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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 high-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, 8 acres of fresh market Bartlett pears, 4 acres of canning 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 272 pear trees per acre (10' x 16') spacing with a productive life of 25 years, once full production of 40 bins per acre is reached.
3. The medium-density orchard is trained to a central leader system.
4. Pear prices are \$150 per 1,050 pound bin.
5. Commercial yields begin in year 4 and full production is reached 9 years after planting with yields of 3, 6, 12, 24, 32, and 40 bins per acre in years 4 through 9, 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 \$40,000 for a 10-person unit. The life of the facility is 30 years and depreciated using the straight-line method of depreciation with a zero salvage value.
8. Foreman housing with all utilities is provided at no cost to the employee, valued at \$600 per month, or \$103 per

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- 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.
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 16' tree row spacing. Gasoline and diesel costs per gallon are \$3.00 and \$3.30, respectively.
 10. The interest rate on operating funds is 8.5 percent, which is treated as a cash expense. One-half of the cash expenses are borrowed for a six-month period.
 11. Machinery and land are owned by the operator and assessed 8.5 and 8 percent rates of interest, respectively, as opportunity costs. Land is valued at \$6,000 per acre.
 12. Previous years' establishment costs are funded by the operator at a charge of 10 percent interest and are considered an opportunity cost.
 13. Herbicides used for strip maintenance are applied to 30 percent of each acre.
 14. 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 8.5 percent interest rate $((\text{cost} + \text{salvage value}) \div 2 \times .085)$. 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 three smudge pots per acre. The wind machines are valued at \$17,000 each and smudge pots cost \$10 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 was 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	523	10	\$ 9,748
Tractor	2 wheel dr 50hp, old	18,000	179	20	2,310
Tractor	2 wheel dr 35 hp, old	7,500	163	20	962
Air-blast sprayer	400 gallon unit, PTO, new	17,500	156	10	3,095
Air-blast sprayer	400 gallon unit, PTO, older	5,000	104	10	884
Flail chopper	8' unit	6,000	138	7	1,531
Weed sprayer	100 gallon unit	2,000	38	15	192
Fertilizer spreader		2,300	12	20	120
Brush windrow		3,500	29	20	182
Gopher machine		1,200	13	20	63
Pickup	1/2 ton 4x4, new	22,000	12,000	10	8,319
Truck	2 ton, used	18,000	3,500	20	2,710
ATV	4 wheeler, new	5,500	3,000	5	2,465
Auger		1,700	35	20	89
Front-end loader & backforks		5,800	64	10	1,026
Bin trailer		5,000	64	10	884
Ladders	35 units	4,500	N/A	10	N/A
Picking bags	35 units	1,500	N/A	5	N/A
Chain & pruning saws	3 units each, 1-loppers	3,000	N/A	3	N/A
Irrigation system	Micro, per acre	1,200	N/A	25	N/A
Wind machine	2 units, gasoline	34,000	35	25	962
Smudge Pots	3 units, per acre	30	15	10	5
Housing facilities	1 unit	40,000	N/A	30	0.00

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	\$22.77	\$0.52	\$7.92	\$0.37	\$31.58
Tractor	2 wheel dr 50hp, old	18.98	0.45	\$9.22	0.51	29.16
Tractor	2 wheel dr 35 hp, old	18.98	0.17	4.21	0.23	23.59
Air-blast sprayer	400 gallon unit, PTO, new	0.00	8.20	14.84	0.40	23.44
Air-blast sprayer	400 gallon unit, PTO, older	0.00	2.07	6.36	0.17	8.61
Flail chopper	8' unit	0.00	2.55	6.95	0.16	9.66
Weed sprayer	100 gallon unit	0.00	0.69	5.60	0.17	6.47
Fertilizer spreader		0.00	0.94	17.77	0.61	19.32
Brush windrow		0.00	0.48	10.95	0.38	11.80
Gopher machine		0.00	0.50	8.83	0.30	9.63
----- Costs per mile -----						
Pickup	1/2 ton 4x4, new	\$0.29	\$0.05	\$0.22	\$0.07	\$0.63
Truck	2 ton, used	0.58	0.57	0.47	0.27	1.89
ATV	4 wheeler, new	0.83	0.02	0.32	0.01	1.18
----- Costs per acre -----						
Auger		\$0.00	\$0.29	\$4.47	\$0.00	\$4.76
Front-end loader & backforks		0.00	0.88	10.91	0.00	11.79
Bin trailer		0.00	0.76	9.41	0.00	10.16
Ladders	35 units	0.00	3.86	9.16	0.00	13.02
Picking bags	35 units	0.00	1.29	5.20	0.00	6.48
Chain & pruning saws	3 units each, 1-loppers	5.18	2.57	16.11	0.00	23.85
Irrigation system	Micro, per acre	0.00	12.00	99.00	0.00	111.00
Wind machines	2 units, gasoline	25.88	6.28	40.11	0.00	72.26
Smudge Pots	3 units, per acre	3.21	0.00	0.00	0.00	3.22
Housing facilities	1 unit	0.00	43.21	41.90	0.00	85.11

Table 3. Estimated Cost of Each Operation with Power Unit for a 16' Between-Row Spacing.

Operation	Tractor	-- Machine costs --					
		Miles per hour	Acres per hour	Labor cost per acre	Variable cost per acre	Fixed cost per acre	Total cost per acre
Air-blast sprayer	4 wheel dr 70hp	2.00	1.94	\$6.70	\$16.23	\$12.13	\$35.07
Flail chopper	4 wheel dr 70hp	2.00	1.65	7.89	15.67	9.34	32.90
Weed sprayer	2 wheel dr 35hp	3.50	2.55	5.11	7.79	4.02	16.92
Fertilizer spreader	2 wheel dr 50hp	3.00	4.07	3.19	5.00	6.90	15.09
Brush windrow	2 wheel dr 50hp	2.00	1.65	7.89	12.07	12.77	32.73
Gopher machine	2 wheel dr 50hp	2.50	3.88	3.35	5.14	4.86	13.35

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	Full Prod
Prices per bin	\$150.00	\$150.00	\$150.00	\$150.00	\$150.00	\$150.00	\$150.00	\$150.00	\$150.00	\$150.00
Bins per acre	0	0	0	0	3	6	12	24	32	40
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
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
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
Production mgmt consultant fees	\$0.00	\$0.00	\$0.00	\$0.00	\$30.00	\$30.00	\$30.00	\$30.00	\$30.00	\$30.00
Hours of pruning and training labor	0.00	2.00	4.00	6.00	13.00	20.00	24.00	28.00	32.00	32.00
Hours of thinning labor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.00	6.00	8.00
Hours of irrigating labor	0.00	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50
Hours to Install Phermone Disruption	0.00	0.00	0.00	0.00	0.50	0.75	0.75	1.00	1.25	1.50
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
Hours for frost protection labor	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Hours of General Labor during Harvest	0.00	0.00	0.00	0.00	2.25	4.50	9.00	18.00	24.00	30.00
Cost of fertilizer - broadcast applied	\$80.00	\$0.00	\$40.00	\$40.00	\$40.00	\$40.00	\$80.00	\$80.00	\$120.00	\$120.00
Cost of fertilizer - lime	\$25.00	\$0.00	\$25.00	\$25.00	\$25.00	\$25.00	\$25.00	\$25.00	\$25.00	\$25.00
Cost of herbicide strip maintenance	\$0.00	\$50.00	\$50.00	\$50.00	\$50.00	\$50.00	\$50.00	\$50.00	\$50.00	\$50.00
Cost of insecticides & fungicides	\$0.00	\$0.00	\$23.00	\$69.00	\$460.00	\$575.00	\$575.00	\$575.00	\$575.00	\$575.00
Cost of Phermone Disruption	\$0.00	\$0.00	\$0.00	\$0.00	\$100.00	\$100.00	\$100.00	\$100.00	\$100.00	\$100.00
Cost of rodent materials	\$0.00	\$20.00	\$20.00	\$20.00	\$20.00	\$20.00	\$20.00	\$20.00	\$20.00	\$20.00
Cost per bee hive	\$0.00	\$0.00	\$0.00	\$0.00	\$36.00	\$36.00	\$36.00	\$36.00	\$36.00	\$36.00
Times for fertilizer - broadcast applied	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Times for herbicide strip spray	0.00	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
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
Times for rodent control	0.00	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

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	Full Prod
Property taxes	\$30.00	\$30.00	\$30.00	\$30.00	\$30.00	\$30.00	\$30.00	\$30.00	\$30.00	\$30.00
Property insurance	\$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
Foreman housing (per month)	\$600	\$600	\$600	\$600	\$600	\$600	\$600	\$600	\$600	\$600
Irrigation assessment	\$35.00	\$35.00	\$35.00	\$35.00	\$35.00	\$35.00	\$35.00	\$35.00	\$35.00	\$35.00
Miscellaneous & overhead	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00
Tree cost	\$6.50	\$6.50	\$6.50	\$6.50	\$6.50	\$6.50	\$6.50	\$6.50	\$6.50	\$6.50
Gasoline price	\$3.00	\$3.00	\$3.00	\$3.00	\$3.00	\$3.00	\$3.00	\$3.00	\$3.00	\$3.00
Diesel fuel price	\$3.30	\$3.30	\$3.30	\$3.30	\$3.30	\$3.30	\$3.30	\$3.30	\$3.30	\$3.30
Operating interest rate	8.50%	8.50%	8.50%	8.50%	8.50%	8.50%	8.50%	8.50%	8.50%	8.50%
Machinery interest rate	8.50%	8.50%	8.50%	8.50%	8.50%	8.50%	8.50%	8.50%	8.50%	8.50%
Land interest rate	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%
Establishment interest rate	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%
% of operating capital borrowed	50.00%	50.00%	50.00%	50.00%	50.00%	50.00%	50.00%	50.00%	50.00%	50.00%
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
Planted trees	0	272	2	2	2	2	2	2	2	2

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 contained in Table 5. A cash flow analysis 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 9 establishment years plus first full production year. Production begins in year 4 with 3 bins of pears per acre and increases to 40 bins at full production. Total variable costs are \$2,553 in the first year with an additional \$117 of cash fixed costs for a total cash cost of \$2,669 per acre.

A positive cash flow begins in year 7 with gross income exceeding total cash costs by \$654 per acre. At full production, or in nine years after planting, the orchard does not return a sufficient amount of gross income to pay all previous years' cash costs. There is \$10,062 per acre remaining over and above prior costs and it is not until year 14 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 32 percent of the total cash costs to establish this orchard. Together, fertilizer and chemicals is the second largest cost item, making up 20 percent of the total cash costs. Machine costs, which include fuel, oil, and repairs, are 18 percent of the cash costs. Tree and irrigation costs are only 7 and 4 percent, respectively, of the total cash costs. The

remaining 19 percent of the total cash costs consists of operating interest (2 percent), insurance and taxes (3 percent), field preparations (4 percent), and other cost items (10 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 \$654 per acre return to the grower. Additionally, at the end of the establishment period, \$35,410 per acre remains to repay all previous establishment costs. This cost is amortized over a 25-year period as an annual payment of \$3,811 per acre as shown in Table 16, Full Production Years, page 23.

The relative contribution of each cost component to the total economic cost is shown in Figure 2. When all economic costs are included, interest cost is the largest cost item with 33 percent of the total costs for the first 10 years of establishment. Machine costs (fuel, oil, repairs, depreciation, and interest charges) are the next largest cost with 17 percent and hired labor costs are third with 16 percent of the total economic costs, respectively. Excluding the "other" cost category (12 percent), fertilizer and chemicals, and land charges are the fourth

and fifth largest cost items totaling 19 percent of the total economic costs when considered together. Trees are 3 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 13 years. With the assumptions in this study, however, this orchard will not generate sufficient gross income to cover all economic costs for the 25-year period. Determining the necessary levels of change to price or inputs that will make this orchard a prudent business investment requires a sensitivity analysis. Using this approach, we determined that profitability could be achieved by doing any one of the following:

- a) increasing the pear prices by 51.5 percent from \$150 to \$227.50 per bin,
- b) increasing anticipated yield by 51.5 percent (5, 9, 18, 36, 49, and 61 bins per acre for years 4, 5, 6, 7, 8, and 9 respectively), or

- c) decreasing the rate of return for previous years' establishment costs to 0.45 percent for all ownership costs.

The results of these adjustments are shown in Figure 4. It should be noted that by reducing assumed interest rates to .45 percent, the amount of money required to establish this orchard in year 9 is decreased by \$17,446 per acre (from \$36,298 per acre to \$18,852). Increasing pear price or yield reduces the amount of money required in year 9 by \$10,521 per acre. While growers often focus on reducing the cost of trees, fertilizers, and chemicals, it is apparent that interest costs are the largest cost component in orchard renewal (Figure 2). Therefore, more emphasis should be placed on obtaining higher fruit prices or a combination of earlier and higher yields to reduce those interest costs. In order to make this strategy work, the additional revenues must be greater than the additional costs of inputs to achieve these increased prices or yields.

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

Income:	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Full Prod
Yield (bins/acre)	0.00	0.00	0.00	0.00	3.00	6.00	12.00	24.00	32.00	40.00
Price (dollars/bin)	<u>150.00</u>	<u>150.00</u>	<u>150.00</u>	<u>150.00</u>	<u>150.00</u>	<u>150.00</u>	<u>150.00</u>	<u>150.00</u>	<u>150.00</u>	<u>150.00</u>
Gross income (dollars/acre)	0.00	0.00	0.00	0.00	450.00	900.00	1,800.00	3,600.00	4,800.00	6,000.00
Variable Costs (per acre):										
Field preparation	1,208.08	30.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trees	0.00	1,768.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00
Irrigation System	0.00	1,200.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paint trees	0.00	30.00	0.00	30.00	0.00	0.00	0.00	0.00	0.00	0.00
Fertilizer	926.65	0.00	65.00	65.00	65.00	65.00	105.00	105.00	145.00	145.00
Chemicals	0.00	50.00	73.00	119.00	510.00	625.00	625.00	625.00	625.00	625.00
Phermone Disruption	0.00	0.00	0.00	0.00	100.00	100.00	100.00	100.00	100.00	100.00
Prod. mgmt consultant fees	0.00	0.00	0.00	0.00	30.00	30.00	30.00	30.00	30.00	30.00
Bee rental	0.00	0.00	0.00	0.00	36.00	36.00	54.00	72.00	72.00	72.00
Rodent materials	0.00	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	90.38	180.75	361.50	723.00	964.00	1,205.00
General labor	75.19	845.49	191.84	336.01	382.72	466.10	536.60	631.47	703.35	729.22
Machine costs	171.41	540.76	363.28	423.49	584.00	584.00	603.42	603.42	603.42	603.42
Housing facilities	43.21	43.21	43.21	43.21	43.21	43.21	43.21	43.21	43.21	43.21
Miscellaneous & overhead	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00
Interest: operating capital	<u>53.12</u>	<u>72.30</u>	<u>17.94</u>	<u>23.90</u>	<u>41.42</u>	<u>47.56</u>	<u>54.54</u>	<u>64.62</u>	<u>72.12</u>	<u>77.79</u>
Total variable costs	2,552.66	4,674.76	862.27	1,148.61	1,990.73	2,285.62	2,621.27	3,105.73	3,466.10	3,738.65
Gross income - variable cost	-2,552.66	-4,674.76	-862.27	-1,148.61	-1,540.73	-1,385.62	-821.27	494.27	1,333.90	2,261.35
Fixed costs (per acre):										
Insurance	51.53	51.53	51.53	51.53	51.53	51.53	51.53	51.53	51.53	51.53
Water assessment	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00
Property taxes	<u>30.00</u>	<u>30.00</u>	<u>30.00</u>	<u>30.00</u>	<u>30.00</u>	<u>30.00</u>	<u>30.00</u>	<u>30.00</u>	<u>30.00</u>	<u>30.00</u>
Total fixed cost	116.53	116.53	116.53	116.53	116.53	116.53	116.53	116.53	116.53	116.53
Total cost	2,669.20	4,791.30	978.80	1,265.15	2,107.26	2,402.15	2,737.81	3,222.26	3,582.64	3,855.18
Net projected returns	-2,669.20	-4,791.30	-978.80	-1,265.15	-1,657.26	-1,502.15	-937.81	377.74	1,217.36	2,144.82
Cumulative returns	-2,669.20	-7,460.49	-8,439.30	-9,704.45	-11,361.71	-12,863.86	-13,801.67	-13,423.93	-12,206.57	-10,061.75

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

Income:	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Full Prod
Yield (bins/acre)	0.00	0.00	0.00	0.00	3.00	6.00	12.00	24.00	32.00	40.00
Price (dollars/bin)	<u>150.00</u>	<u>150.00</u>	<u>150.00</u>	<u>150.00</u>	<u>150.00</u>	<u>150.00</u>	<u>150.00</u>	<u>150.00</u>	<u>150.00</u>	<u>150.00</u>
Gross income(dollars/acre)	0.00	0.00	0.00	0.00	450.00	900.00	1,800.00	3,600.00	4,800.00	6,000.00
Variable Costs (per acre):										
Field preparation	1,208.08	30.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trees	0.00	1,768.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00
Paint trees	0.00	30.00	0.00	30.00	0.00	0.00	0.00	0.00	0.00	0.00
Fertilizer	926.65	0.00	65.00	65.00	65.00	65.00	105.00	105.00	145.00	145.00
Chemicals	0.00	50.00	73.00	119.00	510.00	625.00	625.00	625.00	625.00	625.00
Phermone Disruption	0.00	0.00	0.00	0.00	100.00	100.00	100.00	100.00	100.00	100.00
Prod. mgmt consultant fees	0.00	0.00	0.00	0.00	30.00	30.00	30.00	30.00	30.00	30.00
Bee rental	0.00	0.00	0.00	0.00	36.00	36.00	54.00	72.00	72.00	72.00
Rodent materials	0.00	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	90.38	180.75	361.50	723.00	964.00	1,205.00
General labor	75.19	845.49	191.84	336.01	382.72	466.10	536.60	631.47	703.35	729.22
Machine costs	171.41	540.76	363.28	423.49	584.00	584.00	603.42	603.42	603.42	603.42
Housing facilities	43.21	43.21	43.21	43.21	43.21	43.21	43.21	43.21	43.21	43.21
Miscellaneous & overhead	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00
Interest: operating capital	<u>53.12</u>	<u>72.30</u>	<u>17.94</u>	<u>23.90</u>	<u>41.42</u>	<u>47.56</u>	<u>54.54</u>	<u>64.62</u>	<u>72.12</u>	<u>77.79</u>
Total variable costs	2,552.66	3,474.76	862.27	1,148.61	1,990.73	2,285.62	2,621.27	3,105.73	3,466.10	3,738.65
Gross income - variable cost	-2,552.66	-3,474.76	-862.27	-1,148.61	-1,540.73	-1,385.62	-821.27	494.27	1,333.90	2,261.35
Fixed costs (per acre):										
Insurance	51.53	51.53	51.53	51.53	51.53	51.53	51.53	51.53	51.53	51.53
Water assessment	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00
Property taxes	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
Machine costs	6.90	224.62	310.10	356.49	501.35	501.35	511.08	511.08	511.08	511.08
Foreman housing	102.86	102.86	102.86	102.86	102.86	102.86	102.86	102.86	102.86	102.86
Housing Facilities	41.90	41.90	41.90	41.90	41.90	41.90	41.90	41.90	41.90	41.90
Land interest costs	480.00	480.00	480.00	480.00	480.00	480.00	480.00	480.00	480.00	480.00
Interest on establishment costs	<u>0.00</u>	<u>337.58</u>	<u>822.90</u>	<u>1,104.06</u>	<u>1,446.60</u>	<u>1,877.09</u>	<u>2,335.12</u>	<u>2,783.49</u>	<u>3,145.15</u>	<u>3,391.55</u>
Total fixed cost	748.20	1,303.50	1,874.30	2,201.84	2,689.24	3,119.73	3,587.50	4,035.87	4,397.52	4,643.92
Total cost	3,300.86	4,778.26	2,736.57	3,350.45	4,679.97	5,405.35	6,208.77	7,141.60	7,863.63	8,382.57
Net projected returns	-3,300.86	-4,778.26	-2,736.57	-3,350.45	-4,229.97	-4,505.35	-4,408.77	-3,541.60	-3,063.63	-2,382.57
Cumulative returns	-3,300.86	-8,079.12	-10,815.69	-14,166.15	-18,396.12	-22,901.46	-27,310.23	-0,851.83	-33,915.46	-36,298.03

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

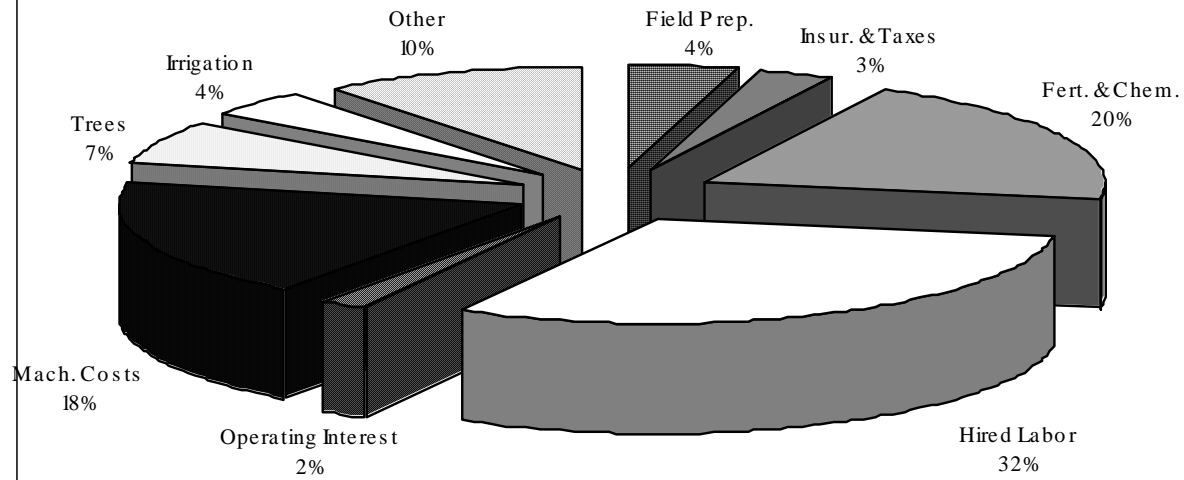
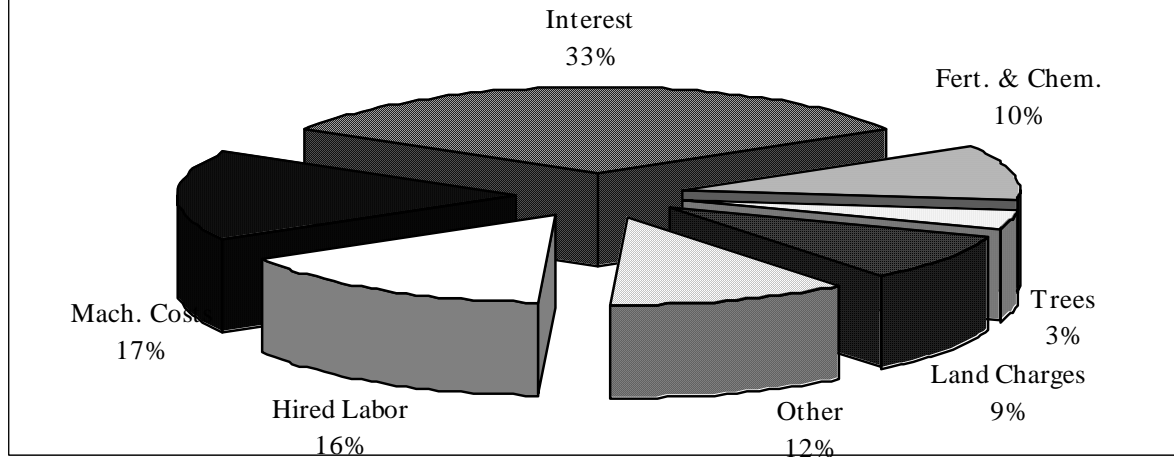
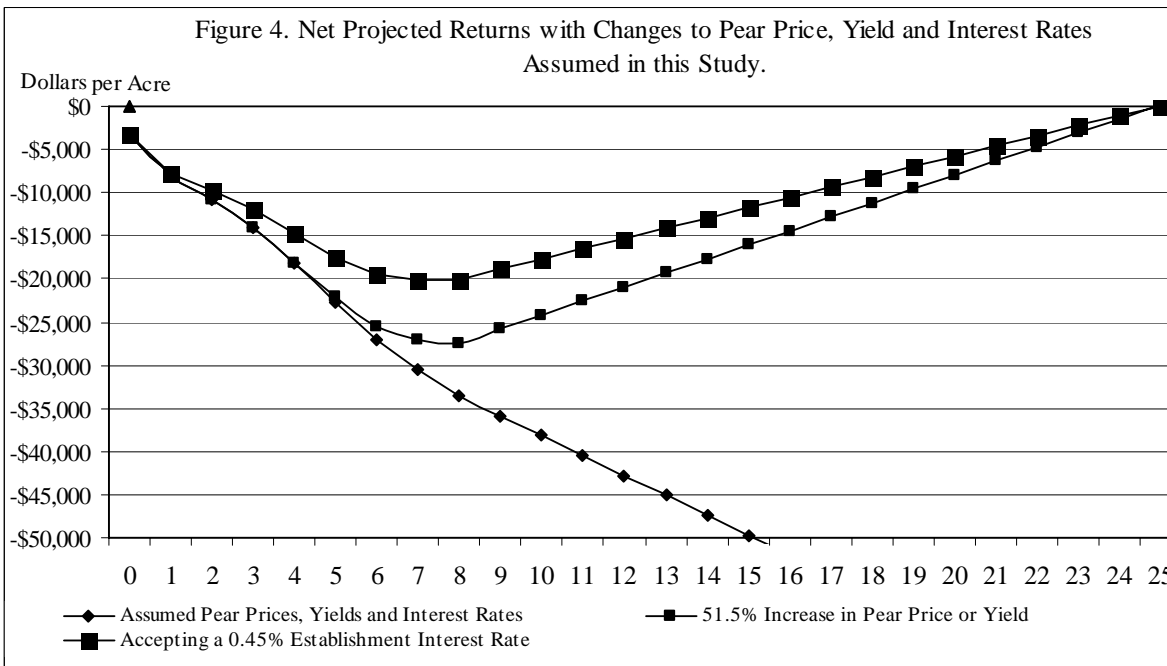
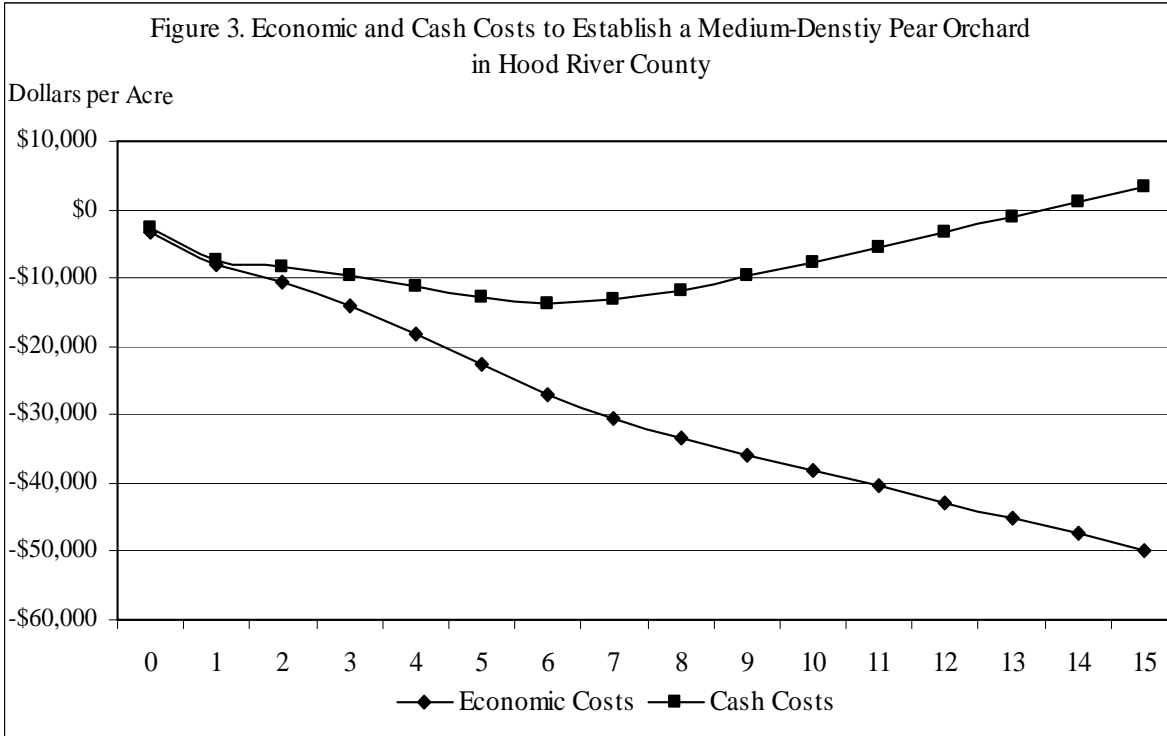


Figure 2. Economic Costs to Establish a Medium-Density Pear Orchard the First Ten Years of Establishment





Conclusion

Historically, most growers have renewed orchards only when production levels no longer covered the cost of production. Today, however, lack of competitive advantages in apple production 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 likely make it more meaningful.

Using the Crop Profitability Analysis (CPA) Program to Analyze Different Price and Yield Scenarios

So many different types of scenarios as to price and yields over the years can occur due to freeze, rain, hail, birds and market conditions that it is infeasible to cover even a small sample of these scenarios in this bulletin. However, the Crop Profitability Analysis (CPA) program developed by Oregon State University, Washington State University, and the University of California at Davis, is a Windows based program designed to help agricultural producers in making long-run cropping decisions. CPA 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 CPA program can be obtained free of charge by going on the Internet at <http://oregonstate.edu/oain> click on the [Ag Tools for Managing Risk](#) and download it along with the companion Budget Editor program. Both programs are fully documented. In addition, the data from this publication for the establishment and production of medium-density pears can also be downloaded by clicking on [Oregon](#)

under “Ready-to-use budget files for CPA and ECL,” and then clicking on [Pear Budgets](#). All assumptions as to prices received, yields obtained, or input items, amounts, and costs can be readily changed using Budget Editor and CPA to modify the budgets provided so the user can develop a set of annual budgets that most fit his/her situation.

CPA 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. It also calculates the beginning and ending investment values and the internal rate of return for each plan. CPA 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 by the authors that before investing in any long-run perennial crop, that the potential investor use the CPA program to fully analyze the potential investment under varying price and yield scenarios to help decide if the potential investment is likely to be economical feasible or not.

APPENDIX A

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

Table 7. Year 0, medium-density pear establishment, \$/acre economic costs and returns.

VARIABLE CASH COSTS	Description	Labor	Machinery	Materials	Total
Remove trees, roots, and rip (2x)	2.0 custom	\$0.00	\$0.00	\$1,200.00	\$1,200.00
Disc	2.0 x/acre	26.00	14.76	0.00	40.76
Staking	272 stakes	46.00	0.00	8.08	54.08
Soil sampling	1.0 x/acre	0.00	0.00	43.65	43.65
Fumigation	1.0 custom	0.00	0.00	778.00	778.00
Fertilizer	1.0 applications	3.19	5.00	80.00	88.19
Lime	1.0 custom	0.00	0.00	25.00	25.00
Pickup, truck & ATV	1.0 x/acre	0.00	151.65	0.00	151.65
Housing facilities	1.0 x/acre	0.00	0.00	43.21	43.21
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>53.12</u>	<u>53.12</u>
Total variable costs		75.19	171.41	2,306.06	2,552.66
FIXED CASH COSTS				Unit	Total
Pickup, truck & ATV insurance				acre	26.53
Water assessment				acre	35.00
Property insurance				acre	25.00
Property taxes				acre	<u>30.00</u>
Total fixed cash costs					116.53
FIXED NON-CASH COSTS				Unit	Total
Machinery and equipment insurance, depreciation & interest				acre	6.90
Pickup, truck & ATV - depreciation & interest				acre	74.95
Foreman housing				acre	102.86
Housing facilities				acre	41.90
Land interest charge				acre	<u>480.00</u>
Total fixed non-cash costs					706.62
Total fixed costs					823.15
Total of all costs per acre					\$3,375.82

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	\$74.35	\$0.00	\$235.35
Planting trees	40.0 hours	460.00	180.00	1,768.00	2,408.00
Painting trees	8.0 hours	92.00	0.00	30.00	122.00
Training trees	2.0 hours	23.00	0.00	0.00	23.00
Herbicide strip maintenance (.30x)	2.0 applications	10.21	15.59	50.00	75.80
Seed cover crop	20.0 lbs	16.25	15.68	30.00	61.93
Flailing/mowing orchard floor	5.0 times	39.43	78.35	0.00	117.78
Rodent control	1.0 applications	3.35	5.14	20.00	28.49
Irrigation	3.5 hours	40.25	20.00	0.00	60.25
Pickup, truck & ATV	1.0 x/acre	0.00	151.65	0.00	151.65
Housing facilities	1.0 x/acre	0.00	0.00	43.21	43.21
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>72.30</u>	<u>72.30</u>
Total variable costs		845.49	540.76	2,088.51	3,474.76
FIXED CASH COSTS					Unit Total
Pickup, truck & ATV insurance				acre	26.53
Water assessment				acre	35.00
Property insurance				acre	25.00
Property taxes				acre	<u>30.00</u>
Total fixed cash costs					116.53
FIXED NON-CASH COSTS					Unit Total
Machinery and equipment insurance, depreciation & interest				acre	224.62
Pickup, truck & ATV - depreciation & interest				acre	74.95
Foreman housing				acre	102.86
Housing facilities				acre	41.90
Land interest charge				acre	480.00
Prior year's establishment costs - Interest				acre	<u>337.58</u>
Total fixed non-cash costs					1,261.92
Total fixed costs					1,378.45
Total of all costs per acre					\$4,853.21

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

VARIABLE CASH COSTS	Description	Labor	Machinery	Materials	Total	
Pruning and training	4.0 hours	\$46.00	\$0.00	\$0.00	\$46.00	
Tree removal & tree replacement	1.0 hours	24.50	19.72	13.00	57.22	
Fertilizer & custom lime	1.0 applications	3.19	5.00	65.00	73.19	
Herbicide strip maintenance (.30x)	2.0 applications	10.21	15.59	50.00	75.80	
Insecticides & fungicides	2.0 applications	13.40	32.47	23.00	68.87	
Flailing/mowing orchard floor	5.0 times	39.43	78.35	0.00	117.78	
Rodent control	1.0 applications	3.35	5.14	20.00	28.49	
Frost protection	1.0 hour	11.50	35.37	0.00	46.87	
Irrigation	3.5 hours	40.25	20.00	0.00	60.25	
Pickup, truck & ATV	1.0 x/acre	0.00	151.65	0.00	151.65	
Housing facilities	1.0 x/acre	0.00	0.00	43.21	43.21	
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>17.94</u>	<u>17.94</u>	
Total variable costs		191.84	363.28	307.15	862.27	
FIXED CASH COSTS					Unit	Total
Pickup, truck & ATV insurance				acre	26.53	
Water assessment				acre	35.00	
Property insurance				acre	25.00	
Property taxes				acre	<u>30.00</u>	
Total fixed cash costs					116.53	
FIXED NON-CASH COSTS					Unit	Total
Machinery and equipment insurance, depreciation & interest				acre	310.10	
Pickup, truck & ATV - depreciation & interest				acre	74.95	
Foreman housing				acre	102.86	
Housing facilities				acre	41.90	
Land interest charge				acre	480.00	
Prior year's establishment costs - Interest				acre	<u>822.90</u>	
Total fixed non-cash costs					1,832.72	
Total fixed costs					1,949.26	
Total of all costs per acre					\$2,811.53	

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

VARIABLE CASH COSTS	Description	Labor	Machinery	Materials	Total
Pruning and training	6.0 hours	\$69.00	\$0.00	\$0.00	\$69.00
Painting trees	8.0 hours	92.00	0.00	30.00	122.00
Tree removal & tree replacement	1.0 hours	24.50	19.72	13.00	57.22
Raking and shredding brush	1.0 x/acre	15.77	27.75	0.00	43.52
Fertilizer & custom lime	1.0 applications	3.19	5.00	65.00	73.19
Herbicide strip maintenance (.30x)	2.0 applications	10.21	15.59	50.00	75.80
Insecticides & fungicides	4.0 applications	26.81	64.93	69.00	160.74
Flailing/mowing orchard floor	5.0 times	39.43	78.35	0.00	117.78
Rodent control	1.0 applications	3.35	5.14	20.00	28.49
Frost protection	1.0 hour	11.50	35.37	0.00	46.87
Irrigation	3.5 hours	40.25	20.00	0.00	60.25
Pickup, truck & ATV	1.0 x/acre	0.00	151.65	0.00	151.65
Housing facilities	1.0 x/acre	0.00	0.00	43.21	43.21
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>23.90</u>	<u>23.90</u>
Total variable costs		336.01	423.49	389.11	1,148.61
FIXED CASH COSTS				Unit	Total
Pickup, truck & ATV insurance				acre	26.53
Water assessment				acre	35.00
Property insurance				acre	25.00
Property taxes				acre	<u>30.00</u>
Total fixed cash costs					116.53
FIXED NON-CASH COSTS				Unit	Total
Machinery and equipment insurance, depreciation & interest				acre	356.49
Pickup, truck & ATV - depreciation & interest				acre	74.95
Foreman housing				acre	102.86
Housing facilities				acre	41.90
Land interest charge				acre	480.00
Prior year's establishment costs - Interest				acre	<u>1,104.06</u>
Total fixed non-cash costs					2,160.26
Total fixed costs					2,276.79
Total of all costs per acre					\$3,425.41

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

GROSS INCOME		Quantity	Unit	\$/Unit	Total	Price/bin	
Pears		3.00	bins	150.00	<u>450.00</u>	<u>150.00</u>	
Total gross income					450.00	150.00	
VARIABLE CASH COSTS		Description	Labor	Machinery	Materials	Total	Cost/bin
Pruning and training	13.0	hours	\$149.50	\$0.00	\$0.00	\$149.50	\$49.83
Tree removal & tree replacement	1.5	hours	36.75	29.43	13.00	79.18	26.39
Raking and shredding brush	1.0	x/acre	15.77	27.75	0.00	43.52	14.51
Fertilizer & custom lime	1.0	applications	3.19	5.00	65.00	73.19	24.40
Herbicide strip maintenance (.30x)	2.0	applications	10.21	15.59	50.00	75.80	25.27
Insecticides & fungicides	10.0	applications	67.02	162.33	460.00	689.36	229.79
Phermone disruption (1/2 rate)	0.5	hours	5.75	0.00	100.00	105.75	35.25
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	36.00	36.00	12.00
Flailing/mowing orchard floor	5.0	times	39.43	78.35	0.00	117.78	39.26
Rodent control	1.0	applications	3.35	5.14	20.00	28.49	9.50
Frost protection	1.0	hour	11.50	35.37	0.00	46.87	15.62
Irrigation	3.5	hours	40.25	20.00	0.00	60.25	20.08
Ladders, pruning, & picking equip.	1.0	x/acre	0.00	12.89	0.00	12.89	4.30
Harvesting costs	3.0	bins	90.38	40.50	0.00	130.88	43.63
General labor	2.3	hours					
Pickup, truck & ATV	1.0	x/acre	0.00	151.65	0.00	151.65	50.55
Housing facilities	1.0	x/acre	0.00	0.00	43.21	43.21	14.40
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>41.42</u>	<u>41.42</u>	<u>13.81</u>
Total variable costs			473.10	584.00	933.63	1,990.73	663.58
FIXED CASH COSTS				Unit	Total	Cost/bin	
Pickup, truck & ATV insurance				acre	26.53	8.84	
Water assessment				acre	35.00	11.67	
Property insurance				acre	25.00	8.33	
Property taxes				acre	<u>30.00</u>	<u>10.00</u>	
Total fixed cash costs					116.53	38.84	
FIXED NON-CASH COSTS				Unit	Total	Cost/bin	
Machinery and equipment insurance, depreciation & interest				acre	501.35	167.12	
Pickup, truck & ATV - depreciation & interest				acre	74.95	24.98	
Foreman housing				acre	102.86	34.29	
Housing facilities				acre	41.90	13.97	
Land interest charge				acre	480.00	160.00	
Prior year's establishment costs - Interest				acre	<u>1,446.60</u>	<u>482.20</u>	
Total fixed non-cash costs					2,647.66	882.55	
Total fixed costs					2,764.19	921.40	
Total of all costs per acre					\$4,754.92	\$1,584.97	
Net projected returns					-\$4,304.92	-\$1,434.97	

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

GROSS INCOME						Quantity	Unit	\$/Unit	Total	Price/bin
Pears			6.00	bins	150.00			<u>900.00</u>	<u>150.00</u>	
Total gross income								900.00	150.00	
VARIABLE CASH COSTS		Description	Labor	Machinery	Materials	Total	Cost/bin			
Pruning and training	20.0	hours	\$230.00	\$0.00	\$0.00	\$230.00	\$38.33			
Tree removal & tree replacement	1.5	hours	36.75	29.43	13.00	79.18	13.20			
Raking and shredding brush	1.0	x/acre	15.77	27.75	0.00	43.52	7.25			
Fertilizer & custom lime	1.0	applications	3.19	5.00	65.00	73.19	12.20			
Herbicide strip maintenance (.30x)	2.0	applications	10.21	15.59	50.00	75.80	12.63			
Insecticides & fungicides	10.0	applications	67.02	162.33	575.00	804.36	134.06			
Phermone disruption (1/2 rate)	0.8	hours	8.63	0.00	100.00	108.63	18.10			
Production mgmt consultant fees	1.0	x/acre	0.00	0.00	30.00	30.00	5.00			
Bee rental	1.0	hives	0.00	0.00	36.00	36.00	6.00			
Flailing/mowing orchard floor	5.0	times	39.43	78.35	0.00	117.78	19.63			
Rodent control	1.0	applications	3.35	5.14	20.00	28.49	4.75			
Frost protection	1.0	hour	11.50	35.37	0.00	46.87	7.81			
Irrigation	3.5	hours	40.25	20.00	0.00	60.25	10.04			
Ladders, pruning, & picking equip.	1.0	x/acre	0.00	12.89	0.00	12.89	2.15			
Harvesting costs	6.0	bins	180.75	40.50	0.00	221.25	36.88			
General labor	4.5	hours								
Pickup, truck & ATV	1.0	x/acre	0.00	151.65	0.00	151.65	25.28			
Housing facilities	1.0	x/acre	0.00	0.00	43.21	43.21	7.20			
Miscellaneous and overhead	1.0	x/acre	0.00	0.00	75.00	75.00	12.50			
Interest: operating capital	6.0	months	<u>0.00</u>	<u>0.00</u>	<u>47.56</u>	<u>47.56</u>	<u>7.93</u>			
Total variable costs			646.85	584.00	1,054.77	2,285.62	380.94			
FIXED CASH COSTS						Unit	Total	Cost/bin		
Pickup, truck & ATV insurance					acre	26.53	4.42			
Water assessment					acre	35.00	5.83			
Property insurance					acre	25.00	4.17			
Property taxes					acre	<u>30.00</u>	<u>5.00</u>			
Total fixed cash costs								116.53	19.42	
FIXED NON-CASH COSTS						Unit	Total	Cost/bin		
Machinery and equipment insurance, depreciation & interest					acre	501.35	83.56			
Pickup, truck & ATV - depreciation & interest					acre	74.95	12.49			
Foreman housing					acre	102.86	17.14			
Housing facilities					acre	41.90	6.98			
Land interest charge					acre	480.00	80.00			
Prior year's establishment costs - Interest					acre	<u>1,877.09</u>	<u>312.85</u>			
Total fixed non-cash costs								3,078.15	513.03	
Total fixed costs								3,194.69	532.45	
Total of all costs per acre								\$5,480.30	\$913.38	
Net projected returns								-\$4,580.30	-\$763.38	

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

GROSS INCOME		Quantity	Unit	\$/Unit	Total	Price/bin	
Pears		12.00	bins	150.00	<u>1,800.00</u>	<u>150.00</u>	
Total gross income					1,800.00	150.00	
VARIABLE CASH COSTS		Description	Labor	Machinery	Materials	Total	Cost/bin
Pruning and training	24.0	hours	\$276.00	\$0.00	\$0.00	\$276.00	\$23.00
Tree removal & tree replacement	2.5	hours	61.25	48.85	13.00	123.10	10.26
Raking and shredding brush	1.0	x/acre	15.77	27.75	0.00	43.52	3.63
Fertilizer & Custom Lime	1.0	applications	3.19	5.00	105.00	113.19	9.43
Herbicide strip maintenance (.30x)	2.0	applications	10.21	15.59	50.00	75.80	6.32
Insecticides & fungicides	10.0	applications	67.02	162.33	575.00	804.36	67.03
Phermone disruption (1/2 rate)	0.8	hours	8.63	0.00	100.00	108.63	9.05
Production mgmt consultant fees	1.0	x/acre	0.00	0.00	30.00	30.00	2.50
Bee rental	1.5	hives	0.00	0.00	54.00	54.00	4.50
Flailing/mowing orchard floor	5.0	times	39.43	78.35	0.00	117.78	9.81
Rodent control	1.0	applications	3.35	5.14	20.00	28.49	2.37
Frost protection	1.0	hour	11.50	35.37	0.00	46.87	3.91
Irrigation	3.5	hours	40.25	20.00	0.00	60.25	5.02
Ladders, pruning, & picking equip.	1.0	x/acre	0.00	12.89	0.00	12.89	1.07
Harvesting costs	12.0	bins	361.50	40.50	0.00	402.00	33.50
General labor	9.0	hours					
Pickup, truck & ATV	1.0	x/acre	0.00	151.65	0.00	151.65	12.64
Housing facilities	1.0	x/acre	0.00	0.00	43.21	43.21	3.60
Miscellaneous and overhead	1.0	x/acre	0.00	0.00	75.00	75.00	6.25
Interest: operating capital	6.0	months	<u>0.00</u>	<u>0.00</u>	<u>54.54</u>	<u>54.54</u>	<u>4.55</u>
Total variable costs			898.10	603.42	1,119.75	2,621.27	218.44
FIXED CASH COSTS					Unit	Total	Cost/bin
Pickup, truck & ATV insurance				acre	26.53	2.21	
Water assessment				acre	35.00	2.92	
Property insurance				acre	25.00	2.08	
Property taxes				acre	<u>30.00</u>	<u>2.50</u>	
Total fixed cash costs					116.53	9.71	
FIXED NON-CASH COSTS					Unit	Total	Cost/bin
Machinery and equipment insurance, depreciation & interest				acre	511.08	42.59	
Pickup, truck & ATV - depreciation & interest				acre	74.95	6.25	
Foreman housing				acre	102.86	8.57	
Housing facilities				acre	41.90	3.49	
Land interest charge				acre	480.00	40.00	
Prior year's establishment costs - Interest				acre	<u>2,335.12</u>	<u>194.59</u>	
Total fixed non-cash costs					3,545.92	295.49	
Total fixed costs					3,662.45	305.20	
Total of all costs per acre					\$6,283.73	\$523.64	
Net projected returns					-\$4,483.73	-\$373.64	

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

GROSS INCOME						
	Quantity	Unit	\$/Unit	Total	Price/bin	
Pears	24.00	bins	150.00	<u>3,600.00</u>	<u>150.00</u>	
Total gross income				3,600.00	150.00	
VARIABLE CASH COSTS						
	Description	Labor	Machinery	Materials	Total	Cost/bin
Pruning and training	28.0 hours	\$322.00	\$0.00	\$0.00	\$322.00	\$13.42
Thinning	4.0 hours	46.00	0.00	0.00	46.00	1.92
Tree removal & tree replacement	2.5 hours	61.25	48.85	13.00	123.10	5.13
Raking and shredding brush	1.0 x/acre	15.77	27.75	0.00	43.52	1.81
Fertilizer	1.0 applications	3.19	5.00	105.00	113.19	4.72
Herbicide strip maintenance (.30x)	2.0 applications	10.21	15.59	50.00	75.80	3.16
Insecticides & fungicides	10.0 applications	67.02	162.33	575.00	804.36	33.51
Phermone disruption (1/2 rate)	1.0 hours	11.50	0.00	100.00	111.50	4.65
Production mgmt consultant fees	1.0 x/acre	0.00	0.00	30.00	30.00	1.25
Bee rental	2.0 hives	0.00	0.00	72.00	72.00	3.00
Flailing/mowing orchard floor	5.0 times	39.43	78.35	0.00	117.78	4.91
Rodent control	1.0 applications	3.35	5.14	20.00	28.49	1.19
Frost protection	1.0 hour	11.50	35.37	0.00	46.87	1.95
Irrigation	3.5 hours	40.25	20.00	0.00	60.25	2.51
Ladders, pruning, & picking equip.	1.0 x/acre	0.00	12.89	0.00	12.89	0.54
Harvesting costs	24.0 bins	723.00	40.50	0.00	763.50	31.81
General labor	18.0 hours					
Pickup, truck & ATV	1.0 x/acre	0.00	151.65	0.00	151.65	6.32
Housing facilities	1.0 x/acre	0.00	0.00	43.21	43.21	1.80
Miscellaneous and overhead	1.0 x/acre	0.00	0.00	75.00	75.00	3.13
Interest: operating capital	6.0 months	<u>0.00</u>	<u>0.00</u>	<u>64.62</u>	<u>64.62</u>	<u>2.69</u>
Total variable costs		1,354.47	603.42	1,147.83	3,105.73	129.41
FIXED CASH COSTS				Unit	Total	Cost/bin
Pickup, truck & ATV insurance				acre	26.53	1.11
Water assessment				acre	35.00	1.46
Property insurance				acre	25.00	1.04
Property taxes				acre	<u>30.00</u>	<u>1.25</u>
Total fixed cash costs					116.53	4.86
FIXED NON-CASH COSTS				Unit	Total	Cost/bin
Machinery and equipment insurance, depreciation & interest				acre	511.08	21.30
Pickup, truck & ATV - depreciation & interest				acre	74.95	3.12
Foreman housing				acre	102.86	4.29
Housing facilities				acre	41.90	1.75
Land interest charge				acre	480.00	20.00
Prior year's establishment costs - Interest				acre	<u>2,783.49</u>	<u>115.98</u>
Total fixed non-cash costs					3,994.29	166.43
Total fixed costs					4,110.82	171.28
Total of all costs per acre					\$7,216.55	\$300.69
Net projected returns					- \$3,616.55	- \$150.69

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

GROSS INCOME							Quantity	Unit	\$/Unit	Total	Price/bin		
Pears						32.00	bins	150.00	<u>4,800.00</u>	<u>150.00</u>			
Total gross income									4,800.00	150.00			
VARIABLE CASH COSTS							Description	Labor	Machinery	Materials	Total	Cost/bin	
Pruning and training	32.0	hours		\$368.00	\$0.00	\$0.00		\$368.00		\$11.50			
Thinning	6.0	hours		69.00	0.00	0.00		69.00		2.16			
Tree removal & tree replacement	2.5	hours		61.25	48.85	13.00		123.10		3.85			
Raking and shredding brush	1.0	x/acre		15.77	27.75	0.00		43.52		1.36			
Fertilizer	1.0	applications		3.19	5.00	145.00		153.19		4.79			
Herbicide strip maintenance (.30x)	2.0	applications		10.21	15.59	50.00		75.80		2.37			
Insecticides & fungicides	10.0	applications		67.02	162.33	575.00		804.36		25.14			
Phermone disruption (1/2 rate)	1.3	hours		14.38	0.00	100.00		114.38		3.57			
Production mgmt consultant fees	1.0	x/acre		0.00	0.00	30.00		30.00		0.94			
Bee rental	2.0	hives		0.00	0.00	72.00		72.00		2.25			
Flailing/mowing orchard floor	5.0	times		39.43	78.35	0.00		117.78		3.68			
Rodent control	1.0	applications		3.35	5.14	20.00		28.49		0.89			
Frost protection	1.0	hour		11.50	35.37	0.00		46.87		1.46			
Irrigation	3.5	hours		40.25	20.00	0.00		60.25		1.88			
Ladders, pruning, & picking equip.	1.0	x/acre		0.00	12.89	0.00		12.89		0.40			
Harvesting costs	32.0	bins		964.00	40.50	0.00		1,004.50		31.39			
General labor	24.0	hours											
Pickup, truck & ATV	1.0	x/acre		0.00	151.65	0.00		151.65		4.74			
Housing facilities	1.0	x/acre		0.00	0.00	43.21		43.21		1.35			
Miscellaneous and overhead	1.0	x/acre		0.00	0.00	75.00		75.00		2.34			
Interest: operating capital	6.0	months		<u>0.00</u>	<u>0.00</u>	<u>72.12</u>		<u>72.12</u>		<u>2.25</u>			
Total variable costs									1,667.35	603.42	1,195.33	3,466.10	108.32
FIXED CASH COSTS								Unit	Total	Cost/bin			
Pickup, truck & ATV insurance							acre	26.53	0.83				
Water assessment							acre	35.00	1.09				
Property insurance							acre	25.00	0.78				
Property taxes							acre	<u>30.00</u>	<u>0.94</u>				
Total fixed cash costs									116.53	3.64			
FIXED NON-CASH COSTS								Unit	Total	Cost/bin			
Machinery and equipment insurance, depreciation & interest							acre	511.08	15.97				
Pickup, truck & ATV - depreciation & interest							acre	74.95	2.34				
Foreman housing							acre	102.86	3.21				
Housing facilities							acre	41.90	1.31				
Land interest charge							acre	480.00	15.00				
Prior year's establishment costs - Interest							acre	<u>3,145.15</u>	<u>98.29</u>				
Total fixed non-cash costs									4,355.95	136.12			
Total fixed costs									4,472.48	139.76			
Total of all costs per acre									\$7,938.58	\$248.08			
Net projected returns									-\$3,138.58	-\$98.08			

Table 16. Full production, medium-density pear establishment, \$/acre economic costs and returns.

GROSS INCOME						
	Quantity	Unit	\$/unit	Total	Price/bin	
Pears	40.00	bins	150.00	<u>6,000.00</u>	<u>150.00</u>	
Total gross income				6,000.00	150.00	
VARIABLE CASH COSTS						
	Description	Labor	Machinery	Materials	Total	Cost/bin
Pruning and training	32.0 hours	\$368.00	\$0.00	\$0.00	\$368.00	\$9.20
Thinning	8.0 hours	92.00	0.00	0.00	92.00	2.30
Tree removal & tree replacement	2.5 hours	61.25	48.85	13.00	123.10	3.08
Raking and shredding brush	1.0 x/acre	15.77	27.75	0.00	43.52	1.09
Fertilizer & Custom Lime	1.0 applications	3.19	5.00	145.00	153.19	3.83
Herbicide strip maintenance (.30x)	2.0 applications	10.21	15.59	50.00	75.80	1.89
Insecticides & fungicides	10.0 applications	67.02	162.33	575.00	804.36	20.11
Phermone disruption (1/2 rate)	1.5 hours	17.25	0.00	100.00	117.25	2.93
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	72.00	72.00	1.80
Flailing/mowing orchard floor	5.0 times	39.43	78.35	0.00	117.78	2.94
Rodent control	1.0 applications	3.35	5.14	20.00	28.49	0.71
Frost protection	1.0 hour	11.50	35.37	0.00	46.87	1.17
Irrigation	3.5 hours	40.25	20.00	0.00	60.25	1.51
Ladders, pruning, & picking equip.	1.0 x/acre	0.00	12.89	0.00	12.89	0.32
Harvesting costs	40.0 bins	1,205.00	40.50	0.00	1,245.50	31.14
General labor	30.0 hours					
Pickup, truck & ATV	1.0 x/acre	0.00	151.65	0.00	151.65	3.79
Housing facilities	1.0 x/acre	0.00	0.00	43.21	43.21	1.08
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>77.79</u>	<u>77.79</u>	<u>1.94</u>
Total variable costs		1,934.22	603.42	1,201.00	3,738.65	93.47
FIXED CASH COSTS				Unit	Total	Cost/bin
Pickup, truck & ATV insurance				acre	26.53	0.66
Water assessment				acre	35.00	0.88
Property insurance				acre	25.00	0.63
Property taxes				acre	<u>30.00</u>	<u>0.75</u>
Total fixed cash costs					116.53	2.91
FIXED NON-CASH COSTS				Unit	Total	Cost/bin
Machinery and equipment insurance, depreciation & interest				acre	511.08	12.78
Pickup, truck & ATV - depreciation & interest				acre	74.95	1.87
Foreman housing				acre	102.86	2.57
Housing facilities				acre	41.90	1.05
Land interest charge				acre	480.00	12.00
Amortized establishment costs				acre	<u>3,810.72</u>	<u>95.27</u>
Total fixed non-cash costs					5,021.52	125.54
Total fixed costs					5,138.05	128.45
Total of all costs per acre					\$8,876.70	\$221.92
Net projected returns					-\$2,876.70	-\$71.92