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

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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 those of 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 pear orchard. It is impossible to cover all pear 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 pear 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 pear 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 orchard under establishment.
2. Remove 8 acres of existing orchard and plant 242 pear trees per acre (10' x 18') 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 system.
4. Pear prices are \$200 per 1,050 pound bin return to grower after packing costs have been subtracted.
5. Commercial yields begin in year 4 and full production is reached 10 years after planting with 3, 5, 10, 20, 30, 40, and 50 bins per acre in years 4 through 10, respectively.
6. General labor is hired at a rate of \$11.50 per hour, machine labor at \$13.00 per hour, and \$21.50 per bin to harvest pears, 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 costs allocated equally over 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 a fixed non-cash opportunity cost to the operator. This is the estimated market rental rate for a three bedroom, two-bathroom house in the area.

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9. 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 18' tree row spacing. Gasoline and diesel costs per gallon are \$4.00. 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. 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.
15. Additional assumptions for variable, cash fixed, and non-cash fixed cost are listed in Table 4.
16. Price inflation for the duration of this study is ignored.
17. Income tax consequences are also ignored for this study.

**Table 1. Machinery Cost Assumptions.**

<b>Machine</b>	<b>Size or description</b>	<b>Market value</b>	<b>Hours or miles of annual use</b>	<b>Expected life (years)</b>	<b>Salvage Value</b>
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 <sup>1</sup>	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
Housing facilities	1 unit, per 70 acres	120,000	N/A	30	0

<sup>1</sup>Included 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	
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 18' Between-Row Spacing.**

Operation	Tractor	-- Machine costs --					Total cost per acre
		Miles per hour	Acres per hour	Labor cost per acre	Variable cost per acre	Fixed cost per acre	
Air-blast sprayer	4 wheel dr 70hp	2.00	3.27	\$3.97	\$6.70	\$7.64	\$18.32
Flail chopper	4 wheel dr 70hp	3.00	2.78	4.67	6.19	4.91	15.77
Weed sprayer	2 wheel dr 35hp	2.75	2.25	5.78	3.50	3.10	12.37
Fertilizer spreader	2 wheel dr 50hp	3.00	9.16	1.42	1.26	2.27	4.95
Brush windrow	2 wheel dr 50hp	3.00	2.78	4.67	3.94	7.56	16.17
Gopher machine	2 wheel dr 50hp	2.50	4.36	2.98	2.53	3.59	9.10

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

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Full Prod
Prices per bin	\$200.00	\$200.00	\$200.00	\$200.00	\$200.00	\$200.00	\$200.00	\$200.00	\$200.00	\$200.00	\$200.00
Bins per acre	0.00	0.00	0.00	0.00	3	5	10	20	30	40	50
Cost of general orchard labor, per hour	\$11.50	\$11.50	\$11.50	\$11.50	\$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	\$13.00	\$13.00	\$13.00	\$13.00
Cost of harvest labor, per bin	\$0.00	\$0.00	\$0.00	\$0.00	\$21.50	\$21.50	\$21.50	\$21.50	\$21.50	\$21.50	\$21.50
Leased Forklift during Harvest <sup>2</sup>	\$0.00	\$0.00	\$0.00	\$0.00	\$60.00	\$60.00	\$60.00	\$60.00	\$60.00	\$60.00	\$60.00
Production mgmt consultant fees	\$0.00	\$0.00	\$0.00	\$0.00	\$30.00	\$30.00	\$30.00	\$30.00	\$30.00	\$30.00	\$30.00
Hours of pruning and training labor	0.00	5.00	10.00	15.00	25.00	35.00	40.00	45.00	50.00	50.00	50.00
Hours of thinning labor	0.00	0.00	0.00	0.00	0.00	0.00	15.00	15.00	18.00	18.00	18.00
Hours of irrigating labor	0.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Hours to Install Phermone Disruption	0.00	0.00	0.00	0.00	2.25	2.25	2.25	2.25	2.25	2.25	2.25
Hours to remove & replace tree labor	0.00	0.50	1.00	1.00	1.50	1.50	2.50	2.50	2.50	2.50	2.50
Hours for frost protection labor	0.00	0.00	0.00	0.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Hours of Supervisory Labor during Harvest	0.00	0.00	0.00	0.00	0.75	1.25	2.50	5.00	7.50	10.00	12.50
Cost of fertilizer - broadcast applied	\$600.00	\$0.00	\$40.00	\$40.00	\$40.00	\$40.00	\$75.00	\$75.00	\$130.00	\$130.00	\$130.00
Cost of fertilizer - lime	\$140.00	\$0.00	\$35.00	\$35.00	\$35.00	\$35.00	\$35.00	\$35.00	\$35.00	\$35.00	\$35.00
Cost of herbicide strip maintenance	\$0.00	\$60.00	\$60.00	\$60.00	\$60.00	\$60.00	\$60.00	\$60.00	\$60.00	\$60.00	\$60.00
Cost of insecticides & fungicides	\$0.00	\$0.00	\$50.00	\$100.00	\$400.00	\$550.00	\$550.00	\$550.00	\$550.00	\$550.00	\$550.00
Cost of Pheromone Disruption	\$0.00	\$0.00	\$0.00	\$0.00	\$200.00	\$200.00	\$200.00	\$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	\$20.00	\$20.00	\$20.00	\$20.00
Cost per bee hive	\$0.00	\$0.00	\$0.00	\$0.00	\$50.00	\$50.00	\$50.00	\$50.00	\$50.00	\$50.00	\$50.00
Times for fertilizer - broadcast applied	1.00	1.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Times for herbicide strip spray	1.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Times for insecticides & fungicides	0.00	0.00	2.00	4.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Number of bee hives per acre	0.00	0.00	0.00	0.00	1.00	1.00	1.50	2.00	2.00	2.00	2.00
Times for rodent control	0.00	1.00	1.00	1.00	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	5.00	5.00	5.00	5.00

<sup>2</sup>Forklift 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.

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

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Full Prod
Property taxes	\$60.00	\$60.00	\$60.00	\$60.00	\$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	\$25.00	\$25.00	\$25.00	\$25.00
Land values	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000
Foreman housing (per month)	\$600	\$600	\$600	\$600	\$600	\$600	\$600	\$600	\$600	\$600	\$600
Irrigation assessment	\$60.00	\$60.00	\$60.00	\$60.00	\$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	\$75.00	\$75.00	\$75.00	\$75.00
Tree cost	\$8.00	\$8.00	\$8.00	\$8.00	\$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	\$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	\$4.00	\$4.00	\$4.00	\$4.00
Propane Price	\$2.25	\$2.25	\$2.25	\$2.25	\$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%	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%	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%	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%	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%	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	6.0	6.0	6.0	6.0
Planted trees	0.00	242	2	2	2	2	2	2	2	2	2

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

### Cash flow analysis

A cash flow analysis for establishing a medium-density pear planting is presented in Table 5. It shows the cash costs required to establish an orchard. Cash costs include labor, trees, irrigation system, 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 nine establishment years plus first full production year. Production begins in year 4 with 3 bins of pears per acre and increases to 50 bins at full production. Total variable costs are \$3,025 in the first year with an additional \$179 of cash fixed costs for a total cash cost of \$3,205 per acre.

A positive cash flow begins in year 7 with gross income exceeding total cash costs by \$494 per acre. At full production, or in ten years after planting, the orchard does not return a sufficient amount of gross income to pay all previous years' cash costs. There is \$7,388 per acre remaining over and above prior costs and it is not until year 12 that all previous years' cash production costs are paid, Figure 3, page 11.

The major cost components in relation to total cash costs are shown in Figure 1 on page 11. Hired labor represents 46 percent of the total cash costs to establish this orchard. Together, fertilizer and chemicals is the second largest cost item, making up 13 percent of the total cash costs. Machine costs, which include fuel, oil, and repairs, are 11 percent of the cash costs. Tree and irrigation costs are only 4 and 2 percent of the total cash costs, respectively. The

remaining 24 percent of the total cash costs are operating interest (1 percent), insurance and taxes (2 percent), field preparations (2 percent), and other cost items (19 percent).

### Economic costs and returns

The economic costs and returns for the establishment of a medium-density pear orchard are shown in Table 6. 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 except that the irrigation system is amortized over its productive life in this analysis and included in fixed machine costs.

Gross income exceeds variable costs beginning in Year 7 with \$673 per acre return to the grower. Additionally, at the end of the establishment period, \$28,712 per acre remains to repay all previous establishment costs. This cost is amortized over a 25-year period as an annual payment of \$2,818 per acre, which includes principal and interest to recover the capital investment of establishing the orchard, as shown in Table 17, Full Production Years, page 24.

The relative contribution of each cost component to the total economic cost is shown in Figure 2 on page 11. When all economic costs are included, interest is the largest item equaling 28 percent of the total costs for the first 10 years of establishment. Machine costs (fuel, oil, repairs, depreciation, and interest charges) and hired labor are the next largest cost at 17 and 20 percent of the total economic costs, respectively. Excluding the "other" cost



category (15 percent), fertilizer and chemicals, and land charges are the third and fourth largest cost items totaling 12 percent of the total economic costs when considered together. Trees are 4 percent of the total economic costs.

The net projected returns for establishing a medium-density pear orchard are shown in

Figure 3. 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 12 years. With the assumptions in this study, this orchard will generate sufficient gross incomes to cover all economic costs in year 22.

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

<b>Income:</b>	<b>Year 0</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Year 4</b>	<b>Year 5</b>	<b>Year 6</b>	<b>Year 7</b>	<b>Year 8</b>	<b>Year 9</b>	<b>Full Prod</b>
Yield (bins/acre)	0.00	0.00	0.00	0.00	3.00	5.00	10.00	20.00	30.00	40.00	50.00
Price (dollars/bin)	<u>200.00</u>	<u>200.00</u>	<u>200.00</u>	<u>200.00</u>	<u>200.00</u>	<u>200.00</u>	<u>200.00</u>	<u>200.00</u>	<u>200.00</u>	<u>200.00</u>	<u>200.00</u>
<b>Gross income</b> (dollars/acre)	0.00	0.00	0.00	0.00	600.00	1,000.00	2,000.00	4,000.00	6,000.00	8,000.00	10,000.00
<b>Variable costs (per acre):</b>											
Field preparation	1,002.00	30.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trees	0.00	1,936.00	16.00	16.00	16.00	16.00	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	12.00	12.00	12.00	12.00
Paint trees	0.00	30.00	0.00	30.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fertilizer	1,623.73	0.00	75.00	75.00	75.00	75.00	110.00	110.00	165.00	165.00	165.00
Chemicals	0.00	60.00	110.00	160.00	460.00	610.00	610.00	610.00	610.00	610.00	610.00
Pheromone Disruption	0.00	0.00	0.00	0.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00
Prod. mgmt consultant fees	0.00	0.00	0.00	0.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
Bee rental	0.00	0.00	0.00	0.00	50.00	50.00	75.00	100.00	100.00	100.00	100.00
Rodent materials	0.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
Harvest labor	0.00	0.00	0.00	0.00	77.19	128.64	257.29	514.57	771.86	1,029.15	1,286.43
General labor	36.42	882.15	257.18	423.97	520.42	635.42	717.42	947.42	1,039.42	1,039.42	1,039.42
Machine costs	205.52	745.66	354.89	378.42	595.32	595.32	605.84	605.84	605.84	605.84	605.84
Seasonal housing facilities	45.43	45.43	45.43	45.43	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	75.00	75.00	75.00	75.00
Interest: operating capital	<u>37.35</u>	<u>47.95</u>	<u>12.07</u>	<u>15.45</u>	<u>27.20</u>	<u>31.16</u>	<u>34.67</u>	<u>41.08</u>	<u>46.13</u>	<u>49.35</u>	<u>52.56</u>
<b>Total variable costs</b>	3,025.44	5,084.18	977.56	1,251.27	2,203.56	2,523.98	2,808.65	3,327.34	3,736.68	3,997.18	4,257.69
<b>Gross income - variable cost</b>	-3,025.44	-5,084.18	-977.56	-1,251.27	-1,603.56	-1,523.98	-808.65	672.66	2,263.32	4,002.82	5,742.31
<b>Cash fixed costs (per acre):</b>											
Insurance	59.19	59.19	59.19	59.19	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	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>	<u>60.00</u>	<u>60.00</u>	<u>60.00</u>	<u>60.00</u>
<b>Total fixed cost</b>	179.19	179.19	179.19	179.19	179.19	179.19	179.19	179.19	179.19	179.19	179.19
<b>Total cost</b>	3,204.63	5,263.37	1,156.75	1,430.45	2,382.75	2,703.16	2,987.84	3,506.53	3,915.87	4,176.37	4,436.88
<b>Net projected returns</b>	-3,204.63	-5,263.37	-1,156.75	-1,430.45	-1,782.75	-1,703.16	-987.84	493.47	2,084.13	3,823.63	5,563.12
<b>Cumulative returns</b>	-3,204.63	-8,468.01	-9,624.76	-11,055.21	-12,837.96	-14,541.13	-15,528.96	-15,035.49	-12,951.36	-9,127.74	-7,388.24

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

<b>Income:</b>	<b>Year 0</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Year 4</b>	<b>Year 5</b>	<b>Year 6</b>	<b>Year 7</b>	<b>Year 8</b>	<b>Year 9</b>	<b>Full Prod</b>
Yield (bins/acre)	0.00	0.00	0.00	0.00	3.00	5.00	10.00	20.00	30.00	40.00	50.00
Price (dollars/bin)	<u>200.00</u>	<u>200.00</u>	<u>200.00</u>	<u>200.00</u>	<u>200.00</u>	<u>200.00</u>	<u>200.00</u>	<u>200.00</u>	<u>200.00</u>	<u>200.00</u>	<u>200.00</u>
<b>Gross income</b> (dollars/acre)	0.00	0.00	0.00	0.00	600.00	1,000.00	2,000.00	4,000.00	6,000.00	8,000.00	10,000.00
<b>Variable costs (per acre):</b>											
Field preparation	1,002.00	30.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trees	0.00	1,936.00	16.00	16.00	16.00	16.00	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	12.00	12.00	12.00	12.00
Paint trees	0.00	30.00	0.00	30.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fertilizer	1,623.73	0.00	75.00	75.00	75.00	75.00	110.00	110.00	165.00	165.00	165.00
Chemicals	0.00	60.00	110.00	160.00	460.00	610.00	610.00	610.00	610.00	610.00	610.00
Pheromone Disruption	0.00	0.00	0.00	0.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00
Prod. mgmt consultant fees	0.00	0.00	0.00	0.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
Bee rental	0.00	0.00	0.00	0.00	50.00	50.00	75.00	100.00	100.00	100.00	100.00
Rodent materials	0.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
Harvest labor	0.00	0.00	0.00	0.00	77.19	128.64	257.29	514.57	771.86	1,029.15	1,286.43
General labor	36.42	882.15	257.18	423.97	520.42	635.42	717.42	947.42	1,039.42	1,039.42	1,039.42
Machine costs	205.52	745.66	354.89	378.42	595.32	595.32	605.84	605.84	605.84	605.84	605.84
Housing facilities	45.43	45.43	45.43	45.43	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	75.00	75.00	75.00	75.00
Interest: operating capital	<u>37.35</u>	<u>47.95</u>	<u>12.07</u>	<u>15.45</u>	<u>27.20</u>	<u>31.16</u>	<u>34.67</u>	<u>41.08</u>	<u>46.13</u>	<u>49.35</u>	<u>52.56</u>
Total <b>variable</b> costs	3,025.44	3,884.18	977.56	1,251.27	2,203.56	2,523.98	2,808.65	3,327.34	3,736.68	3,997.18	4,257.69
<b>Gross income - variable cost</b>	-3,025.44	-3,884.18	-977.56	-1,251.27	-1,603.56	-1,523.98	-808.65	672.66	2,263.32	4,002.82	5,742.31
<b>Fixed costs (per acre):</b>											
Insurance	59.19	59.19	59.19	59.19	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	60.00	60.00	60.00	60.00
Property taxes	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00
Machine costs	91.41	775.35	357.18	384.93	435.52	435.52	444.97	444.97	444.97	444.97	444.97
Foreman housing	102.86	102.86	102.86	102.86	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	91.43	91.43	91.43	91.43
Land interest costs	240.00	240.00	240.00	240.00	240.00	240.00	240.00	240.00	240.00	240.00	240.00
Interest on establishment costs	<u>0.00</u>	<u>298.43</u>	<u>744.14</u>	<u>959.53</u>	<u>1,216.27</u>	<u>1,525.77</u>	<u>1,853.67</u>	<u>2,151.33</u>	<u>2,354.30</u>	<u>2,446.26</u>	<sup>1</sup> <u>2,817.87</u>
Total <b>fixed</b> cost	704.89	1,687.25	1,714.80	1,957.94	2,265.26	2,574.77	2,912.11	3,209.78	3,412.74	3,504.70	3,876.31
<b>Total cost</b>	3,730.33	5,571.44	2,692.36	3,209.20	4,468.83	5,098.75	5,720.76	6,537.12	7,149.42	7,501.88	8,133.99
<b>Net projected returns</b>	-3,730.33	-5,571.44	-2,692.36	-3,209.20	-3,868.83	-4,098.75	-3,720.76	-2,537.12	-1,149.42	498.12	1,866.01
<b>Cumulative returns</b>	-3,730.33	-9,301.77	-11,994.12	-15,203.33	-19,072.15	-23,170.90	-26,891.66	-29,428.78	-30,578.20	-30,080.08	-28,712.20

<sup>1</sup>This cost is an annual payment, amortized over a 25-year period, which includes principal and interest to recover the capital investment of establishing this orchard in years 0 through 9.

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

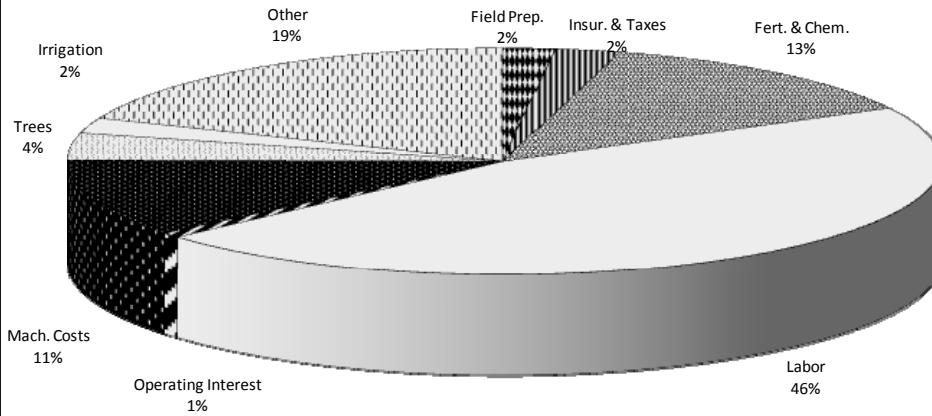


Figure 2. Economic Costs to Establish a Medium-Density Pear Orchard the First Ten Years of Establishment

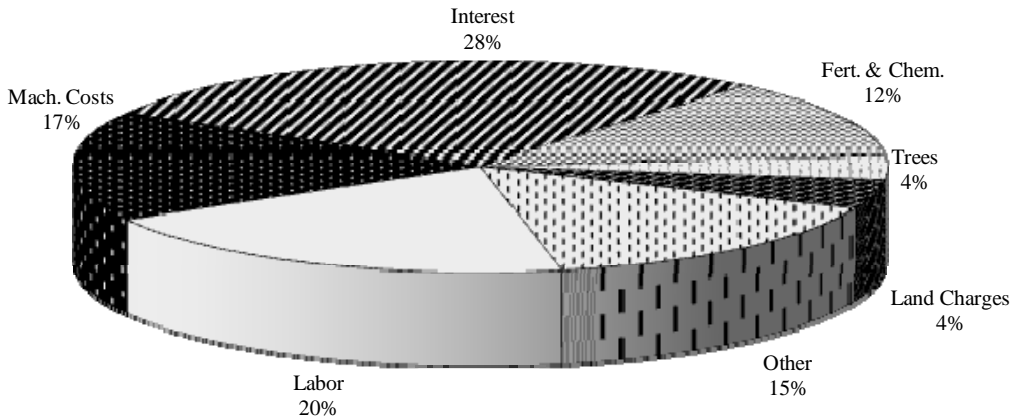
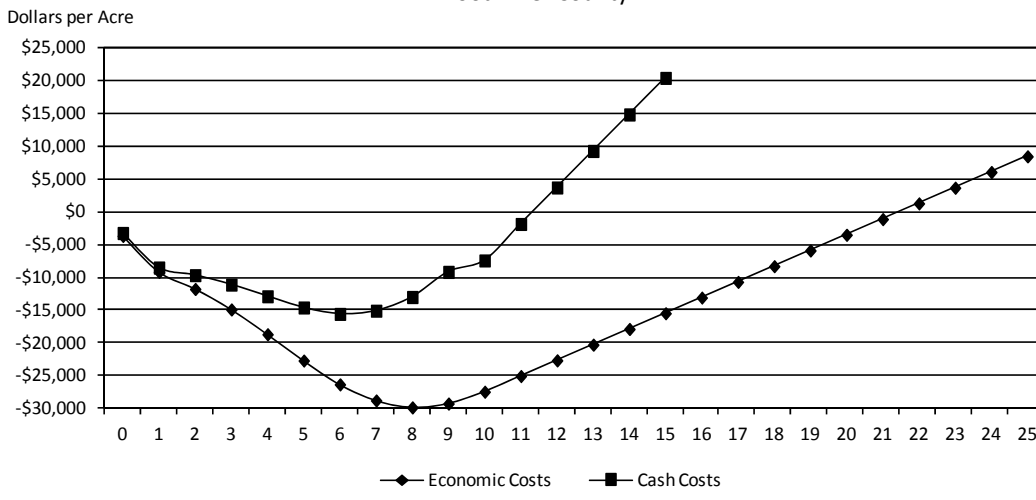


Figure 3. Economic and Cash Costs to Establish a Medium-Density Pear Orchard in Hood River County



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## 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 of apples in the Hood River Valley have increased interest in replacing old orchards with modern medium-density pear orchards.

Medium-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 trade off, 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 pear 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 software 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 to 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 “Pears”, “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 Pear Orchard in Hood River County

<b>Table 7. Year 0, medium-density pear establishment, \$/acre economic costs and returns.</b>						
<b>VARIABLE CASH COSTS</b>	<b>Description</b>	<b>Labor</b>	<b>Machinery</b>	<b>Materials</b>	<b>Total</b>	
Remove trees, roots, and rip (2x)	2.0 custom	\$0.00	\$0.00	\$1,000.00	\$1,000.00	
Disc	2.0 x/acre	26.00	14.76	0.00	40.76	
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	1.42	1.26	600.00	602.68	
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>37.35</u>	<u>37.35</u>	
<b>Total variable costs</b>		36.42	205.52	2,783.51	3,025.44	
<b>FIXED CASH COSTS</b>					<b>Unit</b>	<b>Total</b>
Pickup, truck & ATV insurance				acre	34.19	
Water assessment				acre	60.00	
Property insurance				acre	25.00	
Property taxes				acre	<u>60.00</u>	
<b>Total fixed cash costs</b>					179.19	
<b>FIXED NON-CASH COSTS</b>					<b>Unit</b>	<b>Total</b>
Machinery and equipment insurance, depreciation & interest				acre	2.27	
Pickup, truck & ATV - depreciation & interest				acre	89.14	
Foreman housing				acre	102.86	
Housing facilities				acre	91.43	
Land interest charge				acre	<u>240.00</u>	
<b>Total fixed non-cash costs</b>					525.70	
<b>Total fixed costs</b>					704.89	
<b>Total of all costs per acre</b>					<b>\$3,730.33</b>	

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

VARIABLE CASH COSTS	Description	Labor	Machinery	Materials	Total	
Dig holes	14.0 hours	\$161.00	\$129.63	\$0.00	\$290.63	
Planting trees	40.0 hours	460.00	\$370.38	1,936.00	2,766.38	
Painting trees	8.0 hours	92.00	0.00	30.00	122.00	
Training trees	5.0 hours	57.50	0.00	0.00	57.50	
Herbicide strip maintenance (.30x)	2.0 applications	11.55	6.99	60.00	78.55	
Seed cover crop	20.0 lbs	16.25	15.68	30.00	61.93	
Flailing/mowing orchard floor	5.0 times	23.36	30.94	0.00	54.31	
Rodent control	1.0 applications	2.98	2.53	20.00	25.51	
Irrigation	5.0 hours	57.50	12.00	0.00	69.50	
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>47.95</u>	<u>47.95</u>	
<b>Total variable costs</b>		882.15	757.66	2,244.38	3,884.18	
<b>FIXED CASH COSTS</b>					<b>Unit</b>	<b>Total</b>
Pickup, truck & ATV insurance				acre	34.19	
Water assessment				acre	60.00	
Property insurance				acre	25.00	
Property taxes				acre	<u>60.00</u>	
<b>Total fixed cash costs</b>					179.19	
<b>FIXED NON-CASH COSTS</b>					<b>Unit</b>	<b>Total</b>
Machinery and equipment insurance, depreciation & interest				acre	686.21	
Pickup, truck & ATV - depreciation & interest				acre	89.14	
Foreman housing				acre	102.86	
Housing facilities				acre	91.43	
Land interest charge				acre	240.00	
Prior year's establishment costs - Interest				acre	<u>298.43</u>	
<b>Total fixed non-cash costs</b>					1,508.06	
<b>Total fixed costs</b>					1,687.25	
<b>Total of all costs per acre</b>					<b>\$5,571.44</b>	

<b>Table 9. Year 2, medium-density pear establishment, \$/acre economic costs and returns.</b>						
<b>VARIABLE CASH COSTS</b>	<b>Description</b>	<b>Labor</b>	<b>Machinery</b>	<b>Materials</b>	<b>Total</b>	
Pruning and training	10.0 hours	\$115.00	\$0.00	\$0.00	\$115.00	
Tree removal & tree replacement	1.0 hours	24.50	10.66	16.00	51.16	
Fertilizer & custom lime	2.0 applications	2.84	2.52	75.00	80.36	
Herbicide strip maintenance (.30x)	2.0 applications	11.55	6.99	60.00	78.55	
Insecticides & fungicides	2.0 applications	7.94	13.41	50.00	71.35	
Flailing/mowing orchard floor	5.0 times	23.36	30.94	0.00	54.31	
Rodent control	1.0 applications	2.98	2.53	20.00	25.51	
Frost protection	1.0 hour	11.50	98.33	0.00	109.83	
Irrigation	5.0 hours	57.50	12.00	0.00	69.50	
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>12.07</u>	<u>12.07</u>	
<b>Total variable costs</b>		257.18	366.89	353.50	977.56	
<b>FIXED CASH COSTS</b>					<b>Unit</b>	<b>Total</b>
Pickup, truck & ATV insurance				acre	34.19	
Water assessment				acre	60.00	
Property insurance				acre	25.00	
Property taxes				acre	<u>60.00</u>	
<b>Total fixed cash costs</b>					179.19	
<b>FIXED NON-CASH COSTS</b>					<b>Unit</b>	<b>Total</b>
Machinery and equipment insurance, depreciation & interest				acre	268.04	
Pickup, truck & ATV - depreciation & interest				acre	89.14	
Foreman housing				acre	102.86	
Housing facilities				acre	91.43	
Land interest charge				acre	240.00	
Prior year's establishment costs - Interest				acre	<u>744.14</u>	
<b>Total fixed non-cash costs</b>					1,535.61	
<b>Total fixed costs</b>					1,714.80	
<b>Total of all costs per acre</b>					<b>\$2,692.36</b>	



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

VARIABLE CASH COSTS	Description	Labor	Machinery	Materials	Total	
Pruning and training	15.0 hours	\$172.50	\$0.00	\$0.00	\$172.50	
Painting trees	8.0 hours	92.00	0.00	30.00	122.00	
Tree removal & tree replacement	1.0 hours	24.50	10.66	16.00	51.16	
Raking and shredding brush	1.0 x/acre	9.35	10.13	0.00	19.48	
Fertilizer & custom lime	2.0 applications	2.84	2.52	75.00	80.36	
Herbicide strip maintenance (.30x)	2.0 applications	11.55	6.99	60.00	78.55	
Insecticides & fungicides	4.0 applications	15.89	26.81	100.00	142.70	
Flailing/mowing orchard floor	5.0 times	23.36	30.94	0.00	54.31	
Rodent control	1.0 applications	2.98	2.53	20.00	25.51	
Frost protection	1.0 hour	11.50	98.33	0.00	109.83	
Irrigation	5.0 hours	57.50	12.00	0.00	69.50	
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>15.45</u>	<u>15.45</u>	
<b>Total variable costs</b>		423.97	390.42	436.88	1,251.27	
<b>FIXED CASH COSTS</b>					<b>Unit</b>	<b>Total</b>
Pickup, truck & ATV insurance				acre	34.19	
Water assessment				acre	60.00	
Property insurance				acre	25.00	
Property taxes				acre	<u>60.00</u>	
<b>Total fixed cash costs</b>					179.19	
<b>FIXED NON-CASH COSTS</b>					<b>Unit</b>	<b>Total</b>
Machinery and equipment insurance, depreciation & interest				acre	295.79	
Pickup, truck & ATV - depreciation & interest				acre	89.14	
Foreman housing				acre	102.86	
Housing facilities				acre	91.43	
Land interest charge				acre	240.00	
Prior year's establishment costs - Interest				acre	<u>959.53</u>	
<b>Total fixed non-cash costs</b>					1,778.75	
<b>Total fixed costs</b>					1,957.94	
<b>Total of all costs per acre</b>					<b>\$3,209.20</b>	

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

<b>GROSS INCOME</b>						
	<b>Quantity</b>	<b>Unit</b>	<b>\$/Unit</b>	<b>Total</b>	<b>Price/bin</b>	
Pears	3.00	bins	200.00	<u>600.00</u>	<u>200.00</u>	
<b>Total gross income</b>				600.00	200.00	
<b>VARIABLE CASH COSTS</b>						
	<b>Description</b>	<b>Labor</b>	<b>Machinery</b>	<b>Materials</b>	<b>Total</b>	<b>Cost/bin</b>
Pruning and training	25.0 hours	\$287.50	\$0.00	\$0.00	\$287.50	\$95.83
Tree removal & tree replacement	1.5 hours	36.75	15.92	16.00	68.67	22.89
Raking and shredding brush	1.0 x/acre	9.35	10.13	0.00	19.48	6.49
Fertilizer & custom lime	2.0 applications	2.84	2.52	75.00	80.36	26.79
Herbicide strip maintenance (.30x)	2.0 applications	11.55	6.99	60.00	78.55	26.18
Insecticides & fungicides	10.0 applications	39.72	67.04	400.00	506.75	168.92
Pheromone disruption (1/2 rate)	2.3 hours	25.88	0.00	200.00	225.88	75.29
Production mgmt consultant fees	1.0 x/acre	0.00	0.00	30.00	30.00	10.00
Bee rental	1.0 hives	0.00	0.00	50.00	50.00	16.67
Flailing/mowing orchard floor	5.0 times	23.36	30.94	0.00	54.31	18.10
Rodent control	1.0 applications	2.98	2.53	20.00	25.51	8.50
Frost protection	2.0 hour	23.00	98.33	0.00	121.33	40.44
Irrigation	5.0 hours	57.50	12.00	0.00	69.50	23.17
Ladders, pruning, & picking equip	1.0 x/acre	0.00	16.01	0.00	16.01	5.34
Harvesting costs	3.0 bins	77.19	95.41	60.00	232.60	77.53
Supervisory labor	0.8 hours					
Tractor drivers	0.3 hours					
Pickup, truck & ATV	1.0 x/acre	0.00	189.49	0.00	189.49	63.16
Housing facilities	1.0 x/acre	0.00	0.00	45.43	45.43	15.14
Miscellaneous and overhead	1.0 x/acre	0.00	0.00	75.00	75.00	25.00
Interest: operating capital	6.0 months	<u>0.00</u>	<u>0.00</u>	<u>27.20</u>	<u>27.20</u>	<u>9.07</u>
<b>Total variable costs</b>		597.61	547.32	1,058.63	2,203.56	734.52
<b>FIXED CASH COSTS</b>						
				<b>Unit</b>	<b>Total</b>	<b>Cost/bin</b>
Pickup, truck & ATV insurance				acre	34.19	11.40
Water assessment				acre	60.00	20.00
Property insurance				acre	25.00	8.33
Property taxes				acre	<u>60.00</u>	<u>20.00</u>
<b>Total fixed cash costs</b>					179.19	59.73
<b>FIXED NON-CASH COSTS</b>						
				<b>Unit</b>	<b>Total</b>	<b>Cost/bin</b>
Machinery and equipment insurance, depreciation & interest				acre	346.38	115.46
Pickup, truck & ATV - depreciation & interest				acre	89.14	29.71
Foreman housing				acre	102.86	34.29
Housing facilities				acre	91.43	30.48
Land interest charge				acre	240.00	80.00
Prior year's establishment costs - Interest				acre	<u>1,216.27</u>	<u>405.42</u>
<b>Total fixed non-cash costs</b>					2,086.07	695.36
<b>Total fixed costs</b>					2,265.26	755.09
<b>Total of all costs per acre</b>					<b>\$4,468.83</b>	<b>\$1,489.61</b>
<b>Net projected returns</b>					<b>-\$3,868.83</b>	<b>-\$1,289.61</b>

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

<b>GROSS INCOME</b>						
	<b>Quantity</b>	<b>Unit</b>	<b>\$/Unit</b>	<b>Total</b>	<b>Price/bin</b>	
Pears	5.00	bins	200.00	<u>1,000.00</u>	<u>200.00</u>	
<b>Total gross income</b>				1,000.00	200.00	
<b>VARIABLE CASH COSTS</b>						
	<b>Description</b>	<b>Labor</b>	<b>Machinery</b>	<b>Materials</b>	<b>Total</b>	<b>Cost/bin</b>
Pruning and training	35.0 hours	\$402.50	\$0.00	\$0.00	\$402.50	\$80.50
Tree removal & tree replacement	1.5 hours	36.75	15.92	16.00	68.67	13.73
Raking and shredding brush	1.0 x/acre	9.35	10.13	0.00	19.48	3.90
Fertilizer & custom lime	2.0 applications	2.84	2.52	75.00	80.36	16.07
Herbicide strip maintenance (.30x)	2.0 applications	11.55	6.99	60.00	78.55	15.71
Insecticides & fungicides	10.0 applications	39.72	67.04	550.00	656.75	131.35
Pheromone disruption (1/2 rate)	2.3 hours	25.88	0.00	200.00	225.88	45.18
Production mgmt consultant fees	1.0 x/acre	0.00	0.00	30.00	30.00	6.00
Bee rental	1.0 hives	0.00	0.00	50.00	50.00	10.00
Flailing/mowing orchard floor	5.0 times	23.36	30.94	0.00	54.31	10.86
Rodent control	1.0 applications	2.98	2.53	20.00	25.51	5.10
Frost protection	2.0 hour	23.00	98.33	0.00	121.33	24.27
Irrigation	5.0 hours	57.50	12.00	0.00	69.50	13.90
Ladders, pruning, & picking equip.	1.0 x/acre	0.00	16.01	0.00	16.01	3.20
Harvesting costs	5.0 bins	128.64	95.41	60.00	284.05	56.81
Supervisory labor	1.3 hours					
Tractor drivers	0.5 hours					
Pickup, truck & ATV	1.0 x/acre	0.00	189.49	0.00	189.49	37.90
Housing facilities	1.0 x/acre	0.00	0.00	45.43	45.43	9.09
Miscellaneous and overhead	1.0 x/acre	0.00	0.00	75.00	75.00	15.00
Interest: operating capital	6.0 months	<u>0.00</u>	<u>0.00</u>	<u>31.16</u>	<u>31.16</u>	<u>6.23</u>
<b>Total variable costs</b>		764.06	547.32	1,212.59	2,523.98	504.80
<b>FIXED CASH COSTS</b>						
			<b>Unit</b>	<b>Total</b>	<b>Cost/bin</b>	
Pickup, truck & ATV insurance			acre	34.19	6.84	
Water assessment			acre	60.00	12.00	
Property insurance			acre	25.00	5.00	
Property taxes			acre	<u>60.00</u>	<u>12.00</u>	
<b>Total fixed cash costs</b>				179.19	35.84	
<b>FIXED NON-CASH COSTS</b>						
			<b>Unit</b>	<b>Total</b>	<b>Cost/bin</b>	
Machinery and equipment insurance, depreciation & interest			acre	346.38	69.28	
Pickup, truck & ATV - depreciation & interest			acre	89.14	17.83	
Foreman housing			acre	102.86	20.57	
Housing facilities			acre	91.43	18.29	
Land interest charge			acre	240.00	48.00	
Prior year's establishment costs - Interest			acre	<u>1,525.77</u>	<u>305.15</u>	
<b>Total fixed non-cash costs</b>				2,395.58	479.12	
<b>Total fixed costs</b>				2,574.77	514.95	
<b>Total of all costs per acre</b>				<b>\$5,098.75</b>	<b>\$1,019.75</b>	
<b>Net projected returns</b>				<b>-\$4,098.75</b>	<b>-\$819.75</b>	

**Table 13. Year 6, medium-density pear establishment, \$/acre economic costs and returns.**

<b>GROSS INCOME</b>							
	<b>Quantity</b>	<b>Unit</b>	<b>\$/Unit</b>	<b>Total</b>	<b>Price/bin</b>		
Pears	10.00	bins	200.00	<u>2,000.00</u>	<u>200.00</u>		
<b>Total gross income</b>				2,000.00	200.00		
<b>VARIABLE CASH COSTS</b>							
	<b>Description</b>	<b>Labor</b>	<b>Machinery</b>	<b>Materials</b>	<b>Total</b>	<b>Cost/bin</b>	
	Pruning and training	40.0 hours	\$460.00	\$0.00	\$0.00	\$460.00	\$46.00
	Tree removal & tree replacement	2.5 hours	61.25	26.44	16.00	103.69	10.37
	Raking and shredding brush	1.0 x/acre	9.35	10.13	0.00	19.48	1.95
	Fertilizer & Custom Lime	2.0 applications	2.84	2.52	110.00	115.36	11.54
	Herbicide strip maintenance (.30x)	2.0 applications	11.55	6.99	60.00	78.55	7.85
	Insecticides & fungicides	10.0 applications	39.72	67.04	550.00	656.75	65.68
	Pheromone disruption (1/2 rate)	2.3 hours	25.88	0.00	200.00	225.88	22.59
	Production mgmt consultant fees	1.0 x/acre	0.00	0.00	30.00	30.00	3.00
	Bee rental	1.5 hives	0.00	0.00	75.00	75.00	7.50
	Flailing/mowing orchard floor	5.0 times	23.36	30.94	0.00	54.31	5.43
	Rodent control	1.0 applications	2.98	2.53	20.00	25.51	2.55
	Frost protection	2.0 hour	23.00	98.33	0.00	121.33	12.13
	Irrigation	5.0 hours	57.50	12.00	0.00	69.50	6.95
	Ladders, pruning, & picking equip	1.0 x/acre	0.00	16.01	0.00	16.01	1.60
	Harvesting costs	10.0 bins	257.29	95.41	60.00	412.70	41.27
	Supervisory labor	2.5 hours					
	Tractor drivers	1.0 hours					
	Pickup, truck & ATV	1.0 x/acre	0.00	189.49	0.00	189.49	18.95
	Housing facilities	1.0 x/acre	0.00	0.00	45.43	45.43	4.54
	Miscellaneous and overhead	1.0 x/acre	0.00	0.00	75.00	75.00	7.50
	Interest: operating capital	6.0 months	<u>0.00</u>	<u>0.00</u>	<u>34.67</u>	<u>34.67</u>	<u>3.47</u>
<b>Total variable costs</b>		974.71	557.84	1,276.10	2,808.65	280.86	
<b>FIXED CASH COSTS</b>							
				<b>Unit</b>	<b>Total</b>	<b>Cost/bin</b>	
	Pickup, truck & ATV insurance			acre	34.19	3.42	
	Water assessment			acre	60.00	6.00	
	Property insurance			acre	25.00	2.50	
	Property taxes			acre	<u>60.00</u>	<u>6.00</u>	
<b>Total fixed cash costs</b>					179.19	17.92	
<b>FIXED NON-CASH COSTS</b>							
				<b>Unit</b>	<b>Total</b>	<b>Cost/bin</b>	
	Machinery and equipment insurance, depreciation & interest			acre	355.83	35.58	
	Pickup, truck & ATV - depreciation & interest			acre	89.14	8.91	
	Foreman housing			acre	102.86	10.29	
	Housing facilities			acre	91.43	9.14	
	Land interest charge			acre	240.00	24.00	
	Prior year's establishment costs - Interest			acre	<u>1,853.67</u>	<u>185.37</u>	
<b>Total fixed non-cash costs</b>					2,732.92	273.29	
<b>Total fixed costs</b>					2,912.11	291.21	
<b>Total of all costs per acre</b>					<b>\$5,720.76</b>	<b>\$572.08</b>	
<b>Net projected returns</b>					<b>-\$3,720.76</b>	<b>-\$372.08</b>	

**Table 14. Year 7, medium-density pear establishment, \$/acre economic costs and returns.**

<b>GROSS INCOME</b>						
	<b>Quantity</b>	<b>Unit</b>	<b>\$/Unit</b>	<b>Total</b>	<b>Price/bin</b>	
Pears	20.00	bins	200.00	<u>4,000.00</u>	<u>200.00</u>	
<b>Total gross income</b>				4,000.00	200.00	
<b>VARIABLE CASH COSTS</b>						
	<b>Description</b>	<b>Labor</b>	<b>Machinery</b>	<b>Materials</b>	<b>Total</b>	<b>Cost/bin</b>
Pruning and training	45.0 hours	\$517.50	\$0.00	\$0.00	\$517.50	\$25.88
Thinning	15.0 hours	172.50	0.00	0.00	172.50	8.63
Tree removal & tree replacement	2.5 hours	61.25	26.44	16.00	103.69	5.18
Raking and shredding brush	1.0 x/acre	9.35	10.13	0.00	19.48	0.97
Fertilizer	2.0 applications	2.84	2.52	110.00	115.36	5.77
Herbicide strip maintenance (.30x)	2.0 applications	11.55	6.99	60.00	78.55	3.93
Insecticides & fungicides	10.0 applications	39.72	67.04	550.00	656.75	32.84
Pheromone disruption (1/2 rate)	2.3 hours	25.88	0.00	200.00	225.88	11.29
Production mgmt consultant fees	1.0 x/acre	0.00	0.00	30.00	30.00	1.50
Bee rental	2.0 hives	0.00	0.00	100.00	100.00	5.00
Flailing/mowing orchard floor	5.0 times	23.36	30.94	0.00	54.31	2.72
Rodent control	1.0 applications	2.98	2.53	20.00	25.51	1.28
Frost protection	2.0 hour	23.00	98.33	0.00	121.33	6.07
Irrigation	5.0 hours	57.50	12.00	0.00	69.50	3.48
Ladders, pruning, & picking equip.	1.0 x/acre	0.00	16.01	0.00	16.01	0.80
Harvesting costs	20.0 bins	514.57	95.41	60.00	669.99	33.50
Supervisory labor	5.0 hours					
Tractor drivers	2.1 hours					
Pickup, truck & ATV	1.0 x/acre	0.00	189.49	0.00	189.49	9.47
Housing facilities	1.0 x/acre	0.00	0.00	45.43	45.43	2.27
Miscellaneous and overhead	1.0 x/acre	0.00	0.00	75.00	75.00	3.75
Interest: operating capital	6.0 months	<u>0.00</u>	<u>0.00</u>	<u>41.08</u>	<u>41.08</u>	<u>2.05</u>
<b>Total variable costs</b>		1,461.99	557.84	1,307.51	3,327.34	166.37
<b>FIXED CASH COSTS</b>						
				<b>Unit</b>	<b>Total</b>	<b>Cost/bin</b>
Pickup, truck & ATV insurance				acre	34.19	1.71
Water assessment				acre	60.00	3.00
Property insurance				acre	25.00	1.25
Property taxes				acre	<u>60.00</u>	<u>3.00</u>
<b>Total fixed cash costs</b>					179.19	8.96
<b>FIXED NON-CASH COSTS</b>						
				<b>Unit</b>	<b>Total</b>	<b>Cost/bin</b>
Machinery and equipment insurance, depreciation & interest				acre	355.83	17.79
Pickup, truck & ATV - depreciation & interest				acre	89.14	4.46
Foreman housing				acre	102.86	5.14
Housing facilities				acre	91.43	4.57
Land interest charge				acre	240.00	12.00
Prior year's establishment costs - Interest				acre	<u>2,151.33</u>	<u>107.57</u>
<b>Total fixed non-cash costs</b>					3,030.59	151.53
<b>Total fixed costs</b>					3,209.78	160.49
<b>Total of all costs per acre</b>					<b>\$6,537.12</b>	<b>\$326.86</b>
<b>Net projected returns</b>					<b>-\$2,537.12</b>	<b>-\$126.86</b>

**Table 15. Year 8, medium-density pear establishment, \$/acre economic costs and returns.**

<b>GROSS INCOME</b>						
	<b>Quantity</b>	<b>Unit</b>	<b>\$/Unit</b>	<b>Total</b>	<b>Price/bin</b>	
Pears	30.00	bins	200.00	<u>6,000.00</u>	<u>200.00</u>	
<b>Total gross income</b>				6,000.00	200.00	
<b>VARIABLE CASH COSTS</b>						
	<b>Description</b>	<b>Labor</b>	<b>Machinery</b>	<b>Materials</b>	<b>Total</b>	<b>Cost/bin</b>
Pruning and training	50.0 hours	\$575.00	\$0.00	\$0.00	\$575.00	\$19.17
Thinning	18.0 hours	207.00	0.00	0.00	207.00	6.90
Tree removal & tree replacement	2.5 hours	61.25	26.44	16.00	103.69	3.46
Raking and shredding brush	1.0 x/acre	9.35	10.13	0.00	19.48	0.65
Fertilizer	2.0 applications	2.84	2.52	165.00	170.36	5.68
Herbicide strip maintenance (.30x)	2.0 applications	11.55	6.99	60.00	78.55	2.62
Insecticides & fungicides	10.0 applications	39.72	67.04	550.00	656.75	21.89
Pheromone disruption (1/2 rate)	2.3 hours	25.88	0.00	200.00	225.88	7.53
Production mgmt consultant fees	1.0 x/acre	0.00	0.00	30.00	30.00	1.00
Bee rental	2.0 hives	0.00	0.00	100.00	100.00	3.33
Flailing/mowing orchard floor	5.0 times	23.36	30.94	0.00	54.31	1.81
Rodent control	1.0 applications	2.98	2.53	20.00	25.51	0.85
Frost protection	2.0 hour	23.00	98.33	0.00	121.33	4.04
Irrigation	5.0 hours	57.50	12.00	0.00	69.50	2.32
Ladders, pruning, & picking equip.	1.0 x/acre	0.00	16.01	0.00	16.01	0.53
Harvesting costs	30.0 bins	771.86	95.41	60.00	927.27	30.91
Supervisory labor	7.5 hours					
Tractor drivers	3.1 hours					
Pickup, truck & ATV	1.0 x/acre	0.00	189.49	0.00	189.49	6.32
Housing facilities	1.0 x/acre	0.00	0.00	45.43	45.43	1.51
Miscellaneous and overhead	1.0 x/acre	0.00	0.00	75.00	75.00	2.50
Interest: operating capital	6.0 months	<u>0.00</u>	<u>0.00</u>	<u>46.13</u>	<u>46.13</u>	<u>1.54</u>
<b>Total variable costs</b>		1,811.28	557.84	1,367.56	3,736.68	124.56
<b>FIXED CASH COSTS</b>						
				<b>Unit</b>	<b>Total</b>	<b>Cost/bin</b>
Pickup, truck & ATV insurance				acre	34.19	1.14
Water assessment				acre	60.00	2.00
Property insurance				acre	25.00	0.83
Property taxes				acre	<u>60.00</u>	<u>2.00</u>
<b>Total fixed cash costs</b>					179.19	5.97
<b>FIXED NON-CASH COSTS</b>						
				<b>Unit</b>	<b>Total</b>	<b>Cost/bin</b>
Machinery and equipment insurance, depreciation & interest				acre	355.83	11.86
Pickup, truck & ATV - depreciation & interest				acre	89.14	2.97
Foreman housing				acre	102.86	3.43
Housing facilities				acre	91.43	3.05
Land interest charge				acre	240.00	8.00
Prior year's establishment costs - Interest				acre	<u>2,354.30</u>	<u>78.48</u>
<b>Total fixed non-cash costs</b>					3,233.56	107.79
<b>Total fixed costs</b>					3,412.74	113.76
<b>Total of all costs per acre</b>					<b>\$7,149.42</b>	<b>\$238.31</b>
<b>Net projected returns</b>					<b>-\$1,149.42</b>	<b>-\$38.31</b>

**Table 16. Year 9, medium-density pear establishment, \$/acre economic costs and returns.**

<b>Table 16. Year 9, medium-density pear establishment, \$/acre economic costs and returns.</b>						
<b>GROSS INCOME</b>		<b>Quantity</b>	<b>Unit</b>	<b>\$/Unit</b>	<b>Total</b>	<b>Price/bin</b>
Pears		40.00	bins	200.00	<u>8,000.00</u>	<u>200.00</u>
Total <b>gross</b> income					8,000.00	200.00
<b>VARIABLE CASH COSTS</b>						
	<b>Description</b>	<b>Labor</b>	<b>Machinery</b>	<b>Materials</b>	<b>Total</b>	<b>Cost/bin</b>
Pruning and training	50.0 hours	\$575.00	\$0.00	\$0.00	\$575.00	\$14.38
Thinning	18.0 hours	207.00	0.00	0.00	207.00	5.18
Tree removal & tree replacement	2.5 hours	61.25	26.44	16.00	103.69	2.59
Raking and shredding brush	1.0 x/acre	9.35	10.13	0.00	19.48	0.49
Fertilizer	2.0 applications	2.84	2.52	165.00	170.36	4.26
Herbicide strip maintenance (.30x)	2.0 applications	11.55	6.99	60.00	78.55	1.96
Insecticides & fungicides	10.0 applications	39.72	67.04	550.00	656.75	16.42
Pheromone disruption (1/2 rate)	2.3 hours	25.88	0.00	200.00	225.88	5.65
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	23.36	30.94	0.00	54.31	1.36
Rodent control	1.0 applications	2.98	2.53	20.00	25.51	0.64
Frost protection	2.0 hour	23.00	98.33	0.00	121.33	3.03
Irrigation	5.0 hours	57.50	12.00	0.00	69.50	1.74
Ladders, pruning, & picking equip.	1.0 x/acre	0.00	16.01	0.00	16.01	0.40
Harvesting costs	40.0 bins	1,029.15	95.41	60.00	1,184.56	29.61
Supervisory labor	10.0 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>49.35</u>	<u>49.35</u>	<u>1.23</u>
Total <b>variable</b> costs		2,068.57	557.84	1,370.78	3,997.18	99.93
<b>FIXED CASH COSTS</b>						
				<b>Unit</b>	<b>Total</b>	<b>Cost/bin</b>
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 <b>fixed cash</b> costs					179.19	4.48
<b>FIXED NON-CASH COSTS</b>						
				<b>Unit</b>	<b>Total</b>	<b>Cost/bin</b>
Machinery and equipment insurance, depreciation & interest				acre	355.83	8.90
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	240.00	6.00
Prior year's establishment costs - Interest				acre	<u>2,446.26</u>	<u>61.16</u>
Total <b>fixed non-cash</b> costs					3,325.51	83.14
Total <b>fixed</b> costs					3,504.70	87.62
<b>Total of all costs per acre</b>					<b>\$7,501.88</b>	<b>\$187.55</b>
<b>Net projected returns</b>					<b>\$498.12</b>	<b>\$12.45</b>

**Table 17. Full production, medium-density pear establishment, \$/acre economic costs and returns.**

<b>Table 17. Full production, medium-density pear establishment, \$/acre economic costs and returns.</b>							
<b>GROSS INCOME</b>		<b>Quantity</b>	<b>Unit</b>	<b>\$/unit</b>	<b>Total</b>	<b>Price/bin</b>	
Pears		50.00	bins	200.00	<u>10,000.00</u>	<u>200.00</u>	
<b>Total gross income</b>					10,000.00	200.00	
<b>VARIABLE CASH COSTS</b>		<b>Description</b>	<b>Labor</b>	<b>Machinery</b>	<b>Materials</b>	<b>Total</b>	<b>Cost/bin</b>
Pruning and training	50.0 hours	\$575.00	\$0.00	\$0.00	\$575.00	\$11.50	
Thinning	18.0 hours	207.00	0.00	0.00	207.00	4.14	
Tree removal & tree replacement	2.5 hours	61.25	26.44	16.00	103.69	2.07	
Raking and shredding brush	1.0 x/acre	9.35	10.13	0.00	19.48	0.39	
Fertilizer & Custom Lime	2.0 applications	2.84	2.52	165.00	170.36	3.41	
Herbicide strip maintenance (.30x)	2.0 applications	11.55	6.99	60.00	78.55	1.57	
Insecticides & fungicides	10.0 applications	39.72	67.04	550.00	656.75	13.14	
Pheromone disruption (1/2 rate)	2.3 hours	25.88	0.00	200.00	225.88	4.52	
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	23.36	30.94	0.00	54.31	1.09	
Rodent control	1.0 applications	2.98	2.53	20.00	25.51	0.51	
Frost protection	2.0 hour	23.00	98.33	0.00	121.33	2.43	
Irrigation	5.0 hours	57.50	12.00	0.00	69.50	1.39	
Ladders, pruning, & picking equip.	1.0 x/acre	0.00	16.01	0.00	16.01	0.32	
Harvesting costs	50.0 bins	1,286.43	95.41	60.00	1,441.85	28.84	
Supervisory labor	12.5 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>52.56</u>	<u>52.56</u>	<u>1.05</u>	
<b>Total variable costs</b>		2,325.86	557.84	1,373.99	4,257.69	85.15	
<b>FIXED CASH COSTS</b>			<b>Unit</b>	<b>Total</b>	<b>Cost/bin</b>		
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>		
<b>Total fixed cash costs</b>				179.19	3.58		
<b>FIXED NON-CASH COSTS</b>			<b>Unit</b>	<b>Total</b>	<b>Cost/bin</b>		
Machinery and equipment insurance, depreciation & interest			acre	355.83	7.12		
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	240.00	4.80		
Amortized establishment costs			acre	<u>2,817.87</u>	<u>56.36</u>		
<b>Total fixed non-cash costs</b>				3,697.12	73.94		
<b>Total fixed costs</b>				3,876.31	77.53		
<b>Total of all costs per acre</b>					<b>\$8,133.99</b>	<b>\$162.68</b>	
<b>Net projected returns</b>					<b>\$1,866.01</b>	<b>\$37.32</b>	