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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

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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 Johnson¹

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. Parttime 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.



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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 growi	ing apples,
semi-c	lwarf orchard	, western	Michiga	an, 1979

Operation	Labor	Machinery	Materials	Total	Your farm cost
Pruning & brush removal	\$ 66.13	.\$13.41	1	\$ 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	Sector Anna
Spraying	8.33	8.39	183.12	199.84	
Management & misc. repairs	72.59			81.59	
Other	.44	4.68	12.76	17.88	
Totals	\$162.87	\$43.60	\$232.85	\$439.32	\$

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

Table 1

at at gand

		Labor		Ma	Machinery		2	Materials			
Operation	Labor Hr. Per 10 Acres	lr. Wage Rate	Cost	Ho Equipment o Used Us	Hours of Use	Cost Per Hour of Use	r Cost	Item	Cost Per 10 Acres	Total Cost Per 10 Acres	Your Farm Cost
Trimming (heavy one yr., light next)	, 130 20	\$4.27 3.54	\$555.10 70.80	Power pruners & Tower, Chain saw	130 15	\$.72	\$93.60 8.55			\$728.05	
Removing brush	10	3.54	35.40	New 60 hp tractor Brush rake or mower	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	2.21 .18	5.53 .45	4#/tree Ammonia Nitrate @\$6/cwt.	\$259.20	297.20	
Potash (ev. 5 yr) annual cost	rr) .5	4.27	2.14	40 hp tractor (used) Fertilizer spreader	<u>ۍ ت</u>	2.21	1.10	0-0-60 200#/A(\$6/ cwt)every 5th yr.	24.00	27.44	
Lime { custom app.	pp5 yr.	4.27	2.14					2T. Lime @\$13/T.	2.60	4.74	
Weed control (spray ½ area)	, 7.5	4.27	32.02	40 hp tractor (used) Weed sprayer	5.0	2.21	11.05 1.90	l qt/A Paraquat 011.50/qt	56.35	101.32	
	5.	4.27	21.35	40 hp tractor (used) Weed sprayer	4.0	2.25	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			Service of the	
Green tip- prepink	1.5	4.27	6.41	60 hp tractor (new) Kinkelder sprayer	1.5	2.95	4.43 1.83				

2.95

6.41

4.27

Prepink-pink 1.5

4.43

60 hp tractor (new) 1.5 2. Kinkelder sprayer 1.5 1.

Wage RateCost LgedEquipment LoseHours of Lged4.276.4160 hp tractor (new)1.5 Kinkelder sprayer1.5 54.276.4160 hp tractor (new)1.5 54.276.4160 hp tractor (new)1.5 64.276.4160 hp tractor (new)1.5 64.276.4340 hp tractor (new)1.5 64.274.2704.044.28750 mi1.004.29298.90750 mi51.628.6851.66 </th <th></th> <th>L</th> <th>Labor</th> <th></th> <th>Ma</th> <th>Machinery</th> <th></th> <th></th> <th>Materials</th> <th></th> <th></th> <th></th>		L	Labor		Ma	Machinery			Materials			
5 4.27 6.41 60 hp tractor (new) 1.5 2.95 4.43 5 4.27 6.41 60 hp tractor (new) 1.5 2.92 4.43 5 4.27 6.41 60 hp tractor (new) 1.5 2.92 4.43 5 4.27 6.41 60 hp tractor (new) 1.5 2.95 4.43 5 4.27 6.41 60 hp tractor (new) 1.5 2.95 4.43 5 4.27 6.41 60 hp tractor (new) 1.5 2.95 4.43 6 6.41 60 hp tractor (new) 1.5 2.95 4.43 6 6.41 60 hp tractor (new) 1.5 2.95 4.43 6 6.41 60 hp tractor (new) 1.5 1.22 1.83 7 6.41 60 hp tractor (new) 1.5 2.95 4.43 6.427 6.41 60 hp tractor (new) 1.5 2.95 4.43 6.427 6.41 60 hp tractor (new) 1.5 2.95		TO		Cost		f e	Cost Per Hour of Use	Cost	Item	Cost Per 10 Acres	Total Cost Per 10 Acres	Your Farm Cost
5 4.27 6.41 60 hp tractor (new) 1.5 2.95 4.43 4.33 5 4.27 6.41 60 hp tractor (new) 1.5 2.95 4.43 4.33 5 4.27 6.41 60 hp tractor (new) 1.5 2.95 4.43 4.43 5 4.27 6.41 60 hp tractor (new) 1.5 2.95 4.43 4.43 5 4.27 6.41 60 hp tractor (new) 1.5 2.95 4.43 4.43 4.43 4.43 4.43 4.43 4.43 4.43 4.43 4.43 6.0 hp tractor (new) 1.5 2.95 4.43 </td <td>Bloom</td> <td>1.5</td> <td>4.27</td> <td>6.41</td> <td>60 hp tractor (new) Kinkelder sprayer</td> <td>1.5</td> <td>2.95 1.22</td> <td>4.43 1.83</td> <td></td> <td></td> <td></td> <td></td>	Bloom	1.5	4.27	6.41	60 hp tractor (new) Kinkelder sprayer	1.5	2.95 1.22	4.43 1.83				
5 4.27 6.41 0.0 µ tractor (new) 1.5 1.22 1.43 5 4.27 6.41 60 µ tractor (new) 1.5 1.22 1.43 6 0.0 µ tractor (new) 1.5 2.95 4.43 4.43 5 4.27 6.41 60 µ tractor (new) 1.5 1.22 1.43 7.5 4.27 6.41 60 µ tractor (new) 1.5 1.22 1.43 6.4 60 µ tractor (new) 1.5 1.22 1.43 1.43 6.4 6.41 60 µ tractor (new) 1.5 2.95 4.43 1.33 7.5 4.27 6.41 60 µ tractor (new) 1.5 2.95 4.43 1.33 6.5 4.27 6.41 60 µ tractor (new) 1.5 2.95 4.43 1.33 1.31	Petal Fall	1.5	4.27	6.41	60 hp tractor (new) Kinkelder sprayer	1.5	2.95 1.22	4.43				
5 4.27 6.41 60 hp tractor (new) 1.5 2.95 4.43 $.5$ 4.27 6.41 60 hp tractor (new) 1.5 2.95 4.43 $.5$ 4.27 6.41 60 hp tractor (new) 1.5 2.95 4.43 $.5$ 4.27 6.41 60 hp tractor (new) 1.5 2.95 4.43 $.5$ 4.27 6.41 60 hp tractor (new) 1.5 2.95 4.43 $.5$ 4.27 6.41 60 hp tractor (new) 1.5 2.95 4.43 $.5$ 4.27 6.41 60 hp tractor (new) 1.5 2.95 4.43 $.5$ 4.27 6.41 60 hp tractor (new) 1.5 2.95 4.43 $.5$ 4.27 6.41 60 hp tractor (new) 1.5 2.95 4.43 $.6$ 6.41 60 hp tractor (new) 1.5 2.95 4.43 703.216 703.216 $.5$ 4.27 6.41 60 hp tractor (new) 1.5 4.53 <td< td=""><td>1st cover</td><td>1.5</td><td>4.27</td><td>6.41</td><td>60 hp tractor (new) Kinkelder sprayer</td><td>1.5</td><td>2.95 1.22</td><td>4.43</td><td></td><td></td><td></td><td></td></td<>	1st cover	1.5	4.27	6.41	60 hp tractor (new) Kinkelder sprayer	1.5	2.95 1.22	4.43				
5 4.27 6.41 60 hp tractor (new) 1.5 2.95 4.43 .5 4.27 6.41 60 hp tractor (new) 1.5 2.95 4.43 .5 4.27 6.41 60 hp tractor (new) 1.5 2.95 4.43 .5 4.27 6.41 60 hp tractor (new) 1.5 2.95 4.43 .5 4.27 6.41 60 hp tractor (new) 1.5 2.95 4.43 .5 4.27 6.41 60 hp tractor (new) 1.5 2.95 4.43 .6 61 hp tractor (new) 1.5 2.95 4.43 7021 703.23 .5 4.27 6.41 60 hp tractor (new) 1.5 2.95 4.43 7021 703.23 .6 4.27 6.41 60 hp tractor (new) 1.5 2.95 4.43 7021 703.23 703.23 .6 4.43 60 hp tractor (new) 1.5 2.95 4.43 7021 $70.33.33$ 7021 7021 $70.33.33$	2nd cover	1.5	4.27	6.41	60 hp tractor (new) Kinkelder sprayer	1.5 1.5	2.95 1.22	4.43 1.83				
5 4.27 6.41 60 hp tractor (new) 1.5 2.95 4.43 5 4.27 6.41 60 hp tractor (new) 1.5 2.95 4.43 5 4.27 6.41 60 hp tractor (new) 1.5 2.95 4.43 5 4.27 6.41 60 hp tractor (new) 1.5 2.95 4.43 5 4.27 6.41 60 hp tractor (new) 1.5 2.95 4.43 6 60 hp tractor (new) 1.5 2.95 4.43 703.33 1.5 6.41 60 hp tractor (new) 1.5 2.95 4.43 6.41 60 hp tractor (new) 1.5 2.95 4.43 703.33 1.5 4.27 6.41 60 hp tractor 1.00 2.95 4.43 703.33 1.5 4.27 6.41 60 hp tractor 1.00 1.06 10.60 703.65 1.5 4.43 40 hp tractor 1.00 2.95 4.43 $70.33.96$ 1.5 4.43 40 hp tractor </td <td>3rd cover</td> <td>1.5</td> <td>4.27</td> <td>6.41</td> <td>60 hp tractor (new) Kinkelder sprayer</td> <td>1.5 1.5</td> <td>2.95 1.22</td> <td>4.43 1.83</td> <td></td> <td></td> <td></td> <td></td>	3rd cover	1.5	4.27	6.41	60 hp tractor (new) Kinkelder sprayer	1.5 1.5	2.95 1.22	4.43 1.83				
5 4.27 6.41 60 hp tractor (new) 1.5 2.95 4.43 5 4.27 6.41 60 hp tractor (new) 1.5 2.95 4.43 5 4.27 6.41 60 hp tractor (new) 1.5 2.95 4.43 5 4.27 6.41 60 hp tractor (new) 1.0 2.95 2.95 $1.831.16$ 51.96 5 4.27 6.41 60 hp tractor (new) 1.0 2.95 2.95 $1.96.31.96.31$ $703.23.91$ 5 4.27 6.41 60 hp tractor (new) 1.0 2.95 $2.4.43$ $1.96.31.16$ $703.23.19$ 5 4.27 6.41 60 hp tractor (new) 1.5 2.95 4.43 $90.631.168$ 877.03 6 80 10.60 10.60 10.60 10.60 10.60 10.61 94.53 6 3.54 4.43 40 hp tractor 10.0 10.60 10.64 $94.53.50/47$ 4 70 4.27 427.00 1.0	4th cover	1.5	4.27	6.41	60 hp tractor (new) Kinkelder sprayer	1.5 1.5	2.95	4.43				
.5 4.27 6.41 60 hp tractor (new) 1.5 2.95 4.43 $70 tal s prays.^1$ $81.831.16$ $81.931.16$ 81.5 .5 4.27 6.41 60 hp tractor (new) 1.0 2.95 703.23 700 700.23 700.23 <	5th cover	1.5	4.27	6.41	60 hp tractor (new) Kinkelder sprayer	1.5 1.5	2.95 1.22	4.43				
.5 4.27 6.41 60 hp tractor (new) 1.0 2.95 2.95 1.02 2.95 1.02 <td>6th cover</td> <td>1.5</td> <td>4.27</td> <td>6.41</td> <td>60 hp tractor (new) Kinkelder sprayer</td> <td>1.5 1.5</td> <td>2.95 1.22</td> <td>4.43</td> <td></td> <td></td> <td></td> <td></td>	6th cover	1.5	4.27	6.41	60 hp tractor (new) Kinkelder sprayer	1.5 1.5	2.95 1.22	4.43				
.5 4.27 6.41 60 hp tractor (new) 1.5 2.95 4.43 $(6000000000000000000000000000000000000$	Thinning spray 1 yr. in 4 (400 gal/A)	1.5	4.27	6.41	60 hp tractor (new) Hi pressure sprayer	1.0	2.95	2.95	Total sprays: ¹ (Insecticides (Miticides	\$1,831.16 703.23) 196.31) 837.09)	\$1,998.43	
Electricity & repair 10A 1.06 10.60 10.5 Custom airplane 3.50/A 35.00 Zinc Phosphide Corn 28.00 10.4/A Lostom airplane 3.50/A 35.00 Zinc Phosphide Corn 28.00 0.5 3.54 4.43 40 hp tractor 1.0 2.21 1.10 1.5 trees/acre 26.25 0.0 4.27 40 hp 1.00 2.18 1.00 9.000 9.53.50/tree 26.25 0.0 4.27 427.00 1.0 1.12/mi 90.00 9.53.50/tree 26.25 70 4.27 298.90 70 mi .12/mi 90.00 54.3 71 4.27 298.90 54.3 54.3 52.328.49 54.3	Drop Control Spray ½ acrea		4.27	6.41	60 hp tractor (new) Air blast sprayer	1.5 1.5	2.95 4.53	4.436.80	(Growth regula			
Custom airplane 3.50/A 35.00 Zinc Phosphide Corn 28.00 1.5 3.54 4.43 40 hp tractor 1.0 2.21 1.10 1.5 trees/acre 26.25 0.0 4.27 427.00 1.0 2.18 1.09 0.953.50/tree 26.25 70 4.27 298.90 750 mi .12/mi 90.00 52.328.49 54.5 70 4.27 298.90 58.43 .12/mi 90.00 52.328.49 54.5	Well & pump operation					10A	1.06	10.60			10.60	
2.5 3.54 4.43 40 hp tractor 1.0 2.21 1.10 1.5 trees/acre 26.25 trailer 1.0 4.27 427.00 4.27 427.00 750 mi 112/mi 90.00 $4.27 \frac{298.90}{51.628.68}$ 750 mi 112/mi 90.00 $720 \frac{12}{51.628.68}$ 720 mi 112/mi 90.00 70 mi 112/mi 90.00 70 mi 112/mi 90.00 70 mi 112/mi 90.00 720 mi 112/mi 90.00 $70 mi$	Mouse baiting				Custom airplane	3.50/A		35.00	Zinc Phosphide	Corn 28.00	63.00	
00 4.27 427.00 70 4.27 <u>298.90</u> \$1,628.68 52,328.49 \$4;	Tree replacemen (annual cost-	t 2.5	3.54	4.43	40 hp tractor trailer	1.0	2.21 .18	1.10	1.5 trees/acre @\$3.50/tree	26.25	31.87	
ion Pickup 750 mi .12/mi 90.00 70 4.27 <u>298.90</u> \$1,628.68 \$2,328.49 \$4;	Management & lab supervision	or 100	4.27	427.00							427.00	
70 4.27 <u>298.90</u>	Pickup operatio	ч				50 mi	.12/mi	00.06			90.06	
\$1,628.68 \$4.36.10 \$2,328.49	Misc. repairs	70	4.27	298.90			l le				298.90	
	TOTALS		\$	1,628.68			**	436.10		\$2,328.49	\$4,393.27	

¹From 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

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. \times \$4.27)	\$ 34.16	and the second second
Part time labor $(.75 \text{ hr.} \times \$3.54)$	2.66	
Piecework labor (375 bu. @ \$.55)	206.25	
Piecework drops (25 bu. × \$.48)	12.00	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1
Equipment use	36.54	-
Total	\$291.61	
Cost per bushel	\$.73	and the second second

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

and the second second	Total	Your farm cost
Variable growing cost	\$ 439.32	
Variable harvest cost	291.61	and the second
Overhead cost	308.22	
Total	\$1,039.15	the state of the s

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

Yield per acre		Variable harvest cost		Your farm variable cost	Fixed cost	Total cost	Your farm total cost
	1		Pe	r bushel		1. 1. Mar	Second Second
200	\$2.20	.73	\$2.93		\$1.54	\$4.47	The second
250	1.76	.73	2.49	La Maria	1.23	3.72	a fill and a
300	1.46	.73	2.19		1.03	3.22	14. 13 M
350	1.25	.73	1.98	1 10	.88	2.86	1 million
400	1.10	.73	1.83		.77	2.60	A.S. Mar
500	.88	.73	1.61	M.C.	.62	2.23	
600	.73	.73	1.46	Service Service	.51	1.97	8
700	.63	.73	1.36	Sec. 1	.44	1.80	4- 1- 1.



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

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

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