5-1-1958

Investment and Operating Costs of Irrigation in the Delta Area of Mississippi, A Progress Report

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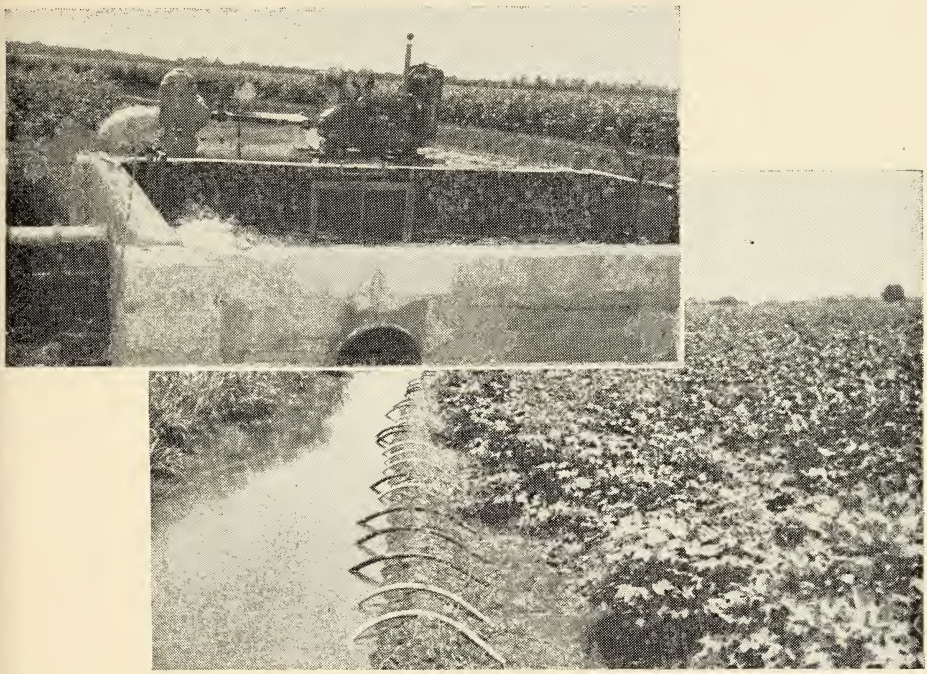

Investment and Operating Costs of Irrigation

in the Delta Area of Mississippi

A PROGRESS REPORT

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AGRICULTURAL EXPERIMENT STATION
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In Cooperation with The Farm Economics Research Division, Agricultural Research Service, U. S. Department of Agriculture

ACKNOWLEDGMENTS

The authors acknowledge the many suggestions and helpful criticisms of Dr. D. W. Parvin, Head, Department of Agricultural Economics, Mississippi Agricultural Experilent Station, Dr. W. L. Giles, Superintendent. Delta Branch Experiment Station, and Mr. E. L. Langsford and Mr. Max M. Tharp, Farm Economics Research Division, A. R. S., U. S. D. A. in the planning and execution of this study. Thanks are due Mr. Perrin Grissom, Agronomist, Delta Branch Experiment Station and Mr. Dow Welch, Assistant Agricultural Economist, Mississippi Agricultural Experiment Station, for reviewing the manuscript. Thanks are also due the farmers, irrigation equipment dealers, and electric power companies who provided the information for the study.

TABLE OF CONTENTS

	Page
SUMMARY	4
INTRODUCTION	5
SOURCE OF WATER	5
Investment	6
Operating Costs	6
DISTRIBUTION SYSTEMS	7
Replacement Costs	10
Sprinkler Systems	10
Farms Having Wells Only	10
Farms Having Surface Sources of Water Only	11
Farms Having Both Sources of Water	11
Gated Pipe	12
Farms Having Wells Only	12
Farms Having Surface Sources of Water Only	13
Farms Having Both Sources of Water	13
Siphon Tubes	14
Farms Having Wells Only	14
Farms Having Surface Sources of Water Only	15
Farms Having Both Sources of Water	16
Other Gravity Irrigation Methods	17
Farms Having Wells Only	17
Farms Having Surface Sources of Water Only	18
Farms Having Both Sources of Water	19
Operating Costs	19
Farms Having Wells Only	19
Farms Having Surface Sources Only	20
Farms Having Wells and Surface Sources of Water	20
All Farms	20
PRODUCTION RESPONSES NECESSARY TO COVER IRRIGATION COSTS	22
Cotton	22
Corn	23
Soybeans	23
APPENDIX	24

Summary

Supplemental irrigation has received increased attention as a production practice in the Delta of Mississippi in recent years. In many instances, use of the practice has been based on a costly "trial and error" approach. This study was designed to give some insight into the cost of developing sources of irrigation water and to compare investment and annual operating costs for alternative methods of distributing water.

When natural surface sources of water are conveniently located and properly used, they are cheaper than wells as a source of irrigation water. However, the dependability of a surface source of water is often an open question. Wells in the Delta area offer a dependable and fairly cheap source of irrigation water. It is possible to develop and equip a well delivering 2,000 gallons of water per minute for approximately $5,000. Annual pumping costs for such a well could be expected to average around $0.45 per acre-inch. For smaller wells, these pumping costs will increase; they may go as high as $1.00 per acre-inch. For large wells—those in the neighborhood of a pumping capacity of 2,500 gallons per minute, annual costs range from 25 to 35 cents per acre-inch.

Based on the 145 farms included in the study reported here, investment in irrigation equipment averaged $73 per acre irrigated for sprinkler systems, $57 for gated-pipe systems, $36 for siphon-tube systems, and $50 for other gravity systems. Average investment for the 145 farms was $56 per acre irrigated.

Annual operating costs per acre irrigated averaged as follows: Sprinkler systems, $18; gated-pipe systems, $18; siphon-tube systems, $8; and other gravity systems, $12. Average annual costs for all systems amounted to $15 per acre irrigated.

In appraising these costs it should be kept in mind that supplemental irrigation is relatively new in the Mississippi Delta and the majority of producers who are using it have had little or no previous experience. Both management and labor are "feeling their way" in the use of the practice and many problems have resulted. Optimum efficiency in the use of equipment and labor has not been attained. The planning and management of the individual operator continues to be the chief factor affecting labor requirements and costs.

As management and labor gain more knowledge and experience, efficiency in the use of irrigation would naturally be expected to occur. In addition to reducing the costs of irrigation, these increased efficiencies may also alter the cost relationships existing among the various distribution methods.

With present practices and techniques, and 1956 prices, an increase in yield of 255 pounds of seed cotton, 15 bushels of corn, or 7 bushels of soybeans per acre would be required to cover the direct and associated cost of two irrigations.

Supplemental Irrigation, Investment and Operating Costs in the Delta Area of Mississippi

By THOMAS E. TRAMEL, GRADY B. CROWE and J. F. ABEL, JR.[2]

An increasing interest in the use of supplemental irrigation as a production practice in humid areas has been evident for the last few years. In Mississippi alone, crop acreages irrigated excluding acreages of rice have increased from essentially none in 1949 to roughly 150,000 in 1956.

This increase reflects the accelerated search for new machines and new production techniques for improving production efficiency, which had its beginning during and immediately following World War II. In addition to its part in normal technological progress, supplemental irrigation is receiving increased attention for several reasons. Among these are: (1) the relatively widespread droughts that have occurred in humid production areas during critical growing periods in the last few years; (2) the generally favorable reports that have come from experience with the practice; (3) the availability of quality irrigation equipment; and (4) continued efforts on the part of producers to maintain total production on restricted land bases.

Considerable research information has been collected in the last few years on the agronomic and engineering phases of supplemental irrigation. However, little effort has been made to utilize this information to evaluate the relative profitableness of the practice. Farmers are investing considerable sums of money in irrigation equipment without the benefit of sound cost information on which to base their decisions.

It is the purpose of this progress report to present the economic phases of supplemental irrigation dealing with investment and annual operating costs. Comparisons are made of investment and operating costs for alternative sources of water and alternative methods of distributing water. It is anticipated that the findings below will ultimately be incorporated in a complete economic evaluation of the practice of supplemental irrigation, which will be presented in later reports.

Most of the data used in the study reported here was obtained by personal interviews with 145 farmers in the Mississippi Delta who used supplemental irrigation. Information was obtained from 22 farmers in 1954 and 123 farmers in 1956. To supplement the data collected from farmers, additional information was obtained from drilling companies, equipment dealers, and power suppliers.

Source of Water

Water for irrigation is obtained from both surface sources and wells. Most of the surface sources used are natural sources such as creeks, bayous, and lakes. Obviously, a dependable and conveniently located surface source of water is cheaper than a well. However, it must be re-

[1]This report is part of a more comprehensive study of supplemental irrigation and its implications being conducted by the Mississippi Agricultural Experiment Station and the Farm Economics Research Division, Agricultural Research Service, U.S.D.A.

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Table 1. Average rated capacity and investment[1] for wells of varying sizes, Delta Area, Mississippi, 1956.

Item	Type of power unit	
	Electric motor	Combustion engine
		Small[2]
Number of wells	19	18
Rated capacity (g. p. m.)	717	588
Total investment (dollars)	2,480	2,030
		Medium[3]
Number of wells	49	28
Rated capacity (g. p. m.)	1,998	1,975
Total investment (dollars)	4,550	5,060
		Large[4]
Number of wells	9	3
Rated capacity (g. p. m.)	2,364	2,567
Total investment (dollars)	4,500	5,080

[1]Includes investment in pumps and power units. [2]2"-6" pumps.
[3]8"-10" pumps. [4]12" pumps and over.

membered that, in many instances, the dependability of a surface source is inversely proportional to the number of farmers who think it dependable and are able to use it. Many streams have been pumped dry during periods of critical water needs. Location, too, is important. An investment of $1.00 to $1.25 per foot is required to move water through pipes. The use of open ditches requires less investment but expenses of maintenance and repair are incurred.

Wells have proved to be a dependable and reasonably cheap source of water in the Delta. Wells are usually drilled to a depth of 100 to 165 feet, averaging about 125 feet. They are shallow compared with depths in older irrigated areas. Water is usually reached at 15 to 22 feet, although the pumping level after draw-down varies greatly with the formation, it is usually no more than 30 to 45 feet.

Investment

Average investments for wells of varying sizes and for different sources of power are presented in Table 1. Smalls wells,[3] which are preferred by many who irrigate, cost roughly half as much as medium-sized or large wells but they deliver only about a third as much water. Wells equipped to deliver between 2,000 and 2,500 gallons per minute cost roughly $4,500 to $5,000, including the pump and power unit. From an investment standpoint, the source of power for the pump makes only a slight difference.

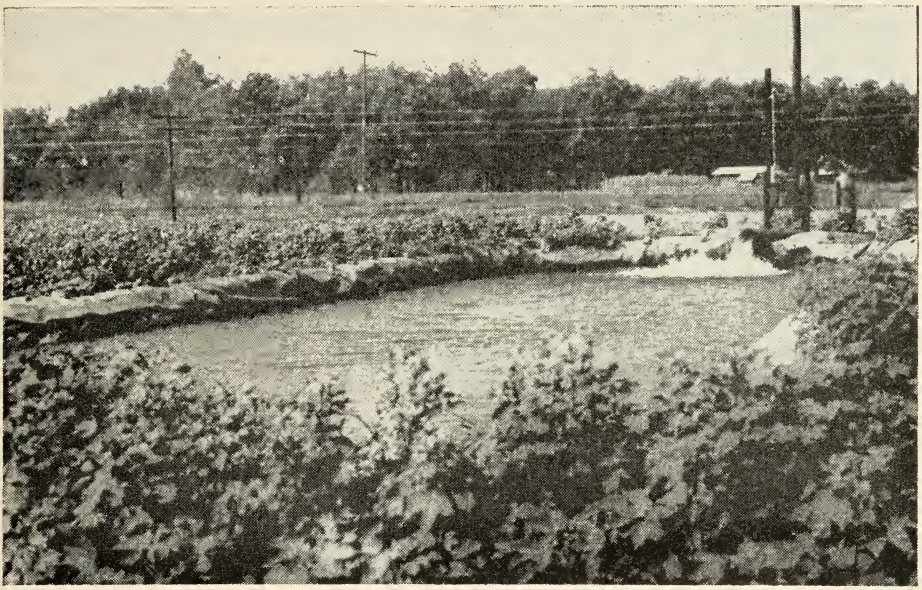
Operating Costs

Operating costs and related information for wells of different sizes are shown in Table 2. These operating costs include, in additon to variable costs, such fixed-cost items as depreciaton and interest on investment.

Fixed costs and fuel accounted for more than 90 percent of total operating costs, regardless of size of well or source of power. For pumps powered with electric motors, cost of electricity accounted for roughly 45 percent of operating costs and fixed charges for slightly more than 50 percent. For combustion engines, fuel costs were somewhat lower. They averaged 22 to 33 percent of operating costs. Fixed charges for wells equipped with pumps powered by combustion-type engines were well over 60 percent of the total annual costs.

Costs per hour of operation ranged from $1.16 for small wells with electric motors to $2.15 for large wells with combustion engines. The apparent lack of a

[3]For purposes of this report, wells are grouped into small, medium, and large sizes. Small wells are equipped with pumps ranging from 2" to 6" in size; medium wells from 8" to 10"; and large wells have pumps of 12" or more.



Typical well in the Delta.

pattern in these cost figures is a reflection of the extremely wide varation in amount of annual use. Pumps powered by combustion engines for both small and large wells were used only about 60 percent as much as pumps powered by electric motors. Less annual use results in a poorer distribution of overhead costs and increases hourly operating rates.

Only for medium-sized wells was the amount of annual use sufficiently comparable to allow a sound comparison of hourly operating costs between power sources. Combustion engines were cheaper in this instance, by $0.24 per hour—$1.84 compared with $2.08.

Costs per increment of water pumped declined rapidly as size of well increased. Cost per acre-inch pumped by electric motors dropped from $0.73 for small wells to $0.28 for large wells. The higher pumping cost per acre-inch indicated for small and large wells powered by combustion engines is a result of less annual use. Had these wells been used as much as those operated with electricity, this cost differential between sources of power would have tended to disappear. In fact, costs per acre-inch might have been less for wells with which combustion engines were used, as was the case for medium-sized wells.

Distribution Systems

Thus far this report has dealt only with costs associated with pumping water from wells. Once water has been pumped to the top of the ground, one or more of several systems of distribution may be used to transport and apply it to the crops to be irrigated. For purposes of this report, alternative methods of applying water are grouped into four categories: (1) sprinklers, (2) gated pipes, (3) siphon tubes, and (4) other gravity methods.

Sprinkler irrigation actually simulate

rain. Water is transported from the source to the field either in pipes or in open ditches and delivered through spray nozzles to the crop. The sprinkler system is composed of a pump, pipe fittings, and risers to which the nozzles are attached. Water is discharged under pressure through the nozzles so that it breaks up into small drops and covers an area uniformly. Usually, little or no land preparation is necessary for the use of sprinkler irrigation.

Gated pipe is a method of furrow or gravity irrigation. Water is transported from the source to the field by either open ditches or conveyance pipes and delivered to the crop through a gate or opening in the application pipe corresponding to each furrow. Once the water is discharged at the head of the furrow, it flows

Table 2. Annual costs[1] of pumping water from 126 wells of varying sizes, Delta Area, Mississippi, 1956.

Item	Type of power unit	
	Electric motor	Combustion engine
	Small[2]	
Number of wells	19	18
Hours operated annually	511	302
Cost of fuel or electricity (dollars)	267	85
Cost of repairs (dollars)	12	46
Cost of motor oil and other lubricants (dollars)	4	6
Interest on investment (dollars)	62	51
Depreciation on wells, pumps, and power units (dollars)	248	203
Total annual cost (dollars)	593	391
Annual cost per hour (dollars)	1.16	1.29
Cost per acre-inch (dollars)	.73	1.00
	Medium[3]	
Number of wells	49	28
Hours operated annually	512	526
Cost of fuel or electricity (dollars)	482	249
Cost of repairs (dollars)	9	78
Cost of motor oil and other lubricants	4	9
Interest on investment (dollars)	114	126
Depreciation on wells, pumps, and power units (dollars)	455	506
Total annual costs (dollars)	1,064	968
Annual cost per hour (dollars)	2.08	1.84
Cost per acre-inch (dollars)	.47	.42
	Large[4]	
Number of wells	9	3
Hours operated annually	768	482
Cost of fuel or electricity (dollars)	532	338
Cost of repairs (dollars)	19	57
Cost of motor oil and other lubricants (dollars)	5	5
Interest on investment (dollars)	113	127
Depreciation on wells, pumps, and power units (dollars)	450	508
Total annual costs (dollars)	1,119	1,035
Annual cost per hour (dollars)	1.46	2.15
Cost per acre-inch (dollars)	.28	.38

[1]Depreciation calculated at the rate of 10 percent of the replacement cost and interest on investment at 5 percent on one-half replacement cost.

[2]2"-6" pumps.

[3]8"-10" pumps.

[4]12" pumps and over.

along the row by gravity. Various types of gates permit controlling the flow of water. Although use of this method may require some land preparation, in general, it reduces the cost of land preparation considerably below that necessary for other gravity methods.

The use of siphon tubes is another furrow or gravity-irrigation method. Water is transported from the source to the field in pipes or open ditches and delivered to the crop from a ditch at the head of the field by means of siphon tubes. Usually an aluminum, plastic or rubber siphon tube, which may vary in size from three-fourths of an inch to two inches, is placed in each furrow. Land must be properly leveled and graded if this method of irrigation is to be used effectively.

Other gravity-irrigation methods, as used here, include flood and shovel irrigation. The shovel system makes possible furrow irrigation with a minimum of equipment. Ditches at the head of a field are cut with a shovel and water is allowed to flow down the furrows by gravity. Flood irrigation has a number of modifications. In wild flooding, water is turned loose at the highest point in a field and allowed to run to the lowest points. This system is used mainly for pastures and small grain. In contour-check flooding, dikes are built along contours and the entire area encompassed by a dike is flooded, much as is done in irrigating rice.

Of the four systems discussed, the gated pipe was the most widely used on the 145 farms studied. Slightly over 29,000 acres of crops were irrigated on these farms. About 32 percent of this acreage was irrigated by use of gated pipe, 28 percent by sprinklers, 15 percent by siphon tubes, and 25 percent by other gravity methods. An average of approximately two applications of water was made. More

Sprinkler irrigation.

Siphon irrigation.

than 70 percent of the acreage irrigated was in cotton. Soybeans accounted for approximately 18 percent of the acreage and corn for about 5 percent. The rest was in pasture and miscellaneous crops.

REPLACEMENT COSTS

A fundamental consideration that each farmer must face in deciding whether to equip his farm for supplemental irrigation is the relatively high initial investment required. In many instances the type of system he chooses and the extent to which he prepares for irrigation is influenced by his capital position. The pages that follow will attempt to give some insight as to the investment required for different irrigation systems using alternative sources of water, as well as a breakdown of the cost of individual items.

Differences in initial cost for the different systems should not be interpreted as differences an individual farmer could expect to incur, however. In deciding which type of system to buy, each farmer chose the system that appeared to fit his individual situation. Thus replacement costs for the different systems must be interpreted only as average for those farms having particular systems.

Sprinkler Systems

Sprinkler irrigation was used on roughly a third of the farms included in the study reported here. This method was used on farms where both wells and surface sources supplied irrigation water. The effect on investment of using alternative water sources is taken into account in the discussion below.

Farms Having Wells Only. Total replacement cost chargeable to sprinkler irrigation on 28 farms, where water was supplied by wells, averaged $12,824 per farm, $83 per acre irrigated, and $39 per acre once-over-equivalent (Table 3). Pipes used in transporting and distributing irrigation water represented the largest single investment item, accounting for 40 percent of total investment in sprinkler

Table 3. Investment per farm for sprinkler-irrigation equipment, conveyance structures, and land forming, 28 farms having wells only, Delta Area, Misissippi, 1956.[1]

Item	Farms reporting	Allocated per farm reporting	Investment	
			Average per farm reporting	Average for 28 farms
	Number	Number	Dollars	Dollars
Wells, pumps, and power units	28	.86	3,982	3,982
Other pumps and power units	23	1.10	2,155	1,770
Trailers	21	----	81	61
Pipes	28	----	5,143	5,143
Other equipment	28	----	1,366	1,366
Land forming	8	----	291	83
Conveyance structures	16	----	410	234
Land lost	10	2.59 acres	518	185
Total	---	----	------	12,824
Total per acre irrigated	---	-----	------	83
Total per acre once-over-equivalent	---	-----	------	39

[1]Average acreage irrigated 155; acres once-over-equivalent 325.

equipment. The average well installation on these farms cost $4,630. However, as only 86 percent of the water pumped from the wells was distributed by sprinklers, only $3,982 of this investment cost is properly chargeable to sprinkler irrigation. Average investment in wells, well pumps, and power units on these 28 farms accounted for 31 percent of the total investment; other pumps and power units accounted for another 14 percent. Equipment used for sprinkler irrigation, other than pumps and power units, nozzles, risers, valves, plugs, elbows, and so on represented 11 percent of the total. Investment in such items as trailers, land forming, conveyance structures, and land lost in ditches was relatively unimportant. It should be pointed out, however, that in many instances drainage ditches already available were used to transport water. If it were necessary to build a complete set of ditches for irrigation purposes, this item would represent a sizeable expense. On these 28 farms, water was applied by the sprinkler system 2.1 times to an average of 155 acres.

Farms Having Surface Sources of Water Only. In many instances natural surface sources such as creeks, bayous, and lakes are used to supply irrigation water. On 21 farms using such sources, total investment in sprinkler irrigation equipment averaged $9,396 per farm, $59 per acre irrigated, and $29 per acre once-over-equivalent (Table 4). Pipes were again the largest single item of investment; they accounted for 55 percent of the total and other equipment for 14 percent. On these 21 farms, an average of 160 acres was irrigated an average of 2.0 times by use of sprinkler equipment.

The main differences in investment between these farms and those using well water are in investment in well installation and in other pumps and power units. Although on farms using surface water the investment in other pumps and power units was considerably higher, it was not high enough to offset the cost of the well installations. As both groups of farms irrigated approximately the same acreage, it is evident that the surface sources of water were sufficiently dependable and conveniently enough located to make them source of irrigation water.

Farms Having Both Sources of Water. Only two farms were observed on which both wells and surface sources of water

Table 4. Investment per farm for sprinkler irrigation equipment, conveyance structures, and land forming, 21 farms having surface sources of water only, Delta Area, Mississippi, 1956.[1]

Item	Farms reporting	Allocated per farm reporting	Investment	
			Average per farm reporting	Average for 21 farms
	Number	Number	Dollars	Dollars
Pumps and power units	21	1.56	2,625	2,625
Trailers	16	----	100	76
Pipes	21	----	5,168	5,168
Other equipment	21	----	1,293	1,293
Land forming	4	----	499	95
Conveyance structures	7	----	387	129
Land lost	4	.26 ac	53	10
Total	----	----	------	9,396
Total per acre irrigated	----	----	------	59
Total per acre once-over-equivalent	----	----	------	29

[1]Average acreage irrigated 160; acres once-over-equivalent 328.

were used in conjunction with sprinkler irrigation. On these farms, replacement cost averaged $17,789 per farm, $79 per acre irrigated, and $34 per acre once-over-equivalent (Table 5). Pipes accounted for 49 percent of the total investment, other pumps and power units for 23 percent, well installations for 16 percent, and other equipment for 11 percent. These two farms irrigated an average of 224 acres 2.4 times by use of sprinkler equipment. Items of investment on these farms are about what would be expected in light of the investment on farms using either one source of water or the other. Well costs are not as high on these farms as on farms that use wells exclusively. Neither are costs of other pumps and power units as high as on farms that depend entirely on surface sources of water.

It will be noted that very little capital was invested in land forming on farms using sprinkler irrigation. In fact, this item averaged only $95 per farm for the entire group.

Regardless of source of water investment per acre irrigated by sprinkler systems averaged $73 per acre for the 51 farms on which sprinkler systems were used. For a complete tabulation of investment in sprinkler equipment for this group of farms, see Appendix Table 1.

Gated Pipe

As previously stated, gated pipe was the most common method of irrigation found in this study. It was used on almost half the farms included.

Farms Having Wells Only. On 42 farms using gated pipe and having wells only as a source of water, total replacement cost chargeable to gated pipe irrigation averaged $8,001 per farm, $61 per acre irrigated, and $29 per acre once-over-equivalent (Table 6). Well installations accounted for 44 percent of the total replacement costs. Large quantities of pipe for transportation and distribution of water are needed for irrigation with gated pipe, as well as with sprinkler systems, and pipe accounted for 28 percent of the total capital outlay. Other pumps and power units made up 14 percent of the investment. Acres irrigated by use of gated pipe averaged 132 for this group of farms: times irrigated averaged 2.1.

It will be noted that about half the farms using gated pipe had an investment in land forming, for an average of almost $500 per farm for the 42 farms. Although this figure is high compared with the figure for sprinkler irrigation, it is still relatively low because when farmers first begin irrigating they irrigate first the

Gated pipe.

land that requires a minimum of land forming. As irrigation is expanded to more acres, this item of investment can be expected to increase materially.

Farms Having Surface Sources of Water Only. On 24 farms on which surface sources of water only were used investment in gated-pipe irrigation equipment averaged $4,558 per farm, $48 per acre irrigated, and $30 per acre once-over-equivalent (Table 7). This represents a considerable reduction in investment per acre over farms on which wells were used —$48 compared with $61. However, on the average this group irrigated only 94 acres 1.6 times by gated pipe. So investment per acre once-over-equivalent was about the same as for the group of farms on which wells were used.

Farms Having Both Wells and Surface Sources of Water. Only 5 farmers who were using gated-pipe irrigation were found to be obtaining irrigation water from both wells and surface sources. However, they were operating large farms and irrigating an average of 328 acres 1.58 times by gated pipe for a once-over-equivalent acreage of 518 (Table 8).

On these farms, total investment in irrigation equipment averaged $17,604 per farm, $54 per acre irrigated, and $34 per acre once-over-equivalent. As would be expected, investment per acre irrigated fell between that for farms using wells only and for those using surface sources of water only. The chief item of investment on these farms was well installations, which accounted for 31 percent of the total investment. Pipes accounted for 27 percent of the total and pumps and power units other than those for wells accounted for 21 percent. On these 5 farms, land forming was a significant item of investment; it amounted to $1,518 dollars per farm and accounted for 9 percent of the total investment. Land lost in preparing for irrigation was also an important item of investment; it averaged slightly over 9 acres per farm reporting and amounted to an average of $1,466 per farm for the 5 farms.

Investment per acre irrigated by gated pipe regardless of source of irrigation water amounted to $57. This is considerably less than the investment of $73 per acre indicated for sprinkler systems. For a complete tabulation of investment in gated-pipe equipment for the 71 farms using this system, see Appendix Table 2.

Siphon Tubes

Siphon tube irrigation is a popular type of gravity irrigation; it was used on about 20 percent of the farms included in the study reported here.

Farms Having Wells Only. Where wells supplied irrigation water, the total replacement cost chargeable to siphon-tube irrigation averaged $5,942 per farm, $39 per acre irrigated, and $15 per acre once-over-equivalent (Table 9). These investment figures are considerably lower than those indicated for sprinklers and gated pipe.

Of the total investment for this system of irrigation, well installations accounted for 54 percent; land forming for 21 percent; and land lost for 10 percent. Pipe and other pieces of equipment were relatively unimportant items of investment.

Land forming was reported on almost half the farms on which siphon tube irrigation was used and for these farms this item averaged $2,592 per farm. Fifteen of the farms reported an average of almost 4 acres per farm lost in preparing for irrigation. This involved an average cost of $618 per farm for the 19 farms on

Table 5. Investment per farm for sprinkler irrigation equipment, conveyance structures, and land forming, 2 farms having wells and surface sources of water, Delta Area, Mississippi, 1956.[1]

Item	Farms reporting	Allocated per farm reporting	Investment	
			Average per farm reporting	Average for 2 farms
	Number	Number	Dollars	Dollars
Wells, pumps, and power units	2	.60	2,786	2,786
Other pumps and power units	2	1.21	4,054	4,054
Trailers	2	---	21	21
Pipes	2	---	8,691	8,691
Other equipment	2	---	1,978	1,978
Land forming	1	---	512	256
Conveyance structures	1	---	6	3
Land lost	0	---	---	---
Total	---	---	---	17,789
Total per acre irrigated	---	---	---	79
Total per acre once-over-equivalent	---	---	---	34

[1]Average acreage irrigated 224; acres once-over-equivalent 527.

Table 6. Investment per farm for gated-pipe irrigation equipment, conveyance structures, and land forming, 42 farms having wells only, Delta Area, Mississippi, 1956.[1]

Item	Farms reporting	Allocated per farm reporting	Investment	
			Average per farm reporting	Average for 42 farms
	Number	Number	Dollars	Dollars
Wells, pumps, and power units	42	.87	3,505	3,505
Other pumps and power units	36	1.01	1,308	1,121
Trailers	18	---	68	29
Pipes	42	---	2,220	2,220
Other equipment	37	---	305	269
Land forming	20	---	1,012	482
Conveyance structures	18	---	357	153
Land lost	19	2.46 ac.	491	222
Total	---	---	---	8,001
Total per acre irrigated	---	---	---	61
Total per acre once-over-equivalent	---	---	---	29

which siphon tubes were used and which had only wells as sources of water. For this group of farms, acres irrigated by siphon tubes averaged 151; times irrigated averaged 2.7.

Farms Having Surface Sources of Water Only. Total investment in siphon tube irrigaton, for farmers who obtain irrigation water from surface sources only, averaged $3,618 per farm, $30 per acre irrigated, and $17 per acre once-over-equivalent (Table 10). This is a clear-cut case of natural surface sources being cheaper to develop when they are available.

Pumps and power units represent 49 percent of the total investment for this group of farms, land forming 32 percent, and pipes 11 percent. The greater investment in pipes is a result of their use for transporting water from surface sources to points of distribution. Land forming was reported on half the farms in this group and for those reporting represented an average cost of $2,288 per farm. Land lost amounted to less than one acre per farm reporting and averaged only $133 per farm for the group of farms using siphon tubes and having surface sources. For this group of farms, an average of

Table 7. Investment per farm for gated-pipe irrigation equipment, conveyance structures, and land forming, 24 farms having surface sources of water only, Delta Area, Mississippi, 1956.[1]

Item	Farms reporting	Allocated per farm reporting	Investment	
			Average per farm reporting	Average for 24 farms
	Number	Number	Dollars	Dollars
Pumps and power units	24	1.10	1,602	1,602
Trailers	18	----	59	44
Pipes	24	----	2,328	2,328
Other equipment	24	----	313	313
Land forming	7	----	648	189
Conveyance structures	6	----	64	16
Land lost	4	1.98 ac.	396	66
Total	----	----	----	4,558
Total per acre irrigated	----	----	----	48
Total per acre once-over-equivalent	----	----	----	30

[1]Average acreage irrigated 94; acres once-over-equivalent 152.

Table 8. Investment per farm for gated-pipe irrigation equipment, conveyance structures, and land forming, 5 farms having wells and surface sources of water, Delta Area, Mississippi, 1956.[1]

Item	Farms reporting	Allocated per farm reporting	Investment	
			Average per farm reporting	Average for 5 farms
	Number	Number	Dollars	Dollars
Wells, pumps, and power units	5	1.13	5,399	5,399
Other pumps and power units	5	3.06	3,691	3,691
Trailers	4	----	115	92
Pipes	5	----	4,699	4,699
Other equipment	5	----	253	253
Land forming	5	----	1,518	1,518
Conveyance structures	1	----	2,430	486
Land lost	4	9.16 ac.	1,832	1,466
Total	----	----	----	17,604
Total per acre irrigated	----	----	----	54
Total per acre once-over-equivalent	----	----	----	34

[1]Average acreage irrigated 328; acres once-over-equivalent 518.

121 acres was irrigated an average of 1.8 times by use of siphon tubes.

Farms Having Both Wells and Surface Sources of Water. Only three farms using the siphon-tube irrigation and both wells and surface sources were encountered in this study. On these farms total investment chargeable to the siphon-tube system averaged $5,307 per farm, $30 per acre irrigated, and $15 per acre once-over-equivalent (Table 11). The main items of investment were: wells, 41 percent; other pumps and power units, 22 percent; pipes 12 percent; land forming, 12 percent; and land lost, 9 percent.

In general wells were large on these farms, costing an average of $6,624. However, as they were used also in conjunction with other distribution systems, only a third of this amount was properly chargable to siphon-tube irrigation. Land forming which was reported on all three farms, averaged $647 per farm and land lost averaged $455 per farm. Investment per acre irrigated for this system compares favorably with any other system included in this study. For these three farms, an average of 174 acres was irrigated with siphon-tubes an average of 2.0 times.

Table 9. Investment per farm for siphon-irrigation equipment, conveyance structures, and land forming, 19 farms having wells only, Delta Area, Mississippi, 1956.[1]

Item	Farms reporting	Allocated per farm reporting	Investment	
			Average per farm reporting	Average for 19 farms
	Number	Number	Dollars	Dollars
Wells, pumps, and power units	19	.92	3,194	3,194
Other pumps and power units	12	1.14	706	446
Trailers	7	-----	38	14
Pipes	5	-----	456	120
Other equipment	15	-----	170	134
Land forming	9	-----	2,592	1,228
Conveyance structures	13	-----	275	188
Land lost	15	3.92 ac.	783	618
Total	---	-----	------	5,942
Total pre acre irrigated	---	-----	------	39
Total per acre once-over-equivalent	---	-----	------	15

[1]Average acreage irrigated 151; acres once-over-equivalent 404.

Table 10. Investment per farm for siphon-irrigation equipment, conveyance structures, and land forming, 8 farms having surface sources of water only, Delta Area, Mississippi, 1956.[1]

Item	Farms reporting	Allocated per farm reporting	Investment	
			Average per farm reporting	Average for 8 farms
	Number	Number	Dollars	Dollars
Pumps and power units	8	1.64	1,784	1,784
Trailers	2	-----	12	3
Pipes	7	-----	456	399
Other equipment	6	-----	83	62
Land forming	4	-----	2,288	1,144
Conveyance structures	3	-----	248	93
Land lost	6	.88 ac.	177	133
Total	---	-----	------	3,618
Total per acre irrigated	---	-----	------	30
Total per acre once-over-equivalent	---	-----	------	17

[1]Average acreage irrigated 121; acres once-over-equivalent 217.

For complete listing of investment items associated with siphon-tube irrigation regardless of the source of irrigation water, see Appendix Table 3.

Other Gravity-Irrigation Methods

Other gravity-irrigation methods, as was pointed out earlier, include both shovel- and flood-irrigation systems. These methods of irrigation were used on approximately 38 percent of the farms studied.

Farms Having Wells Only. On 39 farms using other gravity methods of irrigation and obtaining irrigation water from wells, total investment associated with this system of irrigation averaged $8,833 per farm, $54 per acre irrigated, and $32 per acre once-over-equivalent (Table 12). The main items of investment were: wells, which accounted for 42 percent of the total investment; land forming for 18 percent; pipes for 14 percent; other pumps and power units for 11 percent; and land lost for 9 percent.

Again the significance of land prepara-

Table 11. Investment per acre for siphon-irrigation equipment, conveyance structures, and land forming, 3 farms having wells and surface sources of water, Delta Area, Mississippi, 1956.[1]

Item	Farms reporting	Allocated per farm reporting	Investment	
			Average per farm reporting	Average for 3 farms
	Number	Number	Dollars	Dollars
Wells, pumps, and power units	3	.33	2,186	2,186
Other pumps and power units	3	1.22	1,183	1,183
Trailers	2	----	69	46
Pipes	2	----	942	628
Other equipment	3	----	162	162
Land forming	3	----	647	647
Conveyance structures	0	----	----	----
Land lost	3	2.28 ac	455	455
Total	----	----	----	5,307
Total per acre irrigated	----	----	----	30
Total per acre once-over-equivalent	----	----	----	15

[1]Average irrigated 174; acres once-over-equivalent 348.

Table 12. Investment per farm for other gravity systems irrigation equipment, conveyance structures, and land forming, 39 farms having wells only, Delta Area, Mississippi, 1956.[1]

Item	Farms reporting	Allocated per farm reporting	Investment	
			Average per farm reporting	Average for 39 farms
	Number	Number	Dollars	Dollars
Wells, pumps, and power units	39	1.00	3,674	3,674
Other pumps and power units	24	1.28	1,534	944
Trailers	13	----	51	17
Pipes	30	----	1,599	1,230
Other equipment	29	----	169	126
Land forming	17	----	3,746	1,633
Conveyance structures	23	----	655	386
Land lost	22	7.30 ac.	1,459	823
Total	----	----	----	8,833
Total per acre irrigated	----	----	----	54
Total per acre once-over-equivalent	----	----	----	32

[1]Average acreage irrigated 165; acres once-over-equivalent 277.

tion as an investment item with gravity irrigation is noted. On 17 of the 39 farms land forming was reported to the extent of $3,746 per farm. Land lost which was reported on 22 farms, averaged more than 7 acres and amounted to an average of $1,459 per farm. The relatively high investment in pipes indicates a significant use of this equipment for transporting water from the source to points of distribution. Acres irrigated by other gravity methods averaged 165 for the 39 farms; times over averaged 1.7.

Farms Having Surface Sources of Water Only. On 15 farms on which other gravity systems of irrigation were used, surface sources of water were used exclusively. On these farms, total replacement costs chargeable to other gravity irrigation averaged $1,586 per farm, $29 per acre irrigated, and $20 per acre once-over-equivalent (Table 13). Again the practical use of surface water for irrigation is demonstrated as cheaper than water from wells. Although investment per farm in other gravity-method systems was lower than for other groups studied, the acreage irrigated was small also. Only 54 acres were irrigated by these systems per farm. Water was applied to this acreage an average of 1.5 times.

The main items of investment for this method of irrigation were pumps and power units, accounting for 42 percent of the total and pipes, representing 34 percent. Land lost accounted for 10 percent of the total investment and other equipment for 6 percent. Costs of land forming were

Table 13. Investment per farm for other gravity systems, irrigation equipment, conveyance structures, and land forming, 15 farms having surface sources of water only, Delta Area, Mississippi, 1956.[1]

Item	Farms reporting	Allocated per farm reporting	Investment: Average per farm reporting	Investment: Average for 15 farms
	Number	Number	Dollars	Dollars
Pumps and power units	15	.65	667	667
Trailers	7	------	21	10
Pipes	14	------	579	540
Other equipment	13	------	113	98
Land forming	5	------	171	57
Conveyance structures	6	------	135	54
Land lost	6	2.00 ac.	400	160
Total	----	------	--------	1,586
Total per acre irrigated	----	------	--------	29
Total per acre once-over-equivalent	----	------	--------	20

[1]Average acreage irrigated 54; acres once-over-equivalent 79.

Table 14. Investment per farm for other gravity systems, irrigation equipment, conveyance structures, and land forming, 1 farm having well and surface sources of water, Delta Area, Mississippi, 1956.[1]

Item	Farms reporting	Allocated per farm reporting	Investment: Average per farm reporting	Investment: Average for 1 farm
	Number	Number	Dollars	Dollars
Wells, pumps, and power units	1	.13	660	660
Other pumps and power units	1	.65	169	169
Land lost	1	.39 ac	78	78
Total	----	------	--------	907
Total per acre irrigated	----	------	--------	8
Total per acre once-over-equivalent	----	------	--------	8

[1]Average acreage irrigated 120; acres once-over-equivalent 120.

Gravity irrigation.

not significant.

Farms Having Both Wells and Surface Sources of Water. Only one farmer who uses other gravity irrigation was found to be obtaining irrigation water from both wells and surface sources. As one observation could be misleading, it was omitted from this discussion. However, the data are presented in Table 14. For a complete tabulation of investment items for other gravity systems, regardless of source of irrigation water, see Appendix Table 4.

For a more comprehensive look at the investment picture, see Table 15, which shows total investment per acre in irrigation equipment for all combinations of distribution systems and water sources. These investments range from a high of $83 for sprinkler systems and well water to a low of $30 per acre for siphon tubes and surface water sources. For a complete listing of investment items by types of distribution system and by sources of irrigation water, see Appendix Tables 1-8.

Operating Costs

Annual costs of irrigation include interest on investment, depreciation, and maintenance of leveled land and conveyance structures,[4] as well as "out of pocket" costs such as those for electricity, fuel, repairs, lubricants, and labor. These and other annual cost items for the different irrigation systems are presented in this section. As was the case with investments, however, they should be interpreted only as average annual costs on the farms studied. Differences between costs for the different systems should not be interpreted as differences in costs an individual could expect to incur between systems for a given situation.

Farms Having Wells Only. On farms using wells as a source of water, annual irrigation costs per acre irrigated varied from a high of $20 for sprinkler systems

[4]Ten percent of the investment in land leveling and conveyance structures is included in depreciation as an annual charge for maintenance.

Table 15. Total investment in irrigation equipment per acre irrigated by type of distribution system used and source of irrigation water, Delta Area, Mississippi, 1956.

Source of water	Type of distribution system				
	Sprinkler	Gated pipe	Siphon	Other gravity methods	All systems
			Dollars		
Wells only	83	61	39	54	60
Surface sources only	59	48	30	29	49
Both wells and surface sources	79	54	30	8	51
All farms studied	73	57	36	50	56
			No. farms		
Wells only	28	42	19	39	89
Surface sources only	21	24	8	15	50
Both wells and surface sources	2	5	3	1	6
All farms studied	51	71	30	55	145

and gated pipe to a low of $9 for siphon tubes (Tables 16). Costs per acre once-over-equivalent ranged from $10 for sprinklers to $3 for siphon tubes. There was little difference between operating costs for sprinklers and gated pipe. Both require sizeable investments in equipment and labor requirements are higher than for the other systems. Siphon-tube irrigation was much cheaper than irrigation by these two systems largely because of lower investment resulting in smaller fixed costs, and because of lower labor requirements. However, as was pointed out earlier, the proper use of siphon-tube irrigation requires that land be properly prepared. In the initial stages of adoption of the practice of supplmental irrigation land that required little or no preparation was selected. As irrigation is extended to additional acreages, more land preparation will be needed and these annual costs are likely to rise somewhat.

The main items of annual expense for all distribution systems were depreciation, labor and fuel. The proportion of total operating costs accounted for by depreciation ranged from 30 percent for gated pipe to 45 percent for siphon tubes and other gravity systems. Labor costs ranged from 13 percent of the total for other gravity systems to 37 percent for gated pipe. Fuel or electricity was roughly 20 percent of total costs for each of the different systems.

Farms Having Surface Sources of Water Only. On farms using surface water only, annual costs of irrigation per acre irrigated were slightly lower than for farms having wells, but they followed the same general pattern among systems. Total costs per acre irrigated ranged from a high of $16 for sprinklers to a low of $8 for siphon tubes. Costs per acre once-over-equivalent ranged from $9 for gated pipe to $5 for siphon tubes. Depreciation represented the largest single item of annual costs.

Farms Having Wells and Surface Sources of Water. On farms using both sources of irrigation water, annual irrigation costs per acre irrigated ranged from a high of $18 for sprinklers to $7 for siphon tubes.[5] The general pattern of comparative costs among systems was much the same as the two situations discussed above. In general, these comparisons reflect lower costs from the use of surface sources of water and otherwise indicate little effect of source of water on annual operating costs for the various distribution systems.

All Farms. A comparison of annual irrigation costs for alternative application systems regardless of source of irrigation water is also presented in Table 16. Annual irrigation costs per acre irrigated

[5]Ignoring the one farm using other gravity systems.

Table 16. Annual cost of irrigation by type of system, Delta Area, Mississippi, 1956.[1]

Item	Type of system: Sprinkler	Gated pipe	Siphon	Other gravity systems	All systems
			Dollars		
Farms having wells only					
Fuel and electricity	611	452	286	417	650
Repairs, oil and grease	226	220	83	193	277
Depreciation	1,282	800	594	883	1,295
Interest on investment	321	200	149	221	324
Labor	682	966	219	262	831
Total	3,122	2,638	1,331	1,976	3,377
Total per acre irrigated	20	20	9	12	16
Total per acre once-over-equivalent	10	9	3	7	8
Farms having surface sources only					
Fuel and electricity	488	201	181	72	352
Repairs, oil, and grease	209	132	135	119	207
Depreciation	940	456	362	159	719
Interest on investment	235	114	90	40	180
Labor	695	441	211	147	581
Total	2,567	1,344	979	537	2,039
Total per acre irrigated	16	14	8	10	14
Total per acre once-over-equivalent	8	9	5	7	8
Farms having wells and surface sources					
Fuel and electricity	982	848	327	71	1,210
Repairs, oil, and grease	326	333	116	9	446
Depreciation	1,779	1,760	531	91	2,342
Interest on investment	445	440	133	23	585
Labor	565	1,808	164	269	1,822
Total	4,097	5,189	1,271	463	6,405
Total per acre irrigated	18	16	7	4	14
Total per acre once-over-equivalent	8	10	4	4	8
All farms studied					
Fuel and electricity	575	395	262	316	570
Repairs, oil, and grease	223	198	100	170	260
Depreciation	1,161	752	526	671	1,140
Interest on investment	290	188	131	168	285
Labor	683	848	211	231	786
Total	2,932	2,381	1,230	1,556	3,041
Total per acre irrigated	18	18	8	12	15
Total per acre once-over-equivalent	9	9	4	7	8

[1]See Table 15 for number of farms in each classification.

ranged from $18 for sprinklers and gated pipe to $8 for siphon tubes and averaged $15 for all systems. Costs per acre once-over-equivalent ranged from $9 for sprinklers and gated pipe to $4 for siphon tubes averaged $8 for all systems. The lower cost of siphon-tube irrigation is clearly established in this comparison, as well as in the others presented above. Depreciation and labor are again shown to be the two main items of annual cost.

In appraising investments and costs associated with alternative systems of distributing irrigation water as reported herein, two major considerations should be kept in mind. First, this is a progress report dealing with the initial findings in a broad and comprehensive study of supplemental irrigation. The final report will contain a more thorough and complete economic analysis of the practice. These preliminary findings are released at this time only because of the extreme interest in the subject.

Supplemental irrigation is relatively new in the Mississippi Delta and the majority of producers who are using it have had little or no previous experience. Both management and labor are "feeling their way" in the use of the practice and many inefficiencies have resulted. Exact patterns and techniques in the use of equipment and labor have not yet crystalized. The planning and management of the individual operator has continued to be the chief factor affecting labor requirements and costs. This is evident from the fact that the more efficient operators using each application method had lower costs than the bulk of the operators using any one method.

As management gains more knowledge and labor more experience, efficiency in the use of irrigation would naturally be expected to occur. In addition to reducing the costs of irrigation, these increased efficiencies may also alter the cost relationships that exist among the various distribution methods.

Production Responses Necessary to Cover Irrigation Costs

Sufficient information to permit a complete costs and returns evaluation of supplemental irrigation is not available. However, some insight into the economics of the problem can be gained by estimating the yield responses necessary to cover the costs of using the practice. In addition to the direct cost of irrigation, usually other costs are associated with its use. A prime illustration of these associated costs is the expense of harvesting and processing any increase in yields. Estimates of production response necessary to cover irrigation and associated costs for selected crops are presented in this section of the report.

Cotton

In cotton production, added costs associated with the use of supplemental irrigation are represented by additional poisoning, hoeing, and cultivation and by harvesting and ginning the increased yield. For the year studied, farmers estimated that irrigating cotton resulted in roughly three additional poisonings, something less than one complete hoeing, and a small amount of extra cultivation. Reduced to dollar values these three items make up additional costs of roughly $9.50 per acre. Assuming two irrigations,[6] the direct costs of irrigation amount to an average of $16.00 per acre (average costs for all irrigation methods studied).

Assuming a 36-percent lint turnout, lint cotton worth 33.3 cents per pound[7], cottonseed worth $49.50 per ton[7], and picking,

[6]Cotton was irrigated an average of slightly over 2 times per acre on all farms studied.

[7]Average price received by Mississippi farmers in 1956. **Agricultural Prices**, U. S. Department of Agriculture, AMS, Washington, D. C., January-December, 1956.

hauling, and ginning to cost $4.10 per hundredweight, a pound of seed cotton would be worth 10 cents in the field. Thus an increase in yield of 255 pounds of seed cotton per acre would have been required to cover irrigation and associated costs.

Corn

The only additional costs associated with irrigated corn production is that of harvesting the increased yield. Earlier studies indicate that for crops harvested mechanically, increases in yield result in only small additional harvesting costs.[8]

Assuming two irrigations[10] at a cost of of 4 cents per bushel and a market price for corn of $1.14 per bushel,[9] a bushel of corn would be worth $1.10 in the field.

Assumng two irrigations[10] at a cost of $16.00 per acre for the season, an increase in yield of approximately 15 bushels would be required to cover irrigation and associated costs.

Soybeans

In producing soybeans as in producing corn, the only indirect cost attributable to irrigation is that of harvesting increased yields. As soybeans are harvested entirely with machines, these added costs are small. Assuming an additional harvesting cost of 8 cents per bushel and a market price of 2.33 per bushel,[11] a bushel of soybeans would be worth $2.25 in the field. Assuming two irrigations[12] at a cost of $16.00 per acre, an increased yield of slightly over 7 bushels per acre would be necessary to cover the full costs of supplemental irrigation.

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[8]Specified Production Costs for Cotton and Alternative Crops, Yazoo-Mississippi Delta, by Grady B. Crowe, Mississippi Agricultural Experiment Station and Production Economics Research Branch, Stoneville, Miss., March, 1956.

[9]Average price received by Mississippi Farmers in 1956. **Agricultural Prices, op. cit.**

[10]Corn was irrigated an average of 2 times on all farms studied.

[11]Average prices received by Mississippi farmers in 1956, **Agricultural Prices, Op. Cit.**

[12]Soybeans were irrigated an average of 1.5 times on all farms studied.

Appendix Tables

Appendix Table 1. Investment per farm for sprinkler-irrigation equipment, conveyance structures, and land forming, 51 farms, Delta Area, Mississippi, 1956.[1]

Item	Farms reporting	Allocated per farm reporting	Investment	
			Average per farm reporting	Average for 51 farms
	Number	Number	Dollars	Dollars
Wells, pumps, and power units	30	.84	3,902	2,295
Other pumps and power units	46	1.31	2,452	2,212
Trailers	39	----	86	66
Pipes	51	----	5,292	5,292
Other equipment	51	----	1,360	1,360
Land forming	13	----	373	95
Conveyance structures	24	----	386	182
Land lost	14	1.93 ac.	386	106
Total	----	----	----	11,608
Total per acre irrigated	----	----	----	73
Total per acre once-over-equivalent	----	----	----	35

[1]Average acreage irrigated 160; acres once-over-equivalent 334.

Appendix Table 2. Investment per farm for gated-pipe irrigation equipment, conveyance structures, and land forming, 71 farms, Delta Area, Mississippi, 1956.[1]

Item	Farms reporting	Allocated per farm reporting	Investment	
			Average per farm reporting	Average for 71 farms
	Number	Number	Dollars	Dollars
Wells, pumps, and power units	47	.90	3,707	2,454
Other pumps and power units	65	1.20	1,600	1,465
Trailers	40	----	69	39
Pipes	71	----	2,431	2,431
Other equipment	66	----	304	283
Land forming	32	----	1,012	456
Conveyance structures	25	----	369	130
Land lost	27	3.38 ac.	676	257
Total	----	----	----	7,515
Total per acre irrigated	----	----	----	57
Total per acre once-over-equivalent	----	----	----	30

[1]Average acreage irrigated 133; acres once-over-equivalent 253.

Appendix Table 3. Investment per farm for siphon, irrigation equipment, conveyance structures, and land forming, 30 farms, Delta Area, Mississippi.[1]

Item	Farms reporting	Allocated per farm reporting	Investment	
			Average per farm reporting	Average for 30 farms
	Number	Number	Dollars	Dollars
Wells, pumps, and power units	22	.84	3,056	2,241
Other pumps and power units	23	1.32	1,143	876
Trailers	11	----	38	14
Pipes	14	----	525	245
Other equipment	24	----	147	118
Land forming	16	----	2,152	1,148
Conveyance structures	16	----	270	144
Land lost	24	2.96 ac.	591	472
Total	---	----	----	5,258
Total per acre irrigated	---	----	----	36
Total per acre once-over-equivalent	---	----	----	15

[1]Average acreage irrigated 145; acres once-over-equivalent 349.

Appendix Table 4. Investment per farm for other gravity systems irrigation equipment, conveyance structures, and land forming, 55 farms, Delta Area, Mississippi, 1956.[1]

Item	Farms reporting	Allocated per farm reporting	Investment	
			Average per farm reporting	Average for 55 farms
	Number	Number	Dollars	Dollars
Wells, pumps, and power units	40	.98	3,600	2,618
Other pumps and power units	40	1.03	1,174	854
Trailers	20	----	41	15
Pipes	44	----	1,275	1,020
Other equipment	42	----	152	116
Land forming	22	----	2,933	1,173
Conveyance structures	29	----	548	289
Land lost	29	5.97 ac.	1,190	629
Total	---	----	----	6,714
Total per acre irrigated	---	----	----	50
Total per acre once-over-equivalent	---	----	----	30

[1]Average acreage irrigated 134; acres once-over-equivalent 221.

Appendix Table 5. Investment per farm for irrigation equipment, conveyance structures, and land forming, 89 farms having wells only, Delta Area, Mississippi, 1956.[1]

Item	Farms reporting	Allocated per farm reporting	Investment	
			Average per farm reporting	Average for 89 farms
	Number	Number	Dollars	Dollars
Wells, pumps, and power units	89	1.31	5,199	5,199
Other pumps and power units	66	1.61	2,151	1,595
Trailers	41	----	93	43
Pipes	80	----	3,593	3,230
Other equipment	83	----	687	641
Land forming	37	----	2,961	1,231
Conveyance structures	47	----	672	355
Land lost	41	7.12 ac.	1,424	656
Total	----	----	----	12,950
Total per acre irrigated	----	----	----	60
Total per acre once-over-equivalent	----	----	----	29

[1]Average acreage irrigated 216; acres once-over-equivalent 442.

Appendix Table 6. Investment per farm for irrigation equipment, conveyance structures, and land forming, 50 farms having surface sources of water only, Delta Area, Mississippi, 1956.[1]

Item	Farms reporting	Allocated per farm reporting	Investment	
			Average per farm reporting	Average for 50 farms
	Number	Number	Dollars	Dollars
Pumps and power units	50	1.64	2,358	2,358
Trailers	43	----	66	57
Pipes	49	----	3,586	3,514
Other equipment	49	----	747	732
Land forming	13	----	1,273	331
Conveyance structures	15	----	310	93
Land lost	15	1.75 ac.	350	105
Total	----	----	----	7,190
Total per acre irrigated	----	----	----	49
Total per acre once-over-equivalent	----	----	----	27

[1]Average acreage irrigated 148; acres once-over-equivalent 269.

Appendix Table 7. Investment per farm for irrigation equipment, conveyance structures, and land forming, 6 farms having wells and surface sources of water, Delta Area, Mississippi, 1956.[1]

Item	Farms reporting	Allocated per farm reporting	Investment	
			Average per farm reporting	Average for 6 farms
	Number	Number	Dollars	Dollars
Wells, pumps, and power units	6	1.33	6,631	6,631
Other pumps and power units	6	3.67	5,047	5,047
Trailers	5	----	128	107
Pipes	6	----	7,127	7,127
Other equipment	6	----	951	951
Land forming	5	----	2,025	1,688
Conveyance structures	2	----	1,218	406
Land lost	5	8.77 ac.	1,754	1,462
Total	----	----	----	23,419
Totl per acre irrgated	----	----	----	51
Total per acre once-over-equivalent	----	----	----	29

[1]Average acreage irrigated 455; acres once-over-equivalent 801.

Appendix Table 8. Investment per farm for irrigation equipment, conveyancee structures, and land forming, 145 farms, Delta Area, Mississippi, 1956.[1]

Item	Farms reporting	Allocated per farm reporting	Investment	
			Average per farm reporting	Average for 145 farms
	Number	Number	Dollars	Dollars
Wells, pumps, and power units	95	1.31	5,289	3,465
Other pumps and power units	122	1.72	2,378	2,001
Trailers	89	----	82	51
Pipes	135	----	3,747	3,489
Other equipment	138	----	720	685
Land forming	55	----	2,476	939
Conveyance structures	64	----	605	267
Land lost	61	5.93 ac.	1,187	499
Total	----	----	----	11,396
Total per acre irrigated	----	----	----	56
Total per acre once-over-equivalent	----	----	----	29

[1]Average acreage irrigated 202; acres once-over-equivalent 397.