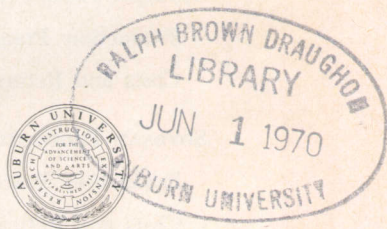


BULLETIN 401

MAY 1970

COSTS and RETURNS
of Producing
SOYBEANS in ALABAMA



Agricultural Experiment Station
AUBURN UNIVERSITY

E. V. SMITH, *Director/Auburn, Alabama*

CONTENTS

	<i>Page</i>
INTRODUCTION.....	3
METHOD OF STUDY.....	5
Selection of Sample.....	5
Cost Procedure.....	5
DESCRIPTION OF FARMS.....	6
Crop Enterprises.....	6
SOYBEAN PRODUCTION IN THE SOUTHEASTERN AREA.....	7
Production Practices.....	7
Costs and Returns.....	10
SOYBEAN PRODUCTION IN THE SOUTHWESTERN AREA.....	15
Production Practices.....	15
Costs and Returns.....	18
SOYBEAN PRODUCTION IN THE BLACK BELT AREA.....	22
Production Practices.....	23
Costs and Returns.....	24
SOYBEAN PRODUCTION IN THE NORTHEASTERN AREA.....	29
Production Practices.....	30
Costs and Returns.....	31
SUMMARY.....	36
APPENDIX.....	40

FIRST PRINTING 3M, MAY 1970

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COSTS and RETURNS of Producing SOYBEANS in ALABAMA*

SIDNEY C. BELL, *Associate Professor of Agricultural Economics*

BRUCE H. WARD, *Former Graduate Research Assistant*

INTRODUCTION

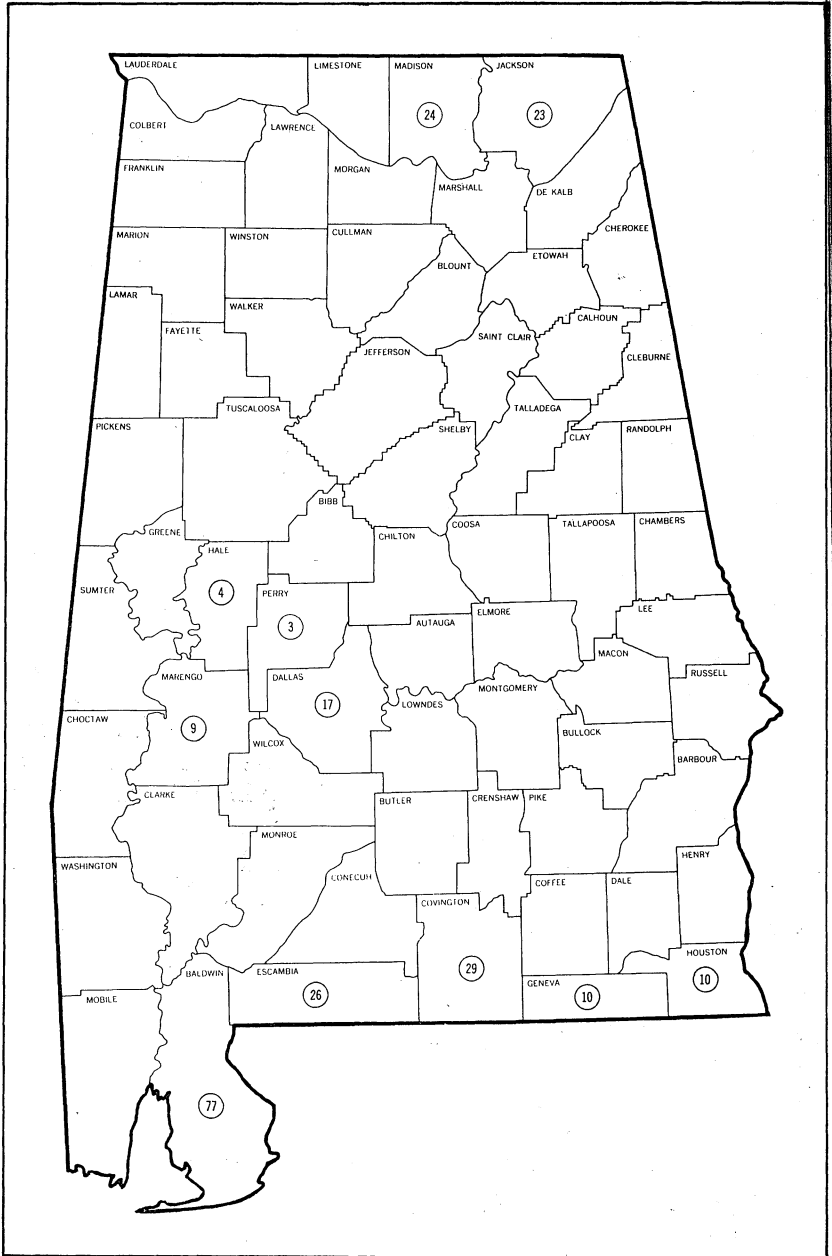
THE SOYBEAN is not a new crop in Alabama but has recently become established as a major cash crop. The first commercial acreage, 3,000 acres, was harvested in 1924.

In the 10-year period (1958-1967) acreage of soybeans increased 266 per cent, from 130,000 acres in 1958 to 484,000 in 1967. Total value of the crop during the same period increased from \$4.9 million to \$30.7 million, an increase of more than 500 per cent. In 1967, corn was the only row crop in Alabama planted to more acres than soybeans.

Data on types and acreage of crops being reduced are necessary in any projection on the future of Alabama agriculture. The primary objectives of this study were:

1. To ascertain why farmers are expanding production of soybeans and what crops are being replaced by soybeans.
2. To determine the physical and dollar value inputs (cost) used in producing soybeans in four producing areas.
3. To determine the effect of size of enterprise and selected production practices on yields and net returns.
4. To determine the returns (profit) for producing soybeans in four producing areas of Alabama.

* This study was conducted under Hatch research project Ala-256 and supported by Hatch and State funds. Appreciation is expressed to the 231 farmers who supplied information for this study.



Counties sampled and number of farms included in sample.

METHOD OF STUDY

Selection of Sample

Areas covered in this study were: the southeastern area including Houston, Geneva, and Covington counties; the southwestern area including Escambia and Baldwin; the Black Belt area including Dallas, Marengo, Hale, and Perry; and the northeastern area including Madison and Jackson counties, see Figure. These four areas grew about two-thirds of the total soybean acreage in 1966.

An area probability sampling technique was used to select farms in each county. The number of farmers included in the sample was based on the number of soybean producers and the number of acres of soybeans grown in the sample area in 1966. A minimum number of 30 producers was selected for each area. The number of soybean producers sampled in each county was based on the county's proportionate share of the total acreage for the area in which the county was located.

Both cost and physical input data were based on the 1966 crop. Two hundred and thirty-two usable questionnaires were obtained by means of personal interviews. Forty-nine questionnaires were taken in the southeastern area, 103 in the southwestern area, 33 in the Black Belt area, and 47 in the northeastern area.

Cost Procedures

Few farmers interviewed kept detailed records whereby machinery use for the soybean enterprise could be determined. Since most machinery used in producing soybeans was also used in producing other crops, it was not possible to get the actual hours each machine was used in producing soybeans on each farm. In calculating machinery cost, hours of annual use for each machine were assumed to be the number of hours annually required for the wear-out life to equal the obsolescence life, Appendix Table 1. Costs per hour for operation of the different farm machines used were based on data in Appendix Table 2. The time requirements for performing different operations involving machinery were based on time requirements given by farmers or on the estimated time requirement given in the Virginia machinery cost study.

Costs of seed, inoculant, fertilizer, insecticide, and custom work were obtained from farmers interviewed. These costs were actual costs paid by the farmer. Items the farmer did not purchase, such as seed, were charged at the price the farmer reported that he would have had to pay had that item been purchased.

Hauling cost was charged at \$.003 per bushel per mile. This cost was based on the use of a one and one-half ton truck used to carry 150 bushels. This type truck was used by most farmers.

Interest on operating capital was charged at 6 per cent per annum for a 6-month period. The amount of operating capital required was obtained by adding material costs to variable machinery costs.

DESCRIPTION OF FARMS

Crop Enterprises

The 231 farms sampled were primarily row crop farms. Some crops grown in addition to soybeans were corn, cotton, small grains, peanuts, potatoes, and truck crops. The number of farms, acreages, and yields by crops are shown in Appendix Table 3. Corn was the most popular crop followed by small grains and cotton.

Acreage of soybeans per farm was approximately 184 with the Black Belt area averaging 320 acres; the southwestern, 190 acres; the northeastern, 162 acres; and the southeastern, approximately 100 acres. The southwestern had the highest yields followed by the northeastern, the Black Belt, and the southeastern. The yield of the various crops indicated these farmers were probably above average for Alabama.

Many farmers interviewed were planning to increase soybean acreage. This was especially true in two fairly new areas of production, the southeastern and the Black Belt. The number of farmers planning to increase soybean acreage and reasons for increasing are shown in Appendix Table 4. There were 37 of 49 farmers in the southeastern area planning to increase and 28 out of 33 in the Black Belt planning to increase. A more profitable crop and ability to double crop were the most popular reasons given for planning to increase acreage.

The crop, and its fertilization, planted prior to soybeans in many cases affects the yield of the soybean crop. Therefore data were collected on the crop planted prior to planting soybeans. The prior crop planted and its fertilization rate plus other data and the average yield of soybeans are shown in Appendix Table 5. These data indicated very little correlation between the prior crop to soybeans and the yield of soybeans.

The date of planting usually affects the yield of soybeans, especially if the planting season is extended to the first of July. The planting date with average yield and other selected factors are shown in Appendix Table 6. Based on these data, soybeans planted on recommended planting dates had the highest yield in all areas. Ability to plant late and still get reasonably good yields is one of the major advantages of the soybean crop.

Another advantage is less labor required than for many other crops. There was an increased efficiency in labor use as soybean acreages increased because the average number of hours of labor required per acre decreased in almost every instance, Appendix Table 7. The average number of labor hours for all farms was approximately 3.2 hours.

Corn and cotton were crops reduced to expand soybean production. A major exception to this was the Black Belt area where most increased soybean acreage resulted from permanent pastures converted into soybean production.

SOYBEAN PRODUCTION IN THE SOUTHEASTERN AREA

Farmers in this area had from 1 to 21 years experience growing soybeans with a mean of 4.5 years. All but 10 of the farmers had been growing soybeans 5 years or less.

Production Practices

Cropping Systems

Soybeans were commonly grown in this area as both a single and double crop. The double-cropped soybeans were usually planted following small grains harvested for grain.

Varieties

Soybean varieties recommended for southern Alabama were Bragg, Jackson, and Hampton. The varieties planted and the average yields obtained were as follows:

<i>Variety</i>	<i>Average yield per acre in bushels</i>	<i>Number of farms</i>
Hampton.....	25.6	39
Bragg.....	24.8	14
Jackson.....	22.0	4
Hood.....	20.0	1
Ogden.....	17.5	1

Hampton was by far the most popular variety and also had the highest average yield indicating popularity of the variety was related directly with average yield. Bragg was especially popular as a second variety among farmers who had a large acreage because it has an earlier maturity date than Hampton. By planting two varieties, Hampton and Bragg, farmers were able to spread their harvest season over a longer period.

SEEDING RATE. The seeding rate on farms in the sample ranged from 50 to 120 pounds per acre or from 0.8 to 2.0 bushels per acre. All farmers, except five, planted between 0.8 and 1.3 bushels of seed per acre. These five farmers planted a higher rate, from 1.4 to 2.0 bushels of seed per acre.

TYPE OF SEED. It was not possible to determine the quality of soybean seed planted, but farmers were asked whether their seed were registered, certified, or non-certified. Eighty-four per cent of the farmers reported using certified seed, 10 per cent using non-certified, and 6 per cent reported using registered seed.

FERTILIZATION. The average amount of fertilizer applied per acre was 16 pounds of N, 18 pounds of P, and 38 pounds of K. There were only four farmers in this area who did not use any fertilizer for their soybeans. These farmers felt that the residual fertilizer from the previous crop was sufficient to provide adequate nutrients for producing a good yielding crop.

There were 17 farmers who broadcast and 28 who used row application of fertilizer. Four farmers did not apply any fertilizer. Soybean yields by type of fertilizer application were: broadcast 23.2 bushels per acre, drilled in row 27.1 bushels, and no fertilizer, 27.7 bushels.

Weed Control

MECHANICAL. All growers except three cultivated soybeans one or more times; 12 per cent cultivated soybeans once; 68 per cent cultivated twice; 14 per cent cultivated 3 times; and the remaining 6 per cent did not cultivate. The overall average was 1.9 cultivations.

CHEMICAL. Twenty per cent of the farmers used a preemergence herbicide. Nine of 10 farmers using a herbicide used trifluralin and one used vernolate. Three farmers used a band treatment and seven farmers broadcast. The average per acre cost for

preemergence material was \$6.33. Farmers who used chemical weed control had an average yield of 26.7 bushels per acre while those who did not use chemical weed control averaged 25.5 bushels per acre.

HAND. Only one farmer reported using hand weed control. Better mechanical and chemical methods of controlling weeds and a shortage of hand labor were reported as primary reasons for not using hand labor.

Insect Control

Farmers did not report any insect damage to stands. The foliage feeders were reported most frequently as causing damage in the early season. During the latter part of the season, pod and foliage feeding insects were reported with about equal frequency.

Approximately 90 per cent of the insecticides were applied with an airplane on a custom basis. Those applying insecticides with ground rigs used either a tractor sprayer or a high clearance sprayer.

The number of insecticide applications was positively correlated with yield. The number of insecticide applications and average yields were as follows:

<i>Number of insecticide applications</i>	<i>Av. yield per acre in bushels</i>	<i>Number of farms</i>
0.....	23.0	25
1.....	27.5	24
2.....	30.7	8
3.....	36.3	2

Harvest

The labor required for soybean harvest is substantially less than for most other crops. Twenty-four per cent of the farmers who combined their own beans used only one man in the harvest operation and the remaining 76 per cent used two men. None of the farmers reported using any seasonal hired labor in the harvest operation.

Fifty-one per cent of the farmers were owners or part owners of their combines. Ten per cent were share owners and the remaining 41 per cent were sole owners. Sixteen per cent of the combines owned were pull type and the remainder were self-propelled models. Farmers not owning combines paid an average of \$6.74 per acre to get their beans harvested.

Costs and Returns

Since the production practices farmers follow in producing soybeans do not fluctuate very much from year to year, the cost of producing an acre of soybeans will not change greatly from year to year. Even though prices of inputs and methods of producing the crop change, costs are much more stable than gross returns. Yield is influenced by climatic conditions, price is influenced by market conditions and both may fluctuate from year to year.

Gross Returns

Gross returns for soybeans, which were affected by yield and price changes, averaged \$72.18 per acre in 1966. Yield averaged 25.8 bushels per acre and price averaged \$2.79 per bushel. The sample year, 1966, was a good year for both yield and price.

Net Returns

The average net returns to land, labor, and management was \$41.33 per acre. This figure does not reflect any charge for land or labor. If land is charged at the average cash rent of \$9.26 per acre, this leaves a return to labor and management of \$32.07 per acre. Using a labor charge of \$1.60 per hour for an average of 3.13 hours, the total labor charge is \$5.01. This leaves an average return to management of \$27.06. A \$.50 per bushel lower price would reduce this to \$14.16 per acre.

Costs

The machinery and materials costs averaged \$30.15 per acre for all farms. The costs were determined by the price and quantity of inputs that were used in soybean production. The average costs per acre for materials were as follows:

<i>Material</i>	<i>Costs per acre</i>
Seed.....	\$ 5.26
Fertilizer.....	7.26
Lime.....	1.60
Herbicide.....	1.54
Insecticide.....	1.14
Inoculant.....	.21
Total for materials.....	\$17.01

The average machinery costs per acre, including machinery hired, are shown in Table I.

TABLE 1. TOTAL, VARIABLE, AND FIXED MACHINERY COSTS BY OPERATION, SOUTHEASTERN ALABAMA, 1966

Operation	Total cost	Variable cost	Fixed cost
	<i>Dol.</i>	<i>Dol.</i>	<i>Dol.</i>
Land preparation.....	2.79	1.67	1.12
Planting.....	1.31	.75	.56
Cultivating.....	1.22	.61	.61
Insecticide application.....	.76	.76	---
Combining.....	4.82	1.93	2.89
Hauling.....	2.04	.67	1.37
Other ¹.....	.20	.10	.10
Total.....	13.14	6.49	6.65

¹ Broadcasting fertilizer and applying herbicide as an operation separate from land preparation.

Effects of Size of Enterprise

For this analysis all records of this area were sorted into three groups based on acreage of soybean enterprise. The differences in costs and returns by size of the soybean enterprise are shown in Tables 2 and 3.

As size of enterprise increased yield per acre increased; price per bushel increased; gross returns increased; total cost per acre was almost constant; and net returns increased. While total cost per acre remained almost constant, there were noticeable differences in some of the individual cost items. As size of enterprise increased land preparation cost decreased; planting cost decreased; combining cost decreased; and hauling cost increased, Table 3.

The difference in returns to land, labor, and management between the small size group with a return of \$35.39 per acre and the large size group with a return of \$47.94 indicates that economies of size exist in the production of soybeans. The returns to land, labor, and management for the largest one-third of farms were 35 per cent higher than for the smallest one-third of farms. Another important difference was that the average price received by the largest size group was 10 per cent higher than that received by the smallest size group, while yield of the large size group was 8.4 per cent higher.

The middle size group had the highest material cost, Table 2, but also had the lowest machinery cost of the three groups. Under material cost the middle group paid more for seed and fertilizer than either of the other two groups but paid substantially less for insecticides.

TABLE 2. AVERAGE COSTS AND RETURNS FOR SOYBEAN PRODUCER GROUPS BY SIZE OF ENTERPRISE, SOUTHEASTERN ALABAMA, 1966

Item	Acreage range		
	Less than 35 (small)	35-99 (middle)	More than 99 (large)
No. of farms.....	16	18	15
Av. acreage of soybeans/farm.....	21	61	230
Av. yield per acre in bushels.....	24.9	25.4	27.0
Av. price per bushel (<i>Dol.</i>).....	2.64	2.84	2.93
Av. gross receipts (<i>Dol./acre</i>).....	65.74	72.14	79.11
Variable costs (<i>Dol.</i>)			
Material			
Seed.....	4.90	5.74	5.08
Fertilizer.....	6.50	8.33	6.80
Lime.....	1.60	1.60	1.60
Herbicide.....	1.55	1.72	1.32
Insecticide.....	1.19	.63	1.68
Inoculant.....	.26	.21	.29
Total material cost (<i>Dol.</i>).....	16.00	18.26	16.77
Variable machinery cost (<i>Dol.</i>).....	6.94	5.90	6.66
Total variable costs (<i>Dol.</i>).....	22.94	24.16	23.44
Other costs (<i>Dol.</i>)			
Interest on operating capital ¹.....	.69	.72	.70
Fixed machinery cost.....	6.72	6.24	7.04
Land cost ²	9.26	9.26	9.26
Labor cost ³	5.84	4.66	4.56
All costs.....	45.45	45.11	44.99
Returns to land, labor, and mgt. (<i>Dol.</i>).....	35.39	41.04	47.94
Returns to labor and mgt. (<i>Dol.</i>).....	26.13	31.78	38.68
Returns to management (<i>Dol.</i>).....	20.29	27.12	34.12

¹ Variable cost at 6 per cent per annum for 6 months.

² Land cost charged at average cash rent.

³ Labor charged at \$1.60 per hour.

TABLE 3. AVERAGE MACHINERY COSTS FOR SOYBEAN PRODUCERS BY OPERATION AND SIZE OF ENTERPRISE, SOUTHEASTERN ALABAMA, 1966

Operation	Acreage range		
	Less than 35 (small)	35-99 (middle)	More than 99 (large)
	<i>Dol.</i>	<i>Dol.</i>	<i>Dol.</i>
Land preparation.....	3.46	2.68	2.21
Planting.....	1.45	1.39	1.07
Cultivation.....	1.23	1.16	1.25
Insecticide application.....	.80	.42	1.12
Combining.....	5.27	4.88	4.27
Hauling.....	1.28	1.54	3.53
Other ¹.....	.17	.07	.25
Total.....	13.66	12.14	13.70

¹ Broadcasting fertilizer and applying herbicide as an operation apart from land preparation.

Variations Among Producer Groups

Variations in yields, returns, and costs were evident among individual producers. To determine the outstanding characteristics of the operations carried on at various levels of income, the data were sorted into three groups on the basis of net returns to land, labor, and management. These groups were designated as low, mid, and high producer groups, Table 4.

An examination of the data obtained for the three producer groups indicated that yields, prices, cost, and size of soybean enterprise influenced net returns. The high income group obtained higher yields and received higher prices, with only a very slight increase in material and machinery cost. The cost per bushel of

TABLE 4. COSTS AND RETURNS FOR SOYBEAN PRODUCERS BY RETURNS TO LAND, LABOR, AND MANAGEMENT, SOUTHEASTERN ALABAMA, 1966

Item	All producers	Producer groups ⁴		
		Low	Mid	High
No. of farms	49	16	17	16
Av. acreage of soybeans/farm	100	60	81	159
Av. yield per acre in bushels	25.8	17.2	25.4	34.7
Per acre				
Gross returns (<i>Dol.</i>)	72.18	46.74	71.45	98.36
Fixed machinery cost (<i>Dol.</i>)	6.65	5.99	7.29	6.64
Total variable cost (<i>Dol.</i>)	23.50	23.05	23.13	24.34
Interest on operating capital ¹ (<i>Dol.</i>)	.70	.69	.69	.73
Land cost ² (<i>Dol.</i>)	9.26	9.26	9.26	9.26
Labor cost ³ (<i>Dol.</i>)	5.01	4.74	5.42	4.86
All costs (<i>Dol.</i>)	45.12	43.73	45.79	45.83
Returns to land, labor, and mgt. (<i>Dol.</i>)	41.33	17.01	40.34	66.65
Returns to labor and mgt. (<i>Dol.</i>)	32.07	7.75	31.08	57.39
Returns to management (<i>Dol.</i>)	27.06	3.01	25.66	52.53
Per bushel				
Gross returns (price) (<i>Dol.</i>)	2.79	2.72	2.81	2.83
Fixed machinery cost (<i>Dol.</i>)	.26	.35	.29	.19
Total variable cost (<i>Dol.</i>)	.91	1.34	.91	.70
Interest on operating capital ¹ (<i>Dol.</i>)	.03	.04	.03	.02
Land cost ² (<i>Dol.</i>)	.36	.54	.36	.27
Labor cost ³ (<i>Dol.</i>)	.19	.28	.21	.14
All costs (<i>Dol.</i>)	1.75	2.55	1.80	1.32
Returns to land, labor, and mgt. (<i>Dol.</i>)	1.59	.99	1.59	1.92
Returns to labor and mgt. (<i>Dol.</i>)	1.23	.45	1.22	1.65
Returns to management (<i>Dol.</i>)	1.04	.17	1.01	1.51

¹ Charged at 6 per cent of variable cost for 6 months.

² Land was charged at average cash rent.

³ Labor was charged at \$1.60 per hour.

⁴ Based on net returns to land, labor, and management.

output for the high income group was only about half that of the low income group and considerably lower than the mid income group. The returns per bushel to labor and management for the high income group was 3.7 times as much as for the low group. Returns to management for the high income group averaged \$52.53 per acre as compared to \$3.01 per acre for the low income producers. On a per bushel basis, net returns to management ranged from \$1.51 for the high income group to \$.17 for the low income group while the mid income group averaged \$1.01.

When considering all costs on a per acre basis the average for all farms was \$45.12 with a range from \$43.73 for the low income group to \$45.83 per acre for the high income group. While cost per acre varied very little, cost per bushel varied from \$2.55 for the low income group to \$1.32 for the high income group. The mid income group had a cost per bushel of \$1.80. These con-

TABLE 5. AVERAGE MATERIAL AND MACHINERY COSTS FOR SOYBEAN PRODUCER GROUPS, BY RETURNS TO LAND, LABOR, AND MANAGEMENT, SOUTHEASTERN ALABAMA, 1966

Item	Producer group ²		
	Low	Mid	High
No. of farms.....	16	17	16
Av. acreage per farm.....	60	81	159
Av. yield per acre in bushels.....	17.2	25.4	34.7
	<i>Costs per acre</i>		
Material cost (<i>Dol.</i>)			
Seed.....	5.80	5.05	4.95
Fertilizer.....	7.29	7.00	7.50
Lime.....	1.60	1.60	1.60
Herbicide.....	2.23	1.16	1.25
Insecticide.....	.32	1.28	1.84
Inoculant.....	.26	.15	.21
Total for materials (<i>Dol.</i>).....	17.50	16.24	17.35
Machinery cost (<i>Dol.</i>)			
Land preparation.....	2.66	2.83	2.86
Planting.....	1.23	1.33	1.38
Cultivating.....	1.11	1.17	1.25
Insecticide application.....	.21	.85	1.21
Combining.....	4.75	4.91	4.82
Hauling.....	1.26	2.97	1.95
Other ¹.....	.32	.12	.16
Total machinery costs (<i>Dol.</i>).....	11.54	14.18	13.63
Total machinery and materials costs (<i>Dol.</i>).....	29.04	30.42	30.98

¹ Cost of broadcasting fertilizer and applying herbicide as an operation separate from land preparation.

² Based on returns to land, labor, and management.

siderable differences were mainly a result of large differences in yield of the three income groups.

Although the total cost per acre varied very little, there was some variation in machinery and material costs among the income groups, Table 5. The low income group spent more on material inputs and less on machinery inputs than either of the other two groups. The average amount paid for seed decreased and the amount spent on insecticides increased substantially from the low income group to the high income group.

Machinery cost was highest for the mid income group mainly because of substantially higher hauling costs. From the low income group to the high income group the average cost of land preparation, planting, cultivating, and insecticide application increased. These are strong indications that better management through better land preparation, more careful planting, more intensive cultivation, and better insect control increased yield and thus net returns.

SOYBEAN PRODUCTION IN THE SOUTHWESTERN AREA

Farmers in this area had produced soybeans from 2 to 35 years with an average of 16.9 years. Sixty-eight per cent had grown soybeans 15 years or longer.

Production Practices

Cropping Systems

Soybeans are commonly grown in this area as both a single and double crop. The double-cropped soybeans were grown in rotation with potatoes, small grain, or vegetable crops.

The highest soybean yields in this area were made when soybeans were planted after potatoes and permanent pasture. Soybeans grown on cropland that was idle the year previous had the lowest average yield. Potatoes and small grain were two of the most popular previous crops and soybeans grown following these crops had a higher yield than the average for the area. This indicated one advantage of using soybeans in a double cropping system in this area. The complementary relationship between these crops makes a double cropping system quite profitable.

Varieties

Soybean varieties recommended for this area were Bragg, Jackson, and Hampton. The varieties planted, yields of each variety, and the number of farmers producing each variety were as follows:

<i>Variety</i>	<i>Av. yield per acre in bushels</i>	<i>Number of farmers</i>
Lee.....	38.1	4
2A-Dorth.....	35.0	24
Hood.....	34.5	43
Bienville.....	32.6	1
Jackson.....	32.4	13
Hampton.....	31.9	78
Bragg.....	27.3	49
Stuart.....	22.6	3

Hampton was the most popular variety in this area as well as in the southeastern area. Bragg was second and Hood third followed by 2A-Dorth. Of the four most popular varieties, Bragg had the lowest yield and 2A-Dorth had the highest yield.

SEEDING RATE. The seeding rate ranged from 0.8 to 1.4 bushels per acre but the 1 bushel per acre rate was by far the most common. Eighty per cent of the farmers seeded at a rate of 0.9 and 1.1 bushels per acre.

TYPE OF SEED. The quality of seed used could not be determined but farmers were asked whether their seed were registered, certified, or non-certified. Eighty-six per cent reported using certified seed and 14 per cent non-certified.

Fertilization

Two methods of providing soybeans with plant nutrients were practiced in this area. The most popular method was that of applying fertilizer to the soybean crop either row application or broadcast. The other method was applying enough fertilizer to the crop planted prior to the soybean crop so that the residual fertilizer from the previous crop was sufficient to provide adequate nutrients for producing a good yielding soybean crop.

There were 72 farmers who applied fertilizer directly to their soybean crop. They applied an average of 19 pounds of N, 21 pounds of P, and 44 pounds of K. Thirty-one farmers did not apply any fertilizer directly to their soybean crop. However, many of these farmers were growing soybeans following potatoes. Potatoes were highly fertilized and the residual fertilizer was con-

sidered sufficient to provide the necessary plant nutrients for the soybean crop.

There were 23 farmers who broadcast fertilizer, 41 who drilled in row, and 37 who did not use any fertilizer. Soybean yields by type of fertilizer application were: broadcast, 30.6 bushels; drilled in row, 30.1 bushels; and no fertilizer 32.2 bushels.

Weed Control

MECHANICAL. All producers in this area cultivated soybeans at least once, with number of cultivations ranging from 1 to 5. The average number of cultivations was 2.8, 50 per cent higher than the average number in the southeastern area.

CHEMICAL. Only four farmers reported using chemical weed control. All four used a preemergence herbicide. Trifluralin was used by three farmers in a broadcast treatment and one farmer used Amiben in a band treatment. The average cost for the pre-emergence material was \$6.10 per acre. The four farmers using chemical weed control produced an average yield of 31.9 bushels per acre, 0.7 bushel per acre higher than the area.

HAND. All farmers cultivated their soybeans, and 53 per cent also used 0.9 hours of labor for hand weed control.

Insect Control

The farmers reported no reduced stands because of cutworms or other insects. The first insecticide application was applied most frequently to control foliage feeding insects. The second insecticide application was applied with about equal frequency to control foliage feeding and pod feeding insects. Those farmers applying 3 applications reported pod feeding insects most often as the insect causing trouble. There was a positive correlation between insecticide application and yield. The number of insecticide applications and average soybean yields were as follows:

<i>Number of insecticide applications</i>	<i>Av. yield per acre in bushels</i>	<i>Number of farms</i>
0	29.5	11
1	31.0	92
2	31.2	38
3	34.3	12

The majority of insecticide applications, 82 per cent, were applied with an airplane on a custom basis. The remainder of applications was divided about even between tractor sprayers and high-clearance sprayers.

Costs and Returns

Gross Returns

Gross returns from soybeans, which were affected by yield and price changes, averaged \$89.08 per acre in 1966. Yield averaged 31.2 bushels per acre and price averaged \$2.85 per bushel.

Net Returns

The average net returns to land, labor, and management was \$60.41 per acre. A land charge at average cash rent of \$12.25 per acre leaves an average return to labor and management of \$48.16 per acre. Charging \$1.60 per hour for an average of 3.80 hours gives a labor cost of \$6.08. Considering these charges, the average return to management is \$42.08 per acre. A \$.50 lower price would reduce this to \$26.48 per acre.

Costs

Costs are determined by price and quantity of the inputs. When considering all farmers interviewed in this area, the machinery and material cost per acre of soybeans averaged \$28.03 per acre.

The average costs per acre for materials were as follows:

<i>Material</i>	<i>Costs per acre</i>
Seed.....	\$ 4.81
Fertilizer.....	5.84
Lime.....	1.60
Herbicide.....	.27
Insecticide.....	2.05
Inoculant.....	.06
Total for materials.....	\$14.63

The average total, fixed, and variable machinery costs per acre, including machinery hired, are shown in Table 6.

TABLE 6. TOTAL, VARIABLE, AND FIXED MACHINERY COSTS PER ACRE OF SOYBEANS BY OPERATION, SOUTHWESTERN ALABAMA, 1966

Operation	Total cost	Variable cost	Fixed cost
	<i>Dol.</i>	<i>Dol.</i>	<i>Dol.</i>
Land preparation.....	3.14	1.88	1.26
Planting.....	1.00	.57	.43
Cultivating.....	1.79	.90	.89
Insecticide applications.....	1.37	1.37	----
Combining.....	4.36	1.74	2.62
Hauling.....	1.68	.55	1.13
Other ¹.....	.05	.02	.03
Total.....	13.39	7.03	6.36

¹ Broadcasting fertilizer and applying herbicide as an operation apart from land preparation.

Effect of Size of Enterprise

The data for farms were sorted into three groups, based on acreage of soybeans, to determine relationship of size with other factors. This sorting indicated there was a positive correlation between size and other factors because as size of soybean enterprise increased yield per acre, price per bushel, gross returns per acre, and returns to land, labor, and management increased, Table 7.

Average total material and machinery costs varied from \$26.91 per acre for the middle size group to \$29.76 per acre for the small size group, Table 7.

The difference in returns to land, labor, and management between the small, middle, and large size groups demonstrated that economies of size existed in the production of soybeans in this

TABLE 7. AVERAGE COSTS AND RETURNS FOR SOYBEAN PRODUCERS BY SIZE OF ENTERPRISE, SOUTHWESTERN ALABAMA, 1966

Item	Acreage range		
	Less than 100 (small)	100-249 (middle)	More than 249 (large)
No. of farms.....	37	33	33
Av. acreage of soybeans/farm.....	50	155	376
Av. yield per acre in bushels.....	30.5	31.4	31.9
Av. price per bushel (<i>Dol.</i>).....	2.80	2.86	2.90
Av. gross receipts (<i>Dol./acre</i>).....	85.40	89.80	92.51
Variable costs (<i>Dol.</i>)			
Material			
Seed.....	4.81	4.76	4.87
Fertilizer.....	6.32	5.42	5.72
Lime.....	1.60	1.60	1.60
Herbicide.....	.21	---	.61
Insecticide.....	1.94	2.03	2.18
Inoculant.....	.10	.06	.04
Total material cost (<i>Dol.</i>).....	14.98	13.87	15.02
Variable machinery cost (<i>Dol.</i>).....	7.66	6.87	6.51
Total variable costs (<i>Dol.</i>).....	22.64	20.74	21.53
Other costs (<i>Dol.</i>)			
Interest on operating capital ¹.....	.68	.62	.62
Fixed machinery cost.....	7.12	6.17	5.68
Land cost ²	12.25	12.25	12.25
Labor cost ³	7.63	5.73	4.69
All costs.....	50.32	45.51	44.77
Returns to land, labor, and mgt. (<i>Dol.</i>)...	54.96	62.27	64.68
Returns to labor and mgt. (<i>Dol.</i>).....	42.68	50.02	52.41
Returns to management (<i>Dol.</i>).....	35.08	44.29	47.72

¹ Variable cost at 6 per cent per annum for 6 months.

² Land cost charged at average cash rent.

³ Labor charged at \$1.60 per hour.

TABLE 8. AVERAGE MACHINERY COSTS FOR SOYBEAN PRODUCERS BY OPERATION AND SIZE OF ENTERPRISE, SOUTHWESTERN ALABAMA, 1966

Operation	Acreage range		
	Less than 100	100-249	More than 249
	<i>Dol.</i>	<i>Dol.</i>	<i>Dol.</i>
Land preparation.....	3.42	3.14	2.82
Planting.....	1.05	1.06	.88
Cultivating.....	1.92	1.66	1.78
Insecticide application.....	1.30	1.36	1.46
Combining.....	5.63	4.03	3.28
Hauling.....	1.36	1.79	1.93
Other ¹.....	.10	---	.04
Total.....	14.78	13.04	12.19

¹ Broadcasting fertilizer and applying herbicide as an operation apart from land preparation.

area. The return to land, labor, and management for the large size group was 17 per cent higher than returns of the small size group.

The yield per acre of the large size group was 5 per cent greater than the yield of the small size group, and price per bushel for soybeans was 4 per cent higher for the large size group than for the small size group. At the same time average material and machinery cost for the large size group was \$5.59 per acre less than average material and machinery cost for the small size group.

The middle size group had the lowest material costs primarily because of lower average seed and fertilizer costs. Total machinery costs were highest for the small group with higher land preparation, cultivation, and combining costs, Table 8.

Variations Among Producer Groups

Variations in yields, returns, and costs were evident among individual producers. To determine the outstanding characteristics of the operations carried on at various levels of income, the data were divided into three groups on the basis of net returns to land, labor, and management. These groups were designated as low, mid, and high producer groups.

Yields, prices, and costs influenced net returns, Table 9. The high income group obtained higher yields and higher prices with lower material and machinery costs than the low income group. The material and machinery costs per unit of output for the high income group were only 53 per cent of the per unit cost of the low income group and 69 per cent of the per unit cost of the mid income group.

TABLE 9. COSTS AND RETURNS FOR SOYBEAN PRODUCERS BY RETURNS TO LAND, LABOR, AND MANAGEMENT, SOUTHWESTERN ALABAMA, 1966

Item	All producers	Producer groups ⁴		
		Low	Mid	High
No. of farms	103	32	35	36
Av. acreage of soybeans/farm	189	152	216	195
Av. yield per acre in bushels	31.2	23.6	31.7	37.5
Per acre				
Gross returns (<i>Dol.</i>)	89.08	65.50	90.91	108.17
Fixed machinery cost (<i>Dol.</i>)	6.35	6.42	6.47	6.18
Total variable cost (<i>Dol.</i>)	21.67	23.96	21.73	19.59
Interest on operating capital ¹ (<i>Dol.</i>) .....	.65	.72	.65	.59
Land cost ² (<i>Dol.</i>)	12.25	12.25	12.25	12.25
Labor cost ³ (<i>Dol.</i>)	6.08	7.28	5.63	5.44
All costs (<i>Dol.</i>)	47.00	50.63	46.73	44.05
Returns to land, labor, and mgt. (<i>Dol.</i>)	60.41	34.40	61.42	81.81
Returns to labor and mgt. (<i>Dol.</i>)	48.16	22.15	59.17	69.56
Returns to management (<i>Dol.</i>)	42.08	14.87	43.54	64.12
Per bushel				
Gross returns (price) (<i>Dol.</i>)	2.85	2.78	2.87	2.88
Fixed machinery cost (<i>Dol.</i>) .....	.20	.27	.20	.16
Total variable cost (<i>Dol.</i>) .....	.69	1.02	.69	.52
Interest on operating capital ¹ (<i>Dol.</i>) .....	.02	.03	.02	.02
Land cost ² (<i>Dol.</i>) .....	.39	.52	.49	.33
Labor cost ³ (<i>Dol.</i>) .....	.19	.31	.18	.15
All costs (<i>Dol.</i>)	1.49	2.15	1.48	1.19
Returns to land, labor, and mgt. (<i>Dol.</i>)	1.94	1.46	1.96	2.17
Returns to labor and mgt. (<i>Dol.</i>)	1.55	.94	1.57	1.84
Returns to management (<i>Dol.</i>)	1.36	.63	1.39	1.69

¹ Variable cost charged at 6 per cent per annum for 6 months.

² Land charged at average cash rent.

³ Labor charged at \$1.60 per hour.

⁴ Producer groups are based on returns to land, labor, and management.

The per acre returns to management for the low income producers were \$14.87 as compared with \$64.12 for the high income group, while returns to the mid income group were \$43.54. Returns to management on a per bushel basis ranged from \$.63 for the low group to \$1.69 for the high group.

When considering all costs on a per acre basis, the average for all farms was \$47.00 with a range from \$44.05 for the high income group to \$50.63 for the low income group. There was much more variation in cost per bushel than in cost per acre because of the large variations in yield. The costs per bushel ranged from \$2.15 for the low income group to \$1.19 for the high income group.

The differences in average machinery and material costs among producer groups are shown in Table 10. Most of the difference

TABLE 10. AVERAGE MATERIAL AND MACHINERY COSTS FOR SOYBEAN PRODUCERS BY RETURNS, SOUTHWESTERN ALABAMA, 1966

Item	Producer group ²		
	Low	Mid	High
No. of farms.....	32	35	36
Av. acreage per farm.....	152	216	195
Av. yield per acre in bushels.....	23.6	31.7	37.5
	<i>Costs per acre</i>		
Material cost (<i>Dol.</i>)			
Seed.....	5.13	4.54	4.80
Fertilizer.....	7.72	5.80	4.22
Lime.....	1.60	1.60	1.60
Herbicide.....	.68	---	.16
Insecticide.....	1.81	2.39	1.93
Inoculant.....	.06	.11	.04
Total for materials (<i>Dol.</i>).....	17.00	14.44	12.75
Machinery cost (<i>Dol.</i>)			
Land preparation.....	3.20	3.02	3.20
Planting.....	1.09	.97	.95
Cultivating.....	1.80	1.76	1.80
Insecticide applications.....	1.20	1.60	1.28
Combining.....	4.35	4.66	4.09
Hauling.....	1.68	1.65	1.70
Other ¹.....	.06	.10	---
Total machinery costs (<i>Dol.</i>).....	13.38	13.76	13.02
Total machinery and material costs (<i>Dol.</i>).....	30.38	28.20	25.77

¹ Cost of broadcasting fertilizer and applying herbicide as an operation separate from land preparation.

² Groups based on returns to land, labor, and management.

among groups was because of differences in material cost. Fertilizer cost accounted for most of the difference. Relatively low fertilizer costs were associated with relatively high returns, the higher the returns of the group the lower the average cost of fertilizer. This could have been explained somewhat by the high fertilizer rate of prior crop with no fertilizer applied to the soybean crop.

There was very little difference between total machinery cost among producer groups. Machinery costs varied from a high of \$13.76 per acre for the mid income group to a low of \$13.02 for the high income group.

SOYBEAN PRODUCTION IN THE BLACK BELT AREA

In this area, soybeans were a relatively new crop, only 6 of the 33 farmers had grown soybeans more than 2 years. The average experience growing soybeans was only 2.8 years.

Production Practices

Cropping Systems

Soybeans were grown following in rotation with several different crops. However, three-fourths of the soybeans were grown following permanent pasture that had just been converted to row crops or small grain. Soybeans double cropped with small grain averaged 1 bushel per acre less than the overall average.

Varieties

The varieties recommended for central Alabama were Lee, Bragg, Jackson, and Hampton. The varieties planted and average yield obtained were as follows:

<i>Variety</i>	<i>Av. yield per acre in bushels</i>	<i>Per cent of total¹</i>
Lee.....	24.7	57
Hampton.....	25.1	13
Bragg.....	29.6	9
Rebel.....	28.0	9
Jackson.....	29.1	6
Hood.....	20.8	4
Bienville.....	27.8	2

¹ Refers to total of all varieties grown on all farms.

Lee was by far the most popular variety although the average yield was slightly below the average of all varieties. Hampton, the favorite variety in southern Alabama, was the second most popular variety followed by Bragg and Rebel.

SEEDING RATE. The seeding rate ranged 0.8 to 1.3 bushels per acre. The 0.8 bushel per acre rate was by far the most common. Eighty per cent of the farmers seeded at a rate of 0.8 or 0.9 bushels per acre.

TYPE OF SEED. The quality of the seed used by the farmers could not be determined but farmers were asked whether their seed were registered, certified or non-certified. Sixty-four per cent of the farmers reported using certified seed and 34 per cent reported non-certified.

FERTILIZATION. Twenty-six of the 33 farmers in this area applied fertilizer to soybeans. They applied an average of 13 pounds of N, 20 pounds of P, and 42 pounds of K. Two methods of application were used, broadcast and applied in the row at planting time. Those broadcasting their fertilizer averaged 28.3 bushels

per acre and those applying it in the row averaged 25.0. The farmers that did not use any fertilizer averaged 23.9 bushels.

Weed Control

MECHANICAL. All but 3 producers in this area cultivated soybeans at least once, with number of cultivations ranging from 1 to 5. The average number of cultivations was 2.7, about the same as the southwestern area.

CHEMICAL. Twelve, about 35 per cent of the producers, used a preemergence herbicide for weed control. Trifluralin was the most popular type material with 6 of the 12 farmers using it. The average cost for the preemergence material was \$4.97 per acre.

HAND. Farmers reported no use of hand labor in control of weeds for this area.

Insect Control

About 85 per cent of the insecticides were applied on a custom basis with an airplane. Most applications were applied for the control of pod worms or the cabbage looper.

The number of insecticide applications was positively correlated with yield. The number of applications and average yields were as follows:

<i>Number of insecticide applications</i>	<i>Av. yield per acre in bushels</i>	<i>Number of farms</i>
0	24.2	19
1	28.4	8
2	29.2	6

Costs and Returns

Gross Returns

Gross returns from soybeans affected by yield and price changes averaged \$68.10 per acre in 1966. Yield averaged 25.7 bushels per acre and price averaged \$2.65 per bushel.

Net Returns

Average net returns to land, labor, and management were \$41.73 per acre. Charging land at an average cash rent of \$7.64 per acre leaves an average return to labor and management of \$34.07 per acre. Labor costs were \$4.85 using \$1.60 per hour for an average of 3.03 hours. Considering these charges, the average

return to management was \$29.22. If price was \$.50 per bushel lower, this return would be reduced to \$16.37 per acre.

Costs

Costs are determined by price and quantity of inputs. When considering all farmers interviewed in this area, the machinery and material costs for soybeans averaged \$25.80 per acre.

The average cost per acre for materials was as follows:

<i>Material</i>	<i>Costs per acre</i>
Seed.....	\$ 3.91
Fertilizer.....	4.85
Lime.....	1.25
Herbicide.....	1.79
Insecticide.....	.88
Inoculant.....	.19
Total for materials.....	\$12.87

The average total, fixed, and variable machinery costs per acre, including machinery hired, are shown in Table 11.

TABLE 11. TOTAL, VARIABLE, AND FIXED MACHINERY COSTS BY OPERATION, BLACK BELT AREA, ALABAMA, 1966

Operation	Total cost	Variable cost	Fixed cost
	<i>Dol.</i>	<i>Dol.</i>	<i>Dol.</i>
Land preparation.....	3.34	2.00	1.34
Planting.....	.97	.55	.42
Cultivating.....	1.45	.72	.73
Insecticide application.....	.59	.59	----
Combining.....	4.51	1.80	2.71
Hauling.....	1.87	.62	1.25
Others ¹.....	.20	.10	.10
Total.....	12.93	6.38	6.55

¹ Broadcasting fertilizer and applying herbicide as an operation apart from land preparation.

Effects of Size of Enterprise

Data from farms were sorted into three groups, based on acreage of soybeans, to determine relationship of size with other factors. This sorting indicated there was a positive correlation between size and other factors because as size of soybean enterprise increased yield per acre, price per bushel, gross returns per acre, and returns to land, labor and management increased, Table 12. Average total material and machinery costs varied from \$22.78 per acre for the large size group to \$30.75 per acre for the middle size group, Table 12.

The difference in returns to land, labor, and management between the small, middle, and large size group demonstrated that

TABLE 12. AVERAGE COSTS AND RETURNS FOR SOYBEAN PRODUCERS BY SIZE OF ENTERPRISE, BLACK BELT AREA, ALABAMA, 1966

Item	Acreage range		
	Less than 80 (small)	80-299 (middle)	More than 299 (large)
No. of farms.....	10	12	11
Av. acreage of soybeans/farm.....	48	121	782
Av. yield per acre in bushels.....	25.1	26.1	25.8
Av. price per bushel (<i>Dol.</i>).....	2.53	2.62	2.79
Av. gross receipts (<i>Dol./acre</i>).....	63.50	68.38	71.98
Variable costs (<i>Dol.</i>)			
Material			
Seed.....	3.88	4.15	3.69
Fertilizer.....	5.60	5.75	3.18
Lime.....	1.25	1.25	1.25
Herbicide.....	1.32	2.25	1.70
Insecticide.....	.95	2.84	.44
Inoculant.....	.21	.13	.04
Total material cost (<i>Dol.</i>).....	13.21	16.37	10.30
Variable machinery cost (<i>Dol.</i>).....	6.55	7.47	5.01
Total variable costs (<i>Dol.</i>).....	19.86	23.87	15.31
Other cost (<i>Dol.</i>)			
Interest on operating capital ¹.....	.60	.72	.46
Fixed machinery cost.....	7.25	6.88	5.47
Land cost ²	7.64	7.64	7.64
Labor cost ³	4.78	5.15	4.58
All costs.....	40.13	44.26	33.46
Returns to land, labor, and mgt. (<i>Dol.</i>) ..	35.79	36.91	50.74
Returns to labor and mgt. (<i>Dol.</i>).....	28.15	29.27	43.10
Returns to management (<i>Dol.</i>).....	23.37	24.12	38.52

¹ Variable cost at 6 per cent per annum for 6 months.

² Land cost charged at average cash rent.

³ Labor charge at \$1.60 per hour.

economies of size existed in the production of soybeans in this area. The returns to land, labor, and management for the large size group was 41 per cent higher than the return of the small size group.

The yield per acre of the large size group was 3 per cent greater than the yield of the small size group, and the price per bushel for soybeans was 10 per cent higher for the large size group than for the small size group. At the same time the average material and machinery cost for the large size group was \$4.33 per acre less than the average material and machinery cost for the small size group.

The large size group had the lowest material costs primarily because of lower average seed and fertilizer costs. Total machinery costs were highest for the middle size group with higher land preparation, and combining costs, Table 13.

TABLE 13. AVERAGE MACHINERY COSTS FOR SOYBEAN PRODUCERS BY OPERATION AND SIZE OF ENTERPRISE, BLACK BELT AREA, ALABAMA, 1966

Operation	Acreage range		
	Less than 80 (small)	80-299 (middle)	More than 299 (large)
	<i>Dol.</i>	<i>Dol.</i>	<i>Dol.</i>
Land preparation.....	3.03	4.05	2.80
Planting.....	1.07	1.11	.73
Cultivation.....	1.34	1.32	1.69
Insecticide application.....	.38	1.14	.18
Combining.....	5.63	5.04	2.91
Hauling.....	2.07	1.51	2.07
Other ¹.....	.28	.18	.10
Total.....	13.80	14.35	10.48

¹ Broadcasting fertilizer and applying herbicide as an operation apart from land preparation.

Variations Among Producer Groups

Variations in yields, returns, and costs were evident among individual producers. To determine the outstanding characteristics of the operations carried on at various levels of income, the data were divided into three groups on the basis of net returns to land, labor, and management. These groups were designated as low, mid, and high producer groups.

An examination of the data obtained from the study of the three producer groups, Table 14, indicated that yields influenced net returns more than any other item. The high income group in this area had about 100 per cent higher yields than the low income group. Also, lower machinery and material costs influenced this return to a lesser degree. The variable cost per unit of output for the high income group was less than 50 per cent of the per unit cost of the low income group and about 80 per cent of the per unit cost of the mid income group. Also, the fixed machinery cost was less per unit of output for the high income group than for the low or mid income group.

The returns to management for the low income producers were \$6.13 as compared with \$52.67 for the high income group, while returns to the mid income group were only \$29.46. Returns to management on a per bushel basis ranged from \$.56 for the low group to \$1.52 for the high group.

When considering all costs on a per acre basis, there was not much difference between the low, mid, and high income groups. In fact, the low group had the smallest cost with \$37.82 per acre,

TABLE 14. COSTS AND RETURNS FOR SOYBEAN PRODUCERS BY RETURNS TO LAND LABOR, AND MANAGEMENT, BLACK BELT AREA, ALABAMA, 1966

Item	All producers	Producer groups ⁴		
		Low	Mid	High
No. of farms	33	12	11	10
Av. acreage of soybeans/farm	319.7	253.8	379.5	331.5
Av. yield per acre in bushels	25.7	16.7	27.4	34.6
Per acre				
Gross returns (<i>Dol.</i>)	68.10	47.32	70.22	90.70
Fixed machinery cost (<i>Dol.</i>)	6.53	5.92	6.80	4.98
Total variable cost (<i>Dol.</i>)	19.25	19.41	20.09	18.15
Interest on operating capital ¹ (<i>Dol.</i>)	.58	.58	.60	.54
Land cost ² (<i>Dol.</i>)	7.64	7.64	7.64	7.64
Labor cost ³ (<i>Dol.</i>)	4.85	4.27	5.63	4.69
All costs (<i>Dol.</i>)	38.85	37.82	40.76	38.00
Returns to land, labor, and mgt. (<i>Dol.</i>)	41.73	21.41	42.73	65.00
Returns to labor and mgt. (<i>Dol.</i>)	34.07	13.77	35.09	57.36
Returns to management (<i>Dol.</i>)	29.22	6.13	29.46	52.67
Per bushel				
Gross returns (price) (<i>Dol.</i>)	2.65	2.83	2.56	2.62
Fixed machinery cost (<i>Dol.</i>)	.25	.35	.25	.20
Total variable cost (<i>Dol.</i>)	.75	1.16	.73	.52
Interest on operating capital ¹ (<i>Dol.</i>)	.02	.03	.02	.02
Land cost ² (<i>Dol.</i>)	.30	.46	.28	.22
Labor cost ³ (<i>Dol.</i>)	.19	.26	.21	.14
All costs (<i>Dol.</i>)	1.51	2.26	1.49	1.10
Returns to land, labor, and mgt. (<i>Dol.</i>)	1.62	1.28	1.56	1.88
Returns to labor and mgt. (<i>Dol.</i>)	1.33	.82	1.28	1.66
Returns to management (<i>Dol.</i>)	1.14	.56	1.07	1.52

¹ Variable cost charged at 6 per cent per annum for 6 months.

² Land charged at average cash rent.

³ Labor charged at \$1.60 per hour.

⁴ Producer groups are based on returns to land, labor, and management.

with the mid group with a high of \$40.76. However, because of the large difference in yield per acre, there was a large difference in all cost on a per bushel basis ranging from a low of \$1.10 for the high to \$2.26 for the low group.

Individual items that comprised machinery and material costs were studied. The differences in average machinery and material costs among producer groups are shown in Table 15. There was not much difference in total machinery and material cost for the three groups, although there was considerable difference in individual items. The high group had the lowest material cost with \$11.60 per acre compared to \$13.63 for the low group. On the other hand, the low group had the lowest machinery cost with \$11.70 per acre compared to \$13.70 for the mid income group.

TABLE 15. AVERAGE MATERIAL AND MACHINERY COSTS FOR SOYBEAN PRODUCER GROUPS, BY RETURNS TO LAND, LABOR, AND MANAGEMENT, BLACK BELT AREA, ALABAMA, 1966

Item	Producer groups ²		
	Low	Mid	High
No. of farms.....	12	11	10
Av. acreage per farm.....	254	380	332
Av. yield per acre in bushels.....	16.7	27.4	34.6
	<i>Costs per acre</i>		
Material cost (<i>Dol.</i>)			
Seed.....	4.02	3.85	3.86
Fertilizer.....	5.33	5.09	4.00
Lime.....	1.25	1.25	1.25
Herbicide.....	2.26	1.20	1.64
Insecticide.....	.61	1.40	.62
Inoculant.....	.16	.20	.23
Total for materials (<i>Dol.</i>).....	13.63	13.19	11.60
Machinery cost (<i>Dol.</i>)			
Land preparation.....	2.88	3.44	3.74
Planting.....	1.02	1.02	.87
Cultivating.....	1.77	1.38	1.14
Insecticide application.....	.40	.94	.42
Combining.....	4.14	4.48	4.99
Hauling.....	1.32	2.24	2.13
Other ¹.....	.17	.20	.24
Total machinery costs (<i>Dol.</i>).....	11.70	13.70	13.53
Total machinery and material costs (<i>Dol.</i>).....	25.33	26.89	25.73

¹ Cost of broadcasting fertilizer and applying herbicide as an operation separate from land preparation.

² Based on returns to land, labor, and management.

One of the material costs that decreased as the income increased was fertilizer per acre. The high income group spent \$4.00 per acre compared to \$5.33 for the low income group. Also in the machinery cost, the cost for cultivating decreased as income increased with a low of \$1.14 per acre for the high group and \$1.77 per acre for the low income group.

SOYBEAN PRODUCTION IN THE NORTHEASTERN AREA

The farmers in this area have been producing soybeans quite some time. Twenty of the 47 farmers had been producing soybeans more than 11 years with only 11 farmers producing soybeans less than 5 years. There was no significant difference in yield based on years of producing soybeans.

Production Practices

Cropping Systems

Soybeans are commonly grown in this area as a single crop although there was some double cropping with soybeans following small grain. The highest soybean yields in this area were those planted following cotton or permanent pasture. Soybeans grown following soybeans or double cropped with small grains had the lowest average yield.

Varieties

The soybean varieties recommended for this area were Lee and Hood. The varieties planted, yields of each variety, and the number of farmers producing each variety were as follows:

<i>Variety</i>	<i>Av. yield per acre in bushels</i>	<i>Number of farmers</i>
Lee.....	32.2	38
Hood.....	32.0	15
Ogden.....	28.6	28
Jackson.....	23.2	1

Lee was the most popular variety and also had the highest yield.

SEEDING RATE. The seeding rate ranged from 0.8 to 1.2 bushels per acre but the 0.8 bushel per acre was by far the most common. About 80 per cent of the farmers seeded their beans at 0.8 or 0.9 bushel per acre.

TYPE OF SEED. The quality of the seed used by the farmers could not be determined but farmers were asked whether their seed were registered, certified, or non-certified. Only 35 per cent of the farmers reported using certified seed in this area, with 58 per cent using non-certified and 7 per cent using registered.

FERTILIZATION. Thirty-eight of the 47 farmers in this area applied fertilizer to soybeans. The broadcast method was not as popular in this area as some of the others; only six producers used it. These farmers averaged 32.2 bushels per acre yield compared to 31.2 for those that applied fertilizer in the row. Those that did not use any fertilizer averaged 30.0 bushels per acre.

The average amount of fertilizer applied per acre was about 15 pounds of N, 20 pounds of P, and 40 pounds of K.

Weed Control

MECHANICAL. All producers in this area cultivated soybeans at least once, with number of cultivations ranging from one to five, although there were only seven farmers that cultivated as many as four or five times. About 80 per cent of the soybeans in this area were cultivated two or three times. The average number of cultivations was 2.8, about the same as the southwestern and Black Belt areas.

CHEMICAL. Fourteen farmers reported using preemergence chemical weed control. The average cost per acre for this material was \$3.69. Five farmers also reported using postemergence chemical control with an average cost of \$1.20 per acre.

HAND. One farmer reported one hour of weed pulling by hand.

Insect Control

There was not any insect control reported by the farmers in this area. They indicated they would have used some control measures if they had experienced much insect damage.

Costs and Returns

Gross Returns

Gross returns from soybeans, which were affected by yield and price changes, averaged \$82.59 per acre in 1966. Yield averaged 28.7 bushels per acre and price averaged \$2.83 per bushel.

Net Returns

The average net return to land, labor, and management was \$56.64 per acre. Charging land at average cash rent of \$13.80 per acre leaves an average return to labor and management of \$42.84 per acre. Charging \$1.60 per hour for an average of 3.17 hours gives a labor cost of \$5.07. Considering these charges, the average return to management is \$37.77 per acre. If price was \$.50 per bushel lower, this return would be reduced to \$23.42 per acre.

Costs

Costs are determined by price and quantity of the inputs. When considering all farmers interviewed in this area, the machinery

and material cost per acre of soybeans averaged \$19.94 per acre. The average cost per acre for materials was as follows:

<i>Materials</i>	<i>Costs per acre</i>
Seed.....	\$ 3.79
Fertilizer.....	5.59
Lime.....	1.60
Herbicide.....	1.41
Insecticide.....	---
Inoculant.....	.10
Total for materials.....	\$12.49

The average total, fixed, and variable machinery costs per acre, including machinery hired, are shown in Table 16.

TABLE 16. TOTAL, VARIABLE, AND FIXED MACHINERY COSTS PER ACRE OF SOYBEANS BY OPERATION, NORTHEASTERN ALABAMA, 1966

Operation	Total cost	Variable cost	Fixed cost
	<i>Dol.</i>	<i>Dol.</i>	<i>Dol.</i>
Land preparation.....	3.12	1.87	1.25
Planting.....	.97	.55	.42
Cultivating.....	1.00	.50	.50
Insecticide application.....	---	---	---
Combining.....	5.87	2.34	3.53
Hauling.....	1.93	.63	1.30
Other ¹.....	.15	.08	.07
Total.....	13.04	6.64	6.40

¹ Broadcasting fertilizer and applying herbicide as an operation apart from land preparation.

Effects of Size of Enterprise

The farms were sorted into three groups, based on acreage of soybeans, to determine the relationship of size with other factors. This sorting indicated there was no correlation between size and other factors because as the size of the soybean enterprise increased no other factors increased. The small size group had a slightly larger yield with 30.9 bushels per acre than the large size with 30.4, while the middle size group had the low yield with 25.7 bushels, Table 17.

Average total material and machinery costs varied from \$24.95 per acre for the large size group up to \$27.37 per acre for the small size group, Table 17.

The difference in returns to land, labor, and management between the small, middle, and large size group demonstrated that economies of size did not exist in the production of soybeans in this area. This was the only area of the four areas sampled that economies of size did not exist. In this area the small size farmers

TABLE 17. AVERAGE COSTS AND RETURNS FOR SOYBEAN PRODUCERS BY SIZE OF ENTERPRISE, NORTHEAST ALABAMA, 1966

Item	Acreage range		
	Less than 100 (small)	100-249 (middle)	More than 249 (large)
No. of farms.....	14	15	18
Av. yield per acre in bushels.....	30.9	25.7	30.4
Av. price per bushel (<i>Dol.</i>).....	2.71	2.81	2.82
Av. gross receipts (<i>Dol./acre</i>).....	83.74	72.22	85.73
Variable costs (<i>Dol.</i>)			
Material			
Seed.....	3.66	3.65	4.03
Fertilizer.....	4.71	6.93	5.44
Lime.....	1.60	1.60	1.60
Herbicide.....	1.42	1.15	1.61
Insecticide.....	---	---	---
Inoculant.....	.08	.012	.08
Total material cost (<i>Dol.</i>).....	11.47	13.34	12.76
Variable machinery cost (<i>Dol.</i>).....	7.23	5.45	5.69
Total variable costs (<i>Dol.</i>).....	18.70	18.79	18.45
Other costs (<i>Dol.</i>)			
Interest on operating capital ¹.....	.56	.56	.55
Fixed machinery costs.....	8.67	7.47	6.56
Land cost ²	13.80	13.80	13.80
Labor cost ³	5.54	4.88	4.83
All costs.....	37.27	45.50	44.19
Returns to land, labor, and mgt. (<i>Dol.</i>)....	65.81	45.40	60.17
Returns to labor and mgt. (<i>Dol.</i>).....	52.01	31.60	46.37
Returns to management (<i>Dol.</i>).....	46.47	26.72	41.54

¹ Variable cost at 6 per cent per annum for 6 months.

² Land cost charged at average cash rent.

³ Labor charged at \$1.60 per hour.

actually had the highest returns to land, labor, and management with \$65.81 per acre than any of the other sizes. The large size group was second with \$60.17 and the middle size group with \$45.40.

In all other areas, the large size producers received a higher price per bushel of soybeans. This was somewhat true in this area, the small size farmers received \$2.71 per bushel with the middle and large size farmers receiving \$2.81 and \$2.82 per bushel, respectively.

Another item that was different in this area was the cost of producing soybeans. The small size producers had the least average cost with \$37.27 per acre compared to \$45.50 for middle size and \$44.19 per acre for the large size farmers. Thus with a slightly higher yield and lower cost, and approximately the same price per bushel, the smaller size farms had the highest returns to land,

TABLE 18. AVERAGE MACHINERY COSTS FOR SOYBEAN PRODUCERS BY OPERATION AND SIZE OF ENTERPRISE, NORTHEASTERN ALABAMA, 1966

Operation	Acreage range		
	Less than 100	100-249	More than 249
	<i>Dol.</i>	<i>Dol.</i>	<i>Dol.</i>
Land preparation.....	2.94	3.07	3.32
Planting.....	.94	1.03	.95
Cultivating.....	1.11	1.17	1.69
Insecticide application.....	---	---	---
Combining.....	8.70	5.75	3.47
Hauling.....	1.18	1.90	2.65
Other ¹	---	---	.11
Total.....	14.80	12.92	12.19

¹ Broadcasting fertilizer and applying herbicide as an operation apart from land preparation.

labor, and management of any group. Also, they had the highest return to management with \$46.47 than any group, Table 17.

The average machinery cost for producing soybeans indicated economies of size. The larger farms had the least cost with a total of \$12.19 per acre compared to \$14.80 for the small size farms. This was about the only item that followed the pattern of the other areas, Table 18.

Variation Among Producer Groups

Variations in yields, returns, and costs were evident among individual producers. To determine the outstanding characteristics of the operations carried on at various levels of income, the data were divided into three groups on the basis of net returns to land, labor, and management. These groups were designated as low, mid, and high producer groups.

An examination of the data obtained from the study of the three producer groups, Table 19, indicated that yields, prices, and costs influenced net returns. The high income group obtained higher yields and higher prices with about the same material and machinery costs as the low and middle income group. Even though the material and machinery costs were approximately the same on a per acre basis when compared on a per unit of output basis, the high income group's variable cost was only approximately 50 per cent of the low income group's. Also, the fixed machinery cost for the high income group was about 50 per cent of the low income group.

The returns to management for the low income producers were \$6.01 as compared with \$70.09 for the high income group. This

TABLE 19. COSTS AND RETURNS FOR SOYBEAN PRODUCERS BY RETURNS TO LAND, LABOR, AND MANAGEMENT, NORTHEAST ALABAMA, 1966

Item	All pro- ducers	Producer groups ⁴		
		Low	Mid	High
No. of farms	47	14	17	16
v. acreage of soybeans/farm.....	162	121	194	183
v. yield per acre in bushels.....	28.7	20.1	28.5	37.4
er acre				
Gross returns (<i>Dol.</i>)	82.59	52.07	80.59	115.12
Fixed machinery cost (<i>Dol.</i>).....	6.97	7.59	6.99	6.33
Total variable cost (<i>Dol.</i>).....	18.40	18.84	17.33	19.02
Interest on operating capital ¹ (<i>Dol.</i>).....	.58	.60	.55	.60
Land cost ² (<i>Dol.</i>).....	13.80	13.80	13.80	13.80
Labor cost ³ (<i>Dol.</i>).....	5.07	5.23	4.70	5.28
All costs (<i>Dol.</i>).....	44.82	46.06	43.37	45.03
Returns to land, labor, and mgt. (<i>Dol.</i>).....	56.64	25.04	55.72	89.17
Returns to labor and mgt. (<i>Dol.</i>).....	42.84	11.24	41.94	75.37
Returns to management (<i>Dol.</i>).....	37.77	6.01	37.22	70.09
er bushel				
Gross returns (price) (<i>Dol.</i>).....	2.83	2.59	2.83	3.08
Fixed machinery cost (<i>Dol.</i>).....	.27	.38	.25	.17
Total variable cost (<i>Dol.</i>).....	.69	.94	.61	.51
Interest on operating capital ¹ (<i>Dol.</i>).....	.02	.03	.02	.02
Land cost ² (<i>Dol.</i>).....	.51	.69	.48	.37
Labor cost ³ (<i>Dol.</i>).....	.19	.26	.16	.14
All costs (<i>Dol.</i>).....	1.67	2.29	1.52	1.20
Returns to land, labor, and mgt. (<i>Dol.</i>).....	1.86	1.25	1.96	2.38
Returns to labor and mgt. (<i>Dol.</i>).....	1.67	.99	1.79	2.24
Returns to management (<i>Dol.</i>).....	1.16	.30	1.30	1.87

¹ Variable cost charged at 6 per cent per annum for 6 months.

² Land charged at average cash rent.

³ Labor charged at \$1.60 per hour.

⁴ Producer groups are based on returns to land, labor, and management.

was the widest spread of any of the areas studied. Returns to management on a per bushel basis ranged from \$.30 for the low income group to \$1.87 for the high group.

When considering all costs on a per acre basis, the average for all farms was \$44.82 with a range from \$46.06 for the low income to a low of \$43.37 for the middle income group. There was much more variation in cost per bushel than in cost per acre because of the large variations in yield between income groups. The costs per bushel ranged from \$2.29 for the low income down to \$1.20 per bushel for the high income group.

There was little difference in the total machinery and material cost for the low, mid, and high income groups, Table 20. But there was some difference in the total material cost and total ma-

TABLE 20. AVERAGE MATERIAL AND MACHINERY COSTS FOR SOYBEAN PRODUCERS BY RETURNS, NORTHEASTERN ALABAMA, 1966

Item	Producer group ²		
	Low	Mid	High
No. of farms.....	14	17	16
Av. acreage per farm.....	121	194	183
Av. yield per acre in bushels.....	20.1	28.5	37.4
	<i>Costs per acre</i>		
Material cost (<i>Dol.</i>)			
Seed.....	3.63	3.63	4.12
Fertilizer.....	6.03	5.15	5.14
Lime.....	1.60	1.60	1.60
Herbicide.....	1.09	.66	2.49
Insecticide.....	---	---	---
Inoculant.....	.08	.08	.13
Total for materials (<i>Dol.</i>).....	12.54	11.12	13.48
Machinery cost (<i>Dol.</i>)			
Land preparation.....	2.79	3.39	3.14
Planting.....	.98	1.01	.93
Cultivating.....	1.05	1.44	.50
Insecticide application.....	---	---	---
Combining.....	7.97	5.05	4.58
Hauling.....	1.11	2.19	2.49
Other ¹.....	.10	.12	.23
Total machinery costs (<i>Dol.</i>).....	14.00	13.20	11.87
Total machinery and material costs (<i>Dol.</i>).....	26.43	24.32	25.35

¹ Cost of broadcasting fertilizer and applying herbicide as an operation separate from land preparation.

² Groups based on returns to land, labor, and management.

chinery cost for each of these groups. The low income producers tended to have the highest machinery cost and lowest material cost.

SUMMARY

As the acreage of soybeans grown in Alabama has increased in recent years, there has been an increased demand for more information on cost and returns for producing soybeans. This study was directed toward providing this information. The objectives of this study were to determine the costs and returns for producing soybeans in four producing areas and to determine the effect of size of enterprise on costs and returns.

The data in this study were collected by personal interviews from farmers of four farming areas of Alabama. The four area study included about two-thirds of the total soybean acreage of the State in 1966.

About 50 per cent of the farmers interviewed were planning to increase soybean acreage. The two major areas that were planning to expand production were the southeastern and the Black Belt. The most common reason given for planning to expand was that soybeans are more profitable than other crops. Other reasons given were that soybeans fit in well with a double cropping system, they have a low labor and capital requirement, and there is no allotment on soybean acreage.

The 231 farmers sampled were primarily row crop farmers producing in addition to soybeans, corn, cotton, small grains, peanuts, potatoes, and truck crops. Corn was the most popular crop followed by small grains and cotton.

Acreage of soybeans per farm was approximately 184 acres, the Black Belt area averaged 320 acres; the northeastern, 162 acres; the southwestern, 189 acres; and the southeastern approximately 100 acres. The southwestern had the highest yields, followed by northeastern, Black Belt, and southeastern.

There was an increased labor efficiency as the size of farm increased. The average hours of labor per acre varied from 4.77 hours for the small farms in the southwestern to a low of 2.86 for the large Black Belt and southeastern farms. The average number of hours of labor required per acre decreased in every area as the size of farm increased. The average hours of labor for all farms was 3.2.

Corn and cotton were the major crops that were reduced to expand soybean production. The major exception to this was the Black Belt area where most of the increased soybean acreage resulted from permanent pastures converted into soybean production.

The number of insecticide applications was highly correlated with yield. In three of the four areas as number of insecticide applications increased from none to three, yields increased an average of 2 bushels per acre for each additional insecticide application.

Another important factor affecting yield was size of soybean enterprise. Yields increased an average of about one bushel per acre for each 100 acres increase in size of soybean operation in two areas, the southeastern and the southwestern. Another factor that affected net returns was the larger size producers received from 10 to 20 cents per bushel higher price. This was true in all areas of production.

The data for each area were divided into three groups based on returns to land, labor, and management. Also there were two other returns computed, returns to labor and management and returns to management. When comparing all areas, the high group of the southwestern and the northeastern areas had the highest average production with approximately 37 bushels per acre. The 16 high producers in the northeastern area had the highest return to management (return above all cost) with an average of \$70.09 per acre. The high producers in the southeastern and the Black Belt areas were about the same in return to management with approximately \$52.

When comparing the averages for the areas, the southwestern had the highest yield with 31.2 bushels per acre, Table 21. The Black Belt had the largest acreages of soybeans with an average of 320 acres per farm.

There was little difference in the cost of production between areas. The southwestern had the highest cost of \$47.00 per acre and the Black Belt had the lowest cost of \$38.85 per acre. When comparing returns to land, labor, and management, the southwestern with the high yield and the high cost, had the highest returns with \$60.41, followed by the northeastern with \$56.64. When all costs were subtracted and returns to management computed, the southwestern still had the highest with an average of \$42.08 per acre with the southeastern, a low of \$27.06 per acre.

TABLE 21. COST AND RETURNS FOR SOYBEAN PRODUCERS BY AREA AND BY RETURNS TO LAND, LABOR, AND MANAGEMENT IN ALABAMA, 1966

Item	All producers	Area of State			
		Southeastern	Southwestern	Black Belt	Northeastern
No. of farms	232	49	103	33	47
Av. acreage soybeans/farm	183.3	100	189	320	162
Av. yield per acre in bushels	28.8	25.8	31.2	25.7	28.7
Per acre gross returns (Dol.)	81.21	72.18	89.08	68.10	82.59
Fixed machinery cost (Dol.)	6.56	6.65	6.35	6.53	6.97
Total variable cost (Dol.)	21.04	23.50	21.67	19.25	18.40
Interest on operating capital .....	.61	.70	.65	.58	.58
Land cost (average rental rate) (Dol.)	11.28	9.26	12.25	7.64	13.80
Labor cost (\$1.60 per hour) (Dol.)	5.47	5.01	6.08	4.85	5.07
All costs (Dol.)	45.00	45.12	47.00	38.85	44.82
Returns to land, opr. labor, and mgt. (Dol.)	52.95	41.33	60.41	41.74	56.64
Returns to labor and mgt. (Dol.)	41.68	32.07	48.16	34.10	42.84
Returns to management (Dol.)	36.21	27.06	42.08	29.25	37.77

APPENDIX

APPENDIX TABLE 1. ESTIMATED LIFE OF FARM MACHINERY

Machine	Years until obsolete	Wear-out life hours	Hr. per year fo wear-out life to equal obsolescenc life
	Yr.	Hr.	Hr.
Tillage			
Cultivator.....	12	2,500	208
Disk harrow.....	15	2,500	167
Moldboard plow.....	15	2,500	167
Disk plow.....	15	2,500	167
Rotary hoe.....	15	1,500	100
Spike tooth harrow.....	20	2,500	125
Spring tooth harrow.....	20	2,000	100
Planting			
Fertilizer distributors.....	15	1,200	80
Grain drill.....	20	1,200	60
Row crop planter.....	15	1,200	80
Harvesting			
Combine (pull type).....	10	2,000	200
Combine (self-propelled).....	10	2,000	200
Miscellaneous			
Rotary cutter.....	12	2,000	167
Tractors			
Wheel type tractor.....	15	12,000	800

Source: *American Society of Agricultural Engineers*. St. Joseph, Michigan
ASAE Data, AS D230, Farm Machinery Cost and Use.

APPENDIX TABLE 2. ESTIMATED COST OF OPERATING FARM MACHINERY

Machinery	Size	Operating cost			Unit ¹
		Total	Variable	Fixed	
		Dol.	Dol.	Dol.	
illage					
Cultivator.....	2-row	.71	.33	.38	acre
Cultivator.....	4-row	.59	.28	.31	acre
Cultivator.....	6-row	.54	.25	.29	acre
Field cultivator.....	all	.15	.06	.09	acre
Disk harrow (tandem).....	all	.23	.12	.13	acre
Offset harrow.....	all	.53	.16	.37	acre
Moldboard plow.....	all	.95	.64	.31	acre
Cultipacker.....	all	.44	.07	.37	acre
lanting					
Planter.....	2-row	1.15	.57	.58	hour
Planter.....	4-row	2.18	1.09	1.09	hour
Planter.....	6-row	3.12	1.56	1.56	hour
arvesting					
Combine (tractor drawn).....	all	3.18	1.21	1.97	hour
Combine (self-propelled without header).....	all	6.80	2.38	4.42	hour
Header.....	9-10 ft.	1.05	.26	.79	hour
Header.....	11-12 ft.	1.15	.30	.85	hour
Header.....	13-14 ft.	1.17	.30	.87	hour
iscellaneous					
Rotary cutter.....	all	.33	.14	.19	acre
tractor					
Wheel-type.....	Max, drawbar HP ²				
	20-30	.94	.60	.34	hour
	31-40	1.24	.79	.45	hour
	41-50	1.57	1.00	.57	hour
	51-60	1.87	1.20	.67	hour
	61-70	2.14	1.37	.77	hour
	71-80	2.37	1.51	.86	hour
	81-90	2.58	1.65	.93	hour
	91-100	2.76	1.77	.99	hour
	100+	3.00	1.92	1.08	hour

¹ When rate of accomplishment was obtained from the farmer, cost was calculated on a per hour basis, otherwise cost was calculated on a per acre basis using the average rate of accomplishment.

² Horsepower classification based on Nebraska Tractor Test.

Source: *Estimating Farm Machinery Cost*. Agricultural Extension Service, Virginia Polytechnic Institute, Bulletin 290, June 1965, pp. 10-11.

APPENDIX TABLE 3. NUMBER OF FARMS, ACREAGE, AND YIELD BY CROPS GROWN ON
SOYBEAN PRODUCING FARMS IN ALABAMA, 1966

Crop	Area of State			
	Southeastern	Southwestern	Black Belt	Northeastern
Soybeans				
No. of farms.....	49	103	33	47
Total acres.....	4,886	19,412	10,550	7,614
Av. acres per farm.....	99.7	188.7	319.7	62
Av. yield per acre (bu.).....	25.8	31.2	25.7	29.7
Corn				
No. of farms.....	44	81	21	44
Total acres.....	7,361	5,276	3,501	4,868
Av. acres per farm.....	167.3	65.1	166.7	111
Av. yield per acre (bu.).....	34.5	42.8	38.7	54.7
Cotton				
No. of farms.....	35	23	19	40
Total acres.....	1,590	980	3,203	4,351
Av. acres per farm.....	45.4	42.6	168.6	109
Av. yield per acre (lb. lt.).....	265	740	590	680
Small grain (harvested)				
No. of farms.....	23	91	23	13
Total acres.....	3,481	7,155	5,635	585
Av. acres per farm.....	151.3	78.6	245.0	45
Av. yield per acre (bu.).....	27	23.1	24.3	40.5
Grazing and cover crops*				
No. of farms.....	5	32	5	5
Total acres.....	1,149	2,982	565	647
Av. acres per farm.....	229.8	93.2	113.0	129
Av. yield per acre.....	---	---	---	---

APPENDIX TABLE 3. *Continued*

Crop	Area of State			
	Southeastern	Southwestern	Black Belt	Northeastern
Grain sorghum				
No. of farms.....	3	1	3	3
Total acres.....	177	75	297	89
Av. acres per farm.....	59.0	75.0	113.0	30
Av. yield per acre.....	---	---	---	---
Peanuts				
No. of farms.....	41	2		
Total acres.....	3,349	59		
Av. acres per farm.....	81.7	29.5		
Av. yield per acre (lb.).....	1,700	1,440		
Potatoes				
No. of farms.....	2	34		
Total acres.....	85	3,005		
Av. acres per farm.....	42.5	88.4		
Av. yield per acre.....	---	---		
Truck crops				
No. of farms.....	3	18		
Total acres.....	91	1,086		
Av. acres per farm.....	30.3	60.3		
Av. yield per acre.....	---	---		
Other				
No. of farms.....	5	5	1	17
Total acres.....	41	375	200	1,713
Av. acres per farm.....	8.2	75.0	200.0	101
Av. yield per acre.....	---	---	---	---

* Includes small grain not harvested.

APPENDIX TABLE 4. NUMBER OF FARMERS PLANNING TO INCREASE SOYBEAN ACREAGE,
REASONS FOR INCREASE BY AREA OF STATE, ALABAMA, 1966

Reasons	Area of State			
	Southeastern	Southwestern	Black Belt	Northeastern
More profitable.....	14	6	13	6
Ability to double crop.....	8	5	2	2
Lower labor and capital requirements.....	5	3	6	2
No allotment.....	5	8	0	2
Better utilization of machinery.....	4	3	5	1
Spreads out labor requirement.....	1	0	2	0
Other.....	0	2	0	8
Total.....	37	27	28	21

APPENDIX TABLE 1
SELECTED SOYBEAN PRODUCING FARMS BY AREAS OF ALABAMA, 1966

Previous crop	Area of State			
	Southeastern	Southwestern	Black Belt	Northeastern
Soybeans				
Av. yield soybeans (bu.).....	28.2	27.9	22.9	26.8
Av. number years growing soybeans.....	5.8	12	2.5	14.7
Av. planting date.....	5/28	5/24	6/24	6/25
Av. fertilization (lb.)				
N.....	100	15	---	46
P.....	26	21	13	15
K.....	54	41	25	28
Corn				
Av. yield soybeans (bu.).....	24.9	29.0	29.9	33.2
Av. number years growing soybeans.....	1.7	17	2.0	11.0
Av. planting date.....	5/27	5/20	6/7	5/25
Av. fertilization (lb.)				
N.....	102	74	100	111
P.....	24	29	22	26
K.....	47	55	42	50
Cotton				
Av. yield soybeans (bu.).....	24.0	28.9	26.6	39.8
Av. number years growing soybeans.....	1.3	10	1.3	12.1
Av. planting date.....	5/24	5/11	5/24	5/14
Av. fertilization (lb.)				
N.....	77	59	90	88
P.....	27	26	28	27
K.....	54	50	52	56
Small grain¹				
Av. yield soybeans (bu.).....	26.6	31.1	24.7	26.6
Av. number years growing soybeans.....	6.3	19	3.5	12.3
Av. planting date.....	6/9	6/12	6/2	6/10
Av. fertilization (lb.)				
N.....	77	63	81	86
P.....	25	33	25	17
K.....	50	64	47	32

APPENDIX TABLE 5. *Continued*

Previous crop	Area of State			
	Southeastern	Southwestern	Black Belt	Northeastern
Grazing crops				
Av. yield soybeans (bu.).....	27.0	32.8		
Av. number years growing soybeans.....	1.0	20		
Av. planting date.....	5/23	6/8		
Av. fertilization (lb.)				
N.....	60	47		
P.....	31	31		
K.....	58	58		
Potatoes^a				
Av. yield soybeans (bu.).....	12.0	33.6		
Av. number years growing soybeans.....	16.0	22		
Av. planting date.....	6/24	6/14		
Av. fertilization (lb.)				
N.....	165	159		
P.....	121	117		
K.....	270	230		
Permanent pasture				
Av. yield soybeans (bu.).....		33.6	27.4	42.5
Av. number years growing soybeans.....		19	2.2	4.5
Av. planting date.....		5/29	6/3	6/12
Av. fertilization (lb.)				
N.....		114	25	125
P.....		38	16	22
K.....		71	31	42
Idle land				
Av. yield soybeans (bu.).....	21.5		20.4	35.0
Av. number years growing soybeans.....	3.0			9.0
Av. planting date.....	6/12		5/20	6/10
Av. fertilization (lb.)				
N.....	---		---	---
P.....	---		---	---
K.....	---		---	---

APPENDIX TABLE 6. AVERAGE YIELD, SELECTED FACTORS AFFECTING YIELD, AND NUMBER OF FARMERS BY PLANTING DATE, AREAS OF ALABAMA, 1966

Planting date	Areas of State			
	Southeastern	Southwestern	Black Belt	Northeastern
April 15-30				
Av. yield (bu./acre).....		30.7		27.5
Av. seeding rate (bu./acre).....		.9		1.0
Av. number insecticide applications.....		1.1		---
Av. row width (inches).....		34		36
Av. number of years growing soybeans.....		14.3		2.5
No. of farmers.....		7		2
May 1-15				
Av. yield (bu./acre).....	21.3	30.3	20.8	33.8
Av. seeding rate (bu./acre).....	1.2	1.1	.8	.8
Av. number insecticide applications.....	.1	1.3	.20	---
Av. row width (inches).....	34	34	36	39
Av. number of years growing soybeans.....	2.1	15.4	1.9	12.9
No. of farmers.....	7	43	10	26
May 16-31				
Av. yield (bu./acre).....	29.1	32.7	27.6	26.8
Av. seeding rate (bu./acre).....	.9	1.0	.9	.9
Av. number insecticide applications.....	.9	1.5	1.25	---
Av. row width (inches).....	33	34	36	38
Av. number of years growing soybeans.....	3.5	17.4	3.2	14.8
No. of farmers.....	13	47	12	19

APPENDIX TABLE 6. *Continued*

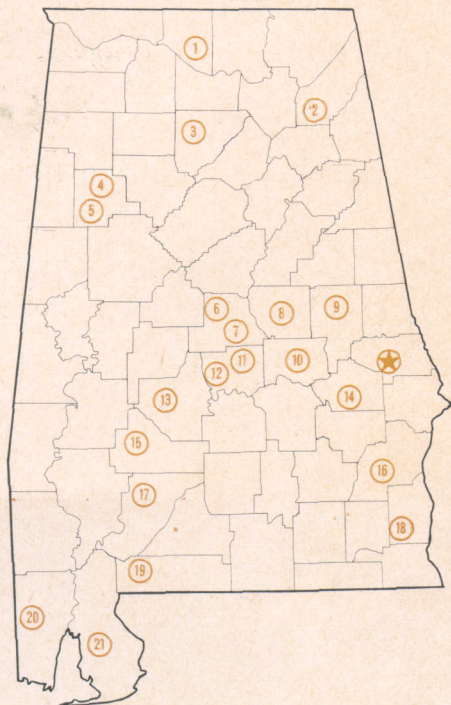
Planting date	Areas of State			
	Scutheastern	Southwestern	Black Belt	Northeastern
June 1-15				
Av. yield (bu./acre)	24.3	31.7	23.8	30.6
Av. seeding rate (bu./acre)	1.1	1.1	.8	.8
Av. number insecticide applications	1.0	1.5	.66	---
Av. row width (inches).....	34	34	36	40
Av. number of years growing soybeans.....	5.5	20.0	2.4	12.5
No. of farmers	34	89	18	25
June 16-30				
Av. yield (bu./acre)	26.2	30.9	24.8	28.1
Av. seeding rate (bu./acre)	1.0	1.1	1.0	.9
Av. number insecticide applications .....	.6	1.5	0	---
Av. row width (inches).....	34	35	34	38
Av. number of years growing soybeans.....	7.2	19.5	3.5	11.3
No. of farmers	14	28	4	16
July 1-August 15				
Av. yield (bu./acre)	18.40	28.75	15.33	25.0
Av. seeding rate (bu./acre)	1.2	1.11	1.0	.9
Av. number insecticide applications	1.2	2.15	.67	---
Av. row width (inches).....	26	36	34	40
Av. number of years growing soybeans.....	4.40	19.10	4.33	2.0
No. of farmers	5	20	3	1

APPENDIX TABLE 7. AVERAGE LABOR HOURS PER ACRE USED IN PRODUCING SOYBEANS, BY SIZE OF FARM AND AREA OF ALABAMA, 1966

Area of State	Size of farm and hours of labor		
northeastern			
Acres of soybeans	Less than 35	35-99	100 or more
Total labor (hr.).....	3.65	2.91	2.85
northwestern			
Acres of soybeans	Less than 100	100-249	250 or more
Total labor (hr.).....	4.77	3.58	2.93
Black Belt			
Acres of soybeans	Less than 79	80-299	300 or more
Total labor (hr.).....	2.99	3.22	2.86
southeastern			
Acres of soybeans	Less than 100	100-199	200 or more
Total labor (hr.).....	3.46	3.05	3.02

AGRICULTURAL EXPERIMENT STATION SYSTEM OF ALABAMA'S LAND-GRANT UNIVERSITY

With an agricultural research unit in every major soil area, Auburn University serves the needs of field crop, live-stock, forestry, and horticultural producers in each region in Alabama. Every citizen of the State has a stake in this research program, since any advantage from new and more economical ways of producing and handling farm products directly benefits the consuming public.



Research Unit Identification

★ Main Agricultural Experiment Station, Auburn.

1. Tennessee Valley Substation, Belle Mina.
2. Sand Mountain Substation, Crossville.
3. North Alabama Horticulture Substation, Cullman.
4. Upper Coastal Plain Substation, Winfield.
5. Forestry Unit, Fayette County.
6. Thorsby Foundation Seed Stocks Farm, Thorsby.
7. Chilton Area Horticulture Substation, Clanton.
8. Forestry Unit, Coosa County.
9. Piedmont Substation, Camp Hill.
10. Plant Breeding Unit, Tallassee.
11. Forestry Unit, Autauga County.
12. Prattville Experiment Field, Prattville.
13. Black Belt Substation, Marion Junction.
14. Tuskegee Experiment Field, Tuskegee.
15. Lower Coastal Plain Substation, Camden.
16. Forestry Unit, Barbour County.
17. Monroeville Experiment Field, Monroeville.
18. Wiregrass Substation, Headland.
19. Brewton Experiment Field, Brewton.
20. Ornamental Horticulture Field Station, Spring Hill.
21. Gulf Coast Substation, Fairhope.