

AEB 0028
May 2012

Orchard Economics: Establishing and Producing Medium-Density Apples in Hood River County

*Tyler West, Rebecca Sullivan, Clark Seavert, and
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Introduction

Many factors enter into the decision to renew an existing orchard or develop a new one. Both require the commitment of considerable effort and financial resources. Planting a medium-density orchard can increase production during the establishment years and reduce the time to reach full production compared to a standard-density orchard. While the medium-density orchard has higher economic potential, it also has greater financial risk associated with it.

This analysis is intended for growers and investors who are considering the economic and financial consequences of planting a medium-density apple orchard. It is impossible to cover all apple variety, rootstock, and training system combinations in a publication of this type, so an attempt has been made to reflect the typical production practices performed in the Hood River County apple industry.

Assumptions

In the preparation of this publication, a set of assumptions were made that reflect current trends in orchard design for establishing a medium-density apple orchard. These assumptions are:

1. Typical acreage for a farm in Hood River County is 70 acres of irrigated land. Bearing acres include: 30 acres of winter pears, 12 acres of fresh market Bartlett pears, 8 acres of medium-density pears, 5 acres of medium-density apples, 5 acres of high-density sweet cherries or wine grapes, and 10 acres, or approximately 15 percent, of the orchard under establishment.
2. Remove 5 acres of existing orchard and plant 558 apple trees per acre (6' x 13' spacing) with a productive life of 25 years, once full production of 50 bins per acre is reached.
3. The medium-density orchard is trained to a central leader on a three-wire vertical support system.
4. Apple prices are \$250 per 850-pound bin return to grower after packing costs are subtracted.
5. Commercial yields begin in year 3, and full production is reached 6 years after planting with yields of 15, 25, 40, and 50 bins per acre in years 3 through 6, respectively.
6. General labor is hired at a rate of \$11.50 per hour, machine labor at \$13.00 per hour, and harvest labor is \$20.00 per bin to harvest apples, which includes worker's compensation, unemployment insurance, and other labor overhead expenses. All labor is treated as a cash variable expense.
7. The owner provides housing facilities for seasonal labor at a cost of \$120,000 for a 10-person unit. The life of the facility is 30 years, depreciated using the straight-line method of depreciation with a zero salvage value, and the costs allocated equally across the 70 acres.
8. Foreman housing with all utilities is provided at no cost to the employee, valued at \$600 per month, or \$103 per acre, and is a fixed non-cash opportunity

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- cost to the operator. This is the estimated market rental rate for a three-bedroom, two-bathroom house in the area.
8. The machinery and equipment used in the budget reflects the typical machinery complement of a farm in Hood River County. A detailed breakdown of machinery values is shown in Table 1. Estimated machinery costs from the American Society of Agricultural Engineers are shown in Table 2. The 70-hp tractor is used for flailing, shredding brush, pulling an air-blast sprayer, and during harvest. The 50-hp tractor is used to auger holes for new trees, spread fertilizer, pull an older air blast sprayer, apply gopher bait, and used at harvest. The 35-hp tractor is used to spray weeds, assist in harvest, and as a general utility tractor. Table 3 lists the estimated cost of each operation with 13' tree row spacing. Gasoline and diesel costs per gallon are \$4.00, respectively. Propane costs \$2.25 per gallon.
 9. The interest rate on operating funds is 5 percent, which is treated as a cash expense. One-half of the cash expenses are borrowed for a six-month period.
 10. Machinery and land are owned by the operator and assessed 6 and 4 percent rates of interest, respectively, as opportunity costs. Land is valued at \$6,000 per acre.
 11. Previous years' establishment costs are funded by the operator at a charge of 8 percent interest and are considered an opportunity cost.
 12. Herbicides used for strip maintenance are applied to 30 percent of each acre.
 13. A micro-sprinkler irrigation system with poly-tube is used at an estimated cost of \$1,200 per acre. The life of the system is 25 years and depreciated using the straight-line method of depreciation with a zero salvage value. Interest is calculated using the average value of the system multiplied by an 8 percent interest rate $((\text{cost} + \text{salvage value}) \div 2 \times .08)$. Repairs and maintenance for the system costs one percent of the purchase price per year.
 14. The trellis system is installed at a cost of \$1,800 per acre, not including stringing the wire. The life of the system is 25 years, and it is depreciated using the straight-line method of depreciation with a zero salvage value. Interest is calculated using the average value of the system multiplied by an 8 percent interest rate $((\text{cost} + \text{salvage value}) \div 2 \times .08)$. Repairs and maintenance for the system costs one percent of the purchase price per year.
 15. Two wind machines are used for frost control along with eight smudge pots per acre. The wind machines are valued at \$28,000 each, and smudge pots cost \$70 each. Depreciation periods are 25 years for the wind machines and 10 years for the smudge pots using the straight-line method of depreciation.
 16. Additional assumptions for variable, cash fixed, and non-cash fixed cost are listed in Table 4.
 17. Price inflation for the duration of this study is ignored.
 18. Income tax consequences are also ignored for this study.

Table 1. Machinery Cost Assumptions.

Machine	Size or description	Market value	Hours or miles of annual use	Expected life (years)	Salvage Value
Tractor	4 wheel dr 70hp, new	\$ 33,000	469	10	\$ 9,748
Tractor	2 wheel dr 50hp, old	18,000	157	20	2,310
Tractor	2 wheel dr 35 hp, old	7,500	161	20	962
Forklift (Leased during harvest)	3 months @ \$1,200/mon	NA	480	NA	NA
Air-blast sprayer	400 gallon unit, PTO, new	17,500	125	10	3,095
Air-blast sprayer	400 gallon unit, PTO, older	5,000	84	10	884
Flail chopper	8' unit	6,000	160	7	1,531
Weed sprayer	100 gallon unit	2,000	61	15	192
Fertilizer spreader		2,300	17	20	120
Brush windrow		3,500	25	20	182
Gopher machine		1,200	16	20	63
Pickup	1/2 ton 4x4, new	35,000	12,000	10	13,235
Truck	2 ton, used	18,000	3,500	20	2,710
Gator	4 wheel, new	8,000	3,000	5	3,585
Auger		1,700	35	20	89
Front-end loader & backforks		5,800	64	10	1,026
Bin trailer		7,500	64	10	1,326
Ladders	35 units, per 70 acres	6,125	N/A	10	N/A
Picking bags	35 units, per 70 acres	1,500	N/A	2	N/A
Chain & pruning saws	3 units each, 1-loppers	3,000	N/A	3	N/A
Irrigation system ¹	Micro, per acre	1,200	N/A	25	N/A
Wind machine	2 units, propane, per 70 acres	56,000	70	25	1,585
Smudge Pots	8 units, per acre	17,920	70	10	3,169
Trellis system ¹	Three-wire vertical, per acre	1,800	N/A	25	N/A
Housing facilities	1 unit, per 70 acres	120,000	N/A	30	0

¹Included in costs are all materials and labor to install system.

Table 2. Machinery Cost Calculations.

Machine	Size or description	--- Variable costs ---			----- Fixed costs -----		Total cost
		Fuel & Lube	Repairs & Maint.	Depr. & Interest	Insurance		
----- Costs per hour -----							
Tractor	4 wheel dr 70hp, new	\$13.80	\$0.46	\$7.70	\$0.41	\$22.37	
Tractor	2 wheel dr 50hp, old	10.12	0.40	\$8.86	0.58	19.96	
Tractor	2 wheel dr 35 hp, old	6.90	0.17	3.60	0.24	10.90	
Forklift (Leased during harvest)	3 months @ \$1,200/mon	8.00	0.00	0.00	0.00	8.00	
Air-blast sprayer	400 gallon unit, PTO, new	0.00	7.68	16.42	0.49	24.59	
Air-blast sprayer	400 gallon unit, PTO, older	0.00	1.94	7.04	0.21	9.19	
Flail chopper	8' unit	0.00	2.95	5.41	0.14	8.50	
Weed sprayer	100 gallon unit	0.00	0.80	3.03	0.11	3.94	
Fertilizer spreader		0.00	1.04	10.94	0.44	12.42	
Brush windrow		0.00	0.45	11.13	0.44	12.03	
Gopher machine		0.00	0.54	5.99	0.24	6.76	
----- Costs per mile -----							
Pickup	1/2 ton 4x4, new	\$0.38	\$0.05	\$0.30	\$0.12	\$0.85	
Truck	2 ton, used	0.77	0.57	0.40	0.27	2.00	
ATV	4 wheeler, new	1.10	0.02	0.41	0.02	1.55	
----- Costs per acre -----							
Auger		\$0.00	\$0.15	\$1.92	\$0.00	\$2.06	
Front-end loader & backforks		0.00	\$2.89	10.66	0.00	13.55	
Bin trailer		0.00	\$3.74	13.78	0.00	17.52	
Ladders	35 units, per 70 acres	0.00	5.25	11.38	0.00	16.63	
Picking bags	35 units, per 70 acres	0.00	1.29	11.35	0.00	12.64	
Chain & pruning saws	3 units each, 1-loppers	6.90	2.57	15.57	0.00	25.04	
Irrigation system	Micro, per acre	0.00	12.00	84.00	0.00	96.00	
Wind machines	2 units, propane, per 70 acres	62.10	15.67	55.77	0.00	133.54	
Smudge Pots	7 units, per acre	18.00	2.56	0.00	0.00	20.56	
Trellis system	Three-wire vertical, per acre	0.00	18.00	126.00	0.00	144.00	
Housing facilities	1 unit, per 70 acres	0.00	45.43	91.43	0.00	136.86	

Table 4. Estimated Cost of Each Operation with Power Unit for a 13' Between-Row Spacing.

Operation	Tractor	Miles per hour	Acres per hour	-- Machine costs --			Total cost per acre
				Labor cost per acre	Variable cost per acre	Fixed cost per acre	
Air-blast sprayer	4 wheel dr 70hp	2.00	2.36	\$5.50	\$9.28	\$10.58	\$25.37
Flail chopper	4 wheel dr 70hp	3.00	4.02	3.23	4.28	3.40	10.92
Weed sprayer	2 wheel dr 35hp	2.75	1.63	8.00	4.84	4.29	17.13
Fertilizer spreader	2 wheel dr 50hp	3.00	6.62	1.96	1.75	3.15	6.86
Brush windrow	2 wheel dr 50hp	3.00	2.01	6.47	5.46	10.46	22.39
Gopher machine	2 wheel dr 50hp	2.50	3.15	4.12	3.51	4.97	12.60

Table 4. Input assumptions for establishing a medium-density apple orchard, (per acre basis).

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Full Prod
Prices per bin	\$250.00	\$250.00	\$250.00	\$250.00	\$250.00	\$250.00	\$250.00
Bins per acre	0	0	0	15	25	40	50
Cost of general orchard labor, per hour	\$11.50	\$11.50	\$11.50	\$11.50	\$11.50	\$11.50	\$11.50
Cost of tractor driver, per hour	\$13.00	\$13.00	\$13.00	\$13.00	\$13.00	\$13.00	\$13.00
Cost of harvest labor, per bin	\$20.00	\$20.00	\$20.00	\$20.00	\$20.00	\$20.00	\$20.00
Leased Forklift during Harvest ¹	\$0.00	\$0.00	\$0.00	\$133.33	\$133.33	\$133.33	\$133.33
Production mgmt consultant fees	\$0.00	\$0.00	\$0.00	\$30.00	\$30.00	\$30.00	\$30.00
Hours of pruning and training labor	0.00	10.00	20.00	60.00	60.00	60.00	60.00
Hours of thinning labor	0.00	0.00	0.00	20.00	30.00	40.00	50.00
Hours of irrigating labor	0.00	3.50	3.50	5.00	5.00	5.00	5.00
Hours to Install Phermone Disruption	0.00	0.00	0.00	2.25	2.25	2.25	2.25
Hours to remove & replace tree labor	0.00	1.00	1.00	2.50	2.50	2.50	2.50
Hours for frost protection labor	0.00	0.00	0.00	2.00	2.00	2.00	2.00
Hours of General Labor during Harvest	0.00	0.00	0.00	3.75	6.25	10.00	12.50
Cost of fertilizer - broadcast applied	\$600.00	\$40.00	\$60.00	\$130.00	\$130.00	\$130.00	\$130.00
Cost of fertilizer - lime	\$140.00	\$0.00	\$25.00	\$35.00	\$35.00	\$35.00	\$35.00
Cost of herbicide strip maintenance	\$0.00	\$50.00	\$50.00	\$60.00	\$60.00	\$60.00	\$60.00
Cost of insecticides & fungicides	\$0.00	\$150.00	\$250.00	\$570.00	\$570.00	\$570.00	\$570.00
Cost of Phermone Disruption	\$0.00	\$0.00	\$0.00	\$200.00	\$200.00	\$200.00	\$200.00
Cost of rodent materials	\$0.00	\$20.00	\$20.00	\$20.00	\$20.00	\$20.00	\$20.00
Cost per bee hive	\$0.00	\$0.00	\$0.00	\$50.00	\$50.00	\$50.00	\$50.00
Times for fertilizer - broadcast applied	1.00	2.00	2.00	2.00	2.00	2.00	2.00
Times for herbicide strip spray	0.00	2.00	2.00	2.00	2.00	2.00	2.00
Times for insecticides & fungicides	0.00	4.00	6.00	10.00	10.00	10.00	10.00
Number of bee hives per acre	0.00	0.00	0.00	2.00	2.00	2.00	2.00
Times for rodent control	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Times for flailing/mowing orchard floor	0.00	5.00	5.00	5.00	5.00	5.00	5.00
Property taxes	\$60.00	\$60.00	\$60.00	\$60.00	\$60.00	\$60.00	\$60.00
Property insurance	\$25.00	\$25.00	\$25.00	\$25.00	\$25.00	\$25.00	\$25.00
Land values	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000
Foreman housing (per month)	\$600	\$600	\$600	\$600	\$600	\$600	\$600
Irrigation assessment	\$60.00	\$60.00	\$60.00	\$60.00	\$60.00	\$60.00	\$60.00
Miscellaneous & overhead	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00
Tree cost	\$8.00	\$8.00	\$8.00	\$8.00	\$8.00	\$8.00	\$8.00
Gasoline price	\$4.00	\$4.00	\$4.00	\$4.00	\$4.00	\$4.00	\$4.00
Diesel fuel price	\$4.00	\$4.00	\$4.00	\$4.00	\$4.00	\$4.00	\$4.00
Propane Price	\$2.25	\$2.25	\$2.25	\$2.25	\$2.25	\$2.25	\$2.25
Operating interest rate	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%
Machinery interest rate	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%
Land interest rate	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%
Establishment interest rate	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%
% of operating capital borrowed	50.00%	50.00%	50.00%	50.00%	50.00%	50.00%	50.00%
Months to borrow operating capital	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Planted trees	0	1,069	2	2	2	2	2

¹Forklift is leased to load bins of fruit onto trucks for 3 months at \$1,200 per month. The total cost of the forklift is \$3,600 allocated across 60 harvested acres of tree fruits.

Results of establishing a medium-density apple orchard in Hood River County

Cash flow analysis

A cash flow analysis for establishing a medium-density apple planting is presented in Table 5. It shows the cash costs required to establish an orchard. Cash costs include labor, trees, irrigation and trellis support systems, fertilizer, chemicals, bee hives, machinery repairs, fuel, lube and oil, labor housing repairs and maintenance, operating (short-term) interest, machinery and housing insurance, irrigation water assessments, and property taxes. The income, variable costs, and cash fixed costs are shown for each of the 5 establishment years plus first full production year. Production begins in year 3 with 15 bins of apples per acre and increases to 50 bins at full production. Total variable costs are \$3,020 in the first year, with an additional \$179 of cash fixed costs for a total cash cost of \$3,200 per acre.

A positive cash flow begins in year 4, with gross income exceeding total cash costs by \$2,096 per acre. At full production, or in 6 years after planting, the orchard does not return a sufficient amount of gross income to pay all previous years' cash costs. There is \$4,364 per acre remaining over and above prior costs, and it is not until year 7 that all previous years' cash production costs are paid, Figure 3, page 10.

The major cost components in relation to total cash costs are shown in Figure 1 on page 10. Hired labor represents 29 percent of the total cash costs to establish this orchard, followed by tree costs at 23 percent. Machine costs, which include fuel, oil, and repairs, are third at 11 percent. Chemicals make up the fourth largest cost at 8 percent and fertilizer, at 7 percent, makes up the fifth largest cost. The trellis system is 5 percent, irrigation system costs are 4

percent, and field prep are 3 percent of the total cash costs. The remaining total cash costs are operating interest (1 percent), insurance and taxes (2 percent), and other cost items (7 percent).

Economic costs and returns

The economic costs and returns for the establishment of a medium-density apple orchard are shown in Table 6 (page 9). Economic costs include all cash costs and ownership costs that are either an opportunity cost to the owner or money borrowed from a financial institution. These ownership costs include the principal and interest payments or a return on investment to the grower, or both, for machinery, housing, land, and funds to pay for previous years' establishment costs. The gross income and variable cash costs remain the same as in Table 5 (page 8) except that the trellis support and irrigation systems are amortized over their productive life in this analysis and included in fixed machine costs.

Gross income exceeds variable costs beginning in year 5 with \$2,390 per acre return to the grower. Additionally, at the end of the establishment period, \$17,647 per acre remains to repay all previous establishment costs. This cost is amortized over a 25-year period as an annual payment of \$2,036 per acre, which includes principal and interest to recover the capital investment of establishing the orchard, as shown in Table 13, Full Production Years, page 18.

The relative contribution of each cost component to the total economic cost is shown in Figure 2 (page 10). When all economic costs are included, hired labor is the largest cost item, at 22 percent of the total costs for the first 7 years of establishment. Interest costs make up the second largest economic cost at 19 percent. Tree costs are third with 18 percent of the

total cost. Machine costs (fuel, oil, repairs, depreciation and interest charges) are the fourth largest cost item, with 14 percent. Fertilizer and chemicals costs make up the fifth largest costs at 11 percent. The remaining cost items, land charges and “other,” are 4 and 12 percent of the total economic costs, respectively.

The net projected returns for establishing a medium-density apple orchard are shown in Figure 3 (page 10). Both the cumulative cash and economic cost and returns are represented. The projected returns for this orchard will cover all cash costs of establishment in the seventh year. With the assumptions used in this study, this orchard covers all economic costs in year 10.

Table 5. Cash costs and returns of establishing a medium-density apple orchard.

Income:	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Full Prod
Yield (bins/acre)	0.00	0.00	0.00	15.00	25.00	40.00	50.00
Price (dollars/bin)	<u>250.00</u>	<u>250.00</u>	<u>250.00</u>	<u>250.00</u>	<u>250.00</u>	<u>250.00</u>	<u>250.00</u>
Gross income (dollars/acre)	0.00	0.00	0.00	3,750.00	6,250.00	10,000.00	12,500.00
Variable costs (per acre):							
Field preparation	1,000.00	30.00	0.00	0.00	0.00	0.00	0.00
Trees	0.00	8,552.00	16.00	16.00	16.00	16.00	16.00
Irrigation system	0.00	1,212.00	12.00	12.00	12.00	12.00	12.00
Trellis system	0.00	1,818.00	18.00	18.00	18.00	18.00	18.00
Paint trees	0.00	30.00	0.00	0.00	0.00	0.00	0.00
Fertilizer	1,625.73	40.00	85.00	165.00	165.00	165.00	165.00
Chemicals	0.00	200.00	300.00	630.00	630.00	630.00	630.00
Pheromone Disruption	0.00	0.00	0.00	200.00	200.00	200.00	200.00
Prod. mgmt consultant fees	0.00	0.00	0.00	30.00	30.00	30.00	30.00
Bee rental	0.00	0.00	0.00	100.00	100.00	100.00	100.00
Rodent materials	0.00	20.00	20.00	20.00	20.00	20.00	20.00
Harvest labor	0.00	0.00	0.00	363.43	605.72	926.60	1,498.93
General labor	30.96	1,349.76	367.97	1,193.46	1,308.46	1,423.46	1,538.46
Machine costs	206.00	699.46	308.68	699.90	699.90	699.90	699.90
Seasonal housing facilities	45.43	45.43	45.43	45.43	45.43	45.43	45.43
Miscellaneous & overhead	75.00	75.00	75.00	75.00	75.00	75.00	75.00
Interest: operating capital	<u>37.29</u>	<u>138.40</u>	<u>15.60</u>	<u>44.60</u>	<u>49.07</u>	<u>54.52</u>	<u>63.11</u>
Total variable costs	3,020.41	14,210.04	1,263.68	3,612.82	3,974.57	4,415.90	5,111.83
Gross income - variable cost	-3,020.41	-14,210.04	-1,263.68	137.18	2,275.43	5,584.10	7,388.17
Fixed costs (per acre):							
Insurance	59.19	59.19	59.19	59.19	59.19	59.19	59.19
Water assessment	60.00	60.00	60.00	60.00	60.00	60.00	60.00
Property taxes	<u>60.00</u>	<u>60.00</u>	<u>60.00</u>	<u>60.00</u>	<u>60.00</u>	<u>60.00</u>	<u>60.00</u>
Total fixed cost	179.19	179.19	179.19	179.19	179.19	179.19	179.19
Total cost	3,199.60	14,389.23	1,442.87	3,792.01	4,153.76	4,595.09	5,291.02
Net projected returns	-3,199.60	-14,389.23	-1,442.87	-42.01	2,096.24	5,404.91	7,208.98
Cumulative returns	-3,199.60	-17,588.83	-19,031.70	-19,073.71	-16,977.47	-11,572.56	-4,363.57

Table 6. Economic costs and returns of establishing a medium-density apple orchard.

Income:	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Full Prod
Yield (pounds/acre)	0.00	0.00	0.00	15.00	25.00	40.00	50.00
Price (dollars/pound)	<u>250.00</u>	<u>250.00</u>	<u>250.00</u>	<u>250.00</u>	<u>250.00</u>	<u>250.00</u>	<u>250.00</u>
Gross income (dollars/acre)	0.00	0.00	0.00	3,750.00	6,250.00	10,000.00	12,500.00
Variable costs (per acre):							
Field preparation	1,000.00	30.00	0.00	0.00	0.00	0.00	0.00
Trees	0.00	8,552.00	16.00	16.00	16.00	16.00	16.00
Irrigation system	0.00	12.00	12.00	12.00	12.00	12.00	12.00
Trellis system	0.00	18.00	18.00	18.00	18.00	18.00	18.00
Paint trees	0.00	30.00	0.00	0.00	0.00	0.00	0.00
Fertilizer	1,625.73	40.00	85.00	165.00	165.00	165.00	165.00
Chemicals	0.00	200.00	300.00	630.00	630.00	630.00	630.00
Pheromone Disruption	0.00	0.00	0.00	200.00	200.00	200.00	200.00
Prod. mgmt consultant fees	0.00	0.00	0.00	30.00	30.00	30.00	30.00
Bee rental	0.00	0.00	0.00	100.00	100.00	100.00	100.00
Rodent materials	0.00	20.00	20.00	20.00	20.00	20.00	20.00
Harvest labor	0.00	0.00	0.00	363.43	605.72	926.60	1,498.93
General labor	30.96	1,349.76	367.97	1,193.46	1,308.46	1,423.46	1,538.46
Machine costs	206.00	699.46	308.68	699.90	699.90	699.90	699.90
Seasonal housing facilities	45.43	45.43	45.43	45.43	45.43	45.43	45.43
Miscellaneous & overhead	75.00	75.00	75.00	75.00	75.00	75.00	75.00
Interest: operating capital	<u>37.29</u>	<u>138.40</u>	<u>15.60</u>	<u>44.60</u>	<u>49.07</u>	<u>54.52</u>	<u>63.11</u>
Total variable costs	3,020.41	11,210.04	1,263.68	3,612.82	3,974.57	4,415.90	5,111.83
Gross income - variable cost	-3,020.41	-11,210.04	-1,263.68	137.18	2,275.43	5,584.10	7,388.17
Fixed costs (per acre):							
Insurance	59.19	59.19	59.19	59.19	59.19	59.19	59.19
Water assessment	60.00	60.00	60.00	60.00	60.00	60.00	60.00
Property taxes	60.00	60.00	60.00	60.00	60.00	60.00	60.00
Machine costs	92.29	684.86	513.76	570.97	570.97	570.97	570.97
Foreman housing	102.86	102.86	102.86	102.86	102.86	102.86	102.86
Seasonal housing facilities	91.43	91.43	91.43	91.43	91.43	91.43	91.43
Land interest cost	320.00	320.00	320.00	320.00	320.00	320.00	320.00
Interest on establishment costs	<u>0.00</u>	<u>304.49</u>	<u>1,335.92</u>	<u>1,640.47</u>	<u>1,861.89</u>	<u>1,929.96</u>	<u>1,2036.05</u>
Total fixed cost	785.76	1,682.83	2,543.16	2,904.91	3,126.33	3,194.40	3,300.53
Total cost	3,806.17	12,892.87	3,806.83	6,517.73	7,100.90	7,610.30	8,412.36
Net projected returns	-3,806.17	-12,892.87	-3,806.83	-2,767.73	-850.90	2,389.70	4,087.64
Cumulative returns	-3,806.17	-16,699.04	-20,505.88	-23,273.61	-24,124.51	-21,734.82	-17,647.18

¹This cost is an annual payment, over a 25-year period, which includes principal and interest to recover the capital investment of establishing this orchard in years 0 through 5.

Figure 1. Cash Costs to Establish a Medium-Density Apple Orchard the First Seven Years of Establishment

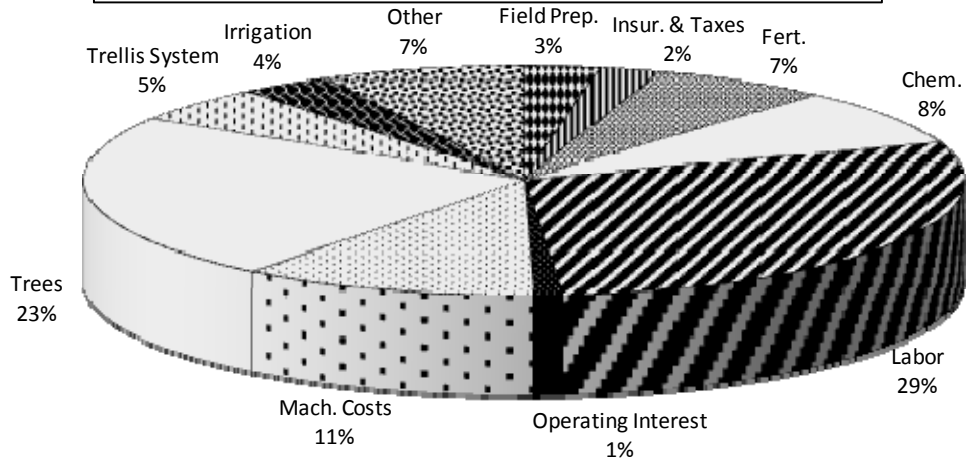


Figure 2. Economic Costs to Establish a Medium-Density Apple Orchard the First Seven Years of Establishment

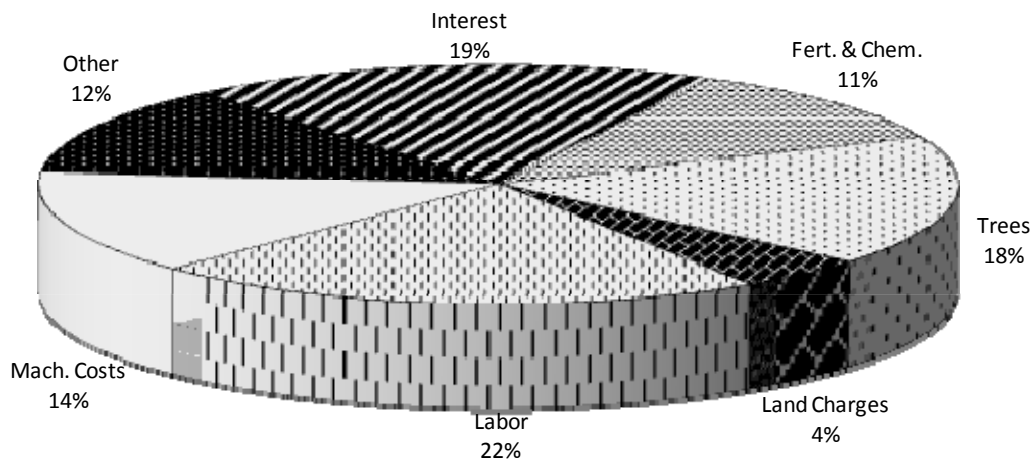
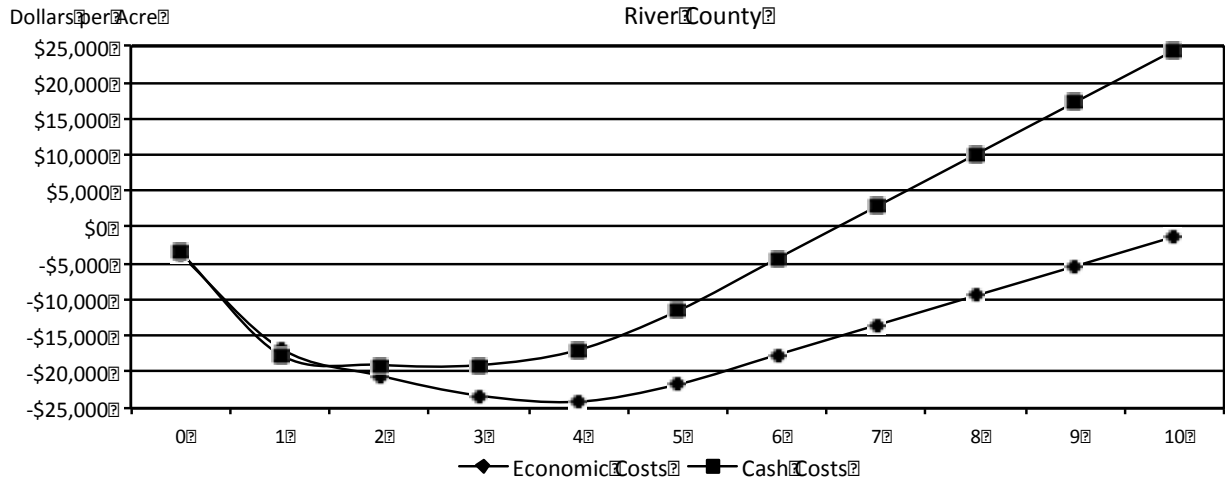


Figure 3. Economic and Cash Costs to Establish a Medium-Density Apple Orchard in Hood River County



Conclusion

Historically, most growers have renewed orchards only when production levels no longer covered the cost of production. Today, however, poor production and market performance have increased interest in replacing old orchards with modern higher-density apple orchards.

Higher-density orchards can offer higher returns that are obtained earlier in the life of the orchard. These early returns can reduce interest costs and therefore improve the profitability and feasibility of an orchard investment. The tradeoff, however, is higher risk due to larger up-front costs and significantly greater management expertise requirements.

This cost of establishment study is meant to provide useful information to apple producers who are considering replacing an existing orchard or planting a new block. As with any enterprise budget, using your own current costs in the analysis will make it more meaningful.

Using the AgProfit™ Program to Analyze Different Price and Yield Scenarios

Many different price and yield scenarios can occur due to freeze, rain, hail, birds and market conditions that it is next to impossible to cover even a small sample in this bulletin. However, the AgProfit™ computer program developed by Oregon State University, Washington State University, University of Arizona, and the University of California at Davis, is a Windows based program designed to help agricultural producers in making long-run cropping decisions. AgProfit™ is designed to use data from annual budgets as input and generate financial analyses of the potential economic performance of perennial crops such as tree

fruit, nut, berry and wine grapes under numerous different long-run scenarios.

The AgProfit™ program can be obtained free of charge at <http://agtools.org>, registering on the website, and downloading the AgProfit™ program, along with the supporting files onto your computer. In addition, the data from this publication can also be downloaded by clicking on “Crop Budget Files” under “Supporting Files” and then clicking on “Apples”, “Oregon”. All assumptions as to prices received, yields obtained, or input items, amounts, and costs can be readily changed using AgProfit™ to modify the budgets provided so the user can develop a set of annual budgets that best fit his/her situation.

AgProfit™ generates three reports for each plan analyzed. “Net Returns and Present Value by Year” gives the net returns and net present value by year and the total net returns and total net present value for each plan along with the annual equivalent. “Accumulated Net Returns” shows the annual returns, annual cost, net returns, and accumulated net returns for each plan. It calculates the number of years the returns are greater than costs, the year returns are greater than total costs of previous years, and the total cash costs to establish. “Net Present Value Profile” calculates the net present value and the annual equivalent at various interest rates for the base plan and the comparison plan. AgProfit™ also graphs the net returns by year, accumulated net returns by year, the net present value at varying discount rates, and the annual equivalent at varying discount rates.

It is recommended that before investing in any long-run perennial crop, that the potential investor use the AgProfit™ program to fully analyze the potential investment under varying price and yield scenarios to help decided if the potential investment is likely to be profitable and feasible.

APPENDIX A

Enterprise Budgets for a Medium-Density Apple Orchard in Hood River County

Table 7. Year 0, medium-density apple establishment, \$/acre economic costs and returns.						
VARIABLE CASH COSTS	Description	Labor	Machinery	Materials	Total	
Remove trees, roots and rip (2x)	1.0 custom	\$0.00	\$0.00	\$1,000.00	\$1,000.00	
Disc	1.0 applications	20.00	14.76	0.00	34.76	
Plotting	1.0 x/acre	9.00	0.00	2.00	11.00	
Soil sampling (1 per 5 acres)	1.0 x/acre	0.00	0.00	8.73	8.73	
Fumigation	1.0 custom	0.00	0.00	875.00	875.00	
Fertilizer (Phosphorous)	1.0 application	1.96	1.75	600.00	603.71	
Lime	1.0 custom	0.00	0.00	140.00	140.00	
Pickup, truck & ATV	1.0 x/acre	0.00	189.49	0.00	189.49	
Housing facilities	1.0 x/acre	0.00	0.00	45.43	45.43	
Miscellaneous and overhead	1.0 x/acre	0.00	0.00	75.00	75.00	
Interest: operating capital	6.0 months	<u>0.00</u>	<u>0.00</u>	<u>37.29</u>	<u>37.29</u>	
Total variable costs		30.96	206.00	2,783.45	3,020.41	
FIXED CASH COSTS					Unit	Total
Pickup, truck & ATV insurance					acre	34.19
Water assessment					acre	60.00
Property insurance					acre	25.00
Property taxes					acre	<u>60.00</u>
Total fixed cash costs						179.19
FIXED NON-CASH COSTS					Unit	Total
Machinery and equipment insurance, depreciation & interest					acre	3.15
Pickup, truck & ATV - depreciation & interest					acre	89.14
Foreman housing					acre	102.86
Housing facilities					acre	91.43
Land interest charge					acre	<u>320.00</u>
Total fixed non-cash costs						606.57
Total fixed costs						785.76
Total of all costs per acre						\$3,806.17

Table 8. Year 1, medium-density apple establishment, \$/acre economic costs and returns.

VARIABLE CASH COSTS	Description	Labor	Machinery	Materials	Total	
Plant trees	40.0 hours	\$980.00	\$420.80	\$8,552.00	\$9,952.80	
Painting trees	12.0 hours	138.00	0.00	30.00	168.00	
Training trees	10.0 hours	115.00	0.00	0.00	115.00	
Fertilizer application	1.0 applications	1.96	1.75	40.00	43.71	
Insecticides and fungicides	4.0 applications	22.00	37.13	150.00	209.13	
Herbicide strip maintenance (.30x)	2.0 applications	16.00	9.68	50.00	75.68	
Seed cover crop	20.0 lbs	16.25	15.68	30.00	61.93	
Flailing/mowing orchard floor	5.0 times	16.17	21.42	0.00	37.60	
Rodent control	1.0 application	4.12	3.51	20.00	27.63	
Irrigation	3.5 hours	40.25	0.00	12.00	52.25	
Trellis System	1.0 x/acre	0.00	0.00	18.00	18.00	
Pickup, truck & ATV	1.0 x/acre	0.00	189.49	0.00	189.49	
Housing facilities	1.0 x/acre	0.00	0.00	45.43	45.43	
Miscellaneous and overhead	1.0 x/acre	0.00	0.00	75.00	75.00	
Interest: operating capital	6.0 months	<u>0.00</u>	<u>0.00</u>	<u>138.40</u>	<u>138.40</u>	
Total variable costs		1,349.76	699.46	9,160.82	11,210.04	
FIXED CASH COSTS					Unit	Total
Pickup, truck & ATV insurance				acre	34.19	
Water assessment				acre	60.00	
Property insurance				acre	25.00	
Property taxes				acre	<u>60.00</u>	
Total fixed cash costs					179.19	
FIXED NON-CASH COSTS					Unit	Total
Machinery and equipment insurance, depreciation & interest				acre	595.72	
Pickup, truck & ATV - depreciation & interest				acre	89.14	
Foreman housing				acre	102.86	
Housing facilities				acre	91.43	
Land interest charge				acre	320.00	
Prior year's establishment costs - Interest				acre	<u>304.49</u>	
Total fixed non-cash costs					1,503.64	
Total fixed costs					1,682.83	
Total of all costs per acre					\$12,892.87	

Table 9. Year 2, medium-density apple establishment, \$/acre economic costs and returns.

VARIABLE CASH COSTS	Description	Labor	Machinery	Materials	Total
Pruning and training	20.0 hours	\$230.00	\$0.00	\$0.00	\$230.00
Tree removal & tree replacement	1.0 hours	24.50	10.66	16.00	51.16
Fertilizer & lime application	2.0 applications	3.93	3.49	85.00	92.42
Herbicide strip maintenance (.30x)	2.0 applications	16.00	9.68	50.00	75.68
Insecticides and fungicides	6.0 applications	33.00	55.69	250.00	338.69
Flailing/mowing orchard floor	5.0 times	16.17	21.42	0.00	37.60
Rodent control	1.0 hours	4.12	3.51	20.00	27.63
Irrigation	3.5 hours	40.25	0.00	12.00	52.25
Trellis System	1.0 x/acre	0.00	0.00	18.00	18.00
Ladders & pruning equip.	1.0 x/acre	0.00	14.72	0.00	14.72
Pickup, truck & ATV	1.0 x/acre	0.00	189.49	0.00	189.49
Housing facilities	1.0 x/acre	0.00	0.00	45.43	45.43
Miscellaneous and overhead	1.0 x/acre	0.00	0.00	75.00	75.00
Interest: operating capital	6.0 months	<u>0.00</u>	<u>0.00</u>	<u>15.60</u>	<u>15.60</u>
Total variable costs		367.97	308.68	587.03	1,263.68
FIXED CASH COSTS					Unit Total
Pickup, truck & ATV insurance				acre	34.19
Water assessment				acre	60.00
Property insurance				acre	25.00
Property taxes				acre	<u>60.00</u>
Total fixed cash costs					179.19
FIXED NON-CASH COSTS					Unit Total
Machinery and equipment insurance, depreciation & interest				acre	424.62
Pickup, truck & ATV - depreciation & interest				acre	89.14
Foreman housing				acre	102.86
Housing facilities				acre	91.43
Land interest charge				acre	320.00
Prior year's establishment costs - Interest				acre	<u>1,335.92</u>
Total fixed non-cash costs					2,363.97
Total fixed costs					2,543.16
Total of all costs per acre					\$3,806.83

Table 10. Year 3, medium-density apple establishment, \$/acre economic costs and returns.

GROSS INCOME						
	Quantity	Unit	\$/Unit	Total	Price/bin	
Apples	15.00	bins	250.00	<u>3,750.00</u>	<u>250.00</u>	
Total gross income				3,750.00	250.00	
VARIABLE CASH COSTS						
	Description	Labor	Machinery	Materials	Total	Cost/bin
Pruning and training	60.0 hours	\$690.00	\$0.00	\$0.00	\$690.00	\$46.00
Thinning	20.0 hours	230.00	0.00	0.00	230.00	15.33
Tree removal & tree replacement	2.5 hours	61.25	26.65	16.00	103.90	6.93
Raking and shredding brush	1.0 x/acre	9.70	9.74	0.00	19.45	1.30
Fertilizer and lime - custom applied	2.0 applications	1.96	3.49	165.00	170.46	11.36
Herbicide strip maintenance (.30x)	2.0 applications	16.00	9.68	60.00	85.68	5.71
Insecticides and fungicides	10.0 applications	54.99	92.82	570.00	717.81	47.85
Pheromone disruption (1/2 rate)	2.5 hours	28.75	0.00	200.00	228.75	15.25
Production mgmt consultant fees	1.0 x/acre	0.00	0.00	30.00	30.00	2.00
Bee rental	2.0 hives	0.00	0.00	100.00	100.00	6.67
Flailing/mowing orchard floor	5.0 times	16.17	21.42	0.00	37.60	2.51
Rodent control	1.0 hours	4.12	3.51	20.00	27.63	1.84
Frost protection	2.0 hour	23.00	98.33	0.00	121.33	8.09
Irrigation	5.0 hours	57.50	0.00	12.00	69.50	4.63
Trellis System	1.0 x/acre	0.00	0.00	18.00	18.00	1.20
Ladders, pruning, & picking equip.	1.0 x/acre	0.00	16.01	0.00	16.01	1.07
Harvesting costs	15.0 bins	363.43	95.41	133.33	592.18	39.48
Supervisory labor	3.8 hours					
Tractor drivers	1.6 hours					
Pickup, truck & ATV	1.0 x/acre	0.00	189.49	0.00	189.49	12.63
Housing facilities	1.0 x/acre	0.00	0.00	45.43	45.43	3.03
Miscellaneous and overhead	1.0 x/acre	0.00	0.00	75.00	75.00	5.00
Interest: operating capital	6.0 months	<u>0.00</u>	<u>0.00</u>	<u>44.60</u>	<u>44.60</u>	<u>2.97</u>
Total variable costs		1,556.89	566.56	1,489.36	3,612.82	240.85
FIXED CASH COSTS						
				Unit	Total	Cost/bin
Pickup, truck & ATV insurance				acre	34.19	2.28
Water assessment				acre	60.00	4.00
Property insurance				acre	25.00	1.67
Property taxes				acre	<u>60.00</u>	<u>4.00</u>
Total fixed cash costs					179.19	11.95
FIXED NON-CASH COSTS						
				Unit	Total	Cost/bin
Machinery and equipment insurance, depreciation & interest				acre	481.83	32.12
Pickup, truck & ATV - depreciation & interest				acre	89.14	5.94
Foreman housing				acre	102.86	6.86
Housing facilities				acre	91.43	6.10
Land interest charge				acre	320.00	21.33
Prior year's establishment costs - Interest				acre	<u>1,640.47</u>	<u>109.36</u>
Total fixed non-cash costs					2,725.72	181.71
Total fixed costs					2,904.91	193.66
Total of all costs per acre					\$6,517.73	\$434.52
Net projected returns					-\$2,767.73	-\$184.52

Table 11. Year 4, medium-density apple establishment, \$/acre economic costs and returns.

Table 11. Year 4, medium-density apple establishment, \$/acre economic costs and returns.							
GROSS INCOME		Quantity	Unit	\$/Unit	Total	Price/bin	
Apples		25.00	bins	250.00	6,250.00	250.00	
Total gross income					6,250.00	250.00	
VARIABLE CASH COSTS		Description	Labor	Machinery	Materials	Total	Cost/bin
Pruning and training	60.0 hours		\$690.00	\$0.00	\$0.00	\$690.00	\$27.60
Thinning	30.0 hours		345.00	0.00	0.00	345.00	13.80
Tree removal & tree replacement	2.5 hours		61.25	26.65	16.00	103.90	4.16
Raking and shredding brush	1.0 x/acre		9.70	9.74	0.00	19.45	0.78
Fertilizer & lime application	2.0 applications		1.96	3.49	165.00	170.46	6.82
Herbicide strip maintenance (.30x)	2.0 applications		16.00	9.68	60.00	85.68	3.43
Insecticides and fungicides	10.0 applications		54.99	92.82	570.00	717.81	28.71
Pheromone disruption (1/2 rate)	2.5 hours		28.75	0.00	200.00	228.75	9.15
Production mgmt consultant fees	1.0 x/acre		0.00	0.00	30.00	30.00	1.20
Bee rental	2.0 hives		0.00	0.00	100.00	100.00	4.00
Flailing/mowing orchard floor	5.0 times		16.17	21.42	0.00	37.60	1.50
Rodent control	1.0 hours		4.12	3.51	20.00	27.63	1.11
Frost protection	2.0 hour		23.00	98.33	0.00	121.33	4.85
Irrigation	5.0 hours		57.50	0.00	12.00	69.50	2.78
Trellis System	1.0 x/acre		0.00	0.00	18.00	18.00	0.72
Ladders, pruning, & picking equip	1.0 x/acre		0.00	16.01	0.00	16.01	0.64
Harvesting costs	25.0 bins		605.72	95.41	133.33	834.46	33.38
Supervisory labor	6.3 hours						
Tractor drivers	2.6 hours						
Pickup, truck & ATV	1.0 x/acre		0.00	189.49	0.00	189.49	7.58
Housing facilities	1.0 x/acre		0.00	0.00	45.43	45.43	1.82
Miscellaneous and overhead	1.0 x/acre		0.00	0.00	75.00	75.00	3.00
Interest: operating capital	6.0 months		<u>0.00</u>	<u>0.00</u>	<u>49.07</u>	<u>49.07</u>	<u>1.96</u>
Total variable costs			1,914.18	566.56	1,493.83	3,974.57	158.98
FIXED CASH COSTS				Unit	Total	Cost/bin	
Pickup, truck & ATV insurance				acre	34.19	1.37	
Water assessment				acre	60.00	2.40	
Property insurance				acre	25.00	1.00	
Property taxes				acre	<u>60.00</u>	<u>2.40</u>	
Total fixed cash costs					179.19	7.17	
FIXED NON-CASH COSTS				Unit	Total	Cost/bin	
Machinery and equipment insurance, depreciation & interest				acre	481.83	19.27	
Pickup, truck & ATV - depreciation & interest				acre	89.14	3.57	
Foreman housing				acre	102.86	4.11	
Housing facilities				acre	91.43	3.66	
Land interest charge				acre	320.00	12.80	
Prior year's establishment costs - Interest				acre	<u>1,861.89</u>	<u>74.48</u>	
Total fixed non-cash costs					2,947.14	117.89	
Total fixed costs					3,126.33	125.05	
Total of all costs per acre					\$7,100.90	\$284.04	
Net projected returns					-\$850.90	-\$34.04	

Table 12. Year 5, medium-density apple establishment, \$/acre economic costs and returns.

GROSS INCOME						
	Quantity	Unit	\$/Unit	Total	Price/bin	
Apples	40.00	bins	250.00	10,000.00	250.00	
Total gross income				10,000.00	250.00	
VARIABLE CASH COSTS						
	Description	Labor	Machinery	Materials	Total	Cost/bin
Pruning and training	60.0 hours	\$690.00	\$0.00	\$0.00	\$690.00	\$17.25
Thinning	40.0 hours	460.00	0.00	0.00	460.00	11.50
Tree removal & tree replacement	2.5 hours	61.25	26.65	16.00	103.90	2.60
Raking and shredding brush	1.0 x/acre	9.70	9.74	0.00	19.45	0.49
Fertilizer & lime application	2.0 applications	1.96	3.49	165.00	170.46	4.26
Herbicide strip maintenance (.30x)	2.0 applications	16.00	9.68	60.00	85.68	2.14
Insecticides and fungicides	10.0 applications	54.99	92.82	570.00	717.81	17.95
Pheromone disruption (1/2 rate)	2.5 hours	28.75	0.00	200.00	228.75	5.72
Production mgmt consultant fees	1.0 x/acre	0.00	0.00	30.00	30.00	0.75
Bee rental	2.0 hives	0.00	0.00	100.00	100.00	2.50
Flailing/mowing orchard floor	5.0 times	16.17	21.42	0.00	37.60	0.94
Rodent control	1.0 hours	4.12	3.51	20.00	27.63	0.69
Frost protection	2.0 hour	23.00	98.33	0.00	121.33	3.03
Irrigation	5.0 hours	57.50	0.00	12.00	69.50	1.74
Trellis System	1.0 x/acre	0.00	0.00	18.00	18.00	0.45
Ladders, pruning, & picking equip.	1.0 x/acre	0.00	16.01	0.00	16.01	0.40
Harvesting costs	40.0 bins	926.60	95.41	133.33	1,155.34	28.88
Supervisory labor	6.3 hours					
Tractor drivers	4.2 hours					
Pickup, truck & ATV	1.0 x/acre	0.00	189.49	0.00	189.49	4.74
Housing facilities	1.0 x/acre	0.00	0.00	45.43	45.43	1.14
Miscellaneous and overhead	1.0 x/acre	0.00	0.00	75.00	75.00	1.88
Interest: operating capital	6.0 months	<u>0.00</u>	<u>0.00</u>	<u>54.52</u>	<u>54.52</u>	<u>1.36</u>
Total variable costs		2,350.06	566.56	1,499.28	4,415.90	110.40
FIXED CASH COSTS						
				Unit	Total	Cost/bin
Pickup, truck & ATV insurance				acre	34.19	0.85
Water assessment				acre	60.00	1.50
Property insurance				acre	25.00	0.63
Property taxes				acre	<u>60.00</u>	<u>1.50</u>
Total fixed cash costs					179.19	4.48
FIXED NON-CASH COSTS						
				Unit	Total	Cost/bin
Machinery and equipment insurance, depreciation & interest				acre	481.83	12.05
Pickup, truck & ATV - depreciation & interest				acre	89.14	2.23
Foreman housing				acre	102.86	2.57
Housing facilities				acre	91.43	2.29
Land interest charge				acre	320.00	8.00
Prior year's establishment costs - Interest				acre	<u>1,929.96</u>	<u>48.25</u>
Total fixed non-cash costs					3,015.21	75.38
Total fixed costs					3,194.40	79.86
Total of all costs per acre					\$7,610.30	\$190.26
Net projected returns					\$2,389.70	\$59.74

Table 13. Full production, medium-density apple establishment, \$/acre economic costs and returns.

Table 13. Full production, medium-density apple establishment, \$/acre economic costs and returns.							
GROSS INCOME		Quantity	Unit	\$/Unit	Total	Price/bin	
Apples		50.00	bins	250.00	<u>12,500.00</u>	<u>250.00</u>	
Total gross income					12,500.00	250.00	
VARIABLE CASH COSTS		Description	Labor	Machinery	Materials	Total	Cost/bin
Pruning and training	60.0 hours		\$690.00	\$0.00	\$0.00	\$690.00	\$13.80
Thinning	50.0 hours		575.00	0.00	0.00	575.00	11.50
Tree removal & tree replacement	2.5 hours		61.25	26.65	16.00	103.90	2.08
Raking and shredding brush	1.0 x/acre		9.70	9.74	0.00	19.45	0.39
Fertilizer and lime - custom applied	2.0 applications		1.96	3.49	165.00	170.46	3.41
Herbicide strip maintenance (.30x)	2.0 applications		16.00	9.68	60.00	85.68	1.71
Insecticides and fungicides	10.0 applications		54.99	92.82	570.00	717.81	14.36
Pheromone disruption (1/2 rate)	2.5 hours		28.75	0.00	200.00	228.75	4.58
Production mgmt consultant fees	1.0 x/acre		0.00	0.00	30.00	30.00	0.60
Bee rental	2.0 hives		0.00	0.00	100.00	100.00	2.00
Flailing/mowing orchard floor	5.0 times		16.17	21.42	0.00	37.60	0.75
Rodent control	1.0 hours		4.12	3.51	20.00	27.63	0.55
Frost protection	2.0 hour		23.00	98.33	0.00	121.33	2.43
Irrigation	5.0 hours		57.50	0.00	12.00	69.50	1.39
Trellis System	1.0 x/acre		0.00	0.00	18.00	18.00	0.36
Ladders, pruning, & picking equip.	1.0 x/acre		0.00	16.01	0.00	16.01	0.32
Harvesting costs	50.0 bins		1,498.93	95.41	133.33	1,727.68	34.55
Supervisory labor	37.5 hours						
Tractor drivers	5.2 hours						
Pickup, truck & ATV	1.0 x/acre		0.00	189.49	0.00	189.49	3.79
Housing facilities	1.0 x/acre		0.00	0.00	45.43	45.43	0.91
Miscellaneous and overhead	1.0 x/acre		0.00	0.00	75.00	75.00	1.50
Interest: operating capital	6.0 months		<u>0.00</u>	<u>0.00</u>	<u>63.11</u>	<u>63.11</u>	<u>1.26</u>
Total variable costs			3,037.39	566.56	1,507.87	5,111.83	102.24
FIXED CASH COSTS				Unit	Total	Cost/bin	
Pickup, truck & ATV insurance				acre	34.19	0.68	
Water assessment				acre	60.00	1.20	
Property insurance				acre	25.00	0.50	
Property taxes				acre	<u>60.00</u>	<u>1.20</u>	
Total fixed cash costs					179.19	3.58	
FIXED NON-CASH COSTS				Unit	Total	Cost/bin	
Machinery and equipment insurance, depreciation & interest				acre	481.83	9.64	
Pickup, truck & ATV - depreciation & interest				acre	89.14	1.78	
Foreman housing				acre	102.86	2.06	
Housing facilities				acre	91.43	1.83	
Land interest charge				acre	320.00	6.40	
Amortized establishment costs				acre	<u>2,036.09</u>	<u>40.72</u>	
Total fixed non-cash costs					3,121.34	62.43	
Total fixed costs					3,300.53	66.01	
Total of all costs per acre					\$8,412.36	\$168.25	
Net projected returns					\$4,087.64	\$81.75	