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Costs and Returns of Irrigated Peanut Production, West Cross Timbers, 1953-57

in cooperation with the
UNITED STATES DEPARTMENT OF AGRICULTURE

TEXAS AGRICULTURAL EXPERIMENT STATION
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SUMMARY

Five years of experience in the West Coast Timbers area of Texas show that wells of low capacity (25 to 120 gallons per minute, g.p.m.) can be used profitably in the production of irrigated peanuts. Special handling techniques are needed to accumulate a water supply and to distribute water over the deep sandy soils where peanuts are grown. Thus pumping, storage and distribution facilities are standard equipment for irrigation with wells of low capacity. The small heads of water (25 to 120 g.p.m.) combined with the types of equipment needed result in an irrigation development cost that ranges from $146 to $301 per acre irrigated on individual farms.

Heavier seeding rates, increased quantities of fertilizer, more hoeing and cultivation and additional harvest costs are incurred when peanuts are irrigated. Also, additional labor is needed to lay out, move and retrieve sprinkler systems.

From 1953-57, yields of peanuts on irrigated land averaged 34 bushels per acre compared with an average dryland yield of 14 bushels per acre —a net difference of 20 bushels in favor of the irrigated peanuts. Irrigation also improved the quality of peanuts produced, particularly during the dry years of 1954 and 1956. Irrigation increased hay yields about 20 bales per acre.

Costs for irrigation water averaged $5.0[illegible] acre-inch, or $33 per acre, during 1953-57. [illegible] cost of labor for irrigation and other costs [illegible] ciated with irrigation ranged from $10.0[illegible] $16.67 and averaged $13.66 per acre for t[illegible] year period. The average total cost of irriga[illegible] including operating and overhead, on indivi[illegible] farms, ranged from $37.96 to $63.34 per acre[illegible] averaged $46.64 per acre of irrigated peanut[illegible] all farms.

The 5-year average net return from [illegible] gated peanut production on individual f[illegible] ranged from $39.65 to $59.64 per acre but [illegible] fered considerably among farms and on the [illegible] farm in different years. The lowest net re[illegible] amounted to $10.25 per acre, whereas the h[illegible] est was $196.40 per acre. These extremes i[illegible] return per acre were both realized on the [illegible] farm in successive years.

The 5-year average annual net return [illegible] farm from irrigated peanut production was e[illegible] alent to a return ranging from 18.9 to 33.4 [illegible] cent on the amount invested in irrigation f[illegible] ties on these farms. In calculating these [illegible] age annual net return rates, it was assumed [illegible] management returns would be the same [illegible] irrigated as from dryland peanut production[illegible]

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E ERA OF IRRIGATED CASH CROP FARMING IN TEXAS, which began late in the 19th century, been marked from time to time by the addi- of new crops. Early irrigated cash crops isted of cotton and rice. Later, irrigation of ıs, vegetables, grain sorghum and wheat was oduced. In recent years, peanuts have been ed to the list of crops produced under irriga- in Texas.

No doubt peanuts have been irrigated in the , but no instance of peanut irrigation was ıd in the 1948 inventory of irrigation in Tex-

Production of irrigated peanuts is believed ıave begun near Pearsall in Frio county in) and to have expanded from there to other ıs during the drouth of 1952-56. Peanuts now irrigated in several areas of the State but ıt water supplies and acreage allotments have ted the total acreage irrigated. The major ıs of irrigated peanut production are located Pearsall in Frio county, near Camp San a in McCulloch county, near DeLeon in Co- ıche and Erath counties and near Grapeland rockett county.

This study was undertaken to obtain infor- ion on peanut irrigation practices, costs and rns. Because irrigation of peanuts was a tively new practice, no backlog of experience available to assist growers with their eco- ıic production problems. Also, farmers in the ly area obtained their supplies of irrigation er from wells with capacities smaller than erally considered economically feasible for l-scale irrigation. Five farms in the High- ls Community of Comanche and Erath coun- were selected for study. (See cover.) Rec- s covering irrigation development costs, water ıagement and crop production practices and ıomic returns were obtained and analyzed for 3-57.

The practice of irrigation, particularly un- subhumid conditions, modifies the natural en- ınment and the results obtained reflect the ef- s of the kinds and quantities of resources em- ed under various crop and management pro- grams. Year-to-year yields and income vary widely on individual farms and between individual farms in the same year. Since each combination of resources and management practices reflects a different production situation, it is difficult to compare year-to-year results. However, year-to-year yields and income data, as well as averages for individual farms, are useful in determining the range of results that reasonably might be expected from similar enterprises.

FARM ORGANIZATION

The five farms ranged from 220 to 920 acres with 44 to 82 percent in cultivation. All were owner-operated and only two had increased in size since irrigation was started. Three of the farms contained some share-rented land. Farm improvements were above average for this general area.

The farmlands, including the irrigated tracts, are sandy with undulating to gently rolling topography—typical peanut land of the general area.

Although two of the farm operators installed dairy enterprises during the last years of the study, production of peanuts is the main farm enterprise. Peanuts grown on irrigated and dry land accounted for about half the total number of acres cultivated in any given year. Other crops grown were oats, grain sorghum, cotton, peas, Sudan and vetch and rye. Livestock, dairy or beef cattle, were important enterprises on four of the five farms.

Peanuts were the chief crop irrigated. However, because of scant water supplies, the entire acreage of peanuts was irrigated only three times on one farm and only once on another farm during 1953-57. Small acreages of oats, peas, cotton, grain sorghum, vetch and rye and alfalfa have been irrigated. The total number of acres irrigated and the acreages of peanuts irrigated by years and by farms are shown in Table 1.

The average number of acres irrigated per farm changed little during the 5 years, 1953-57. The proportion of all land irrigated for peanuts increased materially. Water was used on other crops only when it was not needed on peanuts.

IRRIGATION FACILITIES

Water supplies are obtained from wells that tap the Trinity sands near their outcrop. Well depths, yields, pump settings and equipment sizes

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ghes, Wm. F. and Motheral, Joe C., Irrigated Agricul- e in Texas. Tex. Agr. Exp. Sta. MP-59.

TABLE 1. ACREAGE IRRIGATED, FIVE SELECTED FARMS, HIGHLANDS COMMUNITY, COMANCHE AND ERATH COUN TEXAS, 1953-57

Farm number	1953			1954			1955			1956			1957		
	Total	Peanuts	Other crops	Total	Peanuts	Other crops	Total	Peanuts	Other crops	Total	Peanuts	Other crops	Total	Peanuts	O cr
								Acres							
1	20	20	0	48	30	18	24	24	0	27	27	0	18	18	
2	85	78	7	88	83	5	101	101	0	79	76	3	82	82	
3	110	40	70	52	25	27	60	60	0	88	60	28	40	40	
4	33	13	20	31	12	9	32	32	0	76	76	0	75	75	
5	25	17	8	33	17	16	30	18	12	40	21	19	31	27	
Average all farms	54.7	33.8	20.9	50.7	33.6	15.1	49.6	47.2	2.4	62.0	52.0	10.0	49.2	48.4	
								Percent							
Irrigated acreage in peanuts, all farms		62			66			95			84			98	

are shown in Table 2. Being near the outcrop area, the saturated section is relatively thin and its thickness differs considerably between wells. The output of most wells has declined. This is evident particularly during the latter part of the pumping season. However, both the water levels and the well yields improved in 1957 when precipitation was above normal. Yields of some wells have declined sharply as a result of mutual interference from nearby wells.

All wells were equipped with turbine pumps powered by small 2 to 5 horsepower electric motors. Wells are arranged to pump into small storage reservoirs, commonly two wells to the reservoir. The reservoirs, with one exception, were constructed before the development of irrigation. The reservoirs commonly have a surface area of one-fourth to one-half acre and can store a supply of water equivalent to that obtained from 4 to 10 days of continuous pumping.

Water is pumped from the storage reservoir and distributed to crops through portable sprinkler systems. Eight sprinkler systems were used on the five cooperating farms. These systems could cover from 1.15 to 2.0 acres per setting, with 1.3 acres per setting the more common size. Sprinkler output ranged from 0.5 to 1.0 inch water per hour. Five of the eight sprinkler tems were designed to deliver 0.75 inch per h

All except one of the sprinkler systems w equipped with 3″ x 3″ pumps powered by u automobile engines operated with butane. Spri ler mains were chiefly 5 and 4-inch diam aluminum pipe with 4 and 3-inch laterals.

COST OF IRRIGATION DEVELOPME

Investments in irrigation facilities have creased since the development of irrigation be in 1952. Additional wells were installed on five cooperating farms, reservoirs were enlar more pipe was added to existing sprinkler tems and more sprinkler systems were ad The initial cost of development and the additi by years are shown in Table 3.

The investment per irrigated acre, like investment per farm, has fluctuated widely f year to year, reflecting the effects of a cha in number of acres irrigated or of increased ital investment. The average investment acre irrigated in 1957 was $100 greater than average investment in 1953.

TABLE 2. CHARACTERISTICS OF IRRIGATION WELLS, FIVE SELECTED FARMS, HIGHLANDS COMMUNITY, COMAN AND ERATH COUNTIES, TEXAS, 1953-57

Item	Unit	Farm No. 1 Well No.		Farm No. 2 Well No.				Farm No. 3 Well No.				Farm No. 4 Well No.			Farm Well
		1	2	1	2	3	4	1	2	3	4	1	2	3	1
Date drilled[1]		1952	1956	1952	1952	1954	1955	1951	1951	1952	1956	1952	1956	1956	1951
Depth drilled	Feet	100	98	116	113	125	125	120	120	129	130	128	125	134	135
Water level	Feet	70	52	64	60	65	60	25	25	100	100	32	78	84	121
Saturated section[2]	Feet	26	28	52	52	60	61	85	85	20	20	78	42	36	9
Pump setting	Feet	96	80	116	113	125	121	110	110	120	120	110	120	120	130
Pump size	Inches	3	2	3	3	3	3	3	3	3	3	4	4	4	3
Motor rating	Horsepower	5	2	5	5	5	5	5	5	3	3	5	5	5	5
Well yield															
1953[3]	G.p.m.	80		80	80			80	100	45		120			60
1954[4]	G.p.m.	45		50	37	75		54	65	[5]		56			25
1956[4]	G.p.m.	35	22	29	39	75	65	58	58	28	40	80	70[3]	120[3]	33

[1]Year the well was drilled; not necessarily year of first use.
[2]Total thickness of water-bearing formation at well site.
[3]Yields reported by operator.
[4]Yields measured.
[5]Well not used in 1954.

During the first 2 years of operation, about one-third of the irrigated acreage was in crops other than peanuts, Table 1. The years 1952-54 served more or less as a "shakedown" period for peanut irrigation. Beginning in 1955, the acreage in "other crops" was sharply curtailed, investment in irrigation facilities increased and the acreage of irrigated peanuts increased by about a third, Tables 1 and 3.

Crops other than peanuts were irrigated when water was not needed for peanuts. Consequently, the increase in the acreage of peanuts irrigated required an expansion in irrigation facilities. Peanuts have been the most profitable crop, and they have borne the brunt of development costs. Elimination of "other crops" has not increased the average cost of development per acre on peanuts to the extent indicated in Table 3. With all the cost of development charged to peanuts, the average development cost per acre has increased from $152 in 1953 to $198 per acre in 1957, an increase of $46 per acre compared with the 1953-57 increase of $100 per acre irrigated, Table 3.

IRRIGATION PRACTICES

The use of low-yielding wells as a source of water supply requires that pumps be started in advance of the irrigation season. Pumps seldom were stopped during the entire irrigation season. Once the reservoir was full, the sprinkler systems were started and operated as long as the supply in the reservoir would permit.

The usual practice was to plant peanuts in late May or early June and to begin applying water in late July or early August, continuing irrigation through September. The number of times water was applied and the irrigation schedule followed depended principally on the season and the quantity of water available.

A modification of this system consisted of planting peanuts at two different times. The early peanuts were planted in March or April. Irrigation was begun in late June and ended about the time water was needed on the peanuts planted in May and June. This technique lengthens the irrigation season and permits a larger acreage of peanuts to be irrigated without adding extra equipment.

The number of irrigations varied with the season and with individual farms, ranging from a low of one application on one farm in 1955, to a high of eight on one farm during the extremely dry year of 1954. In 1954 and 1956, both dry years, the number of applications on the five farms averaged 4.6 and 4.1, respectively. Seasonal conditions were more favorable in 1953 and 1955, and the number of applications was less, averaging 3.7 and 2.2, respectively. The 1957 crop season was marked by heavy and late-season precipitation. The summer was dry, however, and peanuts received an average of 3.3 irrigations.

The number of applications of irrigation water per season varied considerably among farms during the 5 years of observation. However, the usual range was three to five irrigations per season.

Although a few applications ranged up to 3.0 inches per irrigation, the more common rate was 1.5 to 2.0 inches per irrigation. The total amount of water applied per acre ranged from an average of 3.9 acre-inches per acre in 1955 to 7.9 acre-inches per acre in 1956. Water applied during 1953-54 averaged 7.0 and 6.6 acre-inches per acre, respectively. An average of 7.3 acre-inch of water per acre was applied in 1957.

CROP PRODUCTION PRACTICES

The introduction of irrigation has led to some changes in the practices commonly used in producing peanuts compared with production practices on dry land. These changes are mainly in the form of increased rates of fertilizer application, heavier seeding rates and an increase in the amount of hoeing and cultivation required to control weeds. Land preparation practices have not changed since irrigation was introduced. Seeding rates for both irrigated and dryland peanuts have increased since 1953. The more common

TABLE 3. INVESTMENT IN IRRIGATION FACILITIES, FIVE SELECTED FARMS, HIGHLANDS COMMUNITY, COMANCHE AND ERATH COUNTIES, TEXAS, 1953-57[1]

Farm number	1953		1954		1955		1956		1957	
	Total	Per acre irrigated	Total	Per acre irrigated	Total	Per acre irrigated	Total	Per acre irrigated	Total	Per acre irrigated
	Dollars									
1	4,317	216	4,317	90	4,317	180	4,417	164	5,417	301
2	6,595	84	9,147	110	12,292	121	14,192	180	14,192	173
3	6,731	61	6,731	132	8,607	143	10,626	121	10,626	266
4	3,735	113	3,735	174	3,805	119	9,924	130	10,924	146
5	4,275	128	4,527	181	4,527	148	6,469	162	6,684	216
All farms average	5,130	94	5,691	112	6,709	135	9,125	147	9,568	194

[1]Undepreciated amount invested in wells, reservoirs and sprinkler systems.

rate of seeding dryland peanuts was 40 pounds per acre. During the 1953 season, this rate was used for both irrigated and dryland peanuts. Beginning in 1954, the irrigated seeding rate was increased by an average of 5 pounds per acre. In 1957, irrigated peanuts were seeded at an average rate of 45.6 pounds per acre, whereas the rate for dryland peanuts was 43.6 pounds.

The increased seeding rate for dryland peanuts does not necessarily reflect any particular change in production practices. It results from the fact that the number of acres that can be irrigated is not known at planting time. Thus, the operator with scant water resources prepares in advance to irrigate as many acres as the season will permit. The higher seeding rates have tended to be associated with the higher yields. Some of the differences in yield probably are due to management, but yields of irrigated peanuts sellom exceeded 35 bushels per acre with a seeding rate of 40 pounds per acre. In only one instance did the yield fall below 35 bushels per acre when a seeding rate of 50 pounds per acre was used.

Four of the five farmers used heavier rates of fertilizer — chiefly 6-24-24 and 10-20-10 — on irrigated land than on dryland peanuts. The increase ranged from 25 to more than 100 percent in the quantity of materials applied. The usual application on dry land was 80 to 100 pounds of material per acre. On irrigated peanuts, it was 100 to 200 pounds per acre.

The average amount of plant nutrients applied per acre on irrigated peanuts has increased from 7.2-28.8-10.8 pounds (N-P_2O_5-K_2O) in 1953, to 14.0-47.0-13.8 pounds (N-P_2O_5-K_2O) in 1957. The increase in number of pounds per acre of fertilizer nutrients applied on dryland peanuts was less pronounced. The range was from 7.8-25.6-7.8 pounds per acre in 1953 to 8.8-28.4-8.6 pounds (N-P_2O_5-K_2O), respectively, in 1957.

Two of the cooperating farmers fertilized irrigated peanuts with a high concentrate nitrogen solution applied through the sprinkler system. Although the applications were made in ferent years, the results were much the sam a substantial increase in top growth with littl no increase in the yield of peanuts. The pro was not repeated during the 5 years covered the study reported.

The amount of hoeing and the number of tivations required on dryland and irrigated pe nuts were about the same in 1953 and 1954. Si 1954 the amounts of hoeing and cultivation ne ed for irrigated peanuts have increased. The h hoeing requirements for irrigated were consi ably greater than for dryland peanuts. Part this difference probably was due to the 1 drouth, because the 1957 requirements were 1.7 times those for dryland peanuts.

Irrigation has much the same effect on number of cultivations required. Most of irrigated peanuts have received one to three m cultivations than peanuts produced on dry lan

The hoeing and cultivation requirements peanuts planted in early April are particula heavy. The number of man-hours of hoeing quired to control weeds on peanuts planted April has averaged four times more than on i gated peanuts planted in late May or June. E planted peanuts also have required twice as m cultivation as those planted later.

PEANUT YIELDS

Yields of irrigated peanuts averaged 3 bushels per acre compared with an average 13.8 bushels per acre on dry land during 1953- Table 4. The average yield on individual fa ranged from 28.8 to 40 bushels per acre on i gated land compared with a range of 13.2 to 1 bushels per acre on dry land. The seasonal fects in individual years are shown in the he ing on "Average all farms," Table 4.

Although the yield from irrigated pean on individual farms differed considerably in p ticular years, the variation in yearly aver

TABLE 4. PEANUT YIELD PER ACRE, IRRIGATED AND DRYLAND, FIVE SELECTED FARMS, HIGHLANDS COMMUN COMANCHE AND ERATH COUNTIES, TEXAS, 1953-57

Farm number	Yield per acre											
	1953		1954		1955		1956		1957		Average 1953-57	
	Irrigated	Dryland	Irrigated	Dryland	Irrigated	Dryland	Irrigated	Dryland	Irrigated	Dryland	Irrigated	Dryland
	Bushels											
1	35.1	22.0	20.3	5.3	34.6	16.8	31.7	4.7	41.3	13.4	32.17	13.60
2	34.7	24.0	27.5	14.0	36.0	25.0	24.5	3.1	30.0	20.0	28.85	15.55
3	34.0	22.0	52.0	0.0	42.2	25.0	36.7	7.0	40.2	17.0	40.04	13.22
4	53.0	22.0	32.0	9.0	40.7	21.5	40.5	3.3	29.9[1]	16.8	36.96	15.32
5	35.6	25.0	21.0	8.0	47.7	14.5	42.0	6.0	30.0	17.0	35.60	13.64
Average all farms	34.98	23.24	29.51	5.75	39.06	18.16	34.16	7.50	32.49	16.87	34.24	13.83

[1]Yield reduced by root borer damage.

yields was smaller, Table 4. In contrast, the yearly average yields for dryland peanuts ranged from a low of 5.7 to a high of 23.2 bushels per acre.

Moisture conditions during 1953-57 affected yields materially. Precipitation from July to November, the critical period, was below average in 4 of the 5 years, Figure 1. Moisture conditions were more favorable in 1953, 1955 and 1957 than in 1954 and 1956. Although precipitation in both 1953 and 1955 was below the July to November average, its distribution was favorable for crop production. The 1953 crop was made or materially aided by above-average rainfall in October. The 1955 crop was made on above-average rainfall in August and September.

The 1957 season was characterized by heavy spring rainfall, with below-average rainfall in August and September, followed by heavy and prolonged precipitation in the fall. The heavy fall rainfall delayed harvest and resulted in higher than usual harvest and grade losses. Yields on some fields were reduced materially by root borer damage. The combined effects of excess moisture at harvest time and root borer damage reduced 1957 irrigated yields below the 1953 and 1955 levels.

Moisture supplies were extremely short during August of 1954 and 1956, and dryland peanut yields and grades were considerably below average. The 1954 and 1956 dryland crops were made on October and November rainfall.

The weighted average increase in the yield of irrigated peanuts per acre, the amount of water used and the increase in yield per acre-inch of water applied are shown in Table 5. The results shown in Table 5 are averages for individual farms during 1953-57; they reflect the effects of a different combination of practices applied under different management. During the 5 years, a wider range of difference occurred between irrigated and dryland yields on individual farms, Table 4, than is shown in the averages in Table 5. These year-to-year differences on individual farms reflect the effects of a variety of conditions. The conditions under which the study reported was conducted does not permit determination of causes or effects that might have influenced yields, either beneficially or adversely. The irrigated yields obtained in 1955 and 1956 give some indication, however, that as growers gain more experience, the general level of irrigated production may be raised. The 1957 yields were lower than were expected because of heavy rains at harvest time.

In addition to increased yields, irrigation has improved the quality of peanuts. In 1953 and 1955, when moisture was fairly adequate, irrigated and dryland peanuts differed little in quality. Under the short moisture conditions of 1954 and 1956, however, irrigated peanuts graded 12 to 25 points above those produced on dry land. In

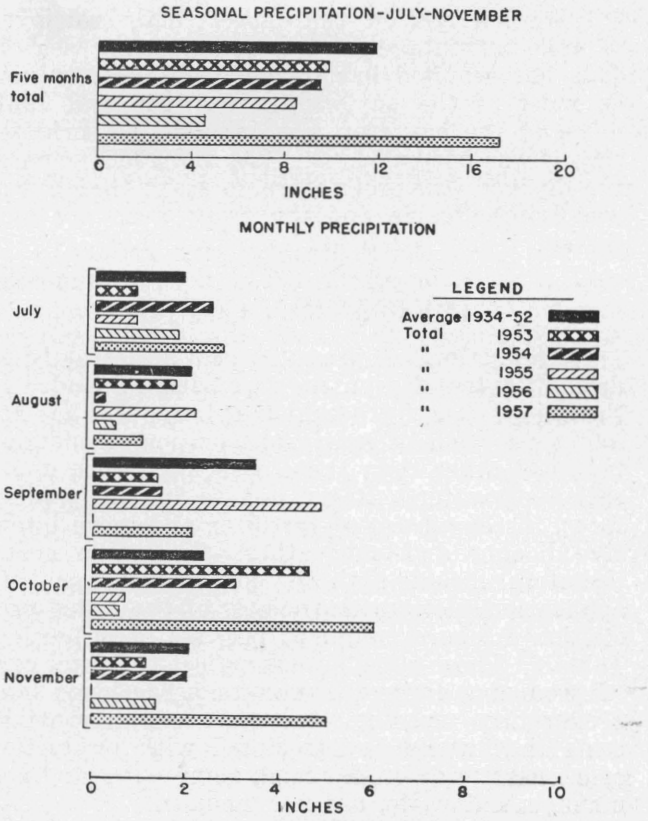

Figure 1. Total and monthly precipitation during the irrigation season. Based on weather bureau records obtained at Dublin and Stephenville, Texas.

1954, a year of low production, a difference of 25 points in grade was worth $3.05 per bushel, including the bonus.

Irrigation also increased the top growth of peanuts with a consequent increase in quantity of hay produced. On some farms, the additional hay produced contributed to the income from the irrigated peanut enterprise. Yields of irrigated peanut hay during the 5 years ranged from 12 to 40 bales per acre on individual farms, with an overall average of 26 (80-pound) bales per acre. Yields of peanut hay produced on dry land have ranged from practically nothing to 15 bales per acre; the 5-year average yield was only 6.6 bales per acre.

TABLE 5. INCREASE IN YIELD OF PEANUTS PER ACRE RESULTING FROM IRRIGATION, FIVE SELECTED FARMS, HIGHLANDS COMMUNITY, COMANCHE AND ERATH COUNTIES, TEXAS, 1953-57

Farm number	Water applied per acre	Average increase in yield per acre[1]	Increase per acre-inch
	Acre-inches	Bushels	Bushels
1	5.08	18.57	3.66
2	6.25	13.30	2.13
3	6.28	26.82	4.26
4	8.02	21.64	2.70
5	6.33	21.96	3.38
All farms average	6.59	20.37	3.09

[1]Increase in yield of irrigated peanuts over the yield of peanuts grown under dryland conditions on the same farms.

With irrigation, the harvest date is delayed to take advantage of the full growing season. This has resulted in damage from frost or rain on most of the hay crops. In 1955 and 1957, much of the hay crop was damaged so seriously that it was not baled. In 1954 and 1956, some of the dryland hay crops were so scant that baling was impracticable and the crops were not harvested.

IRRIGATION COSTS

Production of peanuts was an established dryland enterprise on the five farms included in the study. The introduction of irrigation has not led to adoption of new crops or new production practices other than those associated with application of water. It has led to higher seeding rates, increased use of fertilizer and more intensive hoeing and cultivating. Irrigation costs, therefore, include both the cost of water and its application, along with the cost of the added production measures required because of irrigation, Table 6. These costs do not reflect the total cost of producing irrigated peanuts. The basic land preparation, seeding, cultural and harvesting costs that would be associated with production of a peanut crop on dry land, along with land and management costs, are not included.

Costs shown in Table 6 reflect the average annual per acre cost of irrigation on the individual farms, along with the 5-year average cost for all farms. The cost on individual farms has fluctuated widely, depending on the amount of water used, the necessity for intensifying certain production measures and the differences in yields of irrigated and dryland peanuts.

Differences between the average cost per acre of irrigation on individual farms reflect the combined effects of farm differences in investment per acre irrigated, production practices, yields and management, Tables 3, 4 and 5.

The labor cost listed in Table 6 includes actual number of labor hours required to lay move and retrieve sprinkler lines at a cost o cents per hour. Except for the time spent in ing out and retrieving the sprinkler system, labor ordinarily used in irrigation was exper at the rate of 1 or possible 2 hours a day du the irrigation season.

Depreciation and interest on investmen irrigation facilities is included as a cost in T 6. Consequently, the total cost entry is no actual cash cost. Approximately 48 percen the average irrigation cost of $46.64 per acre $22.65, is depreciation and interest on investm (overhead). As the overhead costs apply on the investment in irrigation facilities, all o head costs are included in the water-cost sec in Table 6.

Slightly more than 62 percent of the t water cost per acre is overhead-depreciation interest. This is not distributed evenly am the components of water cost. For example percent of the average annual pumping cost, percent of the storage cost and 55 percent of distribution cost, exclusive of the labor requ to distribute water, is in the form of overhea

Overhead costs are emphasized since t are commonly overlooked in appraising irriga benefits. Although overhead costs are not parent in any given year, they are real costs. O a period of time, they become especially appar

Added costs of seed, fertilizer, cultiva and harvest are cash outlays. Cost of labor irrigation and added hoeing are calculated as c costs, but usually they are performed by the erator. The actual cash outlays, therefore, w be somewhat lower than indicated above.

The irrigation cost per acre has ranged f a low of $22 to a high of $101 per acre on i vidual farms, Table 7. The 5-year average

TABLE 6. AVERAGE ANNUAL IRRIGATION COST PER ACRE, FIVE SELECTED FARMS, HIGHLANDS COMMUNITY, COMAN AND ERATH COUNTIES, TEXAS, 1953-57

Farm number	Water cost per acre-inch[1]				Water cost per acre[2]	Irrigation labor cost per acre[3]	Added costs of production measures per acre owing to irrigation					
	Pumping	Storage	Distribution	Total			Seed	Fertilizer[4]	Hoeing	Cultivation	Harvest[5]	To
	Dollars											
1	2.71	0.12	3.51	6.34	32.22	2.62	0.	0.	0.62	0.26	6.54	42
2	1.91	.03	2.13	4.07	25.42	1.65	0.	1.91	.31	.86	7.81	37
3	3.21	.09	2.96	6.26	39.34	1.95	1.39	1.61	.55	.33	10.43	55
4	2.03	.06	2.32	4.41	35.37	2.19	.60	2.48	.83	.27	6.25	47
5	3.55	.08	3.74[6]	7.37	46.67	2.82	0.	3.09	.37	0.	10.39	63
Average all farms	2.38	0.07	2.64	5.09	32.98	2.04	.41	1.87	.50	.49	8.35	46

[1]Per acre-inch of water applied with energy at 1.5 cents per kilowatt-hour.
[2]Includes both overhead and operating cost.
[3]Based on a rate of 75 cents per hour.
[4]Includes insect control costs.
[5]Based on custom threshing and baling rates.
[6]Gasoline-fueled plant, other butane fueled.

gation cost per farm ranges from $37.96 to $63.34 per acre. The overhead part of these costs has not varied to the extent indicated by the range in per acre costs on individual farms. Overhead is more or less a fixed cost with the size dictated by the investment in irrigation facilities on individual farms. Most of the year-to-year variation in costs of irrigation on individual farms results from differences in the cost of harvesting the part of the crop that is attributable to irrigation.

IRRIGATION RETURNS

The added returns per acre from irrigated peanuts as compared with peanuts produced on dry land is shown in Table 7. The returns shown in Table 7 are net returns from irrigation, and, as such, reflect the difference between receipts from the sale of increased production of peanuts, grade improvements on the part of the crop that presumably would have been produced under dryland operation and the sale of the additional hay minus the costs attributable to or associated with irrigation.

Differences in costs and returns between individual farms from year to year reflect the effects of seasonal weather conditions on the particular combination of resources and management practices of individual farm operators. Because of these differences, shown in Tables 1-6, there is no valid basis for summarizing the 5-year results for the farms. Each farm represents a different production situation each year. For this reason, the 25 production situations are reported individually in Table 7.

The evaluation of results is based on the principle of added returns minus added costs. Consequently, the higher net returns from irrigation are more likely to be realized in years when nonirrigated peanut yields are low, Table 4, and 1954 and 1956 entries in Table 7. Conversely, the lowest net returns are obtained during years when yields of nonirrigated peanuts are higher, Tables 4 and 7. The net returns in 1957 are low because of harvest and grade losses resulting from rainfall in October and November, Figure 1.

The cost data in Table 6 are 5-year averages for the respective farms. Although there is a difference of approximately $21 per acre between the highest and lowest average costs, average cost figures tend to obscure the wide variation characteristic of this type of farm operation. As shown in Table 7, the range between the highest and lowest cost per acre on individual farms dur-

TABLE 7. ADDED ANNUAL AND AVERAGE NET RETURNS FROM IRRIGATED PEANUT PRODUCTION, FIVE SELECTED FARMS, HIGHLANDS COMMUNITY, COMANCHE AND ERATH COUNTIES, TEXAS, 1953-57

Farm number	Year	Irrigated peanut acreage	Added receipts[1]		Added costs[2]		Net added returns		Return on investment[3]
			Per acre	Total	Per acre	Total	Per acre	Total	
		Acres	— — — — — — — —		Dollars		— — — — — — —		Percent
1	1957	18.0	102.31	1,842	63.06	1,135	39.27	707	13.0
	1956	27.0	107.50	2,902	40.10	1,083	67.37	1,819	41.1
	1955	20.0	59.50	1,198	39.99	800	19.90	398	9.2
	1954	30.0	79.02	2,371	36.19	1,086	42.83	1,285	29.7
	1953	20.0	74.08	1,482	46.39	928	27.70	554	12.8
5-year average		23.0	85.16	1,959	42.26	1,006	41.43	953	20.9
2	1957	82.0	68.00	5,576	40.27	3,303	27.71	2,273	16.0
	1956	76.0	99.49	7,561	47.34	3,598	52.14	3,963	27.9
	1955	101.5	59.15	6,004	33.79	3,430	25.36	2,574	20.9
	1954	83.0	110.85	9,810	37.98	3,153	80.20	6,657	72.7
	1953	85.0	43.80	3,723	31.82	2,498	14.41	1,225	18.5
5-year average		85.5	76.43	6,535	37.96	3,197	39.65	3,338	29.6
3	1957	40.0	105.10	4,204	69.05	2,462	43.55	1,742	16.3
	1956	60.0	148.75	8,925	61.60	3,696	87.15	5,229	49.2
	1955	60.0	59.23	3,554	35.58	2,135	23.65	1,419	16.4
	1954	25.0	297.32	7,433	100.93	2,523	196.40	4,910	72.9
	1953	40.0	45.36	1,814	35.11	1,404	10.25	410	6.1
5-year average		45.0	115.24	5,186	55.60	2,504	59.64	2,684	30.9
4	1957	75.0	45.43	3,407	32.77	2,458	12.65	949	8.7
	1956	76.3	137.42	10,485	53.03	4,047	84.37	6,438	64.9
	1955	32.0	66.67	2,133	44.05	1,410	22.59	723	19.0
	1954	12.5	125.48	1,568	80.72	1,090	38.24	478	12.8
	1953	13.0	108.19	1,406	78.15	1,016	30.00	390	10.4
5-year average		41.8	91.00	3,800	47.99	2,004	42.99	1,795	27.9
5	1957	27.0	95.66	2,583	60.09	1,623	35.55	960	14.4
	1956	21.0	160.95	3,380	83.68	1,757	77.28	1,623	25.1
	1955	18.5	115.18	2,131	62.87	1,163	52.32	968	21.4
	1954	17.5	84.16	1,473	51.53	902	32.62	571	12.6
	1953	17.5	69.93	1,224	56.43	988	13.48	236	5.5
5-year average		20.3	91.09	2,158	63.34	1,286	42.94	871	16.4

[1]Gross value of increased peanut and hay production plus grade improvements.
[2]Costs attributable to or associated with irrigation only.
[3]Added income received from investment in irrigation facilities. Management is the same as on dryland farms.

ing 1953-57 amounted to $26.87, $15.52, $65.82, $47.95 and $32.15 on farms numbered 1, 2, 3, 4 and 5, respectively. For the five farms the range between the highest ($100.93) and the lowest ($31.82) cost per acre during the 5 years amounted to $69.11.

Added gross receipts also varied widely between individual farms in the same year and on individual farms in different years. For instance, there was a difference of $253 per acre between the lowest ($43.80) and the highest ($297.32) added gross receipts per acre. The range between the highest and lowest added gross receipts per acre on individual farms during this 5-year period amounted to $48, $67, $252, $92 and $91 on farms numbered 1, 2, 3, 4 and 5, respectively.

As this evaluation turns on the value of added production less added costs, the highest added receipts tend to be paired with the highest added costs. Likewise, the lowest added receipts are paired with the lowest added cost. Because of this receipt and cost pairing, the range in net added returns is similar to the range in added gross receipts.

The average net gain per farm from production of irrigated peanuts during 1953-57 ranged from $39.65 to $59.64 per acre. The lowest net return received in a particular year was $10.25 per acre, whereas the highest was $196.40. These extremes in net return were received in successive years on farm No. 3, Table 7.

Production of irrigated peanuts was a profitable enterprise each year on all five farms included in the study, Table 7.

The entries in the last two columns of Table 7 may be interpreted in two ways. The return per farm shows the net gain, in addition to t value of the operator's labor, which is inclu as a cost, received on each farm each year. all costs connected with the conduct of the i gated enterprise are covered by the entries der "added costs," the "net added returns farm" may be construed as management inco

The net added return per farm is expres as a return on investment, shown in final colu of Table 7. This item reflects the added inc from the investment in irrigation facilities. M agement is assumed to be the same as before the dryland farm. The actual returns on inv ment amounted to 2.5 percentage points m than is indicated in Table 7. An interest cha of 5 percent on half the amount invested in i gation facilities was included as an added cost

The results obtained on these farms are s nificant in themselves. Of even greater signi cance, however, is the demonstrated fact t small heads of water, Table 2, high investm costs per acre irrigated, Table 3, and consequ high-cost water, Table 6, can be used profita with crops of high value, Table 7.

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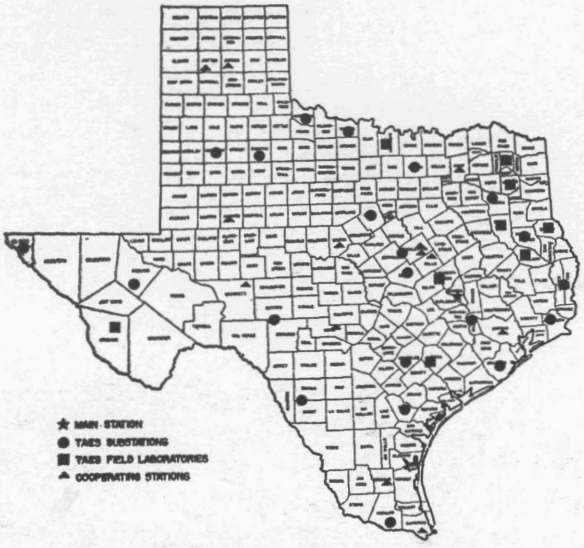

Location of field research units of the Texas Agricultural Experiment Station and cooperating agencies

State-wide Research

The Texas Agricultural Experiment Statio is the public agricultural research agenc of the State of Texas, and is one of te parts of the Texas A&M College Systen

ORGANIZATION

IN THE MAIN STATION, with headquarters at College Station, are 16 su matter departments, 2 service departments, 3 regulatory services an administrative staff. Located out in the major agricultural areas of Texa 21 substations and 9 field laboratories. In addition, there are 14 cooper stations owned by other agencies. Cooperating agencies include the T Forest Service, Game and Fish Commission of Texas, Texas Prison Sy U. S. Department of Agriculture, University of Texas, Texas Technolo College, Texas College of Arts and Industries and the King Ranch. S experiments are conducted on farms and ranches and in rural homes.

OPERATION

THE TEXAS STATION is conducting about 400 active research projects, grou in 25 programs, which include all phases of agriculture in Texas. Am these are:

- Conservation and improvement of soil
- Conservation and use of water
- Grasses and legumes
- Grain crops
- Cotton and other fiber crops
- Vegetable crops
- Citrus and other subtropical fruits
- Fruits and nuts
- Oil seed crops
- Ornamental plants
- Brush and weeds
- Insects
- Beef cattle
- Dairy cattle
- Sheep and goats
- Swine
- Chickens and turkeys
- Animal diseases and parasites
- Fish and game
- Farm and ranch engineering
- Farm and ranch business
- Marketing agricultural product
- Rural home economics
- Rural agricultural economics
- Plant diseases

Two additional programs are maintenance and upkeep, and central servi

Research results are carried to Texas farmers, ranchmen and homemakers by county agents and specialists of the Texas Agricultural Extension Service

AGRICULTURAL RESEARCH seeks the WHATS, the WHYS, the WHENS, the WHERES and the HOWS of hundreds of problems which confront operators of farms and ranches, and the many industries depending on or serving agriculture. Workers of the Main Station and the field units of the Texas Agricultural Experiment Station seek diligently to find solutions to these problems.

Today's Research Is Tomorrow's Progress