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Of Raising Watermelons?

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What Are My Costs?

WHAT ARE MY COSTS

of raising watermelons?

R. J. Hilsenkopf and R. C. Suter

Farmers often wonder what it costs to grow and harvest a crop or what it costs to raise a particular class of livestock. Enterprise cost studies are occasionally available, yet these data are not always applicable in an individual situation.

The purpose of this publication is to report some dollar costs and returns from growers and to outline how a grower can either make future estimates or simply record his own production costs and dollar returns. This is essentially a do-it-yourself kit. A sharp pencil and a little time are all that are required.

Read through the entire publication before attempting to develop your own costs and returns. At the end, several sets of budgeting sheets are included. These are identical with the data presented first. A grower may use these blank sheets to budget his own costs and returns.

Budgeting Technique

Budgeting is a method used to determine present-day costs of production or to develop plans for future use of certain resources, using current capital outlays. The present-day prices used in the technique more nearly reflect today's situation, or those costs that can be expected. This approach becomes more meaningful than cost accounting which has been used to a large extent in the past.

Answers derived in the process depend, of course, on the data put into the budget. Answers depend on:
- Physical inputs used (labor, power, equipment, seed, fertilizer)
- Cost data or prices (land values, labor rates, other costs)
- Methods of budgeting, along with degree of accuracy desired
- Judgment of the person doing the job

Each grower can develop his own production costs along with the probable results he can obtain. In doing so he can use his own physical coefficients, his own basic assumptions or values, the costs he expects to pay and the prices he himself can command. Final results are of course determined by the amounts of resources he uses and the value he places on them.

Production Costs Per 10-Sash Bed and Per Acre

In 1957 the average cost of raising watermelon plants was $85.15 per 10-sash bed or $11.20 per acre of watermelons planted (Table 1). These figures are based on:

1. A concrete block foundation and window-glass sash with estimated service lives of 50 and 25 years, respectively.

2. Present-day capital outlays of $30.78 (foundation) and $106.52 (sash).

3. Annual ownership costs of 5.25 and 10.25 percent, respectively.

4. Typical labor and material inputs as used by 46 melon growers.

The average cost of growing watermelons (including the cover crop and the plants) was $124.93 per acre (Table 2). This figure is based on:

1. A cost of $11.20 per acre for plants.

2. A land value of $296 per acre.

3. An average of 24.0 hours of labor used to grow the crop.

4. A 2-plow tractor, along with other equipment of a complementary size (except for cultivating where a 1-plow tractor and 1-row cultivator were used).

5. A mechanical transplanter.

6. A fertilizer application of 73 pounds nitrogen, 46 pounds phosphate and 46 pounds potash.

7. A yield of 7.5 tons of watermelons per acre which required an average of 25.4 hours of labor for harvesting.

Table 1. Budgeted cost of raising watermelon plants, 46 farms, Southwestern Indiana, 1957.

Basic data resources used	Method of cost computation	Cost per 10-sash bed	
		Sub-total	Total
1. Annual ownership costs			
Present-day replacement cost of capital outlays			
Foundation $30.78			
x 2.00% Depreciation			
x 2.25% Interest			
x 0.00% Repairs			
x 0.76% Taxes			
x 0.24% Insurance			
x 5.25% Total (equals)		$ 1.61	
Sash $106.52			
x 4.00% Depreciation			
x 2.75% Interest			
x 2.50% Repairs			
x 0.76% Taxes			
x 0.24% Insurance			
x 10.25% Total (equals)		$10.92	
Total			$12.53

Table 1 (continued).

2. Labor   Hours per 10-sash bed

	Hours per 10-sash bed	
Cutting manure	1.7	
Cleaning beds	2.2	
Setting bands	6.5	
Tamping manure	6.0	
Planting	7.7	
Weeding, thinning	10.3	
Daily care, watering	8.2	
Total	42.6 hours x $1.00 per hour =	$42.60

3. Materials

	Amount	Price		
Manure	2.13 ton	x $4.35 per ton	$ 9.27	
Pit sand	1.16 yards	x 1.02 per yard	1.18	
Veneer bands	3,779 bands	x 3.55 per thousand	13.42	
Seed	2.18 pounds	x 2.82 per lb	6.15	$30.02

4. Total costs

Per 10-sash bed		$85.15
Per acre (divided by 7.6 acres)		$11.20

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Table 2. Budgeted cost of raising watermelons, 46 farms, Southwestern Indiana, 1957.

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Basic data resources used	Method of cost computation	Cost per acre	
		Sub-total	Total
1. Cost of Plants			
From previous table			$11.20
2. Land charge			
Present market land value $296 per acre			
Interest x 4.5% interest		$13.32	
Taxes, $296 x 33% assessed valuation			
x $3.66 tax rate per $100		$ 3.61	
Total			$16.93
3. Labor (growing)	Hours		
Cover crop	2.9		
Land preparation	2.8		
Fertilizing	1.8		
Transplanting	4.1		
Cultivating	3.9		
Turning vines	5.0		
Weeding or hoeing	3.5		
Total	24.0 hours x $1.00 per hour =		$24.00

Table 2 (continued).

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Basic data resources used		Method of cost computation		Cost per acre Sub-total	Total
4. Tractor power	Hours				
Cover crop	2.9				
Land preparation	2.8				
Fertilizing	1.8				
Transplanting	0.8				
Total	8.3 hours x $1.20 per hour			$ 9.96	
Cultivating	3.9 hours x 0.95 per hour			3.70	
Total					$13.66
5. Equipment use, type		Times Over	Per-acre rate		
Disc harrow, 7 ft tandem		5	@ $ 0.26	$ 1.30	
Moldboard plow, 2-14"		1	0.42	0.42	
Springtooth, 3 section		1	0.14	0.14	
Grain drill, 12 ft		2	1.37	2.74	
Marker, 2 -row		1	0.34	0.34	
Corn planter, 2 row		1	0.59	0.59	
Transplanter		1	0.64	0.64	
Cultivator, mtd, 1 row		6	0.20	1.20	
Total					$ 7.37
6. Cover crop					
Rye seeded, 1.75 bu. x $2.30 per bu.					$ 4.02
7. Fertilizer	Lb per acre		Price per lb		
Nitrogen	73	x	$ 0.124 =	$ 9.05	
Phosphate	46	x	0.092	4.23	
Potash	46	x	0.047	2.16	
Total					$15.44
8. Harvesting and hauling (7.5 ton per acre)					
Labor	25.4 hours x $1.00 per hour =			$25.40	
Farm power	4.9 hours x 1.20 per hour			5.88	
Two wagons				1.02	
Total					$32.30
9. Total per acre costs					$124.93

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Dollar Returns Per Acre and Per Hour

Watermelon yields vary from year to year as well as from farm-to-farm. In 1957 growers harvested an average of 7.5 tons per acre (Table 3). However, a typical yield is 9.4 tons. Many growers stated that their 1957 yields were the lowest they had ever harvested. This was due, they thought, to the above-normal rainfall during the early part of the growing season and heavy winds that occurred at the time melons were setting on the vine.

The average farm price received by growers in 1957 was $31 per ton. However, in 1956 they received only $16. The higher price in 1957 was due to the short crop of watermelons, not only in Indiana but in the United States as a whole. The average price for the period 1955 through 1958 was $21.50 per ton. Yields and prices tend to vary inversely; hence, there is less year-to-year variation in per-acre returns than there is in either yields or prices received.

A grower with an average yield in 1957 obtained a per-acre return of $232.50. The price that year due to the short supply of melons more than offset the lower yields obtained. The per acre returns for a typical year is $202.10.

The dollar returns per hour of labor in 1957 averaged $2.96 (average yield) and $4.20 (high yield) per hour. These figures are above those in a typical year ($2.14 and $3.09) mainly because of the higher prices received.

Table 3. Dollar returns to labor and management, 46 farms, Southwestern Indiana, 1957.

Physical coefficients and prices	1957		Typical year	
	Average yield	High yield	Average yield	High yield
Yield per acre	7.5	11.5	9.4	14.6
Price per ton	$ 31.00	$ 31.00	$ 21.50	$ 21.50
Dollar returns per acre	232.50	356.50	202.10	313.90
Total costs per acre	$124.93	$140.41	$132.25	$152.39
Cost of labor	55.00	67.60	61.00	77.30
Costs other than labor	69.93	72.81	71.25	75.09
Returns to labor and management a/				
Per acre	$162.57	$283.69	$130.85	$238.81
Per hour	2.96	4.20	2.14	3.09

a/ After paying all other costs.

Farm-to-farm Variations in Amounts of Resource Use and Yields

Considerable farm-to-farm variation occurs in the amounts of resource use.

1. The present market land value on the typical farm was $296 per acre; however, on a third of the farms land values averaged $370 per acre, on another third they averaged only $212 per acre (Table 4).

2. The variation in the amount of labor and tractor power used was sizeable. For example, the hotbed operation required an average of 42.6 hours of labor per 10-sash bed. However, a third of the growers spent only 27.7 hours; another third averaged 62.6 hours.

3. In 1957 most growers transplanted melons by hand, they had an average cost of $9.24 (Table 5). In 1958 11 growers were transplanting melons with a mechanical transplanter. Their costs averaged $5.70 per acre.

4. The typical grower applied 73 pounds nitrogen, 46 pounds phosphate and 46 pounds potash. However, a third of the growers averaged 114 pounds nitrogen, 74 pounds phosphate and 73 pounds potash; another third averaged 38 pounds nitrogen, 20 pounds phosphate and 20 pounds potash. In 1957 there was little or no relationship between level of fertilizer application and watermelon yields.

Yields also vary widely from farm to farm. In 1957 one-third of the growers averaged 11.5 tons per acre, 66 percent above average; another third harvested an average of only 5.3 tons per acre. The farm to farm variation in yields is considerably greater than the variation from year to year.

Table 4. Variations in resource use and watermelon yields, 46 farms, Southwestern Indiana, 1957.

	Level of productivity or efficiency		
	Low	Average	High
Land values (per acre)	$212	$ 296	$370
Labor inputs			
Hotbed (hours per 10-sash bed)	62.6	42.6	27.7
Cover crop (hours per acre)	4.4	2.9	1.6
Land preparation	4.3	2.8	1.7
Fertilization	3.6	1.8	1.0
Transplanting (by hand)	8.4	6.9	4.6
(by machine)	5.6	4.1	2.8
Cultivating	5.7	3.9	2.5
Turning vines	7.0	5.0	3.2
Hoeing	5.7	3.5	2.0
Harvesting (comparable yields)	18.5	25.4	38.0
Tractor power (hours per acre)			
Cover crop	4.4	2.9	1.6
Land preparation	4.3	2.8	1.7
Fertilization	3.6	1.8	1.0
Transplanting (by hand)	1.3	1.1	0.8
(by machine)	1.1	0.8	0.5
Cultivating	5.7	3.9	2.5
Harvesting (comparable yields)	3.6	4.9	7.3
Watermelon yields (ton per acre)			
1957	5.3	7.5	11.5
1956	6.3	9.7	19.4
Typical year	6.2	9.4	14.6

Table 5. Transplanting costs: hand vs. machine, Southwestern Indiana, 1957 and 1958.

Inputs or resources methods of budgeting	Cost per acre	
	Sub-total	Total
Transplanting by hand: (46 farms, 1957)		
Labor 6.9 hours @ $ 1.00 per hour	$ 6.90	
Tractor power 1.1 hours @ 1.20	1.32	
Two wagons @ 1.02 per acre	1.02	
Total		$9.24
Transplanting by machine: (11 farms, 1958)		
Present-day capital outlay $150.00		
Annual ownership cost		
$150.00 x 16.75 percent divided by 39 acres	$ 0.64	
Labor 4.1 hours @ $ 1.00 per hour	4.10	
Tractor 0.8 hours @ 1.20	0.96	
Total (assuming plants are hauled on machine)		$5.70

Some Cost Rates

1. Labor, $ 1.00 per hour. The farm operator and some family help is worth more, yet hired labor (for transplanting, hoeing, turning vines and harvesting) in the Knox, Gibson and Daviess area was available for considerably less-- $0.75 per hour.

2. Fertilizer prices (April 1957)

Lime, $3.10 per ton; Nitrogen, $83.00 per ton or $0.124 per lb; Phosphate, $34.96 per ton or $0.092 per lb; Potash, $51.90 per ton or $0.047 per lb.

3. A 2-plow tractor, $1.20 per hour. A 1-plow tractor, $0.95 per hour.

4. Machinery and equipment cost rates.

Equipment type and size	Purchase price a/	Annual ownership cost b/	Annual use (acres)	Per acre rate
Moldboard plow Mounted with 2-14"	$ 311	$ 52.09	123	$ 0.42
Disc harrow 7' tandem	425	71.19	278	0.26
Spring-tooth harrow 3-section	133	22.28	156	0.14
Grain drill - 12'	550	92.12	67	1.37
Marker, 2 row	80	13.40	39	0.34
Mechanical transplanter	150	25.12	39	0.64
Corn planter, 2 row	271	45.39	77	0.59
Cultivator Mounted, 1-row	280	49.90	234	0.20
Two wagons	758	126.96	125	1.02

a/ Obtained from farmers and farm machinery dealers.

b/ Estimated at 16.75 percent of first cost.

The Authors

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Reference

Purdue Agricultural Experiment Station Research Bulletin 729. The data presented are the results of a survey of 46 melon growers in Knox, Gibson and Daviess Counties in 1957. In 1954, 382 farms in these three leading melon-producing counties produced 74 percent of the watermelons raised. To the families on these farms, melons are a major source of income.

Of the 46 growers interviewed 18 were owner-operators, operating an average of 130 acres. Nineteen of them were part-owners; they owned an average of 139 acres, and, in addition, rented 139 acres. Nine were tenant-operators and farmed an average of 212 acres.

The farms averaged 186 total farm acres, with 155 acres in crops. An average of 28 acres of watermelons and 11 acres of cantaloupes were raised; melons thus accounted for 25 percent of the total crop acres.

BUDGETS FOR DEVELOPING COSTS AND RETURNS

Budget of Cost of Raising Watermelon Plants
(Per 10-Sash Bed)

Variety grown _____ :   Bed started _____ (date)
                                    Seed dropped _____
                                    Plants transplanted _____

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Basic data resources used	Method of cost computation	Cost per 10-sash bed Sub-total Total

1. Annual ownership costs

Present-day replacement cost of capital outlays

Foundation $_____
   x _____ % Depreciation
   x _____ % Interest
   x _____ % Repairs
   x _____ % Taxes
   x _____ % Insurance
   x _____ % Total (equals) $_____

Sash $_____
   x _____ % Depreciation
   x _____ % Interest
   x _____ % Repairs
   x _____ % Taxes
   x _____ % Insurance
   x _____ % Total (equals) $_____

   Total $_____

2. Labor   Hours per 10-sash bed

Cutting manure   _____
Cleaning beds   _____
Setting bands   _____
Tamping manure   _____
Planting   _____
Weeding, thinning   _____
Daily care, watering   _____
Other   _____
   Total   _____ hours x $_____ per hour = $_____

3. Materials   Amount   Price

Manure   _____ ton x $_____ per ton = $_____
Pit sand   _____ yards x _____ per yard _____
Veneer bands _____ bands x _____ per thousand _____
Sand   _____ lbs x _____ per lb _____
   Total $_____

4. Total costs

Per 10-sash bed $_____
Per acre (divided by_____ acres) $_____

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Budget of Cost of Raising Watermelons
(Per Acre)

Variety _____ :   Plants transplanted _____ (date)
                                        Harvesting started _____

==

Basic data resources used	Method of cost computation	Cost per acre Sub-total	Total

1. Cost of plants
From previous page $_____

2. Land charge
Present market land value $_____ per acre
     Interest x _____ % interest $_____
     Taxes x _____ % assessed valuation
           x $_____ tax rate per $100 $_____
           Total $_____

3. Labor (growing)   Hours   Hours

	Hours		Hours
Cover crop	_____	Sub-total (left col.)	
plowing	_____	Fertilization	
discing	_____	broadcasting	_____
harrowing	_____	sidedressing	_____
seeding	_____	Transplanting	_____
Land preparation		Cultivating	_____
plowing	_____	Turning vines	_____
discing	_____	Hoeing or weeding	_____
harrowing	_____	Total	
Sub-total	_____	x $_____ per hour =	$_____

4. Tractor power   Hours

	Hours		
Cover crop	_____		
Land preparation	_____		
Fertilization	_____		
Transplanting	_____		
Total	_____	hours x $_____ per hour	$_____
Cultivating		x _____ per hour	_____
Total			$_____

5. Equipment use

	Type	Times over	Per acre rate a/		
Disc harrow	_____	_____	_____	$_____	
Moldboard plow	_____	_____	_____	_____	
Spring tooth	_____	_____	_____	_____	
Grain drill	_____	_____	_____	_____	
Marker	_____	_____	_____	_____	
Corn planter	_____	_____	_____	_____	
Transplanter	_____	_____	_____	_____	
Cultivator	_____	_____	_____	_____	
Total					$_____

6. <u>Cover crop</u>

   Rye seeded, _____ bu. x $_____ per bu. $_____

7. <u>Lime and fertilizer</u> <u>Lb per acre</u>   <u>Price per lb</u>

   Lime   _____   x $_____ = $_____
   Nitrogen   _____   x _____
   Phosphate   _____   x _____
   Potash   _____   x _____
      Total $_____

8. <u>Harvesting and hauling (ton per yield)</u>

   Labor   _____ hours x $_____ per hour = $_____
   Tractor power _____ hours x $_____ per hour
   Wagons
      Total $_____

9. <u>Total per acre cost</u> $_____

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   <u>a</u>/ See Appendix for per-acre rates.

Budget of Equipment Costs
(Annual Ownership Costs Per Acre)

Equipment type and size	Purchase price (1)	Annual ownership cost Percent a/ (2)	Dollar b/ (3)	Annual use (acres) (4)	Use cost per acre c/ (5)
Disc harrow	$＿＿	＿＿	$＿＿	＿＿	$＿＿
Moldboard plow	＿＿	＿＿	＿＿	＿＿	＿＿
Springtooth harrow	＿＿	＿＿	＿＿	＿＿	＿＿
Grain drill	＿＿	＿＿	＿＿	＿＿	＿＿
Marker	＿＿	＿＿	＿＿	＿＿	＿＿
Corn planter	＿＿	＿＿	＿＿	＿＿	＿＿
Mechanical transplanter	＿＿	＿＿	＿＿	＿＿	＿＿
Cultivator	＿＿	＿＿	＿＿	＿＿	＿＿
Wagon(s)	＿＿	＿＿	＿＿	＿＿	＿＿
Other	＿＿	＿＿	＿＿	＿＿	＿＿

a/ Typically this is 16.75 percent of first cost

10.00 percent	depreciation (10 years of useful life)
2.75	interest (or 5.5 percent of average value)
3.00	repairs
0.38	taxes (or average value x 20 percent x $3.80 per $100)
0.12	insurance (or average value x 60% x $0.40 per $100)
0.50	housing
16.75 percent total	

b/ Column (1) times Column (2)

c/ Column (3) divided by Column (4)

Budget of returns raising watermelons

Yields, prices, and dollar returns	Method of budgeting	Returns per acre and per hour
(Per acre)		
1. Yield per acre		$_____
2. Farm price received		$_____
3. Dollar return per acre (line 1 x line 2)		$_____
(Per hour of labor of management)		
4. Total costs per acre (from page 3)		$_____
5. Cost of labor per acre		$_____
6. Costs other than labor per acre (line 4 minus 5)		$_____
7. Return to labor and management per acre (line 3 minus 6)		$_____
8. Number of hours of labor		_____
9. Return to labor and management per hour (line 7 divided by 8)		$_____