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Orchard Economics:

The Costs and Returns of Establishing and Producing High-Density Sweet Cherries In Wasco County

Tyler West, Rebecca Sullivan, Clark Seavert, and Lynn Long



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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 considering 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. The removal of 2.5 acres of older orchard each year and planting of a high-density sweet cherry orchard. A high-density orchard consists of 340 trees per acre with a 10' x 16' spacing, with 11 percent pollinizer trees.
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 return to grower after packing costs have been subtracted. The full production yield in a high-density orchard is 14,000 pounds. Commercial yields begin in year 3 and full production is reached in year 6.
5. 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,

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- and other labor overhead expenses. All labor is treated as a cash variable expense.
6. Seasonal labor facilities provided by the owner cost \$200,000. 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, allocated across the 100 acres.
 7. 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 both \$4.00 and propane \$2.25 per gallon.
 8. The interest rate on operating funds is 5 percent and treated as a cash expense. One-half of the cash expenses are borrowed for a six-month period.
 9. 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 \$10,000 per acre.
 10. Previous year's establishment costs are funded by the operator at a charge of 8 percent interest and are considered an opportunity cost.
 11. Herbicides used for strip maintenance are applied to 30 percent of each acre in year.
 12. A micro-sprinkler irrigation system with micro-sprinklers is used at an estimated cost of \$1,350 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 5 percent interest rate $((\text{cost} + \text{salvage value}) \div 2 \times .05)$. Repairs and maintenance for the system costs one percent of the purchase price per year.
 13. Additional assumptions for variable, cash fixed, and non-cash fixed cost are listed in Table 4 for the high-density orchard.
 14. Price inflation for the time period of this study is ignored.
 15. 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 | 587 | 10 | \$ 10,338 |
| Tractor | 2 Wheel Dr 50hp, Older | 20,000 | 185 | 20 | 2,566 |
| Air-blast spray | 400 Gallon Unit, PTO | 18,000 | 252 | 10 | 3,183 |
| Flail chopper | 8' Unit | 6,000 | 142 | 7 | 1,531 |
| Flail mower | 8' Unit | 6,000 | 85 | 7 | 1,531 |
| Rotary mower | 9' Unit | 6,000 | 107 | 10 | 1,061 |
| Weed sprayer | 100 Gallon Unit | 2,000 | 145 | 15 | 192 |
| Tank sprayer for ATV | | 1,500 | 145 | 10 | 265 |
| Fertilizer spreader | 16' Unit | 2,300 | 13 | 20 | 120 |
| Gopher machine | 8' Unit | 1,200 | 27 | 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 |
| ATV | 4 Wheeler, New | 5,500 | 3,000 | 5 | 2,465 |
| Auger | | 1,700 | 50 | 20 | 89 |
| Bin trailer | 2 Units, per 100 acres | 7,500 | 300 | 10 | 1,326 |
| Front-End loader and backforks | | 5,800 | 300 | 10 | 1,026 |
| Ladders | 80 Units, per 100 acres | 9,000 | N/A | 10 | N/A |
| Picking buckets | 1,600 Buckets, per 100 acres | 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, Standard-Density | Micro-sprinklers, per acre | 1,200 | N/A | 25 | N/A |
| Irrig. system, High-Density | Micro-sprinklers, per acre | 1,350 | N/A | 25 | N/A |
| Wind machine | 1 unit, propane, per 100 acres | 28,000 | 35 | 25 | 1,321 |
| Shop with tools | 20' x 40', per 100 acres | 30,000 | N/A | 30 | 0 |
| Seasonal housing facilities | 16 Units, per 100 acres | 200,000 | N/A | 30 | 0 |

Table 2. Machinery Cost Calculations

| Machine | Size | --- Variable Costs --- | | --- Fixed Costs --- | | Total Cost |
|---------------------------------|--------------------------------|------------------------|------------------|---------------------|-----------|------------|
| | | Fuel & Lube | Repairs & Maint. | Deprec. & Interest | Insurance | |
| ----- Costs per Hour ----- | | | | | | |
| Tractor | 4 Wheel Dr 75hp, New | \$27.60 | \$0.62 | \$6.52 | \$0.35 | \$35.09 |
| Tractor | 2 Wheel Dr 50hp, Older | 23.00 | 0.52 | 8.36 | 0.55 | 32.43 |
| Air-blast spray | 400 Gallon Unit, PTO | 0.00 | 9.74 | 8.40 | 0.25 | 18.39 |
| Flail chopper | 8' Unit | 0.00 | 2.63 | 6.07 | 0.16 | 8.86 |
| Flail mower | 8' Unit | 0.00 | 1.58 | 10.12 | 0.26 | 11.96 |
| Rotary mower | 9' Unit | 0.00 | 2.89 | 6.61 | 0.20 | 9.70 |
| Weed sprayer | 100 Gallon Unit | 0.00 | 1.04 | 1.28 | 0.05 | 2.36 |
| Tank sprayer for ATV | | 0.00 | 0.69 | 1.22 | 0.04 | 1.94 |
| Fertilizer spreader | 16' Unit | 0.00 | 0.97 | 13.61 | 0.54 | 15.13 |
| Gopher machine | | 0.00 | 0.63 | 3.55 | 0.14 | 4.32 |
| ----- 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 | 0.28 | 0.01 | 1.42 |
| ----- Costs per Acre ----- | | | | | | |
| Auger | | \$0.00 | \$0.16 | \$1.34 | \$0.00 | \$1.50 |
| Bin trailer | 2 Units, per 100 acres | 0.00 | 5.94 | 8.82 | 0.00 | 14.77 |
| Front-End loader and backforks | | 0.00 | 4.60 | 6.82 | 0.00 | 11.42 |
| Ladders | 80 Units, per 100 acres | 0.00 | 5.40 | 11.70 | 0.00 | 17.10 |
| Picking buckets | 1,600 Buckets, per 100 acres | 0.00 | 6.00 | 23.00 | 0.00 | 29.00 |
| Pruning and power saws | 2 Ch, 3PP, 3PS, 3HL, 1PL | 6.90 | 1.80 | 10.90 | 0.00 | 19.60 |
| Irrig. system, Standard-Density | Micro-sprinklers, per acre | 0.00 | 12.00 | 84.00 | 0.00 | 96.00 |
| Irrig. system, High-Density | Micro-sprinklers, per acre | 0.00 | 13.50 | 94.50 | 0.00 | 108.00 |
| Wind machine | 1 unit, propane, per 100 acres | 10.87 | 5.17 | 28.26 | 0.00 | 44.30 |
| Shop with tools | 20' x 40', per 100 acres | 0.00 | 7.95 | 28.00 | 0.00 | 35.95 |
| Seasonal housing facilities | 16 Units, per 100 acres | 0.00 | 53.00 | 146.67 | 0.00 | 199.67 |

Table 3. Estimated Cost of Each Operation with Power-Unit in a High-Density Sweet Cherry Orchard.

| Operation | Tractor | Miles per hour | Acres per hour | Labor cost per acre | -- Machine Costs -- | | |
|----------------------|------------------------|----------------|----------------|---------------------|------------------------|---------------------|---------------------|
| | | | | | Variable cost per acre | Fixed cost per acre | Total cost per acre |
| Air-blast spray | 4 Wheel Dr 75hp, New | 3.00 | 3.49 | \$ 3.72 | \$ 10.87 | \$ 4.45 | \$ 19.04 |
| Flail chopper | 4 Wheel Dr 75hp, New | 1.50 | 1.24 | 10.51 | 24.95 | 10.60 | 46.06 |
| Flail mower | 4 Wheel Dr 75hp, New | 2.50 | 2.06 | 6.31 | 14.46 | 8.37 | 29.14 |
| Rotary mower | 4 Wheel Dr 75hp, New | 3.00 | 2.47 | 5.26 | 12.58 | 5.53 | 23.37 |
| Weed sprayer | 2 Wheel Dr 50hp, Older | 2.50 | 1.82 | 7.15 | 13.50 | 5.63 | 26.28 |
| Tank sprayer for ATV | ATV | 2.50 | 1.82 | 7.15 | 3.48 | 1.50 | 12.12 |
| Fertilizer spreader | 2 Wheel Dr 50hp, Older | 4.00 | 13.19 | 0.99 | 1.86 | 1.75 | 4.59 |
| Gopher machine | 2 Wheel Dr 50hp, Older | 2.00 | 3.30 | 3.94 | 7.32 | 3.82 | 15.09 |

Table 4. Input Assumptions to Establish a High-Density Cherry Orchard, 2011, (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 general orchard labor, per hour | \$11.50 | \$11.50 | \$11.50 | \$11.50 | \$11.50 | \$11.50 | \$11.50 |
| Cost of skilled workers, per hour | \$13.00 | \$13.00 | \$13.00 | \$13.00 | \$13.00 | \$13.00 | \$13.00 |
| Cost of supervisors, per hour | \$16.00 | \$16.00 | \$16.00 | \$16.00 | \$16.00 | \$16.00 | \$16.00 |
| Cost of harvest, labor, per lb ¹ | \$0.25 | \$0.25 | \$0.25 | \$0.25 | \$0.25 | \$0.25 | \$0.25 |
| Cost of harvest, equipment & fuel, per lb ¹ | \$0.02 | \$0.02 | \$0.02 | \$0.02 | \$0.02 | \$0.02 | \$0.02 |
| Cost of harvest, housing maintenance, per lb ¹ | \$0.03 | \$0.03 | \$0.03 | \$0.03 | \$0.03 | \$0.03 | \$0.03 |
| Hours of pruning labor | 0.00 | 0.00 | 0.00 | 0.00 | 10.00 | 15.00 | 40.00 |
| Hours of training labor | 0.00 | 7.00 | 15.00 | 13.50 | 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 | 5.50 | 5.50 | 5.50 | 5.50 | 5.50 | 5.50 |
| Hours to remove & replace tree labor | 0.00 | 0.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 |
| Hours for rodent control labor | 0.00 | 3.75 | 3.75 | 3.75 | 3.75 | 3.75 | 3.75 |
| Cost of irrigation monitoring | \$0.00 | \$40.00 | \$40.00 | \$40.00 | \$40.00 | \$40.00 | \$40.00 |
| Cost of fertilizer - broadcast applied | \$0.00 | \$32.00 | \$55.00 | \$110.00 | \$110.00 | \$110.00 | \$110.00 |
| Cost of fertilizer - foliar applied | \$0.00 | \$0.00 | \$50.00 | \$100.00 | \$110.00 | \$110.00 | \$110.00 |
| Cost of herbicide - strip maintenance | \$0.00 | \$125.00 | \$125.00 | \$125.00 | \$125.00 | \$125.00 | \$125.00 |
| Cost of disease control | \$0.00 | \$0.00 | \$0.00 | \$150.00 | \$150.00 | \$150.00 | \$150.00 |
| Cost of insecticides - ground applications | \$0.00 | \$0.00 | \$0.00 | \$85.00 | \$115.00 | \$143.00 | \$143.00 |
| Cost of insecticides - aerial applications | \$0.00 | \$0.00 | \$0.00 | \$80.00 | \$80.00 | \$80.00 | \$80.00 |
| Cost of growth regulators | \$0.00 | \$0.00 | \$0.00 | \$25.00 | \$25.00 | \$35.00 | \$35.00 |
| Cost of rodent materials | \$0.00 | \$10.00 | \$10.00 | \$10.00 | \$10.00 | \$10.00 | \$10.00 |
| Cost per bee hive | \$0.00 | \$0.00 | \$0.00 | \$44.00 | \$44.00 | \$44.00 | \$44.00 |
| Times for fertilizer - broadcast applied | 0.00 | 0.00 | 0.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Times for herbicide strip spray - tractor | 0.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 |
| Times for herbicide strip spray - ATV | 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 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| Times for insecticides - aerial | 0.00 | 0.00 | 0.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| Times for applying rodent control | 0.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Number of bee hives per acre | 0.00 | 0.00 | 0.00 | 1.00 | 2.00 | 2.00 | 2.00 |
| Times for flailing chopping orchard floor | 0.00 | 0.00 | 1.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Times for clail mowing orchard floor | 0.00 | 1.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Times for rotary m owing orchard floor | 0.00 | 1.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 |
| Property taxes, including buildings | \$60 | \$60 | \$60 | \$60 | \$60 | \$60 | \$60 |
| Property insurance | \$35 | \$35 | \$35 | \$35 | \$35 | \$35 | \$35 |
| Land values | \$10,000 | \$10,000 | \$10,000 | \$10,000 | \$10,000 | \$10,000 | \$10,000 |
| Irrigation assessment | \$160 | \$160 | \$160 | \$160 | \$160 | \$160 | \$160 |
| Helicopter - remove water from trees, per acre | \$0.00 | \$0.00 | \$75.00 | \$75.00 | \$75.00 | \$75.00 | \$75.00 |
| Miscellaneous | \$125.00 | \$125.00 | \$125.00 | \$125.00 | \$125.00 | \$125.00 | \$125.00 |
| Tree cost | \$0.00 | \$10.50 | \$10.50 | \$10.50 | \$10.50 | \$10.50 | \$10.50 |
| Gasoline price | \$4.00 | \$4.00 | \$4.00 | \$4.00 | \$4.00 | \$4.00 | \$4.00 |
| Diesel fuel price | \$4.00 | \$4.00 | \$4.00 | \$4.00 | \$4.00 | \$4.00 | \$4.00 |
| Propane price | \$2.25 | \$2.25 | \$2.25 | \$2.25 | \$2.25 | \$2.25 | \$2.25 |
| Operating interest rate | 5.00% | 5.00% | 5.00% | 5.00% | 5.00% | 5.00% | 5.00% |
| Machinery interest rate | 6.00% | 6.00% | 6.00% | 6.00% | 6.00% | 6.00% | 6.00% |
| Land interest rate | 4.00% | 4.00% | 4.00% | 4.00% | 4.00% | 4.00% | 4.00% |
| Establishment interest rate | 8.00% | 8.00% | 8.00% | 8.00% | 8.00% | 8.00% | 8.00% |
| % of operating capital borrowed | 50.00% | 50.00% | 50.00% | 50.00% | 50.00% | 50.00% | 50.00% |
| Months to borrow operating capital | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 |
| Planted trees | 0 | 340 | 2 | 2 | 2 | 2 | 2 |

¹Harvest costs include picker wages and rental fees for 3 tractors, 1 forklift, and a truck.

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 \$2,449 in the first year with an additional \$279 of cash fixed costs for a total cash cost of \$2,728 per acre.

A positive cash flow begins in year 4 with gross income exceeding total cash costs by \$743 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 \$5,899 per acre remaining over and above prior costs and it's not until year 8 that all prior years' cash production costs are paid, Figure 3, page 9.

Figure 1 on page 9 shows the major cost components in relation to total cash costs. Hired labor represents 40 percent of the total cash costs to establish this orchard. Machine costs, which include fuel, oil and repairs, and fertilizer and chemical costs are both 13 percent. Tree cost is the fourth largest cost item with 12 percent of the total cash costs. The remaining cost items encompass 22 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 \$18,307 per acre remains to repay all previous establishment costs. This cost is amortized over a 25-year period as an annual payment of \$1,907 per acre, which includes principal and interest to recover the capital investment of establishing the orchard, as shown in Table 13, Full Production Years, page 18.

Figure 2 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 18 percent of the total. Machine costs (fuel, oil, repairs, depreciation and interest charges) are the third largest cost item at 15 percent of the total costs. Fertilizer and chemicals are 9 percent, tree costs 8 percent, and land charges 6 percent of the total costs. The remaining cost items make up 15 percent of the total economic costs. Figure 3 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 16 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 (tons/acre) | 0.00 | 0.00 | 0.00 | 1,000.00 | 5,000.00 | 10,000.00 | 14,000.00 |
| Price (dollars/pound) | <u>0.85</u> | <u>0.85</u> | <u>0.85</u> | <u>0.85</u> | <u>0.85</u> | <u>0.85</u> | <u>0.85</u> |
| Gross income (dollars/acre) | 0.00 | 0.00 | 0.00 | 850.00 | 4,250.00 | 8,500.00 | 11,900.00 |
| Variable Costs (per acre): | | | | | | | |
| 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 |
| Irrigation system | 0.00 | 1,350.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Paint trees | 0.00 | 40.00 | 0.00 | 40.00 | 0.00 | 0.00 | 0.00 |
| Fertilizer | 110.00 | 32.00 | 55.00 | 210.00 | 220.00 | 220.00 | 220.00 |
| Chemicals | 759.00 | 125.00 | 125.00 | 465.00 | 495.00 | 533.00 | 533.00 |
| Irrigation monitoring | 0.00 | 40.00 | 40.00 | 40.00 | 40.00 | 40.00 | 40.00 |
| Bee rental | 0.00 | 0.00 | 0.00 | 132.00 | 88.00 | 88.00 | 88.00 |
| Rodent materials | 0.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 |
| Harvest costs | 0.00 | 0.00 | 0.00 | 300.00 | 1,500.00 | 3,000.00 | 4,200.00 |
| Other labor | 118.99 | 916.16 | 405.77 | 546.02 | 394.50 | 452.00 | 739.50 |
| Other machine costs | 190.94 | 1,397.29 | 327.34 | 498.74 | 509.61 | 509.61 | 509.61 |
| Seasonal housing & shop facilities | 60.95 | 60.95 | 60.95 | 60.95 | 60.95 | 60.95 | 60.95 |
| Miscellaneous and overhead | 125.00 | 125.00 | 125.00 | 125.00 | 125.00 | 125.00 | 125.00 |
| Interest: operating capital | <u>30.23</u> | <u>79.33</u> | <u>14.63</u> | <u>30.61</u> | <u>43.30</u> | <u>63.24</u> | <u>81.84</u> |
| Total Variable Costs | 2,448.95 | 7,775.73 | 1,184.69 | 2,479.32 | 3,507.36 | 5,122.80 | 6,628.90 |
| Gross Income - Variable Cost | -2,448.95 | -7,775.73 | -1,184.69 | -1,629.32 | 742.64 | 3,377.20 | 5,271.10 |
| Cash fixed costs (per acre): | | | | | | | |
| Insurance | \$58.77 | \$58.77 | \$58.77 | \$58.77 | \$58.77 | \$58.77 | \$58.77 |
| Water assessment | 160.00 | 160.00 | 160.00 | 160.00 | 160.00 | 160.00 | 160.00 |
| Helicopter - remove water from trees | 0.00 | 0.00 | 0.00 | 75.00 | 75.00 | 75.00 | 75.00 |
| Property taxes | <u>60.00</u> | <u>60.00</u> | <u>60.00</u> | <u>60.00</u> | <u>60.00</u> | <u>60.00</u> | <u>60.00</u> |
| Total fixed cost | 278.77 | 278.77 | 278.77 | 353.77 | 353.77 | 353.77 | 353.77 |
| Total cost | 2,727.72 | 8,054.50 | 1,463.46 | 2,833.09 | 3,861.13 | 5,476.57 | 6,982.67 |
| Net projected returns | -2,727.72 | -8,054.50 | -1,463.46 | -1,983.09 | 388.87 | 3,023.43 | 4,917.33 |
| Cumulative returns | -2,727.72 | -10,782.22 | -12,245.68 | -14,228.77 | -13,839.90 | -10,816.47 | -5,899.14 |

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 (tons/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 |
| Gross income (dollars/acre) | 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 | 110.00 | 32.00 | 55.00 | 210.00 | 220.00 | 220.00 | 220.00 |
| Chemicals | 759.00 | 125.00 | 125.00 | 465.00 | 495.00 | 533.00 | 533.00 |
| Irrigation monitoring | 0.00 | 40.00 | 40.00 | 40.00 | 40.00 | 40.00 | 40.00 |
| Bee rental | 0.00 | 0.00 | 0.00 | 132.00 | 88.00 | 88.00 | 88.00 |
| Rodent materials | 0.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 |
| Harvest costs | 0.00 | 0.00 | 0.00 | 300.00 | 1,500.00 | 3,000.00 | 4,200.00 |
| Other labor | 118.99 | 916.16 | 405.77 | 546.02 | 394.50 | 452.00 | 739.50 |
| Other machine costs | 190.94 | 1,397.29 | 327.34 | 498.74 | 509.61 | 509.61 | 509.61 |
| Seasonal housing facilities | 60.95 | 60.95 | 60.95 | 60.95 | 60.95 | 60.95 | 60.95 |
| Miscellaneous and overhead | 125.00 | 125.00 | 125.00 | 125.00 | 125.00 | 125.00 | 125.00 |
| Interest: operating capital | 30.23 | 79.33 | 14.63 | 30.61 | 43.30 | 63.24 | 81.84 |
| Total Variable Costs | 2,448.95 | 6,425.73 | 1,184.69 | 2,479.32 | 3,507.36 | 5,122.80 | 6,628.90 |
| Gross Income - Variable Cost | -2,448.95 | -6,425.73 | -1,184.69 | -1,629.32 | 742.64 | 3,377.20 | 5,271.10 |
| Fixed Costs: | | | | | | | |
| Insurance | \$58.77 | \$58.77 | \$58.77 | \$58.77 | \$58.77 | \$58.77 | \$58.77 |
| Water assessment | 160.00 | 160.00 | 160.00 | 160.00 | 160.00 | 160.00 | 160.00 |
| Helicopter-Remove water from trees | 0.00 | 0.00 | 0.00 | 75.00 | 75.00 | 75.00 | 75.00 |
| Property taxes | 60.00 | 60.00 | 60.00 | 60.00 | 60.00 | 60.00 | 60.00 |
| Machine costs | 74.04 | 647.25 | 228.24 | 363.25 | 378.14 | 396.75 | 411.63 |
| Seasonal housing facilities | 146.67 | 146.67 | 146.67 | 146.67 | 146.67 | 146.67 | 146.67 |
| Land interest cost | 400.00 | 400.00 | 400.00 | 400.00 | 400.00 | 400.00 | 400.00 |
| Interest on establishment costs | 0.00 | 267.87 | 921.18 | 1,173.94 | 1,499.30 | 1,662.12 [¶] | ¹ 1,907.1¢ |
| Total fixed cost | 899.48 | 1,740.56 | 1,974.85 | 2,437.63 | 2,777.87 | 2,959.30 | 3,219.23 |
| Total cost | 3,348.44 | 8,166.28 | 3,159.54 | 4,916.95 | 6,285.23 | 8,082.10 | 9,848.13 |
| Net projected returns | -3,348.44 | -8,166.28 | -3,159.54 | -4,066.95 | -2,035.23 | 417.90 | 2,051.87 |
| Cumulative returns | -3,348.44 | -11,514.72 | -14,674.26 | -18,741.21 | -20,776.45 | -20,358.55 | -18,306.67 |

[¶]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 5.

Figure 1. Cash Costs to Establish a High Density Sweet Cherry Orchard the First Six Years of Establishment.

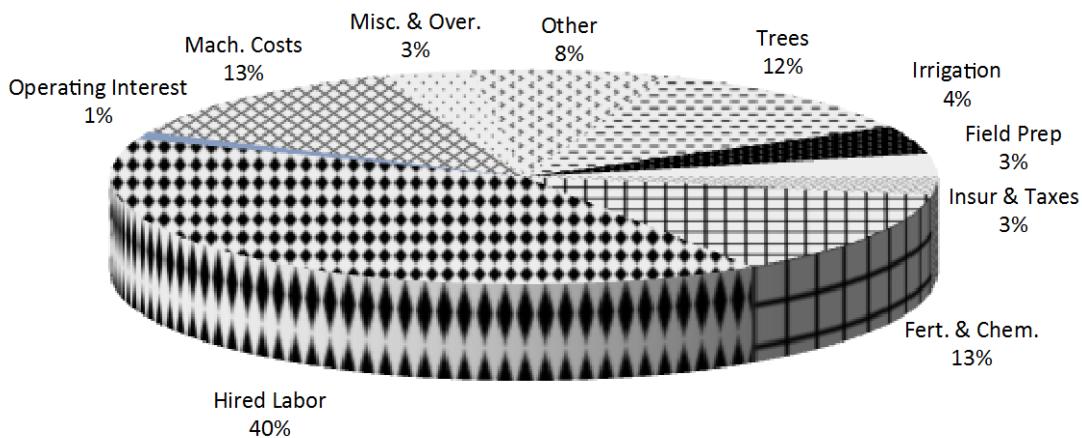


Figure 2. Economic Costs to Establish a High Density Sweet Cherry Orchard the First Six Years of Establishment.

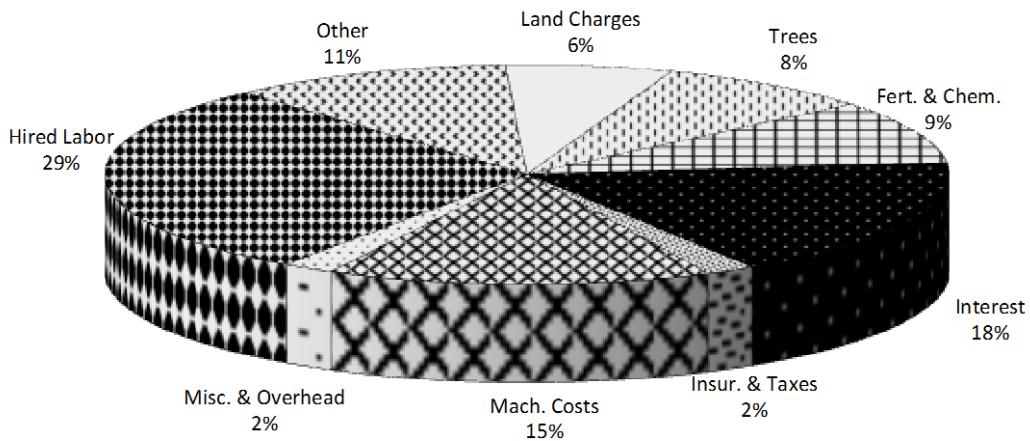
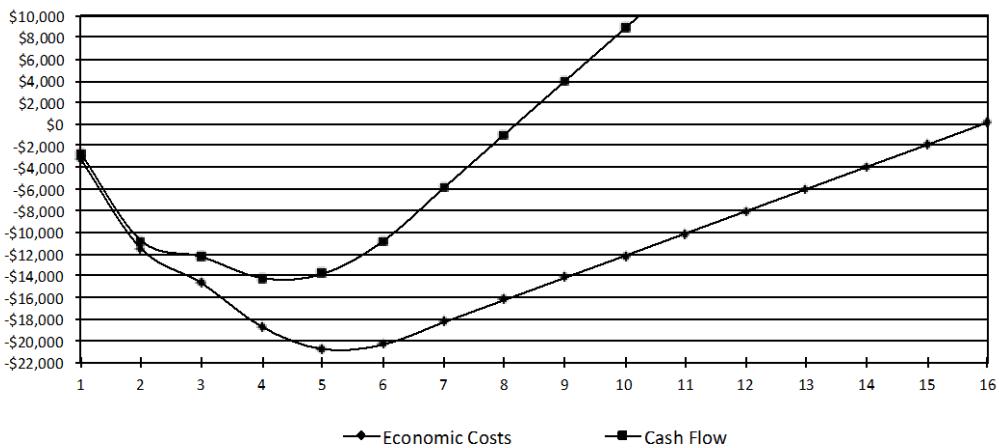


Figure 3. Economic and Cash Costs of Establishment of a High-Density Sweet Cherry Orchard in Wasco County



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 therefore 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. There continue to be many reasons to consider planting a standard-density orchard, including lower establishment costs and a return on investment greater than the cost of borrowing money. So growers should evaluate both alternatives in the context of their own circumstances and decide which best complements and strengthens their overall business plan.

This cost of establishment study provides 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 *AgProfitTM* Program to Analyze Different Price and Yield Scenarios

Many price and yield scenarios can occur due to freeze, rain, hail, birds and market conditions so it is next to impossible to cover even a small sample in this bulletin. However, the *AgProfitTM* 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. *AgProfitTM* 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 *AgProfitTM* program can be obtained free of charge at <http://agtools.org>, registering on the website, and downloading the *AgProfitTM* 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 "Cherries", "Oregon". All assumptions as to prices received, yields obtained, or input items, amounts, and costs can be readily changed using *AgProfitTM* to modify the budgets provided so the user can develop a set of annual budgets that most fit his/her situation.

AgProfitTM 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. *AgProfitTM* 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 uses the *AgProfitTM* program to fully analyze the potential

investment under varying price and yield scenarios to help decide if the potential investment is likely to be profitable and feasible.

APPENDIX A

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

| Table 7. Year 0, Sweet Cherries, 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 | 56.43 | 0.00 | 82.43 |
| 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. | 0.99 | 1.86 | 110.00 | 112.84 |
| 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 | 132.65 | 0.00 | 132.65 |
| Seasonal housing & shop facilities | 1.0 x/acre | 0.00 | 0.00 | 60.95 | 60.95 |
| Miscellaneous and overhead | 1.0 x/acre | 0.00 | 0.00 | 125.00 | 125.00 |
| Interest: operating capital | 6.0 mons | <u>0.00</u> | <u>0.00</u> | <u>30.23</u> | <u>30.23</u> |
| Total variable costs | | 118.99 | 190.94 | 2,139.03 | 2,448.95 |
| FIXED NON-CASH COSTS | | | | Unit | Total |
| Pickup, truck & ATV insurance | | | | acre | 23.77 |
| Water assessment | | | | acre | 160.00 |
| Property insurance | | | | acre | 35.00 |
| Property taxes | | | | acre | <u>60.00</u> |
| Total cash costs | | | | | 278.77 |
| FIXED CASH COSTS | | | | Unit | Total |
| Machinery and equipment depreciation, interest, & insurance | | | | acre | 15.49 |
| Pickup, truck & ATV - depreciation & interest | | | | acre | 58.55 |
| Seasonal housing facilities | | | | acre | 146.67 |
| Land interest charge | | | | acre | <u>400.00</u> |
| Total non-cash costs | | | | | 620.71 |
| Total fixed costs | | | | | 899.48 |
| Total of All Costs Per Acre | | | | | \$3,348.44 |

Table 8. Year 1, Sweet Cherries, High-Density, \$/Acre Economic Costs and Returns.

| VARIABLE CASH COSTS | Description | Labor | Machinery | Materials | Total |
|---|-------------|---------------|-----------------|-----------------|-------------------|
| Dig holes | 14.0 hours | \$171.50 | \$329.42 | \$0.00 | \$500.92 |
| Planting trees | 36.0 hours | 441.00 | 846.67 | 3,570.00 | 4,857.67 |
| 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 | 32.00 | 49.25 |
| Herbicide strip maintenance (.30x) | 2.0 appl. | 14.30 | 27.01 | 125.00 | 166.30 |
| ATV herbicide maintenance (.30x) | 1.0 appl. | 7.15 | 3.48 | 0.00 | 10.63 |
| Seed cover crop (Companion Grass) | 20.0 Lbs | 6.50 | 18.26 | 30.00 | 54.76 |
| Flail mowing | 1.0 times | 0.00 | 0.00 | 0.00 | 0.00 |
| Rotary mower | 1.0 times | 5.26 | 12.58 | 0.00 | 17.83 |
| Rodent control | 3.8 hours | 28.95 | 13.73 | 10.00 | 52.68 |
| Irrigation monitoring | 1.0 acre | 0.00 | 0.00 | 40.00 | 40.00 |
| Irrigation | 5.5 hours | 63.25 | 13.50 | 0.00 | 76.75 |
| Pickup, truck & ATV | 1.0 x/acre | 0.00 | 132.65 | 0.00 | 132.65 |
| Seasonal housing & shop facilities | 1.0 x/acre | 0.00 | 0.00 | 60.95 | 60.95 |
| Miscellaneous and overhead | 1.0 x/acre | 0.00 | 0.00 | 125.00 | 125.00 |
| Interest: operating capital | 6.0 mons | <u>0.00</u> | <u>0.00</u> | <u>79.33</u> | <u>79.33</u> |
| Total variable costs | | 916.16 | 1,397.29 | 4,112.28 | 6,425.73 |
| FIXED CASH COSTS | | | | Unit | Total |
| Pickup, truck & ATV insurance | | | | acre | 23.77 |
| Water assessment | | | | acre | 160.00 |
| Property insurance | | | | acre | 35.00 |
| Property taxes | | | | acre | <u>60.00</u> |
| Total cash costs | | | | | 278.77 |
| FIXED NON-CASH COSTS | | | | Unit | Total |
| Machinery and equipment depreciation, interest, & insurance | | | | acre | 588.69 |
| Pickup, truck & ATV - depreciation & interest | | | | acre | 58.55 |
| Seasonal housing facilities | | | | acre | 146.67 |
| Land interest charge | | | | acre | 400.00 |
| Prior year's establishment costs | | | | acre | <u>267.87</u> |
| Total non-cash costs | | | | | 1,461.79 |
| Total fixed costs | | | | | 1,740.56 |
| Total of All Costs Per Acre | | | | | \$8,166.28 |

Table 9. Year 2, Sweet Cherries, High-Density, \$/Acre Economic Costs and Returns.

| VARIABLE CASH COSTS | Description | Labor | Machinery | Materials | Total |
|---|-------------|---------------|---------------|---------------|-------------------|
| Training trees | 15.0 hours | \$172.50 | \$0.00 | \$0.00 | \$172.50 |
| Tree removal & tree replacement | 3.0 hours | 73.50 | 70.72 | 21.00 | 165.22 |
| Flail chopping | 1.0 x/acre | 10.51 | 24.95 | 0.00 | 35.46 |
| Fertilizer (hand applied) | 1.5 hours | 17.25 | 0.00 | 55.00 | 72.25 |
| Herbicide strip maintenance (.30x) | 2.0 appl. | 14.30 | 27.01 | 125.00 | 166.30 |
| ATV herbicide maintenance (.30x) | 1.0 appl. | 7.15 | 3.48 | 0.00 | 10.63 |
| Flail mowing | 2.0 times | 2.58 | 3.59 | 0.00 | 6.17 |
| Rotary mower | 3.0 times | 15.77 | 37.73 | 0.00 | 53.50 |
| Rodent control | 3.8 hours | 28.95 | 13.73 | 10.00 | 52.68 |
| Irrigation monitoring | 1.0 acre | 0.00 | 0.00 | 40.00 | 40.00 |
| Irrigation | 5.5 hours | 63.25 | 13.50 | 0.00 | 76.75 |
| Pickup, truck & ATV | 1.0 x/acre | 0.00 | 132.65 | 0.00 | 132.65 |
| Seasonal housing & shop facilities | 1.0 x/acre | 0.00 | 0.00 | 60.95 | 60.95 |
| Miscellaneous and overhead | 1.0 x/acre | 0.00 | 0.00 | 125.00 | 125.00 |
| Interest: operating capital | 6.0 mons | <u>0.00</u> | <u>0.00</u> | <u>14.63</u> | <u>14.63</u> |
| Total variable costs | | 405.77 | 327.34 | 451.58 | 1,184.69 |
| FIXED CASH COSTS | | | | Unit | Total |
| Pickup, truck & ATV insurance | | | | acre | 23.77 |
| Water assessment | | | | acre | 160.00 |
| Property insurance | | | | acre | 35.00 |
| Property taxes | | | | acre | <u>60.00</u> |
| Total cash costs | | | | | 278.77 |
| FIXED NON-CASH COSTS | | | | Unit | Total |
| Machinery and equipment depreciation, interest, & insurance | | | | acre | 169.69 |
| Pickup, truck & ATV - depreciation & interest | | | | acre | 58.55 |
| Seasonal housing facilities | | | | acre | 146.67 |
| Land interest charge | | | | acre | 400.00 |
| Prior year's establishment costs | | | | acre | <u>921.18</u> |
| Total non-cash costs | | | | | 1,696.08 |
| Total fixed costs | | | | | 1,974.85 |
| Total of All Costs Per Acre | | | | | \$3,159.54 |

Table 10. Year 3, Sweet Cherries, 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 | | | | | |
| Pruning trees | 13.5 hours | \$155.25 | \$8.70 | \$0.00 | \$163.95 |
| Painting trees | 10.0 hours | 115.00 | 0.00 | 40.00 | 155.00 |
| Tree removal & tree replacement | 3.0 hours | 73.50 | 70.72 | 21.00 | 165.22 |
| Flail chopping | 2.0 x/acre | 10.51 | 24.95 | 0.00 | 35.46 |
| Fertilizer (broadcast applied) | 2.0 appl. | 1.97 | 3.71 | 110.00 | 115.69 |
| Fertilizer (foliar applied) | | 0.00 | 0.00 | 100.00 | 100.00 |
| Herbicide strip maintenance (.30x) | 2.0 appl. | 14.30 | 27.01 | 125.00 | 166.30 |
| ATV herbicide maintenance (.30x) | 1.0 appl. | 7.15 | 3.48 | 0.00 | 10.63 |
| Disease control | 5.0 appl. | 18.62 | 54.36 | 150.00 | 222.97 |
| Insecticides, ground applied | 5.0 appl. | 18.62 | 54.36 | 85.00 | 157.97 |
| Insecticides, aerial applied | 1.0 appl. | 0.00 | 0.00 | 80.00 | 0.080 |
| Growth regulators | 1.0 x/acre | 0.00 | 0.00 | 25.00 | 25.00 |
| Bee rental | 3.0 hives | 0.00 | 0.00 | 132.00 | 132.00 |
| Flail mowing | 2.0 times | 12.62 | 28.91 | 0.00 | 41.53 |
| Rotary mower | 3.0 times | 26.28 | 62.68 | 0.00 | 88.96 |
| Rodent control | 3.8 hours | 28.95 | 13.73 | 10.00 | 52.68 |
| Irrigation monitoring | 1.0 acre | 0.00 | 0.00 | 40.00 | 0.040 |
| Irrigation | 5.5 hours | 63.25 | 13.50 | 0.00 | 76.75 |
| Harvesting costs | 0.5 tons | 250.00 | 20.00 | 30.00 | 300.00 |
| Pickup, truck & ATV | 1.0 x/acre | 0.00 | 132.65 | 0.00 | 132.65 |
| Seasonal housing & shop facilities | 1.0 x/acre | 0.00 | 0.00 | 60.95 | 60.95 |
| Miscellaneous and overhead | 1.0 x/acre | 0.00 | 0.00 | 125.00 | 125.00 |
| Interest: operating capital | 6.0 mons | <u>0.00</u> | <u>0.00</u> | <u>30.61</u> | <u>0.031</u> |
| Total variable costs | 796.02 | 518.74 | 1,164.56 | 2,479.32 | 2.479 |
| FIXED CASH COSTS | | | | | |
| Pickup, truck & ATV insurance | | | acre | 23.77 | 0.024 |
| Water assessment | | | acre | 160.00 | 0.160 |
| Helicopter - remove water from trees | | | acre | 75.00 | 0.075 |
| Property insurance | | | acre | 35.00 | 0.035 |
| Property taxes | | | acre | 60.00 | 0.060 |
| Total cash costs | | | | 353.77 | 0.354 |
| FIXED NON-CASH COSTS | | | | | |
| Machinery and equipment depreciation, interest, & insurance | | | acre | 304.70 | 0.305 |
| Pickup, truck & ATV - depreciation & interest | | | acre | 58.55 | 0.059 |
| Seasonal housing facilities | | | acre | 146.67 | 0.147 |
| Land interest charge | | | acre | 400.00 | 0.400 |
| Prior year's establishment costs | | | acre | 1,173.94 | 1.174 |
| Total non-cash costs | | | | 2,083.86 | 2.084 |
| Total fixed costs | | | | 2,437.63 | 2.438 |
| Total of All Costs Per Acre | | | | \$4,916.95 | \$4.917 |
| Net Projected Returns | | | | (\$4,066.95) | (\$4.067) |

Table 11. Year 4, Sweet Cherries, 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 | | | | | |
| Pruning trees | 10.0 hours | \$115.00 | \$8.70 | \$0.00 | \$123.70 |
| Tree removal & tree replacement | 3.0 hours | 73.50 | 70.72 | 21.00 | 165.22 |
| Flail chopping | 2.0 x/acre | 10.51 | 24.95 | 0.00 | 35.46 |
| Fertilizer (broadcast applied) | 2.0 appl. | 1.97 | 3.71 | 110.00 | 115.69 |
| Fertilizer (foliar applied) | | 0.00 | 0.00 | 110.00 | 0.022 |
| Herbicide strip maintenance (.30 x) | 2.0 appl. | 14.30 | 27.01 | 125.00 | 166.30 |
| ATV herbicide maintenance (30 x) | 1.0 appl. | 7.15 | 3.48 | 0.00 | 10.63 |
| Disease control | 5.0 appl. | 18.62 | 54.36 | 150.00 | 222.97 |
| Insecticides, ground applied | 5.0 appl. | 18.62 | 54.36 | 115.00 | 187.97 |
| Insecticides, aerial applied | 5.0 appl. | 0.00 | 0.00 | 80.00 | 0.016 |
| Growth regulators | 1.0 x/acre | 0.00 | 0.00 | 25.00 | 0.005 |
| Bee rental | 2.0 hives | 0.00 | 0.00 | 88.00 | 0.018 |
| Flail mowing | 2.0 times | 16.34 | 39.79 | 0.00 | 56.13 |
| Rotary mower | 3.0 times | 26.28 | 62.68 | 0.00 | 88.96 |
| Rodent control | 3.8 hours | 28.95 | 13.73 | 10.00 | 52.68 |
| Irrigation monitoring | 1.0 acre | 0.00 | 0.00 | 40.00 | 0.008 |
| Irrigation | 5.5 hours | 63.25 | 13.50 | 0.00 | 76.75 |
| Harvesting costs | 2.5 tons | 1,250.00 | 100.00 | 150.00 | 1,500.00 |
| Pickup, truck & ATV | 1.0 x/acre | 0.00 | 132.65 | 0.00 | 132.65 |
| Seasonal housing & shop facilities | 1.0 x/acre | 0.00 | 0.00 | 60.95 | 0.012 |
| Miscellaneous and overhead | 1.0 x/acre | 0.00 | 0.00 | 125.00 | 0.025 |
| Interest: operating capital | 6.0 mons | 0.00 | 0.00 | 43.30 | 0.009 |
| Total variable costs | 1,644.50 | 609.61 | 1,253.25 | 3,507.36 | 0.701 |
| FIXED CASH COSTS | | | | | |
| Pickup, truck & ATV insurance | | | | acre | 23.77 |
| Water assessment | | | | acre | 160.00 |
| Helicopter - remove water from trees | | | | acre | 75.00 |
| Property insurance | | | | acre | 35.00 |
| Property taxes | | | | acre | 60.00 |
| Total cash costs | | | | | 353.77 |
| | | | | | 0.071 |
| FIXED NON-CASH COSTS | | | | | |
| Machinery and equipment depreciation, interest, & insurance | | | | acre | 319.59 |
| Pickup, truck & ATV - depreciation & interest | | | | acre | 58.55 |
| Seasonal housing facilities | | | | acre | 146.67 |
| Land interest charge | | | | acre | 400.00 |
| Prior year's establishment costs | | | | acre | 1,499.30 |
| Total non-cash costs | | | | | 2,424.10 |
| Total fixed costs | | | | | 2,777.87 |
| Total of All Costs Per Acre | | | | | \$6,285.23 |
| Net Projected Returns | | | | | (\$2,035.23) |
| | | | | | \$1.257 |
| | | | | | (\$0.407) |

Table 12. Year 5, Sweet Cherries, 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 | | | | | |
| Pruning trees | 15.0 hours | \$172.50 | \$8.70 | \$0.00 | \$181.20 |
| Tree removal & tree replacement | 3.0 hours | 73.50 | 70.72 | 21.00 | 165.22 |
| Flail chopping | 2.0 x/acre | 10.51 | 24.95 | 0.00 | 35.46 |
| Fertilizer (broadcast applied) | 2.0 appl. | 1.97 | 3.71 | 110.00 | 115.69 |
| Fertilizer (foliar applied) | | 0.00 | 0.00 | 110.00 | 0.011 |
| Herbicide strip maintenance (.30x) | 2.0 appl. | 14.30 | 27.01 | 125.00 | 166.30 |
| ATV herbicide maintenance (.30x) | 1.0 appl. | 7.15 | 3.48 | 0.00 | 10.63 |
| Disease control | 5.0 appl. | 18.62 | 54.36 | 150.00 | 222.97 |
| Insecticides, ground applied | 5.0 appl. | 18.62 | 54.36 | 143.00 | 215.97 |
| Insecticides, aerial applied | 5.0 appl. | 0.00 | 0.00 | 80.00 | 0.008 |
| Growth regulators | 1.0 x/acre | 0.00 | 0.00 | 35.00 | 0.004 |
| Bee rental | 2.0 hives | 0.00 | 0.00 | 88.00 | 0.009 |
| Flail mowing | 2.0 times | 16.34 | 39.79 | 0.00 | 56.13 |
| Rotary mower | 3.0 times | 26.28 | 62.68 | 0.00 | 88.96 |
| Rodent control | 3.8 hours | 28.95 | 13.73 | 10.00 | 52.68 |
| Irrigation monitoring | 1.0 acre | 0.00 | 0.00 | 40.00 | 0.004 |
| Irrigation | 5.5 hours | 63.25 | 13.50 | 0.00 | 76.75 |
| Harvesting costs | 5.0 tons | 2,500.00 | 200.00 | 300.00 | 3,000.00 |
| Pickup, truck & ATV | 1.0 x/acre | 0.00 | 132.65 | 0.00 | 132.65 |
| Seasonal housing & shop facilities | 1.0 x/acre | 0.00 | 0.00 | 60.95 | 0.006 |
| Miscellaneous and overhead | 1.0 x/acre | 0.00 | 0.00 | 125.00 | 0.013 |
| Interest: operating capital | 6.0 mons | 0.00 | 0.00 | 63.24 | 0.006 |
| Total variable income | 2,952.00 | 709.61 | 1,461.19 | 5,122.80 | 0.512 |
| FIXED CASH COSTS | | | | | |
| Pickup, truck & ATV insurance | | | | acre | 23.77 |
| Water assessment | | | | acre | 160.00 |
| Helicopter - remove water from trees | | | | acre | 75.00 |
| Property insurance | | | | acre | 35.00 |
| Property taxes | | | | acre | 60.00 |
| Total cash costs | | | | | 353.77 |
| | | | | | 0.035 |
| FIXED NON-CASH COSTS | | | | | |
| Machinery and equipment depreciation, interest, & insurance | | | | acre | 338.19 |
| Pickup, truck & ATV - depreciation & interest | | | | acre | 58.55 |
| Seasonal housing facilities | | | | acre | 146.67 |
| Land interest charge | | | | acre | 400.00 |
| Prior year's establishment costs | | | | acre | 1,662.12 |
| Total non-cash costs | | | | | 2,605.53 |
| Total fixed costs | | | | | 2,959.30 |
| Total of All Costs Per Acre | | | | | \$8,082.10 |
| Net Projected Returns | | | | | \$417.90 |
| | | | | | \$0.808 |
| | | | | | \$0.042 |

Table 13. Full Production, Sweet Cherries, High-Density, \$/Acre Economic Costs and Returns

| GROSS INCOME | Quantity | Unit | \$/Unit | Total | Price/Lb |
|---|--------------------|--------------|-------------------|------------------|---------------|
| Sweet Cherries | 14,000 | pounds | 0.85 | <u>11,900.00</u> | 0.85 |
| Total gross income | | | | 11,900.00 | 0.85 |
| VARIABLE CASH COSTS | Description | Labor | Machinery | Materials | Total |
| Pruning trees | 40.0 hours | \$460.00 | \$8.70 | \$0.00 | \$468.70 |
| Tree removal & tree replacement | 3.0 hours | 73.50 | 70.72 | 21.00 | 165.22 |
| Flail chopping | 2.0 x/acre | 10.51 | 24.95 | 0.00 | 35.46 |
| Fertilizer (broadcast applied) | 2.0 appl. | 1.97 | 3.71 | 110.00 | 115.69 |
| Fertilizer (foliar applied) | | 0.00 | 0.00 | 110.00 | 0.0079 |
| Herbicide strip maintenance (.30x) | 2.0 appl. | 14.30 | 27.01 | 125.00 | 166.30 |
| ATV herbicide maintenance (.30x) | 1.0 appl. | 7.15 | 3.48 | 0.00 | 10.63 |
| Disease control | 5.0 appl. | 18.62 | 54.36 | 150.00 | 222.97 |
| Insecticides, ground applied | 5.0 appl. | 18.62 | 54.36 | 143.00 | 215.97 |
| Insecticides, aerial applied | 5.0 appl. | 0.00 | 0.00 | 80.00 | 0.0057 |
| Growth regulators | 1.0 x/acre | 0.00 | 0.00 | 35.00 | 0.0025 |
| Bee rental | 2.0 hives | 0.00 | 0.00 | 88.00 | 0.0063 |
| Flail mowing | 2.0 times | 16.34 | 39.79 | 0.00 | 56.13 |
| Rotary mower | 3.0 times | 26.28 | 62.68 | 0.00 | 88.96 |
| Rodent control | 3.8 hours | 28.95 | 13.73 | 10.00 | 52.68 |
| Irrigation monitoring | 1.0 acre | 0.00 | 0.00 | 40.00 | 0.0029 |
| Irrigation | 5.5 hours | 63.25 | 13.50 | 0.00 | 76.75 |
| Harvesting costs | 7.0 tons | 3,500.00 | 280.00 | 420.00 | 4,200.00 |
| Pickup, truck & ATV | 1.0 x/acre | 0.00 | 132.65 | 0.00 | 132.65 |
| Seasonal housing & shop facilities | 1.0 x/acre | 0.00 | 0.00 | 60.95 | 0.0044 |
| Miscellaneous and overhead | 1.0 x/acre | 0.00 | 0.00 | 125.00 | 0.0089 |
| Interest: operating capital | 6.0 mons | <u>0.00</u> | <u>0.00</u> | <u>81.84</u> | <u>0.0058</u> |
| Total variable costs | 4,239.50 | 789.61 | 1,599.79 | 6,628.90 | 0.4735 |
| FIXED CASH COSTS | | Unit | Total | Cost/Lb | |
| Pickup, truck & ATV insurance | | acre | 23.77 | 0.0017 | |
| Water assessment | | acre | 160.00 | 0.0114 | |
| Helicopter - remove water from trees | | acre | 75.00 | 0.0054 | |
| Property insurance | | acre | 35.00 | 0.0025 | |
| Property taxes | | acre | 60.00 | 0.0043 | |
| Total cash costs | | | 353.77 | 0.0253 | |
| FIXED NON-CASH COSTS | | Unit | Total | Cost/Lb | |
| Machinery and equipment depreciation, interest, & insurance | | acre | 353.08 | 0.0252 | |
| Pickup, truck & ATV - depreciation & interest | | acre | 58.55 | 0.0042 | |
| Seasonal housing facilities | | acre | 146.67 | 0.0105 | |
| Land interest charge | | acre | 400.00 | 0.0286 | |
| Amortized establishment cost | | acre | <u>1,907.16</u> | <u>0.1362</u> | |
| Total non-cash costs | | | 2,865.46 | 0.2047 | |
| Total fixed costs | | | 3,219.23 | 0.2299 | |
| Total of all costs per acre | | | \$9,848.13 | \$0.7034 | |
| Net projected returns | | | \$2,051.87 | \$0.1466 | |