Amount per acre ¹	
	Pct.	Lb.	Pct.	Lb.	Pct.	Lb.	Lb.
Tennessee Valley.....	97	25	98	26	98	20	71
Sand Mountain.....	100	57	100	27	100	22	106
Limestone Valleys.....	98	49	100	32	100	25	106
Upper Coastal Plain.....	100	33	93	24	93	19	76
Piedmont.....	100	38	96	27	96	20	85
Black Belt.....	95	31	78	25	73	21	77
Lower Coastal Plain (West).....	98	45	98	34	98	28	107
Lower Coastal Plain (East).....	100	44	100	29	100	23	96
STATE.....	98	40	96	28	95	23	91

¹ Amount used per acre on farms reporting use of this nutrient on corn.

⁴ From Special Leaflet, "General Fertilizer Recommendations for Alabama." Agricultural Experiment Station, Auburn University (The Alabama Polytechnic Institute), Auburn, Alabama. October 1956.

TABLE 8. PERCENTAGE OF FARMERS USING FERTILIZER AND AVERAGE AMOUNT APPLIED PER ACRE ON HAY CROPS AND PASTURES, 389 FARMS BY FARMING AREAS, ALABAMA, 1957

Farming area	Fertilizer used on hay crops and pastures						Total amount of plant nutrients per acre
	N		P ₂ O ₅		K ₂ O		
	Farm-ers re- porting	Amount per acre ¹	Farm-ers re- porting	Amount per acre ¹	Farm-ers re- porting	Amount per acre ¹	
	<i>Pct.</i>	<i>Lb.</i>	<i>Pct.</i>	<i>Lb.</i>	<i>Pct.</i>	<i>Lb.</i>	<i>Lb.</i>
Tennessee Valley.....	16	15	39	21	38	21	57
Sand Mountain.....	21	12	34	31	33	29	72
Limestone Valleys.....	28	8	52	13	52	14	35
Upper Coastal Plain.....	22	15	24	25	24	23	63
Piedmont.....	48	8	48	13	38	16	37
Black Belt.....	18	4	30	7	30	6	17
Lower Coastal Plain (West).....	59	28	55	35	55	30	93
Lower Coastal Plain (East).....	54	19	74	29	72	30	78
STATE.....	32	17	45	24	43	24	65

¹ Amount used per acre on farms reporting use of this nutrient on hay crops and pastures.

of 14 pounds of N, 40 pounds of P₂O₅, and 52 pounds of K₂O per acre on peanuts in 1957. Fifty-one per cent of the farmers reported applying N to peanuts and virtually all farmers used P₂O₅ and K₂O. The reason given for use of N was "to get the young peanut seedling off to a good start ahead of weeds and grass."

General fertilizer recommendations for peanuts in rotation with other well-fertilized crops are 15 to 20 pounds of P₂O₅ and 30 to 40 pounds of K₂O per acre. Nitrogen is not recommended. For continuous peanuts, 30 to 60 pounds of P₂O₅ and 40 to 80 pounds of K₂O are recommended. In either case, a calcium deficiency for production of peanuts should be corrected.

Was there a relationship between pounds of plant nutrients used per acre and average yields of cotton and corn as reported by farmers?

Although many factors influence yields besides fertilizer use, there was a general over-all increase in yield of cotton and corn as level of fertilizer use increased, Table 9.

TABLE 9. AVERAGE POUNDS OF PRIMARY PLANT NUTRIENTS APPLIED PER ACRE AND AVERAGE YIELD OF COTTON AND CORN, BY FARMING AREAS, ALABAMA, 1957

Farming area	Cotton		Corn	
	Plant nutrients per acre	Lint yield	Plant nutrients per acre	Yield
	<i>Lb.</i>	<i>Lb.</i>	<i>Lb.</i>	<i>Bu.</i>
Tennessee Valley.....	127	367	71	29
Sand Mountain.....	202	437	106	35
Limestone Valleys.....	176	426	106	30
Upper Coastal Plain.....	127	323	76	24
Piedmont.....	138	330	85	29
Black Belt.....	133	314	77	17
Lower Coastal Plain (West).....	170	461	107	30
Lower Coastal Plain (East).....	157	306	96	30
STATE.....	155	375	91	28

ACCEPTANCE of CHANGES in FERTILIZERS

What proportion of farmers used high analysis mixed fertilizers?

A high analysis mixed fertilizer, for purposes of this study, was a grade that contained 30 pounds or more of plant nutrients per 100 pounds of material. Eighty out of 463 farmers, or 17 per cent, said they had used such fertilizers. High analysis fertilizers and percentages of farmers who reported having used such grades are as follows:

<i>Grade of fertilizer</i>	<i>Percentage of farmers who used specified grades of high analysis fertilizers</i>
0-12-20.....	9.7
0-10-20.....	6.0
0-20-20.....	4.7
10-10-10.....	1.5
14-14-14.....	1.5
15-15-15.....	1.3
13-13-13.....	1.1
8-20-14.....	.4
12-12-12.....	.4

Did farmers using high analysis fertilizers prefer them over conventional grades?

Fifty out of the 80 farmers, or 62 per cent, who had used high analysis fertilizers said they preferred them over regular grades.

Why did farmers prefer high analysis fertilizers?

Reasons given for the preference were as follows:

<i>Reason</i>	<i>Percentage of farmers preferring high analysis fertilizers who reported specified reasons</i>
More plant nutrients per bag.....	54
Cheaper per pound of plant food.....	16
Other.....	30

Did some farmers express preference for high analysis fertilizers on one crop but not on another?

Yes. Seven out of 50 farmers, or 16 per cent, indicated that their acceptance and use of high analysis fertilizers depended on the crop. Generally, they preferred high analysis fertilizers for hay and pasture crops but not for field crops. They reported some difficulties in obtaining stands of field crops, and these were associated with the use of high analysis fertilizers.

The highest percentage of farmers who had used high analysis fertilizers was in the Lower Coastal Plain Area (East), although in that area only 44 per cent said they preferred high analysis fertilizers. This rate of preference was lower than that in any other area. Besides the difficulty of obtaining stands of field crops, another factor influencing the preference of high analysis fertilizers was the leaching problem on sandy soils. In the Lower Coastal Plain Area (East), some farmers followed the practice of splitting fertilizer applications to overcome, at least in part, the leaching problem.

How many farmers had used a granulated mixed fertilizer?

Only 7 per cent of the farmers interviewed said they had used a granulated mixed fertilizer. Almost three-fourths of these farmers said they preferred granulated over pulverized fertilizer because it was "easy to put out."

From what sources did farmers get information about new fertilizers?

The fertilizer dealer was mentioned most frequently as the source of information about new fertilizers. The Land-Grant College, neighbors, and farmers relying on their own judgment were the second, third, and fourth most important sources of

information about new fertilizers. Mass media, such as farm magazines, radio, television, and newspapers, ranked below the previously mentioned sources of information about new fertilizers.

As to sources of information about general fertilizer practices, the Land-Grant College and farmers' judgment were first and of equal importance. The fertilizer dealer was next in importance.

What sources of N did farmers prefer?

Forty per cent of the farmers said they preferred ammonium nitrate and 36 per cent preferred nitrate of soda as a source of N. Five per cent stated no preference. Sources of N preferred other than ammonium nitrate and nitrate of soda included ammonium sulfate, anhydrous ammonia, and ammonium nitrate-limestone mixtures.

What reasons did farmers give for preference to source of N?

The various reasons given are as follows:

<i>Reason</i>	<i>Percentage of farmers reporting various reasons</i>
Ammonium nitrate	
Higher percentage N.....	30
Better results.....	24
Cheaper per pound of N.....	24
Other.....	21
Not reported.....	1
Nitrate of soda	
Always used this source.....	39
Better results.....	18
Easier to apply.....	16
Non-acid forming.....	6
Other.....	19
Not reported.....	2

In what kind and size of bag did farmers purchase mixed fertilizer in 1957?

Seventy-three per cent of the farmers interviewed purchased mixed fertilizer in paper bags in 1957, Table 10. A higher proportion of farmers in the Tennessee Valley and Sand Mountain areas purchased fertilizer in 50-pound paper bags than those in other areas. Purchases in 100-pound cloth bags were most common in the Black Belt Area. Only in the Lower Coastal Plain Area (East) were purchases in 200-pound cloth bags reported.

TABLE 10. PERCENTAGE OF FARMERS REPORTING PURCHASES OF MIXED FERTILIZERS BY KIND AND SIZE OF BAG, 457 FARMERS, BY FARMING AREAS, ALABAMA, 1957

Farming area	Kind and size of bag				Not reported
	Paper		Cloth		
	50-pound	100-pound	100-pound	200-pound	
	Pct.	Pct.	Pct.	Pct.	Pct.
Tennessee Valley.....	30	39	29	0	2
Sand Mountain.....	32	52	15	0	1
Limestone Valleys.....	7	78	15	0	0
Upper Coastal Plain.....	8	59	32	0	1
Piedmont.....	0	90	0	0	10
Black Belt.....	0	18	82	0	0
Lower Coastal Plain (West).....	0	83	17	0	0
Lower Coastal Plain (East).....	0	93	0	7	0
STATE.....	11	62	25	1	1

What kind and size of fertilizer bags did farmers prefer?

For the State as a whole, there was no difference between the percentage of farmers who preferred paper and those who preferred cloth fertilizer bags, Table 11. The 100-pound size was more commonly preferred than other size groups; however, farmers in the four farming areas comprising northern Alabama indicated a rather strong preference for 50-pound bags for both paper and cloth.

TABLE 11. PERCENTAGE OF FARMERS EXPRESSING A PREFERENCE FOR VARIOUS KINDS AND SIZES OF FERTILIZER BAGS, 463 FARMS, BY FARMING AREAS, ALABAMA, 1957

Farming area	Size and kind of bag preferred						Not reported
	Paper bag			Cloth bag			
	50-pound	80-pound	100-pound	50-pound	100-pound	200-pound	
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
Tennessee Valley.....	30	0	11	35	24	0	0
Sand Mountain.....	38	1	11	14	20	0	16
Limestone Valleys.....	15	2	43	2	27	0	11
Upper Coastal Plain.....	33	3	11	21	27	2	3
Piedmont.....	3	0	62	3	21	4	7
Black Belt.....	2	0	14	3	78	3	0
Lower Coastal Plain (West).....	0	0	47	2	46	5	0
Lower Coastal Plain (East).....	3	0	63	2	29	3	0
STATE.....	17	1	30	11	34	2	5

To what extent were bulk delivery and spreading available to Alabama farmers?

Seventy-four per cent of all farmers indicated that bulk delivery and spreading of fertilizer were available, whereas such services were not available to 7 per cent of the interviewed farmers. Nineteen per cent of the farmers did not know whether bulk delivery and spreading were available. In the Black Belt Area, 49 per cent of the farmers did not know whether bulk delivery and spreading were available.

What was average distance that bulk fertilizer was hauled from source to farm?

The average distance varied from 15 miles in the Limestone Valley Area to 31 miles in the Black Belt Area. Average for the State was 19 miles.

Did farmers prefer bulk delivery and spreading to conventional ways of buying fertilizer?

No. For the State as an average, less than 1 per cent of the farmers said they preferred bulk delivery and spreading over conventional methods.

Was it cheaper to buy fertilizer in bulk and have it spread or to buy in bags and spread?

As to which was cheaper depended on each farm situation. As an average, farmers reported an additional cost of \$2.70 per ton for delivery and spreading above the cost of the same grade of fertilizer purchased in bags. This additional cost varied from \$1.50 in the Sand Mountain Area to \$3.90 per ton in the Piedmont Area. No doubt some farmers cannot spread or "put out" fertilizer for the difference in price per ton, considering all costs, such as gasoline, labor, depreciation, and repairs on machinery and equipment. A farmer's alternative opportunities for use of the cash outlay involved as well as the machinery, equipment, and labor used in "putting out" fertilizer also influenced the answer to this question.

PRACTICES RELATED to FERTILIZER and ITS USE

What percentage of farmers reported ever having soil tested on the farm they operated?

Thirty per cent, or 137 out of 463 farmers for the State as a whole, had some of their soil tested. Percentages for each farming area are as follows:

<i>Farming area</i>	<i>Percentage of farmers who had soil tested</i>
Tennessee Valley.....	23
Sand Mountain.....	30
Limestone Valleys.....	35
Upper Coastal Plain.....	19
Piedmont.....	38
Black Belt.....	24
Lower Coastal Plain (West).....	31
Lower Coastal Plain (East).....	42
STATE.....	30

How many farmers had soil tested in 1957?

Forty-two of the 463 farmers, or 9 per cent, reported having soil tested in 1957. Variation by farming areas was as follows:

<i>Farming area</i>	<i>Percentage of farmers who had soil tested in 1957</i>
Tennessee Valley.....	8
Sand Mountain.....	12
Limestone Valleys.....	5
Upper Coastal Plain.....	3
Piedmont.....	17
Black Belt.....	12
Lower Coastal Plain (West).....	7
Lower Coastal Plain (East).....	14
STATE.....	9

On what portion of open land was soil tested in 1957?

Based on the acreage of cropland used plus open permanent pasture on all farms, only 4.8 per cent of this acreage was covered by soil tests in 1957. However, for the open land on farms where soil was tested in 1957, almost 36 per cent of the acreage was tested.

What crops were planted following soil test in 1957?

In 50 per cent of the cases, cotton was planted following the soil test. Corn, peanuts, hay and pasture crops, and truck crops

were the others planted after the soil test in that order reported by farmers.

Did farmers follow soil test recommendations?

Apparently most farmers followed soil test recommendations. Fifty-three per cent of the farmers who had soil tested in 1957 stated that they followed recommendations; 26 per cent did not follow recommendations. Fourteen per cent had not received soil test results as of the date they were interviewed, and 7 per cent did not know if they followed the recommendations.

What were some reasons given by farmers for not following soil test recommendations?

Reasons given by 11 out of 42 farmers, 26 per cent, who did not follow soil test recommendations were as follows: "landlord would not go along in purchasing the fertilizer recommended," "weather did not permit following recommendations," and "had no faith in recommendations."

What methods were used to apply mixed fertilizer and N to cotton?

Slightly more than 70 per cent of the farmers applied mixed fertilizer immediately under or with the seed, whereas 23 per cent applied the fertilizer in bands to the side and below the seed. Only 4 per cent applied mixed fertilizer as a side dressing. The remaining 3 per cent used a combination of methods. A larger portion of farmers in the Tennessee Valley and in the Lower Coastal Plains areas applied mixed fertilizer to cotton in bands than in the other areas. The practice of applying mixed fertilizer as a side dressing was most prevalent in the Black Belt Area.

Seventy-nine per cent of the farmers included in the study who grew cotton in 1957 sidedressed with N. Two-thirds of them sidedressed with a distributor and one-third applied the N by hand methods. Hand methods of application were most common in the Black Belt Area.

What methods were used to apply mixed fertilizer and N to corn?

Seventy per cent of the farmers applied mixed fertilizer to corn directly under or with the seed, and 25 per cent applied it

in bands to the side and below the seed. The remaining farmers sidedressed or used a combination of methods in applying mixed fertilizer.

Eighty-seven per cent of the farmers who grew corn applied N as a side dressing. Methods of application were similar to those for cotton.

What methods were used to apply fertilizer to permanent pastures?

A majority of farmers in all areas of the State reported use of a fertilizer spreader in applying fertilizer to permanent pastures. As an average for all farms, 78 per cent used a fertilizer spreader and 22 per cent applied fertilizer by hand. Farmers did not report application of straight nitrogen materials to permanent pastures. In some cases, mixed fertilizer containing nitrogen was used. However, most farmers used mixed fertilizer that contained no nitrogen.

Did farmers report any problems in handling and applying fertilizer?

Yes. About two out of every five farmers reported a problem in handling and applying fertilizer in 1957. Twenty-five per cent of all farmers reported "clogging in hopper" and 14 per cent "caking in bag" as problems. Less than 1 per cent reported "breaking of bag" as a problem. A higher percentage of farmers in the Sand Mountain and Limestone Valley areas reported problems than in other areas.

Did farmers store fertilizer on farm?

Sixty-two out of 463 farmers, or 13 per cent, reported storing some fertilizer on the farm. In almost all cases, storing was not planned nor intentional. It was simply the case of fertilizer being "left over" above needs at a given time. That stored on the farm was for a period averaging 292 days.

In what kinds of buildings was fertilizer stored on farm?

With exception of four, all farmers who stored fertilizer in 1957 said that they kept their carryover in a frame building; 19 per cent of them reported storage having dirt floors, whereas

77 per cent said storage had wood floors. All farmers holding over fertilizer on dirt floors reported fertilizer in an unsatisfactory condition after storage, while those who used wood-floor storage reported satisfactory condition of the held-over fertilizer. Only two farmers reported storage on a concrete floor. Caking in bags and deterioration of bags were reasons given for unsatisfactory storage of fertilizer on dirt floors.

How much fertilizer storage space⁵ did farmers have?

Almost three-fourths of the farmers reported storage space for fertilizer. The average amount reported by these farmers was 465 square feet. Assuming that fertilizer bags are stacked five high, such space would accommodate about 58 tons of fertilizer, which is considerably more than the average amount bought in 1957.

Was there a price incentive for off-season purchases to encourage farm storage?

Based on data from 41 fertilizer dealers, only 4 gave a discount for off-season purchases. Also, apparently very few farmers bought fertilizers at the end of their tax year in order to get additional cash expenses under the cash basis of filing income tax returns.

How many days prior to planting in spring and fall did farmers purchase and receive fertilizer delivery?

As an average, farmers bought fertilizer 19 days before planting and received delivery 8 days prior to spring planting. In the fall, average buying was 10 days before planting and delivery was 5 days before the planting date.

USE of CREDIT for FERTILIZER PURCHASES

What proportion of farmers used credit⁶ to buy fertilizer in 1957?

Fifty-eight per cent, or 268 out of 463 farmers as shown in next table, borrowed funds to buy fertilizer in the spring of 1957. In the Black Belt Area, where the percentage of tenant farmers was greatest, the largest proportion borrowed to buy

⁵ The question on fertilizer storage space was asked in terms of suitable facilities available. Farmers estimated this amount of storage space.

⁶ Purchases on 30-day accounts were not considered in the credit category.

fertilizer. The area in which the smallest percentage borrowed was the Piedmont.

Based on estimates of the cost of fertilizer purchased in the spring and the amount borrowed, 46 per cent of the dollar cost of purchases was on a credit basis. Of the farmers who borrowed, three-fourths obtained loans equal to or greater than the cost of spring fertilizer purchased. One-fourth borrowed less than the cost of fertilizer purchased. For farmers using credit, the amount borrowed for fertilizer purchases averaged 84 per cent of the cost of fertilizer they bought in the spring of 1957.

Only three farmers reported use of credit for fall purchases of fertilizer. Apparently farmers finance fall fertilizer purchases out of receipts from the sale of crops.

<i>Farming area</i>	<i>Percentage of farmers who used credit for spring fertilizer purchases, 1957</i>
Tennessee Valley.....	55
Sand Mountain.....	38
Limestone Valleys.....	43
Upper Coastal Plain.....	62
Piedmont.....	34
Black Belt.....	95
Lower Coastal Plain (West).....	56
Lower Coastal Plain (East).....	71
STATE.....	58

How much money did farmers borrow for fertilizer purchases in spring of 1957?

Sixty-eight per cent of the farmers borrowed less than \$1,000 and only 9 per cent borrowed \$2,000 or more, Table 12. Eleven

TABLE 12. PERCENTAGE OF FARMERS WHO BORROWED VARIOUS AMOUNTS TO PURCHASE FERTILIZER IN THE SPRING OF 1957, 268 FARMS, BY FARMING AREAS, ALABAMA, 1957

Farming area	Amount borrowed				
	Less than \$1,000 to \$2,000 to \$4,000				Not reported
	\$1,000	\$1,999	\$3,999	and over	
	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>
Tennessee Valley.....	69	17	3	3	8
Sand Mountain.....	68	32	0	0	0
Limestone Valleys.....	81	15	0	4	0
Upper Coastal Plain.....	72	8	0	0	20
Piedmont.....	90	0	10	0	0
Black Belt.....	62	2	4	7	25
Lower Coastal Plain (West).....	85	3	3	6	3
Lower Coastal Plain (East).....	45	22	21	5	7
STATE.....	68	12	5	4	11

per cent did not report the amount borrowed. The borrowed amount in many cases was used not only for fertilizer but for purchases of seed and certain other items. The major portion of the borrowed amount was used to purchase fertilizer.

From what sources did farmers obtain credit for fertilizer purchases?

Commercial banks were the source of credit for 38 per cent of the farmers, Table 13. Fertilizer dealers and landlords were the next two most important sources.

TABLE 13. PERCENTAGE OF FARMERS REPORTING VARIOUS SOURCES OF CREDIT FOR FERTILIZER PURCHASES, 268 FARMS, BY FARMING AREAS, ALABAMA, 1957

Farming area	Source of credit						
	Com- mercial bank	Ferti- lizer dealer	Land- lord	PCA ¹	FHA ²	Indi- vidual ³	Other
	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>
Tennessee Valley.....	58	22	3	14	3	0	0
Sand Mountain.....	48	24	0	12	8	4	4
Limestone Valleys.....	27	46	11	0	12	4	0
Upper Coastal Plain.....	33	33	10	6	10	8	0
Piedmont.....	20	40	40	0	0	0	0
Black Belt.....	18	27	53	0	0	2	0
Lower Coastal Plain (West).....	62	20	15	3	0	0	0
Lower Coastal Plain (East).....	38	10	16	24	2	5	5
STATE.....	38	26	20	8	4	3	1

¹ Production Credit Association.

² Farmers Home Administration.

³ Individual other than landlord.

What other sources of fertilizer credit did farmers know and would consider using?

More than half, 59 per cent, said they knew of no other sources of credit they would consider using. Besides those used, known sources that farmers would consider using were most frequently reported as commercial banks and fertilizer dealers.

Why did farmers use particular sources of credit?

Many reasons were given in response to this question. However, the most important was past use, tradition, or habit in using a given source of credit. Other reasons, given, in order of importance, were: "felt obligated to landlord," "low interest rate," "convenient," "only source available," and "fair and just treatment."

What annual interest rate did farmers pay on fertilizer loans?

The annual rate of interest paid varied with source of funds and prevailing rate in local areas. Farmers who borrowed from landlords paid the highest average annual rate of interest, Table 14. Financing tenants by landlords was frequent in the Black Belt Area. In that area not only was a relatively high rate of interest paid by tenants to landlords, but interest rates paid to other suppliers of credit were also relatively high.

TABLE 14. RANGE AND AVERAGE ANNUAL RATE OF INTEREST PAID ON FERTILIZER LOANS ACCORDING TO SOURCE OF CREDIT, 206 FARMS, ALABAMA, 1957

Source of credit	Farms	Annual interest rate paid	
		Range	Average
	<i>No.</i>	<i>Pct.</i>	<i>Pct.</i>
Landlord.....	28	0-48	11.1
Commercial bank.....	90	6-19	7.3
Fertilizer dealer.....	48	0-18	6.3 ¹
Production Credit Association.....	20	3-6 ²	6.0
Individual other than landlord.....	7	0-14	5.6
Farmers Home Administration.....	10	4-6	4.9
Other.....	3	-----	7.0

¹ In calculating rate of interest paid, the principal amount borrowed was based on the credit price for fertilizer, which was somewhat higher than the cash price.

² The 3 per cent considers the dividends received on stock.

The rate of interest, in most cases, was calculated from information supplied by farmers. This included the amount borrowed, date borrowed and date repaid, amount paid as interest, or the rate of interest, and the type of loan. Many farmers did not know the annual rate of interest they were paying.

Fourteen farmers obtained a discounted loan, or one in which interest was deducted in advance. As a result, the interest rate paid was higher than the stated rate. This is reflected in the interest rates as shown in Table 14.

What security was used by farmers in obtaining fertilizer loans?

The security used included unsecured notes, crop notes, chattel mortgages, and real estate mortgages. Twenty-five per cent of the 268 farmers who borrowed money for fertilizer indicated that no security was required by the lender. Forty-five per cent reported a chattel mortgage, 21 per cent a crop note, 5 per cent a real estate mortgage, and 4 per cent an unsecured note.

Did terms of credit for fertilizer loans differ from those prevailing for other production items?

No. Credit terms and practices were reported to be the same whether the loan was for purchasing fertilizer or other production items such as seed and insecticides. Actually most loans were production loans and a major portion of the funds was used for fertilizer purchases.

What sources of income were used to repay fertilizer loans?

Receipts from the sale of crops were reported by 72 per cent of the farmers who borrowed as the source of funds for repayment of fertilizer loans. Receipts from sales of livestock and livestock products as well as Soil Bank payments were also reported used for repayment of loans. Only 5 per cent reported income from off-farm work used to repay fertilizer loans.

ECONOMIC CONSIDERATIONS**How do farmers decide on the grade and amount of fertilizer to use per acre?**

Apparently tradition plays a big part in the decision as to grade and amount of fertilizer to use. Farmers were asked how they decided on the grade of fertilizer to use. Fifty-three per cent replied that they made the decision as to grade on the basis of past grades used. In other words, they continued to use the same grades if past results had been satisfactory. Twelve per cent of the farmers mentioned general recommendations in connection with deciding on a grade to use and 7 per cent mentioned soil tests. Other factors mentioned were "grade neighbor uses," "grade dealer recommends," "grade landlord recommends," and "cheapest grade per ton."

Answers to the question on amount of fertilizer to use were similar to those for grade. A higher percentage (71 per cent) however, said that the amount of fertilizer used depended on past experience. In addition to the foregoing replies, a few farmers mentioned credit or funds available for fertilizer purchases as a factor influencing the amount of fertilizer used.

What costs do farmers consider when purchasing fertilizer?

Although cost was not a factor that farmers voluntarily reported as being important in making fertilizer decisions, th

were asked if they considered cost in deciding on the grade and amount of fertilizer to use. If the answer was affirmative, farmers were asked what cost they considered. The costs were grouped as follows: per ton, per pound of plant food, per bag, or additional cost relative to expected additional return from use of more fertilizer.

Fifty per cent of the farmers indicated they considered cost of fertilizer in deciding on grade and amount to buy. When asked what cost they considered, 64 per cent said "cost per ton." Twenty-seven per cent said they considered cost per pound of plant nutrients. Only 5 per cent considered cost per bag and 4 per cent the additional cost relative to expected additional return from use of added amounts of fertilizer. The cost per bag is obviously the same basis as cost per ton.

The total pounds of plant nutrients that farmers buy depend on the level of fertilization, acreage of crops fertilized, and many other factors. The decision as to amount of fertilizer to apply to a given crop also depends on several things. If the additional return (additional production \times price per pound, per bushel, etc.) is equal to or greater than the additional cost of fertilizer applied, it would be profitable to apply more fertilizer. Possibly more farmers make the decision as to amount of fertilizer to use on the basis described than is reflected in answer to the question on what cost they considered.

Also, involved in this question was farmer's recognition of cost per pound of plant nutrients. It appears that farmers are influenced most by price per ton. Very few figure the actual cost per pound of N, P_2O_5 , and K_2O that they get in mixed fertilizers or the cost of a single nutrient in straight goods. After calculating the cost per pound of plant nutrients, one has the basis for deciding among several grades or kinds of fertilizer to buy.

Did farmers recognize the influence of changing prices received and costs on level of fertilizer used?

No. A majority of farmers did not. Farmers were given three alternative answers to the question: "If the price received for a crop increased and the cost of fertilizer remained the same, what would you do?" Less than half the farmers said they would apply more fertilizer per acre. Fifty per cent said they would make no change in amount of fertilizer used, and 2 per cent said they would apply less fertilizer.

On what crops did farmers report that higher rates of fertilization would pay?

Although a majority of farmers did not recognize the influence of prices received and costs on level of fertilization, slightly more than 60 per cent were of the opinion that additional fertilizer would pay on cotton and corn. Seventy per cent or more indicated that additional fertilizer would pay on small grain, temporary pasture, and permanent pasture.

Did farmers check fertilizer prices at more than one place before buying?

Yes; 236, or 51 per cent, reported checking fertilizer prices at more than one place prior to buying. The highest percentage of farmers who checked prices at more than one place was in the Lower Coastal Plain Area (East) and the lowest percentage was in the Black Belt Area. Thirty-five per cent of the farmers in the State who inquired about fertilizer prices before buying checked at two places, 33 per cent at three places, 24 per cent at four places, 7 per cent at more than four places, and 1 per cent did not report the number.

What difference was found in cash and credit prices for fertilizer in 1957?

Fifty-three per cent of the farmers who checked fertilizer prices found a difference in the cash and credit prices in 1957. The average difference was \$2.00 per ton in favor of the cash payment. Dealers who made credit sales charged the credit price per ton in addition to interest.

CONCLUSIONS and RECOMMENDATIONS

As an average, farmers are doing a better job of fertilizing cotton than corn or hay and pasture crops. This is partly attributable to cotton being recognized as a cash crop and a direct source of income. To a large extent on Alabama farms corn, hay, and pasture crops must be utilized by livestock to produce income. The outcome depends not only on production and utilization of these crops but also on many other livestock management factors. In both research and educational programs, additional emphasis needs to be placed on the role of fertilizers in producing feed and pasture crops and the economics involved. Farmers desire to know the conditions under which profits

be made by producing and utilizing corn, hay, and pasture crops. They also want to know the level of profit that can be expected with various systems of using these crops.

A relatively small percentage of farmers have used high analysis mixed fertilizers. Of those who have used a high analysis fertilizer, a majority favored it over regular grades, primarily because it contained more plant nutrients per bag. A number of farmers preferred high analysis fertilizers for hay and pasture crops but not for row crops because they had difficulty in obtaining good stands when high analysis fertilizer was used. Dealers and agricultural workers should better inform farmers about the place and proper use of high analysis fertilizer. The study showed the fertilizer dealer to be the most important source of information to farmers on new fertilizers.

Fertilizer manufacturers and dealers need to consider more widespread use and emphasis on packaging fertilizer in 50-pound bags. Twenty-eight per cent of the farmers expressed a preference for this bag size. This preference is significant in view of a larger proportion of farmers in age groups of 55 or over than was true a few years ago. Also, the prominence of part-time farming and the use of fertilizers on lawns, flowers, and gardens by urban residents cannot be overlooked.

Lack of credit does not appear to be a problem in connection with fertilizer use. However, farmers do not recognize the various sources of credit available to them. Apparently they do not weigh the costs of credit from various sources but rely on sources that they have previously used. This is an acute problem among tenants. It is related to a low formal education level of the farm operator and associated factors. Greater emphasis in research and extension teaching should be placed on the role of credit and the wise use of credit in financing modern farming operations.

Tradition and habit play a major part in farmers' decisions on grade and amount of fertilizer to use. Those who consider cost are guided in their decision primarily by cost per ton rather than cost per pound of plant nutrients. A majority of farmers do not think in terms of how much they will get back from using additional amounts of fertilizer on a given crop. They do not recognize the influence of changing prices received and costs on level of fertilizer use. There is a dire need for vastly better informed Alabama farmers relative to the economics of fertilizer use.

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