

COST AND RETURN OF CHINESE TARO PRODUCTION IN THE HILO AREA

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Abstract

This study provides an update of the cost and return of Chinese taro production in the Hilo area. Return to management is estimated to be \$5,575 per acre per crop. Total fixed costs and variable costs are \$1,573 and \$4,602 respectively. Estimated breakeven price is 20.6 cents (per lb of taro corm) to cover total costs. For a newly established operation which has to purchase hulis, return to management is reduced by the cost of hulis of \$1,245 to \$4,219, and breakeven price to cover total costs is estimated to be 25.1 cents. Using an optimal fertilization schedule as derived from a recent experiment, return to management can be increased by \$2,500 per acre per crop and breakeven price to cover total costs is estimated to be 19.2 cents.

Introduction

This publication serves as an update to the Farm Management Report No. 17 entitled "Cost and Return of Dry Land Taro Production in Hawaii: 1984" (Marutani, 1984). In addition, the economics of applying the optimal fertilization schedule as derived from a recent experiment will be analyzed.

Because of the assumptions and sources of information used in this study, the data in this publication should be viewed as representative of what a farmer would anticipate for a well-managed Chinese taro enterprise. The data does not represent any particular grower nor does it represent the average. Therefore, many factors may alter the cost and return figures reported here when compared to a particular individual's operation. The primary purpose of this publication is to identify the type of production practices and management program considered to be typical of a well-managed Chinese taro enterprise.

Sources of Information

Data was collected from three growers in the Hilo area. These growers were considered to be representative of having well-managed Chinese taro enterprises. The data was collected with the aid of the "Vegetable-Crop Budget Template" (Cox et al., 1988). The growers were asked to fill in a blank budget template with our assistance. The data were then processed and checked by the respective growers for accuracy. We then used these data as the baseline in generating what we believe would be the typical or representative well-managed Chinese taro enterprise.

Assumptions

The following assumptions were made in developing the enterprise budget:

1. This typical farm has ten acres in production with five acres devoted to Chinese taro.
2. Growing period per crop is nine months and the land is plowed only once a year.
3. Total yield per acre per crop consists of 25,000 pounds of grade A and 5,000 pounds of off-grade taro.
4. The grower receives 40 cents per pound for grade A taro and 35 cents for off-grade taro.
5. The wage rates are \$8.00 and \$4.50 per hour for skilled and unskilled labor respectively.
6. Land is rented at \$400.00 per acre per year.
7. Prices for gasoline and diesel fuel are \$1.55 and \$1.50 per gallon respectively.
8. Interest on operating loans is 12 percent.
9. This typical farm has a 2000 sq. ft. structure valued at \$2000.
10. Machinery and equipment are valued at cost which would be incurred if replaced.
11. Farm overhead cost is charged at 1 cent per pound of production.

Budget Analysis (based on per acre per crop)

Case 1: Typical Operation

Table 1 shows the machinery and labor requirements by operation while Table 2 shows the material requirements by operation. Table 3 lists all the machinery and equipment necessary for a typical taro enterprise along with the derivations of their per hour fixed and variable costs. Fixed costs include depreciation, interest on investment, taxes and insurance. Variable costs include repairs, fuel and lubrication.

Table 4 shows the gross receipts. Table 5 outlines the variable expenses by operation. Table 6 summarizes the cost and return of the typical taro enterprise. Total costs is estimated to be \$6,175 per acre per crop with 25 percent being fixed expenses. With a gross receipt of \$11,750, net return to management is estimated to be \$5,575. Table 7 shows the breakeven prices and yields necessary to cover variable costs and total costs. A grower would have to cover its total costs in the long-run in order to remain profitable. However, in the short-run, the grower would continue to operate as long as its variable costs is covered. In order to cover total costs, a production of 15,765 pounds per acre is needed at 40 cents per pound while a 20.6 cents per pound price is sufficient to cover the total costs with a production of 30,000 pounds per acre.

It should be noted that this study shows a much higher return to management as compared to the 1984 study, \$5,575 vs \$1,389, primarily due to the increase in both per acre yield and price per pound received by the growers.

Case 2: Newly Established Operation (with purchasing cost of hulis)

For newly established operation, the grower has to purchase hulis which are assumed to cost 10 cents per piece. Hulis were spaced one foot apart within rows and 3.5 feet apart between rows with a population of 12,446 plants per acre. In other word, an additional cost of \$1,244.60 would have to be incurred per acre. This would result in a lower return to management as compared to the typical case, \$4,219 vs. \$5,575, and a higher breakeven price to cover total costs, 25.1 cents vs 20.6 cents. (see Table 7)

Case 3: Optimal Fertilization

Based on a recent fertilization experiment (Sato et al., 1989), the optimal fertilization schedule was estimated to be 460 lbs N (1000 lbs Urea), 600 lbs K (1185 lbs Muriate of Potash) and 3,000 lbs. TSP per acre. Using this schedule, yield was estimated to be 40,000 lbs per acre, an increase of 10,000 lbs. This yield increase generates an additional \$4,000 in gross receipt along with an increase of \$583 in fertilizer cost and \$792 in harvesting cost. Obviously, the increase in revenue outweighs the increase in costs. This contributes to an increase in return to management of approximately \$2,500 (\$8,076 vs. \$5,575). Also, breakeven price to cover total costs is lowered to 19.2 cents as compared to 20.6 cents for the typical case. (see Table 7)

References

- Cox, L.J., Nakamoto, S.T., Marutani, H.K., and Leung, P.S. 1988. *A User's Manual for the Vegetable-Crop Budget Template*, Research Extension Series 091, Hawaii Institute of Tropical Agriculture and Human Resources.
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- Sato, D., Silva, J., Leung, P.S., Santos, G., and Kuniyoshi, J. 1989. *Nitrogen and Potassium Fertilization for Dryland Taro*, A GACC Taro Fertility Progress Report No. 1, Hawaii Institute of Tropical Agriculture and Human Resources.

Table 1.--Machinery and Labor Requirements by Operation

Operation	Machinery & Equipment hours		Labor (hours)	
			Skilled	Unskilled
1. Seedling Preparation				
Prepare Hulis				48.0
2. Land Preparation				
Rake	Rake	16.0	16.0	
Mow	Mower, 5ft.	3.0	3.0	
Plow	Plows, 18-inch	4.0	4.0	
Rotovate	Rotovator	2.0	2.0	
Cut row	Furrow Digger	2.0	2.0	
All activities	Tractor	27.0	27.0	
3. Liming				
Liming	Tractor	4.0	4.0	
	Lime Spreader	4.0		
	Tractor, front loader	4.0	4.0	
4. Planting				
Planting Hulis	Iseki	13.4	13.4	16.0
5. Maintenance of Growing Crop				
Weeding	Iseki	13.4	13.4	22.0
Fertilizing	Fertilizer applicator	4.0		4.0
6. Harvesting				
Harvest	Flatbed Truck	5.0		360.0
Wash and Trim				60.0
Bag				30.0
Hauling	Flatbed Truck	15.0		15.0

Table 2.--Material Requirement by Operation

Operation	Material	Quantity	Unit Price
1. Seedling Preparation	Baskets	20	\$ 1.20
3. Liming	Lime	2 tons	20.00
5. Maintenance	16-16-16	10 @ 80lb bags	16.95
6. Harvesting	Bags	600 bags	0.25
	Water	54,000 gals	0.001
	Racks	60	2.00

Table 3.—Machinery and Equipment Cost Calculations

Name	Horse-power	Market Value	Annual Use (hours)	Use Life (years)	Salvage Value	Fuel Type*	Average Value	Depreciation (s.l.)	Interest	Taxes & Insurance	Annual Fixed Cost	Fixed Cost/hour	Repairs	Fuel	Lubrication	Annual Variable Cost	Variable Cost/hour	Total Cost/hour
TRACTORS																		
Tractor	50.00	20000	300	24	1000	Diesel	10500	791.67	1260.00	157.50	2209.17	7.36	833.33	990.00	148.50	1971.83	6.57	13.94
Tractor, front loader	30.00	12000	40	24	600	Diesel	6300	475.00	756.00	94.50	1325.50	33.14	500.00	79.20	11.88	591.08	14.78	47.91
OTHER MACHINERY W/ ENGINES																		
Truck, flatbed, 3/4 - 1 ton	200.00	16000	300	10	800	Diesel	8400	1520.00	1008.00	126.00	2654.00	8.85	1600.00	1800.00	270.00	3670.00	12.23	21.08
Iaeki (Hand-drawn Tractor)	6.50	4500	270	10	225	Gasoline	2363	427.50	283.50	35.44	746.44	2.76	450.00	54.41	8.16	512.57	1.90	4.66
ATTACHMENTS																		
Rotovator		4000	20	15	200		2100	253.33	252.00	31.50	536.83	26.84	266.67	0.00	0.00	266.67	13.33	40.18
Lime spreader		3000	40	36	150		1575	79.17	189.00	23.63	291.79	7.29	50.00	0.00	0.00	50.00	1.25	8.54
Rake		2000	160	36	100		1050	53.20	126.00	15.75	194.95	1.22	56.00	0.00	0.00	56.00	0.35	1.57
Plow, 18-inch		750	40	25	38		394	28.50	47.25	5.91	81.66	2.04	36.00	0.00	0.00	36.00	0.90	2.94
Mower, 5ft		2000	30	15	100		1050	126.67	126.00	15.75	268.42	8.95	133.33	0.00	0.00	133.33	4.44	13.39
OTHER EQUIPMENT																		
Furrow Digger		2000	20	25	100		1050	76.00	126.00	15.75	217.75	10.89	80.00	0.00	0.00	80.00	4.00	14.89
Backpack Fertilizer Applicator		225	40	5	11		118	42.75	14.18	1.77	58.70	1.47	45.00	0.00	0.00	45.00	1.13	2.59

Table 4.--Gross Receipts (based on per acre per crop)

Item	Quantity	Unit	\$/unit	Value
Grade A	25,000	lb.	0.40	\$10,000
Off-Grade	5,000	lb.	0.35	1,750
TOTAL	30,000	lb.	0.39	11,750

Table 5.--Variable Expenses (based on per acre per crop)

Operation	Machinery & Equip.	Labor	Material	Sub-Total
1. Seedling Preparation	\$ 0	\$ 216	\$ 24	\$ 240
2. Land Preparation	235	216	0	451
3. Liming	90	64	40	194
4. Planting	25	179	0	205
5. Maintenance	30	269	170	469
6. Harvesting	245	2,093	326	2,663
Total Variable Costs :	625	3,037	560	4,222

Table 6.--Summary Budget (based on per acre per crop)

Item	Value or Cost	% of Total Cost
1. Gross Receipts	\$11,750	
2. Variable Costs :		
Labor	3,037	49.2
Machinery & Equipments	625	10.1
Materials	560	9.1
Interests on operating expenses	380	6.2
Total Variable Costs	4,602	74.5
3. Income Over Variable Costs	7,148	
4. Fixed Costs:		
Machinery & Equipments	777	12.6
Building	72	1.2
Land	424	6.9
Farm Overheads	300	4.9
Total Fixed Costs	1,573	25.5
5. Total Costs	6,175	100.0
6. Return to management	5,575	
7. Return to labor & management	8,612	
8. Return to machinery & management	6,352	
9. Return to land & management	5,999	

Table 7.--Breakeven Analysis

	Breakeven Yield (lbs/acre)	Breakeven Price (\$/lb)
1. To cover total costs:	15,765	\$0.21
2. To cover variable costs:	11,749	\$0.15

Table 8.--Case Comparison

	Case 1	Case 2	Case 3
Return to Management (\$/acre)	\$5,575	\$4,219	\$8,076
To cover total costs:			
Breakeven yield (lbs/acre)	15,765	19,228	19,490
Breakeven price (\$/lb)	\$0.21	\$0.25	\$0.19
To cover variable costs:			
Breakeven yield (lbs/acre)	11,749	15,212	15,495
Breakeven price (\$/lb)	\$0.15	\$0.20	\$0.15

Note: Case 1 - Typical operation
Case 2 - Newly established operation
Case 3 - Optimal fertilization

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