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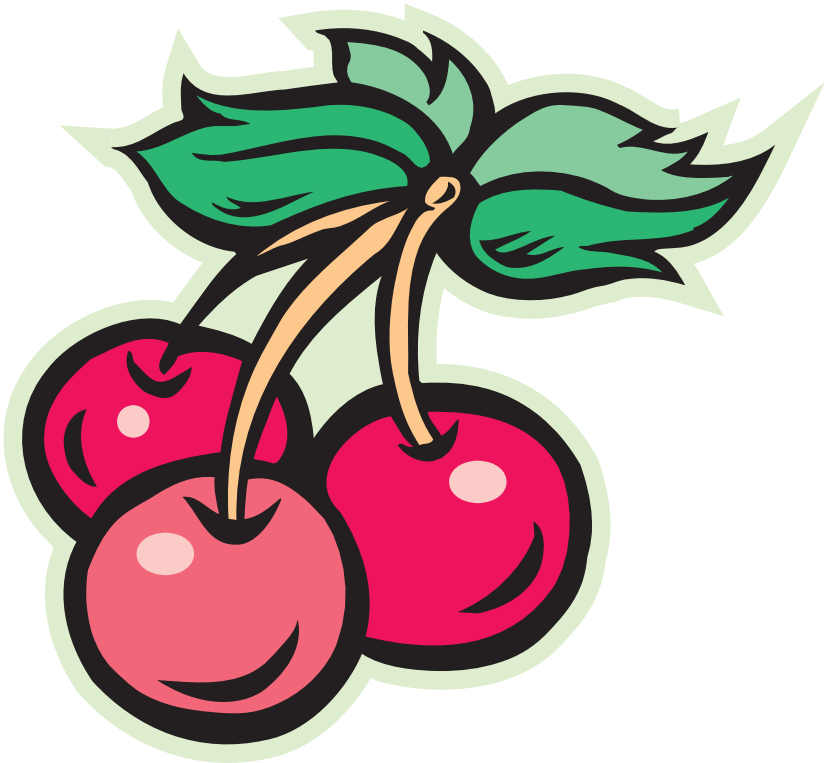

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Introduction

Cherry growers throughout the world have largely moved to high density plantings on semi-dwarfing or dwarfing rootstocks. This affords several advantages including significantly greater precocity, faster return on investment, the potential for higher annual yields, easier maintenance, faster harvests and the ability to more easily protect the orchard from rain, hail and bird damage. However, with these advantages come greater risks. A high density system on dwarfing rootstock is less forgiving than a standard density orchard. Improper management can mean small, poor quality fruit. Poor pruning can lead to excessive shading and spur death and lack of vigor can increase pest and disease attacks. For these reasons it is important that growers properly evaluate their scion/rootstock choices in relationship to the proposed orchard site while critically assessing their own management skills before deciding to plant a high density orchard.

This paper will be useful to growers and investors who are contemplating the economic and financial considerations of planting a sweet cherry orchard. It will be especially useful to those who want to compare the economic benefits of a standard- versus high-density orchard. It is impossible to cover all variety, rootstock and training system combinations in a publication of this magnitude so combinations commonly grown in Wasco County were chosen for comparison.

Assumptions

In the preparation of this publication, several assumptions were made that provided a basis for the costs and returns of establishing and producing a high-density sweet cherry orchard analysis. These assumptions include:

1. Typical acreage for a sweet cherry orchard in Wasco County is 100 acres. Bearing acres include 60 acres of mature, standard density, fresh market sweet cherries, 25 acres of high density, fresh market sweet cherries, 5 acres of mature, standard density, brine market sweet cherries, and approximately 10 percent, or 10 acres, of the orchard under establishment.
2. Remove 2.5 acres of older orchard each year and plant a high-density sweet cherry orchard. A high-density orchard consists of 340 trees per acre with a 10’ x 16’ spacing, and 11 percent of the trees are pollinizers.
3. The high-density orchard is trained to a central leader system.
4. Sweet cherry price is $0.85 per pound or $1,700 per ton.
5. The full production yield in a high-density orchard is 14,000 pounds.

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Commercial yields begin in year 3 and full production is reached in year 6.

6. General labor is hired at a rate of $11.50 per hour, machine labor at $13.00 per hour, and $.25 per pound to harvest cherries, which includes worker's compensation, unemployment insurance, and other labor overhead expenses. All labor is treated as a cash variable expense.
7. Seasonal labor facilities provided by the owner cost $125,000. Sixteen 5-person units are required for this size of operation. 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, except telephone, is provided at no cost to the employee and valued at $368 per acre, a fixed 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 sweet cherry orchard in Wasco County. A detailed breakdown of machinery values is shown in Table 1. Table 2 provides estimated machinery costs from the American Society of Agricultural Engineers. The 75-horsepower 4-wheel drive tractor is used mainly for spraying, flailing and mowing operations, and during harvest. The 50-horsepower 2-wheel driver tractor is used mainly to spray weeds, spread fertilizer and at harvest. Table 3 lists the estimated cost of each operation with the power unit for a high- density orchard. Gasoline and diesel costs per gallon are $3.00 and $3.30, respectively.
10. The interest rate on operating funds is 8.5 percent and 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 $5,000 per acre.
12. Previous year's 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 20 percent of each acre in years 1 through 3, 25 percent in year 4, and 30 percent of each acre in year 5 and beyond.
14. A micro-sprinkler irrigation system with poly-tube is used at an estimated cost of $1,250 per acre in the high-density orchard. 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 a 8.5 percent interest rate ((cost + salvage value) ÷ 2 x .085). Repairs and maintenance for the system costs one percent of the purchase price per year.
15. Additional assumptions for variable, cash fixed, and non-cash fixed cost is listed in Table 4 for the high-density orchard.
16. Price inflation for the time period of this study was ignored.
17. Income tax consequences are also ignored for this study.

Table 1. Machinery Cost Assumptions

Machine	Size	Market Value	Hours or *Miles* of Annual Use	Expected Life (yrs)	Salvage Value
Tractor	4 Wheel Dr 75hp, New	$ 35,000	911	10	$ 10,338
Tractor	2 Wheel Dr 50hp, Older	20,000	466	20	2,566
Air-Blast Spray	400 Gallon Unit, PTO	18,000	387	10	3,183
Flail Chopper	8' Unit	6,000	103	7	1,531
Mower	9' Unit	6,000	121	10	1,061
Weed Sprayer	100 Gallon Unit	2,000	79	15	192
Tank Sprayer for ATV		1,500	34	10	265
Fertilizer Spreader	16' Unit	2,300	25	20	120
Gopher Machine	8' Unit	1,200	13	20	63
Pickup	1/2 Ton 4X4, New	27,000	*12,000*	10	10,210
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	50	20	89
Bin Trailer	2 Units	5,000	300	10	884
Front End Loader and Backforks		5,800	300	10	1,026
Ladders	80 Units	9,000	N/A	10	N/A
Picking Buckets	1600 Buckets	10,000	N/A	5	N/A
Pruning and Power Saws	2 Ch, 3PP, 3PS, 3HL, 1PL	3,000	N/A	3	N/A
Irrig. System, High Density	Micro-sprinklers, per acre	1,250	N/A	25	N/A
Housing Facilities	16 Units	125,000	N/A	30	0

Table 2. Machinery Cost Calculations

Machine	Size	---Variable Costs--- Fuel & Lube	Repairs & Maint.	------ Fixed Costs ------- - Deprec. & Interest	Insurance	Total Cost
			---------- Costs per Hour ----------			
Tractor	4 Wheel Dr 75hp, New	$22.77	$0.96	$4.82	$0.22	$28.77
Tractor	2 Wheel Dr 50hp, Older	18.98	1.30	3.93	0.22	24.43
Air-Blast Spray	400 Gallon Unit, PTO	0.00	11.07	6.16	0.16	17.40
Flail Chopper	8' Unit	0.00	1.91	9.30	0.22	11.42
Mower	9' Unit	0.00	3.16	6.55	0.17	9.88
Weed Sprayer	100 Gallon Unit	0.00	0.86	2.72	0.08	3.67
Tank Sprayer for ATV		0.00	0.44	5.84	0.16	6.44
Fertilizer Spreader	16' Unit	0.00	1.17	8.63	0.30	10.10
Gopher Machine		0.00	0.50	8.58	0.29	9.37
			---------- Costs per Mile ----------			
Pickup	1/2 Ton 4X4, New	$0.29	$0.05	$0.27	$0.09	$0.70
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	$0.16	$1.57	$0.00	$1.73
Bin Trailer	2 Units	0.00	3.96	6.62	0.00	10.58
Front End Loader and Backforks		0.00	4.60	7.68	0.00	12.27
Ladders	80 Units	0.00	5.40	12.83	0.00	18.23
Picking Buckets	1600 Buckets	0.00	6.00	24.25	0.00	30.25
Pruning and Power Saws	2 Ch, 3PP, 3PS, 3HL, 1PL	5.18	1.80	11.28	0.00	18.25
Irrig. System, High Density	Micro-sprinklers, per acre	0.00	12.50	103.13	0.00	115.63
Housing Facilities	16 Units	0.00	33.02	91.67	0.00	124.69

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

					-- Machine Costs --		
Operation	Tractor	Miles per hour	Acres per hour	Labor cost per acre	Variable cost per acre	Fixed cost per acre	Total cost per acre
Air-Blast Spray	4 Wheel Dr 75hp, New	2.00	1.55	$8.38	$22.43	$7.33	$38.13
Flail Chopper	4 Wheel Dr 75hp, New	2.50	0.97	13.40	26.43	15.01	54.85
Mower	4 Wheel Dr 75hp, New	3.00	2.47	5.26	10.87	4.76	20.89
Weed Sprayer	2 Wheel Dr 50hp, Older	3.50	2.55	5.11	8.30	2.73	16.14
Tank Sprayer for ATV	ATV	5.00	3.64	3.57	1.29	2.10	6.96
Fertilizer Spreader	2 Wheel Dr 50hp, Older	3.00	4.07	3.19	5.27	3.21	11.67
Gopher Machine	2 Wheel Dr 50hp, Older	2.50	3.88	3.35	5.36	3.36	12.06

Table 4. Input Assumptions to Establish a High-Density Cherry Orchard, 2007, (per acre basis).

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Full Prod
Prices per Pound	$0.85	$0.85	$0.85	$0.85	$0.85	$0.85	$0.85
Pounds per Acre	0	0	0	1,000	5,000	10,000	14,000
Cost of Orchard Labor w/ housing, per hour	$11.50	$11.50	$11.50	$11.50	$11.50	$11.50	$11.50
Cost of Tractor Drivers w/ housing, per hour	$13.00	$13.00	$13.00	$13.00	$13.00	$13.00	$13.00
Cost of Harvest Labor, per pound	$0.25	$0.25	$0.25	$0.25	$0.25	$0.25	$0.25
Hours of Pruning Labor	0.00	0.00	0.00	0.00	20.00	30.00	40.00
Hours of Training Labor	0.00	7.00	30.00	27.00	0.00	0.00	0.00
Hours of Hand Fertilizing Labor	0.00	1.50	1.50	0.00	0.00	0.00	0.00
Hours of Irrigating Labor	0.00	3.50	3.50	3.50	3.50	3.50	3.50
Hours to Remove & Replace Tree Labor	0.00	0.00	0.50	0.50	1.00	1.00	1.00
Hours for Rodent Control Labor	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Cost of Fertilizer - broadcast applied	$0.00	$20.00	$34.00	$68.00	$68.00	$68.00	$68.00
Cost of Fertilizer - foliar applied	$0.00	$0.00	$30.00	$80.00	$100.00	$100.00	$100.00
Cost of Herbicide - Strip Maintenance	$0.00	$25.00	$25.00	$25.00	$25.00	$25.00	$25.00
Cost of Disease Control	$0.00	$0.00	$0.00	$120.00	$120.00	$120.00	$120.00
Cost of Insecticides - ground applications	$0.00	$0.00	$0.00	$70.00	$100.00	$127.50	$127.50
Cost of Insecticides - aerial applications	$0.00	$0.00	$0.00	$67.50	$67.50	$67.50	$67.50
Cost of Growth Regulators w/ Ca	$0.00	$0.00	$0.00	$23.00	$28.00	$38.00	$38.00
Cost of Rodent Materials	$0.00	$20.00	$20.00	$20.00	$20.00	$20.00	$20.00
Cost per Bee Hive	$0.00	$0.00	$0.00	$36.00	$36.00	$36.00	$36.00
Times for fertilizer - broadcast applied	0.00	0.00	0.00	2.00	2.00	2.00	2.00
Times for Herbicide Strip Spray	0.00	3.00	3.00	3.00	3.00	3.00	3.00
Times for Disease Control	0.00	0.00	0.00	5.00	5.00	5.00	5.00
Times for Insecticides - ground	0.00	0.00	0.00	1.00	1.00	1.00	1.00
Times for Insecticides - aerial	0.00	0.00	0.00	5.00	5.00	5.00	5.00
Number of Bee Hives per acre	0.00	0.00	0.00	1.00	2.00	2.00	2.00
Times for Flailing Orchard Floor	0.00	2.00	4.00	4.00	4.00	4.00	4.00
Times for Mowing Orchard Floor	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Property Taxes	$60.00	$60.00	$60.00	$60.00	$60.00	$60.00	$60.00
Property Insurance	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00
Land Values	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000
Irrigation Assessment	$175.00	$175.00	$175.00	$175.00	$175.00	$175.00	$175.00
Farm Foreman	$368.00	$368.00	$368.00	$368.00	$368.00	$368.00	$368.00
Helicopter - Remove water, per acre	$0.00	$0.00	$0.00	$60.00	$60.00	$60.00	$60.00
Miscellaneous	$75.00	$75.00	$75.00	$75.00	$75.00	$75.00	$75.00
Tree Cost	$0.00	$10.50	$10.50	$10.50	$10.50	$10.50	$10.50
Gasoline Price	$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
Operating Interest Rate	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%
Land Interest Rate	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%
% of Operating Capital Borrowed	50.00%	50.00%	50.00%	50.00%	50.00%	50.00%	50.00%
Months to Borrow Operating Capital	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Planted Trees	0	340	2	2	2	2	2

Results of Establishing a High-Density Sweet Cherry Orchard in Wasco County

Cash Flow Analysis

Table 5 contains a cash flow analysis for establishing a high-density sweet cherry planting. The income, variable costs and cash fixed costs are shown for each of the six establishment years and first full production year. Production begins in year 3 with 1,000 pounds of field-run sweet cherries per acre and increases to 14,000 pounds at full production. Total variable costs are $2,284 in the first year with an additional $674 of cash fixed costs for a total cash cost of $2,958 per acre.

A positive cash flow begins in year 4 with gross income exceeding total cash costs by $402 per acre. When full production is reached, six years after planting, the orchard does not return sufficient gross income to pay all previous years' costs. There is $6,147 per acre remaining over and above prior costs and its not until year 8 that all prior years' cash production costs are paid, Figure 1, page 9.

Figure 2 on page 9 shows the major cost components in relation to total cash costs. Hired labor represents 37 percent of the total cash costs to establish this orchard. Machine costs, which include fuel, oil and repairs, is 13 percent and tree cost is the third largest cost item with 12 percent of the total cash costs. Fertilizer and chemicals are 9 percent for the cash costs and the remaining cost items encompass 29 percent of the total cash costs.

Economic Costs and Returns

Table 6 details the economic costs and returns for the establishment of a high-density orchard. 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. Moreover, fixed machine costs, shop depreciation and interest, labor housing, land interest costs and interest for previous year's establishment costs, are included as well. Here, gross income exceeds variable costs beginning in Year 4. However, at the end of the establishment period $20,380 per acre remains to repay all previous establishment costs. This cost is amortized over a 25-year period as an annual payment of $2,516 per acre as shown in Table 13, Full Production Years, page 17.

Figure 3 shows the cost components in relation to total economic costs. Even when all economic costs are included hired labor remains the largest cost component with 29 percent of the total economic costs for the first 6 years of establishment. Interest costs are the second highest cost item with 24 percent of the total. Machine costs (fuel, oil, repairs, depreciation and interest charges) are the third largest cost item at 14 percent of the total costs. Fertilizer and chemicals are 7 percent and land charges 6 percent of the total costs. The remaining cost items are only 20 percent of the total economic costs. Figure 1 shows the cumulative cash and economic costs in establishing a high-density orchard. This orchard will generate sufficient gross income to cover all cash costs in year 8 and all economic costs for the 25-year period in 14 years, Figure 1, page 9.

Table 5. Cash Costs and Returns of Establishing a High Density Sweet Cherry Orchard.							
Income:	**Year 0**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Full Prod**
Yield (Pounds/Acre)	0.00	0.00	0.00	1,000.00	5,000.00	10,000.00	14,000.00
Price (Dollars/Pound)	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Total **Gross** Income (Dollars/Ac)	0	0	0	850.00	4,250.00	8,500.00	11,900.00
Variable Costs:							
Field Preparation	$1,053.85	$30.00	$0.00	$0.00	$0.00	$0.00	$0.00
Trees	0	3,570.00	21.00	21.00	21.00	21.00	21.00
Irrigation System	0	1,250.00	0	0	0	0	0
Paint Trees	0	40.00	0	40.00	0	0	0
Fertilizer	222.00	20.00	34.00	148.00	168.00	168.00	168.00
Chemicals	605.00	16.67	16.67	297.17	332.17	369.67	369.67
Bee Rental	0	0	0	36.00	72.00	72.00	72.00
Rodent Materials	0	20.00	20.00	20.00	20.00	20.00	20.00
Harvest Labor	0	0	0	319.00	1,319.00	2,569.00	3,569.00
General Labor	121.19	1,503.28	494.84	614.74	431.49	546.49	661.49
Machine Costs	158.88	1,233.36	263.63	567.68	577.82	577.82	577.82
Housing Facilities	0	0	0	33.02	33.02	33.02	33.02
Miscellaneous and Overhead	75.00	75.00	75.00	75.00	75.00	75.00	75.00
Interest: Operating Capital	48.21	139.18	20.54	46.32	64.98	94.78	118.48
Total **Variable** Costs	2,284.13	7,897.49	945.67	2,217.93	3,114.47	4,546.78	5,685.47
Gross Income - Variable Cost	-2,284.13	-7,897.49	-945.67	-1,367.93	1,135.53	3,953.22	6,214.53
Fixed Costs:							
Insurance	$70.57	$70.57	$70.57	$70.57	$70.57	$70.57	$70.57
Water Assessment	175.00	175.00	175.00	175.00	175.00	175.00	175.00
Farm Foreman	368.00	368.00	368.00	368.00	368.00	368.00	368.00
Helicopter - remove water	0.00	0.00	0.00	60.00	60.00	60.00	60.00
Property Taxes	60.00	60.00	60.00	60.00	60.00	60.00	60.00
Total **Fixed** Cost	673.57	673.57	673.57	733.57	733.57	733.57	733.57
Total Cost	2,957.71	8,571.06	1,619.25	2,951.50	3,848.05	5,280.35	6,419.04
Net Projected Returns	-2,957.71	-8,571.06	-1,619.25	-2,101.50	401.95	3,219.65	5,480.96
Cumulative Returns	-2,957.71	-11,528.77	-13,148.01	-15,249.51	-14,847.56	-11,627.91	-6,146.95

Table 6. Economic Costs and Returns of Establishing a High Density Sweet Cherry Orchard.

Income:	**Year 0**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Full Prod**
Yield (Pounds/Acre)	0.00	0.00	0.00	1,000.00	5,000.00	10,000.00	14,000.00
Price (Dollars/Pound)	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Total **Gross** Income(Dollars/Ac)	0.00	0.00	0.00	850.00	4,250.00	8,500.00	11,900.00
Variable Costs:							
Field Preparation	$1,053.85	$30.00	$0.00	$0.00	$0.00	$0.00	$0.00
Trees	0.00	3,570.00	21.00	21.00	21.00	21.00	21.00
Paint Trees	0.00	40.00	0.00	40.00	0.00	0.00	0.00
Fertilizer	222.00	20.00	34.00	148.00	168.00	168.00	168.00
Chemicals	605.00	16.67	16.67	297.17	332.17	378.00	378.00
Bee Rental	0.00	0.00	0.00	36.00	72.00	72.00	72.00
Rodent Materials	0.00	20.00	20.00	20.00	20.00	20.00	20.00
Harvest Labor	0.00	0.00	0.00	319.00	1,319.00	2,569.00	3,569.00
General Labor	121.19	1,503.28	494.84	614.74	431.49	546.49	661.49
Machine Costs	158.88	1,233.36	263.63	567.68	577.82	577.82	577.82
Housing Facilities	0.00	0.00	0.00	33.02	33.02	33.02	33.02
Miscellaneous and Overhead	75.00	75.00	75.00	75.00	75.00	75.00	75.00
Interest: Operating Capital	48.21	139.18	20.54	46.32	64.98	94.78	118.48
Total **Variable** Costs	2,284.13	6,647.49	945.67	2,217.93	3,114.47	4,555.11	5,693.80
Gross Income - Variable Cost	-2,284.13	-6,647.49	-945.67	-1,367.93	1,135.53	3,944.89	6,206.20
Fixed Costs:							
Insurance	$70.57	$70.57	$70.57	$70.57	$70.57	$70.57	$70.57
Water Assessment	175.00	175.00	175.00	175.00	175.00	175.00	175.00
Farm Foreman	368.00	368.00	368.00	368.00	368.00	368.00	368.00
Helicopter - Remove water	0.00	0.00	0.00	60.00	60.00	60.00	60.00
Property Taxes	60.00	60.00	60.00	60.00	60.00	60.00	60.00
Machine Costs	71.81	436.98	239.32	379.04	381.11	381.11	381.11
Housing Facilties	91.67	91.67	91.67	91.67	91.67	91.67	91.67
Land Interest Cost	400.00	400.00	400.00	400.00	400.00	400.00	400.00
Interest on Estab. Costs	0.00	355.42	1,220.07	1,581.23	2,037.41	2,289.07	2,270.88
Total **Fixed** Cost	1,237.05	1,957.63	2,624.63	3,185.51	3,643.76	3,895.42	3,877.23
Total Cost	3,521.18	8,605.12	3,570.30	5,403.44	6,758.23	8,450.53	9,571.03
Net Projected Returns	-3,521.18	-8,605.12	-3,570.30	-4,553.44	-2,508.23	49.47	2,328.97
Cumulative Returns	-3,521.18	-12,126.30	-15,696.60	-20,250.04	-22,758.27	-22,708.80	-20,379.83

Figure 1. Economic and Cash Costs of Establishment of a High-Density Sweet Cherry Orchard in Wasco County

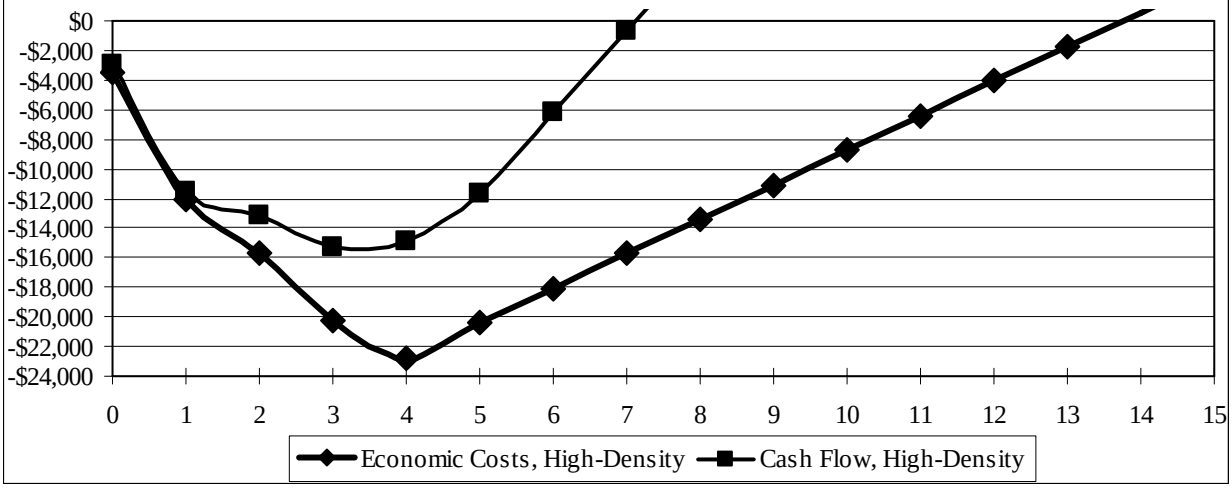


Figure 2. Cash Costs to Establish a High Density Sweet Cherry Orchard the First Six Years of Establishment.

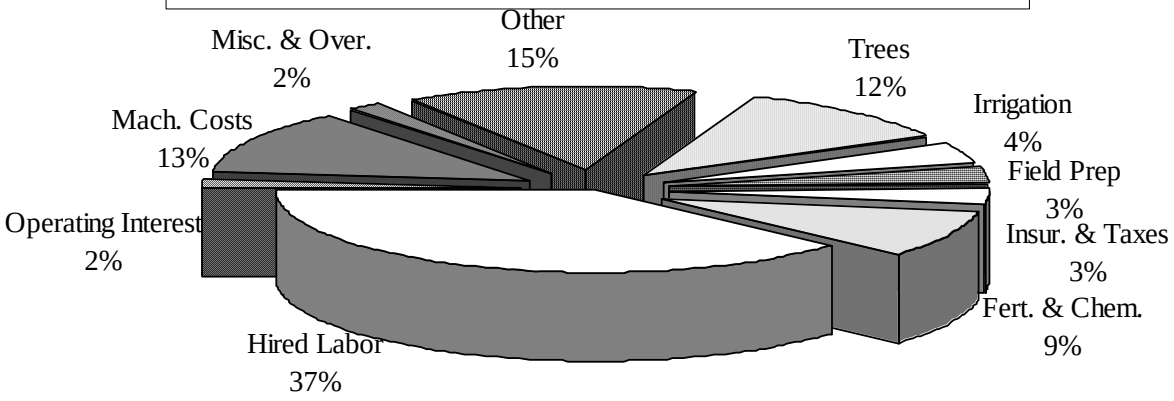
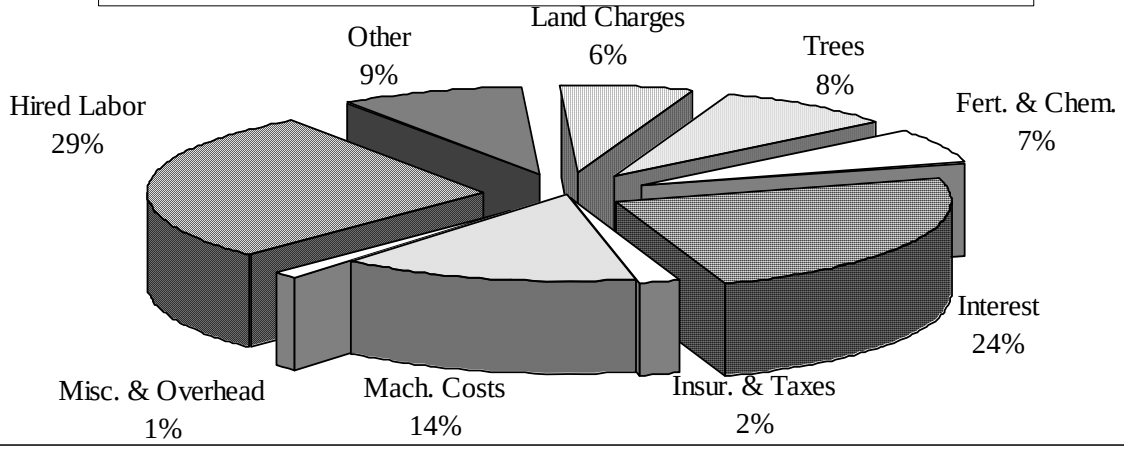


Figure 3. Economic Costs to Establish a High Density Sweet Cherry Orchard the First Six Years of Establishment.



Conclusions

In the past, most growers renewed orchards only when production levels no longer covered the cost of production. Today, however, technological advances in fruit, rootstock, and training system attributes can result in greater gross revenues and increased interest in replacing old stands with a modern high-density orchard.

High-density orchards can offer higher returns that are obtained earlier in the life of the orchard. These early returns reduce interest costs that can greatly impact the profitability and feasibility of an orchard investment. The trade off, however, is higher financial risk due to larger up-front costs and significantly greater management expertise requirements. In contrast, there are many reasons to consider planting a standard-density orchard, such as lower establishment costs and a return on investment greater than the cost of borrowing money. So this alternative is also attractive. Growers must evaluate all possible options and circumstances in orchard establishment that complement and strengthen their overall business plan.

This cost of establishment study is meant to provide useful information to sweet cherry producers who are considering replacing an existing orchard or planting a new block. However, like any other enterprise budget, putting your own current costs in the budget will 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 high-density sweet cherries can also be downloaded by clicking on Oregon under "Ready-to-use budget files for CPA and ECL," and then clicking on Cherry 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 decided if the potential investment is likely to be economical feasible to or not.

APPENDIX A

Enterprise Budgets for High-Density Sweet Cherry Orchard in Wasco County

Table 7. Year 0, Sweet Cherry Orchard, High Density, $/Acre Economic Costs and Returns.

VARIABLE CASH COSTS	Description	Labor	Machinery	Materials	Total
Remove trees, roots, and rip (2x)	Custom	$0.00	$0.00	$1,000.00	$1,000.00
Disc	4.0 appl.	26.00	47.45	0.00	73.45
Staking	340.0 stakes	92.00	0.00	10.20	102.20
Soil Sampling	1.0 x/acre	0.00	0.00	43.65	43.65
Fertilizer (broadcast applied)	1.0 appl.	3.19	5.27	68.00	76.46
Lime (2 ton x 77.00=154.00)	Custom	0.00	0.00	154.00	154.00
Fumigation	Custom	0.00	0.00	605.00	605.00
Pickup, Truck & ATV	1.0 x/acre	0.00	106.16	0.00	106.16
Housing Facilities	1.0 x/acre	0.00	0.00	33.02	33.02
Miscellaneous and Overhead	1.0 x/acre	0.00	0.00	75.00	75.00
Interest: Operating Capital	6.0 mons	0.00	0.00	48.21	48.21
Total **variable** costs		121.19	158.88	2,037.09	2,317.16

FIXED NON-CASH COSTS	Unit	Total
Pickup, Truck & ATV Insurance	acre	20.57
Water Assessment	acre	175.00
Farm Foreman	acre	368.00
Property Insurance	acre	50.00
Property Taxes	acre	60.00
Total **cash** costs		673.57

FIXED CASH COSTS	Unit	Total
Machinery and Equip. Insurance, Depreciation & Interest	acre	13.30
Pickup, Truck & ATV Depreciation & Interest	acre	58.51
Housing Facilities	acre	91.67
Land Interest Charge	acre	400.00
Total **non-cash** costs		563.47
Total **fixed** costs		1,237.05

Total of All Costs Per Acre	**$3,554.20**

Table 8. Year 1, Sweet Cherry Orchard, High Density, $/Acre Economic Costs and Returns.

VARIABLE CASH COSTS	Description		Labor	Machinery	Materials	Total
Dig holes	14.0	hours	$343.00	$286.18	$0.00	$629.18
Planting trees	36.0	hours	882.00	730.07	3,570.00	5,182.07
Painting trees	7.0	hours	80.50	0.00	40.00	120.50
Training trees	7.0	hours	80.50	0.00	0.00	80.50
Fertilizer (hand applied)	1.5	hours	17.25	0.00	20.00	37.25
Herbicide strip maintenance (.20x)	2.0	appl.	10.21	16.61	16.67	43.49
ATV herbicide maintenance (.20x)	1.0	appl.	3.57	1.29	8.33	13.20
Seed Cover Crop (Companion Grass)	20.0	Lbs	6.50	16.64	30.00	53.14
Mowing & Flailing Orchard Floor	2.0	times	32.07	63.73	0.00	95.80
Rodent Control	1.0	hours	7.43	2.68	20.00	30.10
Irrigation	3.5	hours	40.25	10.00	0.00	50.25
Pickup, Truck & ATV	1.0	x/acre	0.00	106.16	0.00	106.16
Housing Facilities	1.0	x/acre	0.00	0.00	33.02	33.02
Miscellaneous and Overhead	1.0	x/acre	0.00	0.00	75.00	75.00
Interest: Operating Capital	6.0	mons	0.00	0.00	139.18	139.18
Total **variable** costs			1,503.28	1,233.36	3,952.20	6,688.84

FIXED CASH COSTS	Unit	Total
Pickup, Truck & ATV Insurance	acre	20.57
Water Assessment	acre	175.00
Farm Foreman	acre	368.00
Property Insurance	acre	50.00
Property Taxes	acre	60.00
Total **cash** costs		673.57

FIXED NON-CASH COSTS	Unit	Total
Machinery and Equip. Insurance, Depreciation & Interest	acre	378.47
Pickup, Truck & ATV Depreciation & Interest	acre	58.51
Housing Facilities	acre	91.67
Land Interest Charge	acre	400.00
Prior Year's Establishment Costs	acre	355.42
Total **non-cash** costs		1,284.06
Total **fixed** costs		1,957.63

Total of All Costs Per Acre	**$8,646.48**

Table 9. Year 2, Sweet Cherry Orchard, High Density, $/Acre Economic Costs and Returns.						
VARIABLE CASH COSTS	**Description**		**Labor**	**Machinery**	**Materials**	**Total**
Training trees	30.0	hours	$345.00	$0.00	$0.00	$345.00
Tree Removal & Tree Replacement	0.5	hours	12.25	10.30	21.00	43.55
Shredding Brush	1.0	x/acre	13.40	26.43	0.00	39.83
Fertilizer (hand applied)	1.5	hours	17.25	0.00	34.00	51.25
Herbicide strip maintenance (.20x)	2.0	appl.	10.21	16.61	16.67	43.49
ATV herbicide maintenance (.20x)	1.0	appl.	3.57	1.29	8.33	13.20
Mowing & Flailing Orchard Floor	4.0	times	45.47	90.16	0.00	135.63
Rodent Control	1.0	hours	7.43	2.68	20.00	30.10
Irrigation	3.5	hours	40.25	10.00	0.00	50.25
Pickup, Truck & ATV	1.0	x/acre	0.00	106.16	0.00	106.16
Housing Facilities	1.0	x/acre	0.00	0.00	33.02	33.02
Miscellaneous and Overhead	1.0	x/acre	0.00	0.00	75.00	75.00
Interest: Operating Capital	6.0	mons	0.00	0.00	20.54	20.54
Total **variable** costs			494.84	263.63	228.56	987.03

FIXED CASH COSTS	**Unit**	**Total**
Pickup, Truck & ATV Insurance	acre	20.57
Water Assessment	acre	175.00
Farm Foreman	acre	368.00
Property Insurance	acre	50.00
Property Taxes	acre	60.00
Total **cash** costs		673.57

FIXED NON-CASH COSTS	**Unit**	**Total**
Machinery and Equip. Insurance, Depreciation & Interest	acre	180.81
Pickup, Truck & ATV Depreciation & Interest	acre	58.51
Housing Facilities	acre	91.67
Land Interest Charge	acre	400.00
Prior Year's Establishment Costs	acre	1,220.07
Total **non-cash** costs		1,951.05
Total **fixed** costs		2,624.63

Total of All Costs Per Acre	**$3,611.65**

Table 10. Year 3, Sweet Cherry Orchard, High Density, $/Acre Economic Costs and Returns.

GROSS INCOME	Quantity	Unit	$/Unit	Total	Price/Lb
Sweet Cherries	1,000	pounds	0.85	850.00	0.85
Total **gross** income				850.00	0.85

VARIABLE CASH COSTS	Description		Labor	Machinery	Materials	Total	Cost/Lb
Pruning trees	27.0	hours	$310.50	$0.00	$0.00	$310.50	$0.311
Painting trees	10.0	hours	115.00	0.00	40.00	155.00	0.155
Tree Removal & Tree Replacement	0.5	hours	12.25	10.30	21.00	43.55	0.044
Shredding Brush	1.0	x/acre	13.40	26.43	0.00	39.83	0.040
Fertilizer (broadcast applied)	2.0	appl.	6.38	10.53	68.00	84.92	0.085
Fertilizer (foliar applied)	1.0	x/acre	0.00	0.00	80.00	80.00	0.080
Herbicide strip maintenance (.20x)	2.0	appl.	10.21	16.61	16.67	43.49	0.043
ATV herbicide maintenance (.20x)	1.0	appl.	3.57	1.29	8.33	13.20	0.013
Disease Control	5.0	appl.	41.89	112.13	120.00	274.02	0.274
Insecticides, ground applied	1.0	appl.	8.38	22.43	70.00	100.80	0.101
Insecticides, aerial applied	1.0	appl.	0.00	0.00	67.50	67.50	0.068
Growth Regulators	1.0	x/acre	0.00	0.00	23.00	23.00	0.023
Bee Rental	1.0	hives	0.00	0.00	36.00	36.00	0.036
Mowing & Flailing Orchard Floor	4.0	times	45.47	90.16	0.00	135.63	0.136
Rodent Control	1.0	hours	7.43	2.68	20.00	30.10	0.030
Irrigation	3.5	hours	40.25	10.00	0.00	50.25	0.050
Ladders, Pruning, & Picking Equip.	1.0	x/acre	0.00	18.38	0.00	18.38	0.018
Harvesting Costs	6.0	hours	319.00	140.58	0.00	459.58	0.460
Pickup, Truck & ATV	1.0	x/acre	0.00	106.16	0.00	106.16	0.106
Housing Facilities	1.0	x/acre	0.00	0.00	33.02	33.02	0.033
Miscellaneous and Overhead	1.0	x/acre	0.00	0.00	75.00	75.00	0.075
Interest: Operating Capital	6.0	mons	0.00	0.00	46.32	46.32	0.046
Total **variable** costs			933.74	567.68	724.85	2,226.26	2.226

FIXED CASH COSTS	Unit	Total	Cost/Lb
Pickup, Truck & ATV Insurance	acre	20.57	0.021
Water Assessment	acre	175.00	0.175
Farm Foreman	acre	368.00	0.368
Helicopter - Remove water	acre	60.00	0.060
Property Insurance	acre	50.00	0.050
Property Taxes	acre	60.00	0.060
Total **cash** costs		733.57	0.734

FIXED NON-CASH COSTS	Unit	Total	Cost/Lb
Machinery and Equip. Insurance, Depreciation & Interest	acre	320.53	0.321
Pickup, Truck & ATV Depreciation & Interest	acre	58.51	0.059
Housing Facilities	acre	91.67	0.092
Land Interest Charge	acre	400.00	0.400
Prior Year's Establishment Costs	acre	1,581.23	1.581
Total **non-cash** costs		2,451.94	2.452
Total **fixed** costs		3,185.51	3.186
Total of All Costs Per Acre		**$5,411.77**	**$5.412**
Net Projected Returns		**($4,561.77)**	**($4.562)**

Table 11. Year 4, Sweet Cherry Orchard, High Density, $/Acre Economic Costs and Returns.

GROSS INCOME	Quantity	Unit	$/Unit	Total	Price/Lb
Sweet Cherries	5,000	pounds	0.85	4,250.00	0.85
Total **gross** income				4,250.00	0.85

VARIABLE CASH COSTS	Description		Labor	Machinery	Materials	Total	Cost/Lb
Pruning trees	20.0	hours	$230.00	$0.00	$0.00	$230.00	$0.046
Tree Removal & Tree Replacement	1.0	hours	24.50	20.44	21.00	65.94	0.013
Shredding Brush	1.0	x/acre	13.40	26.43	0.00	39.83	0.008
Fertilizer (broadcast applied)	2.0	appl.	6.38	10.53	68.00	84.92	0.017
Fertilizer (foliar applied)	1.0	x/acre	0.00	0.00	100.00	100.00	0.020
Herbicide strip maintenance (.25x)	2.0	appl.	10.21	16.61	16.67	43.49	0.009
ATV herbicide maintenance (.25x)	1.0	appl.	3.57	1.29	8.33	13.20	0.003
Disease Control	5.0	appl.	41.89	112.13	120.00	274.02	0.055
Insecticides, ground applied	1.0	appl.	8.38	22.43	100.00	130.80	0.026
Insecticides, aerial applied	5.0	appl.	0.00	0.00	67.50	67.50	0.014
Growth Regulators	1.0	x/acre	0.00	0.00	28.00	28.00	0.006
Bee Rental	2.0	hives	0.00	0.00	72.00	72.00	0.014
Mowing & Flailing Orchard Floor	4.0	times	45.47	90.16	0.00	135.63	0.027
Rodent Control	1.0	hours	7.43	2.68	20.00	30.10	0.006
Irrigation	3.5	hours	40.25	10.00	0.00	50.25	0.010
Ladders, Pruning, & Picking Equip.	1.0	x/acre	0.00	18.38	0.00	18.38	0.004
Harvesting Costs	6.0	hours	1,319.00	140.58	0.00	1,459.58	0.292
Pickup, Truck & ATV	1.0	x/acre	0.00	106.16	0.00	106.16	0.021
Housing Facilities	1.0	x/acre	0.00	0.00	33.02	33.02	0.007
Miscellaneous and Overhead	1.0	x/acre	0.00	0.00	75.00	75.00	0.015
Interest: Operating Capital	6.0	mons	0.00	0.00	64.98	64.98	0.013
Total **variable** costs			1,750.49	577.82	794.50	3,122.81	0.625

FIXED CASH COSTS	Unit	Total	Cost/Lb
Pickup, Truck & ATV Insurance	acre	20.57	0.004
Water Assessment	acre	175.00	0.035
Farm Foreman	acre	368.00	0.074
Helicopter - Remove water	acre	60.00	0.012
Property Insurance	acre	50.00	0.010
Property Taxes	acre	60.00	0.012
Total **cash** costs		733.57	0.147

FIXED NON-CASH COSTS	Unit	Total	Cost/Lb
Machinery and Equip. Insurance, Depreciation & Interest	acre	322.60	0.065
Pickup, Truck & ATV Depreciation & Interest	acre	58.51	0.012
Housing Facilities	acre	91.67	0.018
Land Interest Charge	acre	400.00	0.080
Prior Year's Establishment Costs	acre	2,037.41	0.407
Total **non-cash** costs		2,910.19	0.582
Total **fixed** costs		3,643.76	0.729

Total of All Costs Per Acre	**$6,766.57**	**$1.353**
Net Projected Returns	**($2,516.57)**	**($0.503)**

Table 12. Year 5, Sweet Cherry Orchard, High Density, $/Acre Economic Costs and Returns

GROSS INCOME	Quantity	Unit	$/Unit	Total	Price/Lb
Sweet Cherries	10,000	pounds	0.85	8,500.00	0.85
Total **gross** income				8,500.00	0.85

VARIABLE CASH COSTS	Description		Labor	Machinery	Materials	Total	Cost/Lb
Pruning trees	30.0	hours	$345.00	$0.00	$0.00	$345.00	$0.035
Tree Removal & Tree Replacement	1.0	hours	24.50	20.44	21.00	65.94	0.007
Shredding Brush	1.0	x/acre	13.40	26.43	0.00	39.83	0.004
Fertilizer (broadcast applied)	2.0	appl.	6.38	10.53	68.00	84.92	0.008
Fertilizer (foliar applied)	1.0	x/acre	0.00	0.00	100.00	100.00	0.010
Herbicide strip maintenance (.30x)	2.0	appl.	10.21	16.61	16.67	43.49	0.004
ATV herbicide maintenance (.30x)	1.0	appl.	3.57	1.29	8.33	13.20	0.001
Disease Control	5.0	appl.	41.89	112.13	120.00	274.02	0.027
Insecticides, ground applied	1.0	appl.	8.38	22.43	127.50	158.30	0.016
Insecticides, aerial applied	5.0	appl.	0.00	0.00	67.50	67.50	0.007
Growth Regulators	1.0	x/acre	0.00	0.00	38.00	38.00	0.004
Bee Rental	2.0	hives	0.00	0.00	72.00	72.00	0.007
Mowing & Flailing Orchard Floor	4.0	times	45.47	90.16	0.00	135.63	0.014
Rodent Control	1.0	hours	7.43	2.68	20.00	30.10	0.003
Irrigation	3.5	hours	40.25	10.00	0.00	50.25	0.005
Ladders, Pruning, & Picking Equip.	1.0	x/acre	0.00	18.38	0.00	18.38	0.002
Harvesting Costs	6.0	hours	2,569.00	140.58	0.00	2,709.58	0.271
Pickup, Truck & ATV	1.0	x/acre	0.00	106.16	0.00	106.16	0.011
Housing Facilities	1.0	x/acre	0.00	0.00	33.02	33.02	0.003
Miscellaneous and Overhead	1.0	x/acre	0.00	0.00	75.00	75.00	0.008
Interest: Operating Capital	6.0	mons	0.00	0.00	94.78	94.78	0.009
Total **variable** income			3,115.49	577.82	861.80	4,555.11	0.456

FIXED CASH COSTS	Unit	Total	Cost/Lb
Pickup, Truck & ATV Insurance	acre	20.57	0.002
Water Assessment	acre	175.00	0.018
Farm Foreman	acre	368.00	0.037
Helicopter - Remove water	acre	60.00	0.006
Property Insurance	acre	50.00	0.005
Property Taxes	acre	60.00	0.006
Total **cash** costs		733.57	0.073

FIXED NON-CASH COSTS	Unit	Total	Cost/Lb
Machinery and Equip. Insurance, Depreciation & Interest	acre	322.60	0.032
Pickup, Truck & ATV Depreciation & Interest	acre	58.51	0.006
Housing Facilities	acre	91.67	0.009
Land Interest Charge	acre	400.00	0.040
Prior Year's Establishment Costs	acre	2,289.07	0.229
Total **non-cash** costs		3,161.84	0.316
Total **fixed** costs		3,895.42	0.390

Total of All Costs Per Acre	**$8,450.53**	**$0.845**
Net Projected Returns	**$49.47**	**$0.005**

Table 13. Full Production, Sweet Cherry Orchard, High Density, $/Acre Economic Costs and Returns

GROSS INCOME	Quantity	Unit	$/Unit	Total	Price/Lb
Sweet Cherries	14,000	pounds	0.85	11,900.00	0.85
Total **gross** income				11,900.00	0.85

VARIABLE CASH COSTS	Description		Labor	Machinery	Materials	Total	Cost/Lb
Pruning trees	40.0	hours	$460.00	$0.00	$0.00	$460.00	$0.0329
Tree Removal & Tree Replacement	1.0	hours	24.50	20.44	21.00	65.94	0.0047
Shredding Brush	1.0	x/acre	13.40	26.43	0.00	39.83	0.0028
Fertilizer (broadcast applied)	2.0	appl.	6.38	10.53	68.00	84.92	0.0061
Fertilizer (foliar applied)	1.0	x/acre	0.00	0.00	100.00	100.00	0.0071
Herbicide strip maintenance (.30x)	2.0	appl.	10.21	16.61	16.67	43.49	0.0031
ATV herbicide maintenance (.30x)	1.0	appl.	3.57	1.29	8.33	13.20	0.0009
Disease Control	5.0	appl.	41.89	112.13	120.00	274.02	0.0196
Insecticides, ground applied	1.0	appl.	8.38	22.43	127.50	158.30	0.0113
Insecticides, aerial applied	5.0	appl.	0.00	0.00	67.50	67.50	0.0048
Growth Regulators	1.0	x/acre	0.00	0.00	38.00	38.00	0.0027
Bee Rental	2.0	hives	0.00	0.00	72.00	72.00	0.0051
Mowing & Flailing Orchard Floor	4.0	times	45.47	90.16	0.00	135.63	0.0097
Rodent Control	1.0	hours	7.43	2.68	20.00	30.10	0.0022
Irrigation	3.5	hours	40.25	10.00	0.00	50.25	0.0036
Ladders, Pruning, & Picking Equip.	1.0	x/acre	0.00	18.38	0.00	18.38	0.0013
Harvesting Costs	6.0	hours	3,569.00	140.58	0.00	3,709.58	0.2650
Pickup, Truck & ATV	1.0	x/acre	0.00	106.16	0.00	106.16	0.0076
Housing Facilities	1.0	x/acre	0.00	0.00	33.02	33.02	0.0024
Miscellaneous and Overhead	1.0	x/acre	0.00	0.00	75.00	75.00	0.0054
Interest: Operating Capital	6.0	mons	0.00	0.00	118.48	118.48	0.0085
Total **variable** costs			4,230.49	577.82	885.50	5,693.80	0.4067

FIXED CASH COSTS	Unit	Total	Cost/Lb
Pickup, Truck & ATV Insurance	acre	20.57	0.0015
Water Assessment	acre	175.00	0.0125
Farm Foreman	acre	368.00	0.0263
Helicopter - Remove water	acre	60.00	0.0043
Property Insurance	acre	50.00	0.0036
Property Taxes	acre	60.00	0.0043
Total **cash** costs		733.57	0.0524

FIXED NON-CASH COSTS	Unit	Total	Cost/Lb
Machinery and Equip. Insurance, Depreciation & Interest	acre	322.60	0.0230
Pickup, Truck & ATV Depreciation & Interest	acre	58.51	0.0042
Housing Facilities	acre	91.67	0.0065
Land Interest Charge	acre	400.00	0.0286
Amortized Establishment Costs	acre	2,516.37	0.1797
Total **non-cash** costs		3,389.15	0.2421
Total **fixed** costs		4,122.72	0.2945

Total of all costs per acre	**$9,816.52**	**$0.7012**
Net projected returns	**$2,083.48**	**$0.1488**