Cost of Apple Production in Western Michigan: Semi-Dwarf Planting—108 Trees Per Acre

Michigan State University
Cooperative Extension Service
Myron Kelsey, Extension Specialist and Professor, Agricultural Economics
Archibald Johnson, Specialist, Department of Agricultural Economics

June 1979
4 pages

COOPERATIVE EXTENSION SERVICE
MSU AG FACTS

Costs of Apple Production in Western Michigan:

Semi-Dwarf Planting – 108 Trees Per Acre

Extension Bulletin E-1107 Revised June 1979

By Myron Kelsey and Archibald Johnson[1]

THIS COST EVALUATION of apple production in western Michigan is a projection of costs developed from small group discussions with apple growers in prior years. Growers described common growing and harvesting practices used by average apple growers of the area. They agreed upon the size of apple acreage, equipment and cultural practices generally used by an average apple grower.

These figures do not reflect the average cost of apple production for all growers because costs vary considerably from farm to farm.

The data can help a grower develop his costs and better evaluate his farm situation. Each of the appropriate tables in this report includes a "Your Farm Cost" column for a grower to note costs for a particular operation. Where his costs cannot be determined, the grower may wish to adjust and substitute the study data.

The data were assembled assuming equipment and labor available for a hypothetical farm of 100 acres of diversified tree fruit, including 40 acres of apples. However, the data in Table 1 are presented for 10 acres of apples since it may be easier for a grower to visualize many of the resource inputs on this basis. Per-acre costs, as shown in Tables 2 through 6, can be determined from Table 1, by dividing by 10.

(See Table 1 on pages 2-3.)

The full-time labor classification includes the working time of the operator and regular hired help devoted to apples. Operator labor is not considered a cash expense by producers; but to allow for differences in the proportion of work performed by regular hired help, which is a cash expense, or the operator, both have been included at the $4.27 per hour rate. As a result, producers who do a major portion of the work may have a lower cash labor cost than the figures indicate. Part-time labor was charged at the minimum wage rate of $2.90/hour and full time labor at $3.50/hour. Employee's share of Social Security is 6.13% and the proposed worker's compensation rate of 16% gives an effective wage of $3.54 and $4.29 per hour.

Some major factors considered in the computation of equipment costs are initial cost, salvage value, years of life, annual usage, repair costs, insurance, interest and operating expenses such as gas and oil. The operating costs for each piece of equipment are charged to the crop in Table 1 on the basis of direct hourly use of the equipment.

Variable costs are those that change directly with increases or decreases in the acreage of apples or yield with harvesting cost. Examples of costs which vary with acreage are spray material, fertilizer, hired labor, and machinery operating costs. Costs that vary directly with harvest yields are piecework rates.

Variable costs incurred in apple production are categorized by labor, machinery and materials in Table 2. The details of hours and type of labor, machinery used and hours of use, and kinds and amounts of material used by operation are shown in Table 1. If a grower's costs for particular items are substantially higher than those shown, he may need to closely analyze those components to see if they can be reduced. A high cost for a particular component may be justified if it contributes to a sufficiently higher yield or improved quality.

The variable costs incurred in the harvesting of an acre with estimated total production of 400 bushels of apples are shown in Table 3. Labor is the major cost. Therefore, good labor management should enhance the profit picture. In *most* cases, there will be some higher or lower costs for *some* items associated with higher or lower yields.

Table 2. Variable cost per acre of growing apples, semi-dwarf orchard, western Michigan, 1979

Operation	Labor	Machinery	Materials	Total	Your farm cost
Pruning & brush removal	$ 66.13	$13.41		$ 79.54	_____
Mowing	6.41	5.06		11.47	_____
Fertilization	3.63	.73	28.58	32.94	_____
Weed control	5.34	2.33	8.39	16.06	_____
Spraying	8.33	8.39	183.12	199.84	_____
Management & misc. repairs	72.59	9.00		81.59	_____
Other	.44	4.68	12.76	17.88	_____
Totals	$162.87	$43.60	$232.85	$439.32	$_____

[1] *Extension specialist and specialist, Department of Agricultural Economics.*

Table 1

Growing operations and related variable costs for 10 acres apple production
semi-dwarf orchard 108 trees/acre in western Michigan, 1979

Operation	Labor			Machinery				Materials			Your Farm Cost
	Labor Hr. Per 10 Acres	Wage Rate	Cost	Equipment Used	Hours of Use	Cost Per Hour of Use	Cost	Item	Cost Per 10 Acres	Total Cost Per 10 Acres	
Trimming (heavy one yr., light next)	130 20	$4.27 3.54	$555.10 70.80	Power pruners & Tower, Chain saw	130 15	$ .72 .57	$93.60 8.55			$728.05	
Removing brush	10	3.54	35.40	New 60 hp tractor Brush rake or mower	10 10	2.95 .25	29.50 2.50			67.40	
Mowings (3)	15	4.27	64.05	60 hp tractor (used) Rotary mower	12.5 12.5	2.75 1.70	34.38 16.25			114.68	
Fertilizer	7.5	4.27	32.02	40 hp tractor (used) Trailer	2.5 2.5	2.21 .18	5.53 .45	4#/tree Ammonia Nitrate @$6/cwt.	$259.20	297.20	
Potash (ev. 5 yr) annual cost	.5	4.27	2.14	40 hp tractor (used) Fertilizer spreader	.5 .5	2.21 .40	1.10 .20	0-0-60 200#/A($6/cwt)every 5th yr.	24.00	27.44	
Lime { custom app. once/10 yr.	.5	4.27	2.14					2T. Lime @$13/T.	2.60	4.74	
Weed control (spray ¼ area)	7.5	4.27	32.02	40 hp tractor (used) Weed sprayer	5.0 5.0	2.21 .38	11.05 1.90	1 qt/A Paraquat @11.50/qt	56.35	101.32	
	5.	4.27	21.35	40 hp tractor (used) Weed sprayer	4.0 4.0	2.25 .38	8.84 1.52	Amate-x 60#/100 gal.(27.60/80# bag)	27.60	59.31	
Bee Rental								1 hive/3 A @$22	73.33	73.33	
Spray Program											
Dormant (Dilute @ 300 gal/A)	1.5	4.27	6.41	60 hp tractor (new) Kinkelder sprayer	1.5 1.5	2.95 1.22	4.43 1.83				
Green tip-prepink	1.5	4.27	6.41	60 hp tractor (new) Kinkelder sprayer	1.5 1.5	2.95 1.22	4.43 1.83				
Prepink-pink	1.5	4.27	6.41	60 hp tractor (new) Kinkelder sprayer	1.5 1.5	2.95 1.22	4.43 1.83				

Semi-dwarf orchard (con't)

Operation	Labor			Machinery				Materials			Your Farm Cost
	Labor Hr. Per 10 Acres	Wage Rate	Cost	Equipment Used	Hours of Use	Cost Per Hour of Use	Cost	Item	Cost Per 10 Acres	Total Cost Per 10 Acres	
Bloom	1.5	4.27	6.41	60 hp tractor (new)	1.5	2.95	4.43				
				Kinkelder sprayer	1.5	1.22	1.83				
Petal Fall	1.5	4.27	6.41	60 hp tractor (new)	1.5	2.95	4.43				
				Kinkelder sprayer	1.5	1.22	1.83				
1st cover	1.5	4.27	6.41	60 hp tractor (new)	1.5	2.95	4.43				
				Kinkelder sprayer	1.5	1.22	1.83				
2nd cover	1.5	4.27	6.41	60 hp tractor (new)	1.5	2.95	4.43				
				Kinkelder sprayer	1.5	1.22	1.83				
3rd cover	1.5	4.27	6.41	60 hp tractor (new)	1.5	2.95	4.43				
				Kinkelder sprayer	1.5	1.22	1.83				
4th cover	1.5	4.27	6.41	60 hp tractor (new)	1.5	2.95	4.43				
				Kinkelder sprayer	1.5	1.22	1.83				
5th cover	1.5	4.27	6.41	60 hp tractor (new)	1.5	2.95	4.43				
				Kinkelder sprayer	1.5	1.22	1.83				
6th cover	1.5	4.27	6.41	60 hp tractor (new)	1.5	2.95	4.43				
				Kinkelder sprayer	1.5	1.22	1.83				
Thinning spray 1 yr. in 4 (400 gal/A)	1.5	4.27	6.41	60 hp tractor (new)	1.0	2.95	2.95	Total sprays:[1]	$1,831.16	$1,998.43	
				Hi pressure sprayer	1.0	.90	.90	(Insecticides	703.23)		
								(Miticides	196.31)		
								(Fungicides	837.09)		
Drop Control Spray ½ acreage	1.5	4.27	6.41	60 hp tractor (new)	1.5	2.95	4.43	(Growth regulator	94.53)		
				Air blast sprayer	1.5	4.53	6.80				
Well & pump operation				Electricity & repair	10A	1.06	10.60			10.60	
Mouse baiting				Custom airplane	3.50/A		35.00	Zinc Phosphide Corn 10#/A	28.00	63.00	
Tree replacement (annual cost-1st ½ orchard life)	2.5	3.54	4.43	40 hp tractor	1.0	2.21	1.10	1.5 trees/acre @$3.50/tree	26.25	31.87	
				trailer	1.0	.18	.09				
Management & labor supervision	100	4.27	427.00							427.00	
Pickup operation				Pickup	750 mi	.12/mi	90.00			90.00	
Misc. repairs	70	4.27	298.90							298.90	
TOTALS			$1,628.68				$436.10		$2,328.49	$4,393.27	

[1] From MSU Entomology Department & Pest Management Project.

The overhead, or fixed cost, for apple production (Table 4) includes allocation of machinery overhead on the basis of the proportion of total farm use in apples, interest or orchard investment, orchard depreciation, and property taxes. The fixed costs of machinery are allocated to apples on the basis of hours of use on apples relative to the total hours of use of the equipment on the farm. Fixed costs on machinery include depreciation, interest on investment, insurance and housing costs (interest, insurance and housing equal 9.7 percent of average value).

A grower should evaluate his own farm situation and decide whether fixed costs should be considered as part of the total cost for his decision-making purposes. For instance, orchard overhead is a fixed cost to the owner of an orchard, but a variable cost for the operator, if rented.

Per-acre yields are very important factors in determining production costs per bushel of apples (Table 6). Variable costs per bushel are based on the fact that preharvest costs per acre, such as spraying, pruning, mowing, etc., do not vary greatly regardless of the yield obtained.

Table 3. Variable harvest cost for 400 bushels of apples, semi-dwarf orchard, western Michigan, 1979

	Total	Your farm cost
Labor		
Full time labor (8.00 hrs. × $4.27)	$ 34.16	
Part time labor (.75 hr. × $3.54)	2.66	
Piecework labor (375 bu. @ $.55)	206.25	
Piecework drops (25 bu. × $.48)	12.00	
Equipment use	36.54	
Total	$291.61	
Cost per bushel	$ .73	

Table 4. Overhead costs for growing and harvesting one acre of apples, semi-dwarf orchard, western Michigan, 1979

	Total	Your farm cost
Machinery	$142.22	
Interest on land ($800 × 5%)	40.00	
Interest on average orchard value (1200 ÷ 2 × 8%)	48.00	
Orchard depreciation 1200 ÷ 20 yrs.)	60.00	
Property taxes	18.00	
Total	$308.22	

Table 5. Total growing and harvesting costs for one acre of apples, semi-dwarf orchard, western Michigan, 1979

	Total	Your farm cost
Variable growing cost	$ 439.32	
Variable harvest cost	291.61	
Overhead cost	308.22	
Total	$1,039.15	

Table 6. Effect of varying yield on cost/bushel for apples, semi-dwarf orchard, western Michigan, 1979.

Yield per acre	Variable growing cost	Variable harvest cost	Total variable cost	Your farm variable cost	Fixed cost	Total cost	Your farm total cost
	---------- Per bushel ----------						
200	$2.20	.73	$2.93		$1.54	$4.47	
250	1.76	.73	2.49		1.23	3.72	
300	1.46	.73	2.19		1.03	3.22	
350	1.25	.73	1.98		.88	2.86	
400	1.10	.73	1.83		.77	2.60	
500	.88	.73	1.61		.62	2.23	
600	.73	.73	1.46		.51	1.97	
700	.63	.73	1.36		.44	1.80	

1R-2.5M-6:79-UP, Price 20 cents. Single copy free to Michigan residents.

Michigan State University Printing

O-11451