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COSTS AND RETURNS OF PRODUCING SWEET POTATOES IN HAWAII

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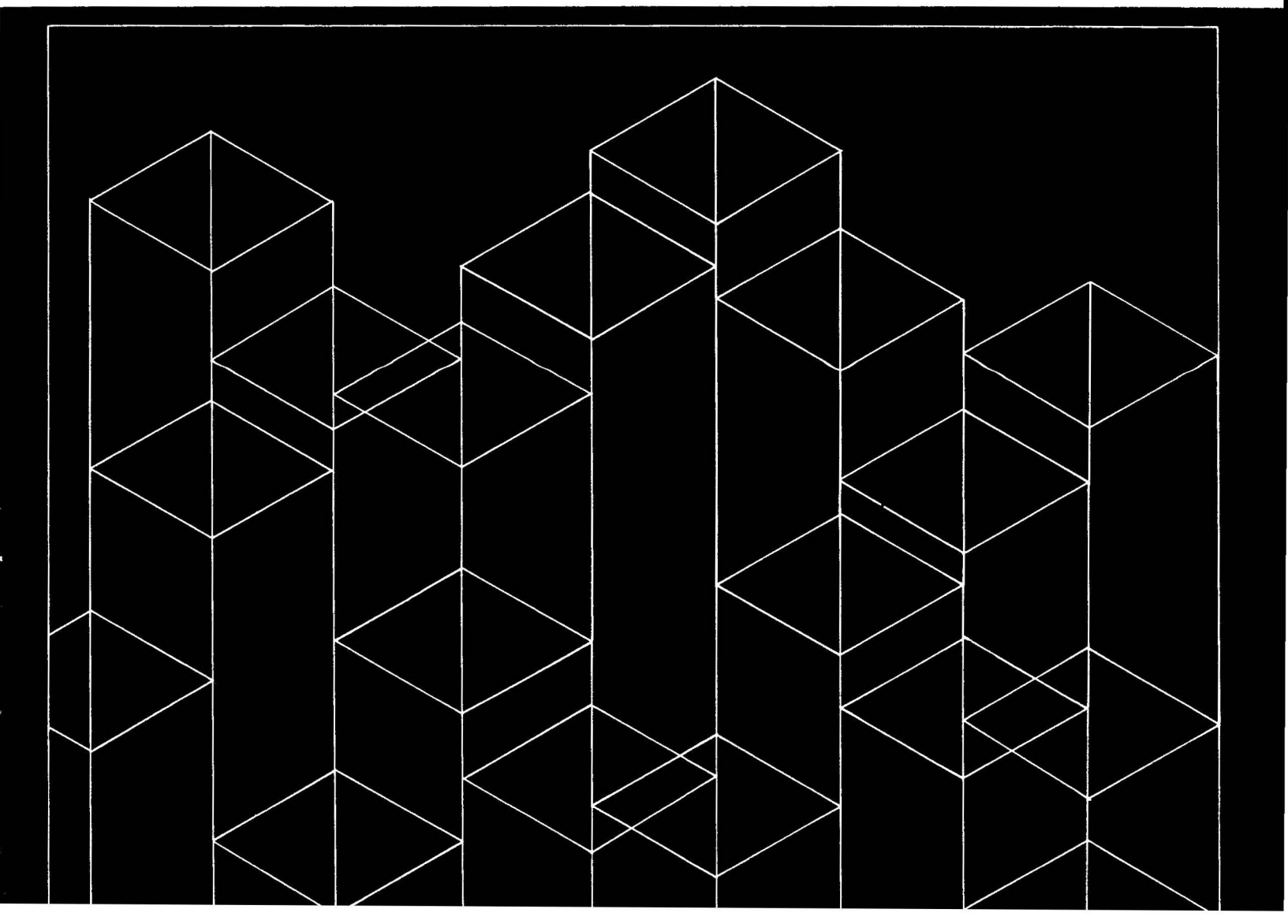

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Wen-yuan Huang and Herbert K. Marutani

ABSTRACT

Costs and returns of producing sweet potatoes in 1976 by four sample farms in Hawaii were investigated. Production performances of these farms were evaluated.

INTRODUCTION

Sweet potatoes *(Ipomoea batatas)* have been considered one of the potential crops for feeding increasing populations in tropical areas (Krauss, 1974). To evaluate the potential of the sweet potato as food in Hawaii, it is imperative that the costs and returns in producing sweet potatoes be investigated.

In 1976, Hawaii's sweet potato crop, harvested from 90 acres of land, totalled 1.365 million pounds and had a sales value of $253,000. This value of sweet potato production is insignificant to the State's economy, totalling only about 2 percent of all vegetables and melons produced.

From 1971 to 1974, about 68 percent of the sweet potatoes produced in the State were from Oahu. In 1975 and 1976, however, the production of Oahu was down to about 56 percent, while the production on Maui and Molokai increased from 14 to about 31 percent of the State's total. At this rate, there is a strong indication that Maui and Molokai may become major sweet potato production areas in the near future.

In computing costs and returns, the actual purchase prices of farm machinery were used in computing the costs of using the machinery. The computation method is given in a paper by Huang et al. (1979). Actual costs of herbicides, fertilizers, water, and insecticides in 1976 were used in the computation. However, in computing labor costs, constant wage rates were used; three dollars per hour was used for common labor, and five dollars per hour was used for labor involving mechanized equipment.

SAMPLE FARMS

Four farmers on Oahu, four on Kauai, and three on Molokai and Maui were interviewed during the period December 1976 to March 1977. In 1975 the combined acreage in sweet potatoes of the 11 farms was 34.5 acres—approximately 54 percent of the State's total acreage harvested that year. Three of the eleven farmers were retired persons.

Considerable variations existed among the farms in varieties of sweet potatoes planted, size and shape of plots, cultivation methods, degree of mechanization, and methods of selling. In this study, costs and returns are given for four farmers out of the eleven: one from Kauai (sample farm 1), one from Oahu (sample farm 2), and two from Maui and Molokai (sample farms 3 and 4). The combined acreage in sweet potatoes of these four farms in 1975 was 28 acres, about 41 percent of the State's total. The following criteria were used in selecting these farmers:

1. They harvested more than ¼-acre of sweet potatoes at a time.
2. They expressed a strong interest in the continuation of growing sweet potatoes as their major source of income.
3. They were not retired persons.

These farmers can be considered typical sweet potato growers of the future. They have not only relatively low production costs but also sweet potato yields that are above the State average. The Kauai farmer (sample farm 1) grows the 'Miyashiro' variety, and the other three a variety of 'Okinawa Red'. The growth period of the 'Miyashiro' is about 6 months, while that of 'Waimanalo Red' ('Okinawa' variety) ranges from 3 to 5 months.

CURRENT CULTIVATION METHODS

In general, sweet potato production includes the following operations: land preparation, planting, fertilizing, weed control, insect control, irrigation, harvesting, and marketing preparation. Physical production inputs in these operations for the four sample farms will be discussed in this order.

There were variations in cultivation practices among the four sample farms, particularly between farm 4 and the other three. Farm 4 adopted relatively highly mechanized

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cultivation practices. The cultivation methods discussed below are for the summer crop (planted in May), as opposed to the winter crop (planted in October). The major difference between the summer and winter crops is that, in order to obtain the same level of yield, the growth period of the winter crop is usually 1 month longer than that of the summer crop. Other than this, cultivation methods are basically the same.

Land Preparation

Operations in land preparation include plowing (or subsoiling), rotovating, harrowing, and ridging. Machine hours used were 20, 11, 19, and 2.86 hours per acre for farms 1, 2, 3, and 4, respectively. The variation among the first three farms is due to differences in crops previously planted, soil type, size of machinery used, and size and shape of farm lot. Growers on these three farms made ridges or furrows for planting the slips. The variation between farm 4 and the other three is mainly attributed to the fact that farm 4 did not make ridges or furrows for planting.

Planting

Planting operations include preparation of slips and the planting itself. Total man-hours used for slip preparation varied from 11 to 26 hours per acre. Planting of slips, except on farm 4, was done by hand. Planting distance between seedlings ranged from 6 to 12 inches, and row spacing from 3 to 4 feet. Planting the slips by hand required 16 to 48 man-hours per acre, but only 15 man-hours when using a planter (farm 4).

Fertilizing

Fertilizer was applied either once or twice, depending on cultural practices. Two growers (farms 3 and 4) applied fertilizer both before planting and one month after planting, while growers on the other two farms applied it only once, before planting. Labor times for fertilizing varied from 1.5 to 6 man-hours, depending on the number of applications, amount applied, and type of equipment used. Machinery is generally used for this operation, but hand application was used on farm 1. The quantity of fertilizer ranged from 600 to 2000 pounds per acre.

Weed Control

One grower (farm 4) used cultivators while the others utilized herbicides such as Dacthal and Paraquat to control weeds, using either boom or knapsack sprayers for the operation. Costs of herbicides ranged from $18 to $27 per acre. Labor times for spraying the herbicides were 12, 34, and 1 man-hours per acre for farms 1, 2, and 3, respectively. The significant reduction in operation time on farm 3 is attributed to the use of a large-scale boom sprayer.

Pest Control

Sweet potato weevils, nematodes, and wire worms are the common pests of sweet potatoes. In some areas, mice and birds also do considerable damage to roots prior to harvest. As a means of controlling pest damage, growers rotated their crops by planting crops such as corn, cabbage, peanuts, watermelons between two crops of sweet potatoes. During the growth period, pesticides such as Diazinon or Parathion were sprayed every two weeks using a power sprayer or duster. Pesticide costs per crop per acre were $96, $44, $191, and $105 for farms 1, 2, 3, and 4, respectively.

Preplant soil fumigation was used on farm 3. Nematocide was applied during soil preparation; the cost per crop per acre of the fumigant was $191. Labor inputs for pest control ranged from 3.3 to 24 man-hours per acre.

Irrigation

Each crop was irrigated from 7 to 12 times, depending on weather, soil conditions, etc. At each irrigation, approximately 2 acre-inches of water were applied, using overhead sprinkler irrigation. Total labor requirements for the operation ranged from 10 to 14 man-hours per acre. Costs of water ranged from 0 to $137 per acre; the grower on farm 2 incurred no cost for water, which he obtained from a nearby stream.

Harvesting

Harvesting operations include vine cutting, digging, picking, packing, and hauling the crop from the field to the storage area. For small areas, the growers used sickles to cut the vines. Labor requirements for this operation were about 48 man-hours per acre. For harvesting large areas, a tractor equipped with a mower was commonly used to cut the vines; this operation took 5 hours or less per acre. For digging, a tractor equipped with a digger was used, and this operation took from 1 (farm 4) to 15 (farm 2) hours for one acre of sweet potatoes. The main reason less time was used on farm 4 was that the sweet potatoes there were grown on a low ridge requiring only one pass to harvest one row, while the other farms employed tractors to make two passes in order to harvest a row of roots. Lower yields on farm 4 also contributed toward the lesser time used.

Table 1. Costs and returns of producing sweet potatoes on sample farm 1 on Kauai

Item	Quantity	Unit	Rate/Unit ($)	Total factor cost ($)	Operation subtotal ($)	Percentage of total costs *
Land preparation					156.16	7.66
(Equipment costs include using 40-hp tractor)						
Harrow (2 times) & plow	16.00	Hr	2.81	44.96		
Ridger	4.00	Hr	2.80	11.20		
Labor	20.00	Hr	5.00	100.00		
Planting					84.00	4.12
(labor for cutting slips and planting)						
Labor (cutting)	12.00	Hr	3.00	36.00		
Labor (planting)	16.00	Hr	3.00	48.00		
Weed control					86.48	4.24
(pre-emergence and 1 month later)						
Dacthal	3.00	Lb	2.00	6.00		
Knapsack sprayer	4.00	Hr	0.04	0.16		
Labor	4.00	Hr	3.00	12.00		
Paraquat	0.50	Gal	40.00	20.00		
Knapsack sprayer	8.00	Hr	0.04	24.00		
Labor	8.00	Hr	3.00	24.00		
Labor (hoeing)	8.00	Hr	3.00			
Fertilizing					177.00	8.69
(preplant application by hand)						
Fertilizer (7-30-20)	1200.00	Lb	0.14	165.00		
Labor	4.00	Hr	3.00	12.00		
Irrigation					254.60	12.49
(10 applications of 8 hr each using overhead sprinkler)						
Water	1.00	Acre	27.00	27.00		
Sprinklers	80.00	Hr	2.47	197.60		
Labor	10.00	Hr	3.00	30.00		
Pest control					273.12	13.40
(6 applications)						
Diazinon (6 times)	24.00	Lb	4.00	96.00		
Duster	24.00	Hr	2.38	57.12		
Labor (6 times)	24.00	Hr	5.00	120.00		
Harvesting					462.20	22.68
Labor (vine cutting)	48.00	Hr	3.00	144.00		
Tractor & digger	4.00	Hr	2.80	11.20		
Labor (pick & pack)	69.00	Hr	3.00	207.00		
Tractor & trailer	10.00	Hr	3.00	30.00		
Labor (dig/haul)	14.00	Hr	5.00	70.00		
Marketing					400.50	19.65
Labor (market prep)	96.00	Hr	3.00	288.00		
Truck (hauling)	15.00	Hr	2.50	27.50		
Labor (hauling)	15.00	Hr	5.00	75.00		
Total operation costs					1894.06	7.06
Other costs (totals)					144.06	
Utilities	7.50	Property tax		30.00		
Land lease	60.00	Auto tax/insurance		12.50		
Indirect labor	20.00	Building depreciation & insurance		14.06		
Total cost per acre per crop					2038.12	100.00
Revenue					4818.78	
Yield per acre	29000.00	Lb				
Grade A	26100.00	Lb	0.17	4437.00		
Off-grade	2900.00	Lb	0.14	406.00		
Gross revenue				4843.00		
Less 0.5% general income tax				24.21		
Net return per acre per crop					2780.66	
Return to labor, risk, management per acre per crop					3970.66	
Cost per pound					0.0703	

* May not total due to rounding.

Table 2. Costs and returns of producing sweet potatoes on sample farm 2 on Oahu

Item	Quantity	Unit	Rate/Unit ($)	Total factor cost ($)	Operation subtotal ($)	Percentage of total costs*
Land preparation					83.42	4.02
(equipment costs include using 30-hp tractor)						
Subsoiler	4.00	Hr	2.26	9.04		
Harrow	2.67	Hr	2.41	6.43		
Ridger	4.67	Hr	2.41	11.25		
Labor	11.34	Hr	5.00	56.70		
Planting					176.01	8.49
(labor for cutting slips and planting)						
Labor (cutting)	10.67	Hr	3.00	32.01		
Labor (planting)	48.00	Hr	3.00	144.00		
Weed control					305.41	14.72
Spraying						
Paraquat	0.50	Gal	36.00	18.00		
Power sprayer	34.67	Hr	3.29	114.06		
Labor	34.67	Hr	5.00	173.35		
Fertilizing					113.01	5.45
(preplant application by hand)						
Fertilizer	600.00	Lb	0.18	105.00		
Labor	2.67	Hr	3.00	8.01		
Irrigation					101.22	4.88
(7 applications using stream water; no cost for water)						
Sprinkler	28.00	Hr	2.49	69.72		
Labor	10.50	Hr	3.00	31.50		
Pest control					114.47	5.52
4 applications						
Parathion	3.96	Lb	1.00	3.96		
Power sprayer	13.33	Hr	3.29	43.86		
Labor	13.33	Hr	5.00	66.65		
Harvesting					823.85	39.72
Labor (vine cutting)	48.40	Hr	3.00	145.20		
Tractor & digger	15.00	Hr	2.41	36.15		
Labor (digging)	15.00	Hr	5.00	75.00		
Labor (pick/pack)	178.50	Hr	3.00	535.50		
Truck	4.00	Hr	3.00	12.00		
Labor (hauling)	4.00	Hr	5.00	20.00		
Marketing					209.20	10.09
Labor (market prep)	48.40	Hr	3.00	145.20		
Truck	8.00	Hr	3.00	24.00		
Labor (hauling)	8.00	Hr	5.00	40.00		
Total operation costs					1926.60	
Other costs (totals)					147.73	7.12
Utilities	9.74	Property tax		66.60		
Land lease	37.50	Auto tax/insurance		8.89		
Building depreciation & insurance	5.00	Indirect labor		20.00		
Total costs per acre per crop					2074.32	100.00
Revenue					5283.45	
Yield per acre	30,000.00	Lb				
Grade A	27,000.00	Lb	0.18	4860.00		
Off-grade	3,000.00	Lb	0.15	450.00		
Gross revenue				5310.00		
Less 0.5% general income tax				26.55		
Net return per acre per crop					3209.12	
Return to labor, risk, management per acre per crop					4682.23	
Cost per pound					0.0691	

*May not total due to rounding.

Table 3. Costs and returns of producing sweet potatoes on sample farm 3 on Maui/Molokai

Item	Quantity	Unit	Rate/Unit ($)	Total factor cost ($)	Operation subtotal ($)	Percentage of total costs*
Land Preparation					187.76	7.66
(equipment costs [except for ridger] include using 60-hp tractor; ridger cost includes using 40-hp tractor)						
Plow	7.00	Hr	5.00	35.00		
Rotovator	6.00	Hr	5.26	31.55		
Subsoiler	2.00	Hr	5.00	10.00		
Ridger	4.00	Hr	4.05	16.20		
Labor	19.00	Hr	5.00	95.00		
Planting					144.00	7.05
(labor for cutting slips and planting)						
Labor (cutting)	12.00	Hr	3.00	36.00		
Labor (planting)	36.00	Hr	3.00	108.00		
Weed control					35.10	1.72
(spraying with tractor and boom sprayer)						
Dacthal	18.00	Lb	1.50	27.00		
Equipment	1.00	Hr	3.10	3.10		
Labor	1.00	Hr	5.00	5.00		
Fertilizing					404.78	19.81
(2 applications: preplant and sidedressing 1 month after planting)						
Fert. (10-30-10)	1000.00	Lb	0.18	175.00		
Labor	2.00	Hr	5.00	10.00		
Fert. (10-30-10)	1000.00	Lb	0.18	175.00		
Equipment	6.00	Hr	4.13	24.78		
Labor	4.00	Hr	5.00	20.00		
Irrigation					220.85	10.81
(7 applications using gravity water pressure)						
Water (1 time)	108.60	Kgal	0.28	30.41		
Water (6 times)	380.13	Kgal	0.28	106.44		
Equipment (7 times)	28.00	Hr	0.50	14.00		
Labor (7 times)	14.00	Hr	5.00	70.00		
Pest control and fumigation					431.13	21.10
(preplant fumigant [Tellon]; pesticide application every other week; spraying with tractor and boom sprayer)						
Tellon	30.00	Gal	6.38	191.40		
Guthion	9.00	Gal	9.57	86.13		
Diazinon	3.75	Gal	28.00	105.00		
Equipment	6.00	Hr	3.10	18.60		
Labor	6.00	Hr	5.00	30.00		
Harvesting					256.42	12.55
Mower/digger	8.20	Hr	5.10	41.82		
Labor (vine cutting)	5.00	Hr	5.00	25.00		
Labor (digging)	3.20	Hr	5.00	16.00		
Labor (pick & pack)	36.00	Hr	3.00	108.00		
Tractor & trailer	8.00	Hr	3.20	25.60		
Labor (hauling)	8.00	Hr	5.00	40.00		
Marketing					311.50	15.25
Labor (market prep)	49.50	Hr	5.00	247.50		
Truck	8.00	Hr	3.00	24.00		
Labor (hauling)	8.00	Hr	5.00	40.00		
Total operation costs					1991.54	
Other costs (totals)					51.53	2.52
Utilities	3.75	Property tax		5.00		
Land lease	10.00	Auto tax/insurance		7.78		
Building depreciation	5.00	Indirect labor		20.00		
Total costs per acre per crop					2043.07	
Revenue					4925.25	
Yield per acre	30,000.00	Lb				
Grade A	15,000.00	Lb	0.18	2700.00		
Off-grade	15,000.00	Lb	0.15	2250.00		
Gross revenue				4950.00		
Less 0.5% general income tax				24.75		
Net return per acre per crop					2882.18	
Return to labor, risk, management per acre per crop					3732.68	
Cost per pound					0.0681	

*May not total due to rounding.

Table 4. Costs and returns of producing sweet potatoes on sample farm 4 on Maui/Molokai

Item	Quantity	Unit	Rate/Unit ($)	Total factor cost ($)	Operation subtotal ($)	Percentage of total costs*
Land preparation					33.94	3.14
(equipment costs include using 60-hp tractor)						
Plow (24 in)	1.20	Hr	6.87	8.24		
Disc (7 ft) & harrow	1.66	Hr	6.87	11.40		
Labor	2.86	Hr	5.00	14.30		
Planting					161.50	14.96
(labor for cutting slips and planting)						
Labor (cutting)	32.00	Hr	3.00	96.00		
Tractor with planter	5.00	Hr	2.10	10.50		
Labor (tractor)	5.00	Hr	5.00	25.00		
Labor (planting)	10.00	Hr	3.00	30.00		
Weed control					26.86	2.49
(cultivating and hilling)						
Cultivator	3.32	Hr	3.09	10.26		
Labor	3.32	Hr	5.00	16.60		
Fertilizing					145.30	13.46
(2 applications: preplant and sidedressing 1 month after planting)						
Fert. (10-30-10)	500.00	Lb	0.18	87.50		
Ammonium sulfate	320.00	Lb	0.16	51.20		
Labor (2 times)	1.32	Hr	5.00	6.60		
Irrigation					106.85	9.90
(12 applications of 8 hr each, gravity water pressure)						
Water	651.60	Kgal	0.08	52.13		
Sprinkler	36.00	Hr	0.52	18.72		
Labor	12.00	Hr	3.00	36.00		
Pest control					132.03	12.23
(5 applications)						
Diazinon (5 times)	60.00	Lb	1.75	105.00		
Equipment	3.30	Hr	3.19	10.53		
Labor (5 times)	3.30	Hr	5.00	16.50		
Harvesting					219.44	20.33
Mower/digger	1.66	Hr	6.87	11.40		
Labor (vine cutting)	0.66	Hr	5.00	3.30		
Labor (digging)	1.00	Hr	5.00	5.00		
Labor (pick & pack)	50.00	Hr	3.00	150.00		
Tractor & trailer	6.00	Hr	3.29	19.74		
Labor (hauling)	6.00	Hr	5.00	30.00		
Marketing					194.10	17.98
Labor (market prep)	18.00	Hr	3.00	54.00		
Truck	6.00	Hr	2.10	12.60		
Labor (hauling)	6.00	Hr	5.00	30.00		
Crates	150.00	Crt	0.25	37.50		
Shipping	150.00	Crt	0.40	60.00		
Total operation costs					1020.02	
Other costs (totals)					54.50	5.51
Utilities	7.50	Property tax		2.37		
Auto tax/insurance	12.50	Land lease		3.13		
Indirect labor	20.00	Building depreciation & insurance		14.00		
Total costs per acre per crop					1074.52	100.00
Revenue					2990.97	
Yield per acre	18,000.00	Lb				
Grade A	16,200.00	Lb	0.17	2754.00		
Off-grade	1800.00	Lb	0.14	252.00		
Gross revenue				3006.00		
Less 0.5% general income tax				15.03		
Net return per acre per crop					1916.45	
Return to labor, risk, management per acre per crop					2424.74	
Cost per pound					0.0597	

*May not total due to rounding.

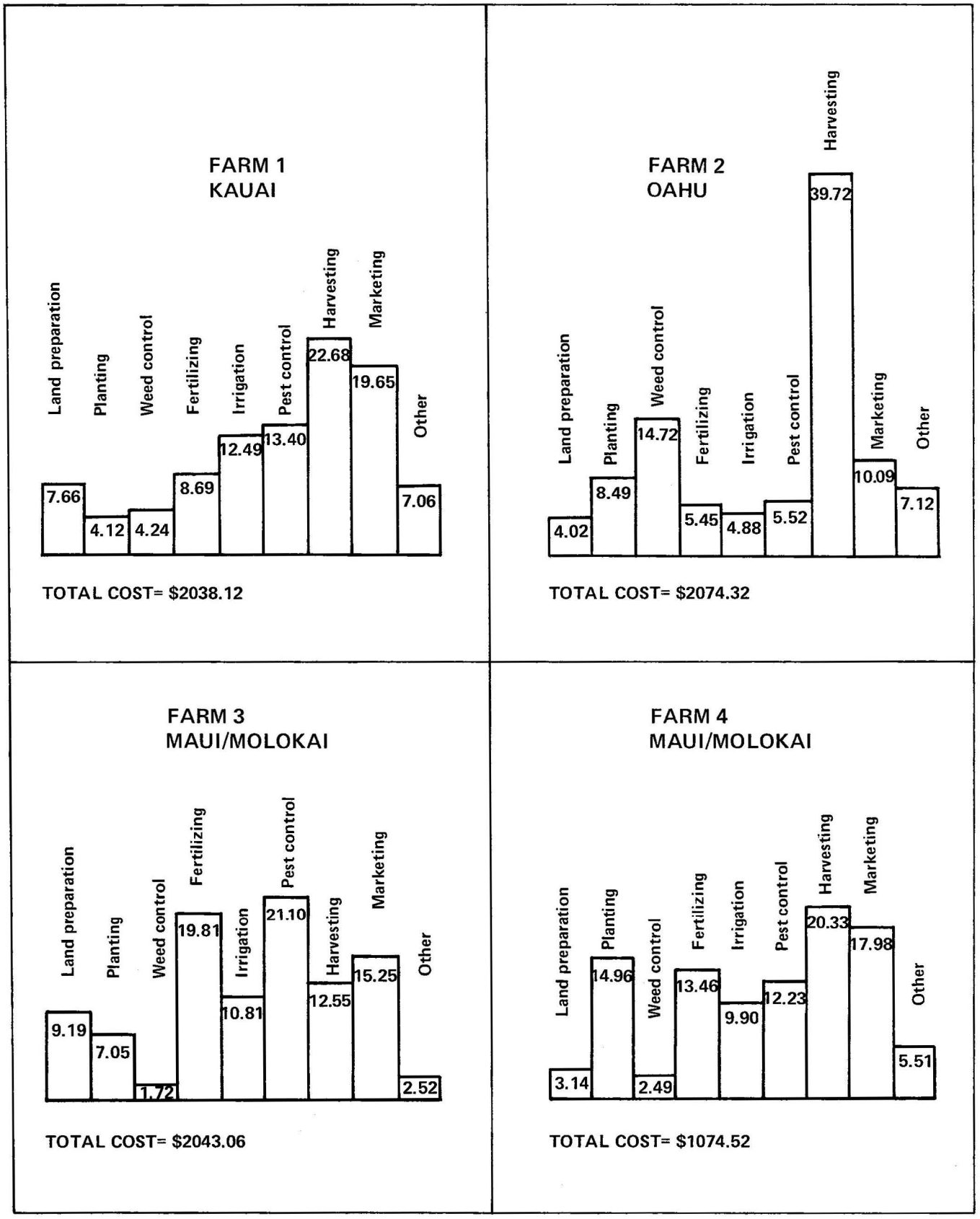

Figure 1. Composition of costs by production operation.

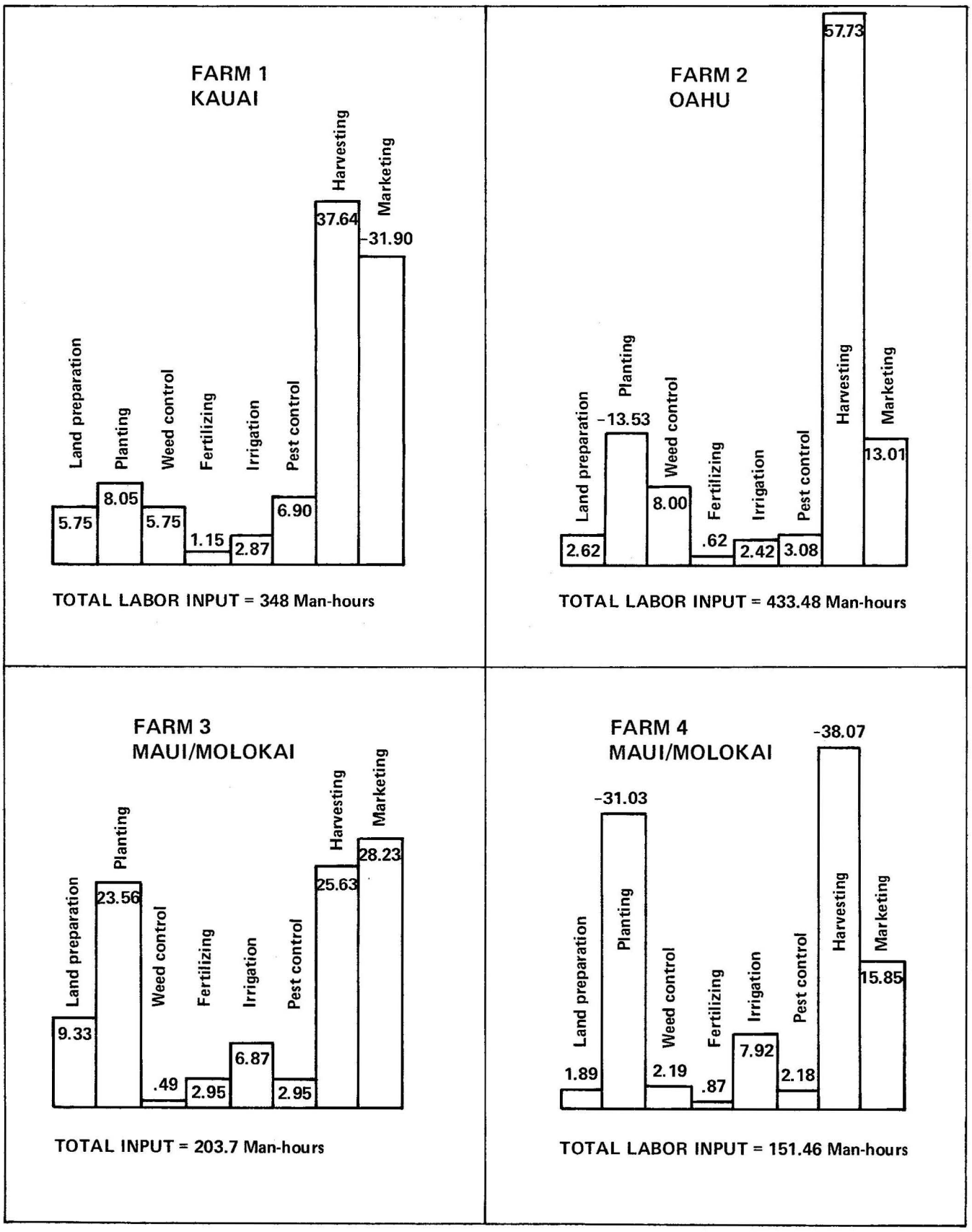

Figure 2. Composition of labor inputs by production operation.

Picking and packing operations involved separating the roots from the vines and putting them into either a trailer or boxes to be picked up by the trailer. Labor requirements for picking and packing ranged from 36 to 178.5 man-hours per acre. This variation is due mainly to differences in yields and to soil conditions at the time of harvest.

Marketing Preparation

Preparing the sweet potatoes for market, which includes washing and grading, required from 18 to 96 man-hours per acre. The variation was again due to differences in yields and soil conditions at the time of harvest. The sweet potatoes were often stored and cured for approximately a week before being sent to market.

COSTS AND RETURNS

Costs

As shown in Tables 1 through 4, costs per acre were $2038.12, $2074.32, $2043.06, and $1074.52 for farms 1, 2, 3, and 4, respectively. Production costs varied little except on farm 4, which incurred less labor cost due to greater use of machinery. Costs per pound of sweet potatoes, respectively, for farms 1, 2, 3, and 4 were 7.03¢, 6.91¢, 6.81¢, and 5.97¢; respective yields per acre were 29,000 pounds, 30,000 pounds, 30,000 pounds, and 18,000 pounds. The smaller yield obtained on farm 4 was mainly due to the practice of using a short growth-production period.

Composition of Total Costs

Figure 1 shows each operation as a percentage of the total cost for each farm. Except for farm 3, more than 20 percent of the total costs for these farms was for harvesting, which used a considerable amount of labor. Marketing costs also were relatively high for some of the growers on islands other than Oahu; this was due primarily to costs in shipping the produce to Honolulu markets.

Composition of Total Labor Input

Figure 2 shows the composition of the total labor input for sweet potato production on each sample farm. There is a significant difference in labor input among the four farms, ranging from 151.46 to 433.48 man-hours per acre. Harvesting and marketing operations make up more than 50 percent of the total labor input on each of the farms. Planting also requires considerable amounts of labor. About half the total production costs incurred were from payments to labor.

Returns

The growers sold their produce either to middlemen or in the retail open market. Prices received from direct selling to the public were about 5¢ to 10¢ more per pound than those received from middlemen. However, in computing returns in this study, the prices paid by middlemen were used because most sweet potatoes were sold this way.

Approximately 10 percent of the total harvest of sweet potatoes was off-grade. Growers received about 3¢ less per pound for off-grade than for grade A sweet potatoes. In computing the total revenue, therefore, different prices were used for grade A and off-grade produce. In deriving the net revenue, one-half of 1 percent (0.5 percent) of the total revenue was subtracted from the total revenue as gross income tax.

Net Return Per Acre

As shown in Tables 1 through 4, net revenues per acre for farms 1, 2, 3, and 4 were $4818.78, $5283.45, $4925.25, and $2990.97, respectively. Net returns (net revenue − total expense) were $2780.66, $3209.12, $2882.18, and $1916.45, respectively.

A summary of costs and returns for the four sample farms is shown in Table 5. In addition to the facts summarized in the first four items, which were discussed previously, the table provides data on the performances of the farms in measurements of net return per pound, net return per man-hour, and net return per acre per day. These three measurements could be used to examine the performances of the farms.

Net Return Per Pound

Farm 1 and farm 3 have the lowest values in this measurement. Farm 4 performed better (no worse than these two) in terms of net return per pound although it had the lowest net return per acre. This could be explained by the difference in farm management objectives between farm 4 and the other two farms. Due to employment of less labor, farm 4 might attempt to maximize the net return for each pound of sweet potato production.

Net Return Per Man-Hour

Farm 1 and farm 2 rank relatively low in this measurement, compared with farms 3 and 4. The main reason for this difference could be that farms 3 and 4 had adapted more efficient farm equipment in their production.

Net Return Per Acre Per Day

There seems to be a significant difference between farm 1 and the others in this measurement. For each day of the production period, farm 1 received $15.44 per acre, while the others received more than $20 per acre. This difference could be explained by the longer growth period required for the variety of sweet potato used on farm 1.

Table 5. Summary of production performances of four sample farms

Item	Farm 1	Farm 2	Farm 3	Farm 4
Cost/acre ($)	2038	2074	2043	1079
Cost/pound ($)	0.070	0.069	0.068	0.059
Gross return/acre ($)	4818	5283	4925	2990
Net return/acre ($)	2780	3209	2882	1911
Net return/pound ($)	0.096	0.107	0.096	0.106
Net return/man-hour ($)	7.99	7.41	14.15	12.62
Net return/acre/day[1] ($)	15.44	26.74	24.02	21.23

[1] The respective growth periods for farms 1, 2, 3, and 4 are 180, 120, 120, and 90 days.

In Table 5, a comparison of the data of farm 1 with farm 4, where a higher level of mechanization is adopted, has a very interesting implication. Despite the fact that farm 4 had less yield and net return per acre than farm 1, it outperformed farm 1 in terms of net return per pound, net return per man-hour, and net return per acre per day. This indicated that the degree of mechanization and the variety used have considerable effect on a farm's production performance. If these measurements are used as an indication of the competitive positions of farms engaging in sweet potato production, the Maui and Molokai farms have a competitive advantage over the Kauai farm.

FACTORS LIMITING EXPANSION OF SWEET POTATO PRODUCTION

Marketing is the major factor limiting sweet potato production in Hawaii. In some production areas, producers frequently find only a small local market or none at all for their produce. The only sizable market for sweet potatoes is Honolulu, which can absorb only a limited amount. In order to avoid flooding the market, producers usually harvest a small amount of sweet potatoes at a time—only a few rows to supply local markets and approximately half an acre in each harvest operation for delivery to the Honolulu market. Because of the current limited demand for sweet potatoes, large-scale production is not feasible. Though efficient farm equipment is available, it has not been adopted by farmers because of their small-scale operations.

Instability in the price a grower can expect to receive has contributed to the fluctuating production of sweet potatoes in Hawaii over the past 10 years. Stabilizing the market through coordinated production is a necessary step toward steady potato production in the State.

The sweet potato weevil (*Cylas formicarius* fabr.) is a serious pest. Upon emerging from eggs that the adult insect has deposited in holes in the stems or roots of the sweet potato, the larvae tunnel into the tissue of the roots and render them inedible. Controlling this insect is a problem when continuous production of sweet potatoes on the same piece of land is desired.

Considerable amounts of labor are required to harvest and prepare sweet potatoes for market. Although a high-efficiency sweet potato harvester is available, the small market demand does not economically allow the grower to use this machinery to harvest a large quantity at one time. Among the harvesting operations, sorting, washing, grading, and packing necessitate large amounts of labor; an inexpensive machine for automating these operations is needed.

Utilization of sweet potatoes is limited. Most of the graded sweet potatoes produced in Hawaii are for table use, with the large, off-grade sweet potatoes being sold to restaurants. There is a dearth of information on the uses of sweet potatoes as processed food. Furthermore, the feasibility of using sweet potatoes as feed for livestock in Hawaii has not been evaluated at this time. A critical examination of possible ways to utilize sweet potatoes is important if the promotion of sweet potato production is desired.

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