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Orchard Economics:

The Costs and Returns to Establish and Produce Sweet Cherries in a High-Density and Ultra-High-Density Orchard In Wasco County

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Introduction

Cherry growers worldwide have moved mainly to high-density plantings on semi-dwarfing or dwarfing rootstocks. This affords several advantages, including greater precocity, faster return on investment, the potential for higher annual yields, easier maintenance, increased worker efficiency, and the ability to protect the orchard more easily from rain, hail, and bird damage. However, with these advantages come significant production 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 essential that growers properly evaluate their scion/rootstock choices in relation to the proposed orchard site while critically assessing their own management skills before deciding to plant a high- or ultra-high-density orchard.

This study is intended for growers and investors considering the economic and financial consequences of planting a high-density or ultra-high-density sweet cherry orchard. It is impossible to cover all variety, rootstock, and training system combinations in a publication of this type, so combinations commonly grown in Wasco County were chosen for comparison.

Assumptions for Both the High- and Ultra-High-Density Systems

In the preparation of this publication, assumptions were made that reflect current trends in orchard design for establishing a sweet cherry orchard. These assumptions are:

1. **Farm size.** The typical size operation in Wasco County growing fruit is 100 acres.
2. **Land.** The market value of irrigated land with no fruit trees is \$15,000 per acre.
3. **Grower returns.** The average sweet cherry prices are \$0.85 per pound returned to the grower after subtracting packing costs.
4. **Tree density and acres.** The typical acreage for a sweet cherry farm includes 45 acres of standard density, 45 acres of high-density, and 5 acres of ultra-high-density plantings, all producing fresh market sweet cherry varieties. Approximately 5 percent, or 5 acres, of the orchard is non-bearing fruit trees. Generally, standard density orchards have less than 300 trees per acre, ultra-high-density orchards greater than 660, and high-density orchards in between.
5. **Labor.** Beginning in Year 0, general orchard labor is paid \$16.75, tractor drivers \$20.25, supervisory labor \$24.50 per hour, and workers harvesting cherries are paid a piece rate of \$0.26 per pound. All rates include worker's compensation, unemployment insurance, and other overhead expenses; therefore, all general, tractor, supervision, and harvest labor are cash variable costs. In addition, labor rates increase three percent annually for inflation in subsequent years after Year 0.
6. **Machinery and equipment.** The machinery and equipment reflect the typical machinery complement of a 100-

*Ashley Thompson, Extension Horticulturalist, Wasco and Hood River counties, Department of Horticulture, Clark Seavert, Professor Emeritus, Department of Applied Economics, and Lynn Long, Professor Emeritus, Department of Horticulture, all at Oregon State University.

acre farm in Wasco County (Appendix A, Tables 1 and 2, pages 12 and 13). A 90-hp tractor is used to pull an air-blast sprayer, flail chopper, grass cutter, and assist during harvest. A 75-hp tractor is used to harvest. An ATV is equipped with a tank sprayer for weed control.

7. **Fuel.** Gasoline, diesel, and propane costs are \$4.00, \$4.00, and \$2.25 per gallon.
8. **Interest.** The interest rate on operating funds is eight percent, treated as a cash expense. One-half of the cash expenses are borrowed for six months.
9. Machinery, labor housing, and land are owned and assessed at an eight, three, and four percent interest rate, respectively, and treated as a fixed non-cash opportunity cost to the owner.
10. The operator funded the establishment costs of this orchard at a charge of six percent interest and treated it as a fixed non-cash opportunity cost.
11. **Chemicals.** Herbicides used for strip maintenance are applied to 30 percent of each acre.
12. **Housing.** Seasonal labor facilities provided by the owner cost \$800,000. Sixteen five-person units are required for this size of operation. A charge of \$0.02 per pound of harvested cherries is assessed for picker camp maintenance during harvest.
13. **Irrigation systems.** A micro-sprinkler plus double-drip irrigation system is used in both the high-density and ultra-high-density orchard systems at an estimated cost of \$1,700 and \$2,000 per acre, respectively.
14. **Frost control.** Two wind machines are valued at \$35,000 each.
15. **Shop and tools.** A shop building with equipment and tools is valued at \$60,000.
16. **Replacement cost calculations.** Replacement costs for irrigation systems, wind machines, housing, buildings, and trellis system are calculated using the

straight-line method of depreciation $((\text{purchase price} - \text{salvage value}) \div \text{total acres})$, if the purchase price is not on an acre basis).

17. **Interest calculations.** Interest charges for irrigation systems, wind machines, housing, buildings, and trellis system are calculated using the average value of the system multiplied by an interest rate $((((\text{purchase price} + \text{salvage value}) \div 2) \times \text{interest rate}) \div \text{total acres})$, if the purchase price is not on an acre basis).
18. **Repairs and maintenance calculations.** Repair and maintenance for irrigation systems, wind machines, buildings, and trellis system costs are calculated using one percent of the per acre purchase price per year. Housing is two percent of the purchase price.
19. **Fixed costs.** Fixed cost input assumptions are listed in Appendix B, Table 5, page 15.
20. **Omitted from this study.** Not included in this study is a return to management, owner labor, family living withdrawals, an accounting for all regulatory costs, annual price and yield volatility, price inflation, and local, state, and federal income taxes paid by the owner.

High-Density Orchard Assumptions

21. **Orchard description.** This orchard is planted to a spacing of 10' x 16' (340 cherry trees per acre), with 11 percent pollinizer trees.
22. The productive life of this orchard is 25 years once full production of 14,000 pounds of field-run cherries per acre is reached.
23. Trees in this system are trained to a central leader system.
24. **Sweet cherry yields.** Commercial yields begin in year 3, and full production is reached five years after planting with 1,000, 5,000, 10,000, and 14,000 pounds per acre, respectively.

25. **Machine costs per acre.** Appendix A, Table 3HD, page 13, lists the estimated costs per acre for each machine operation with an 16' tree row spacing.
26. **Other assumptions.** Other assumptions for variable, cash fixed, and non-cash fixed costs are listed in Appendix B, Table 4HD, page 14.

Ultra-High-Density Orchard Assumptions

27. **Orchard description.** This orchard is planted to a spacing of 6' x 11' (660 cherry trees per acre), with 11 percent cherries as pollinizers.
28. The productive life of this orchard is 20 years once full production of 24,000 pounds of field-run cherries per acre is reached.

29. Trees in this system are trained to a spindle system on to a trellis
30. **Sweet cherry yields.** Commercial yields begin in year 2, and full production is reached three years after planting with 1,500, 4,000, and 24,000 pounds per acre, respectively.
31. **Trellis system.** The trellis system costs \$7,200 per acre installed.
32. **Machine costs per acre.** Appendix A, Table 3UHD, page 13 lists the estimated costs per acre for each machine operation with a 11' tree row spacing.
33. **Other assumptions.** Other assumptions for variable, cash fixed, and non-cash fixed costs are listed in Appendix B, Table 4UHD, page 15.

Results of establishing a high-density cherry orchard

Cash flow analysis

A cash flow analysis for establishing a high-density cherry orchard is presented in Appendix C, Table 6HD, page 16. It shows the cash costs required to develop this type of orchard. Cash costs include labor, trees, irrigation system, fertilizer, chemicals, beehives, machinery repairs, fuel, lube and oil, labor housing repairs and maintenance, operating (short-term) interest, machinery and whole-farm insurance, irrigation water assessments, and property taxes. The income, variable costs, and cash fixed costs are shown for each of the six establishment years plus the first full production year. Total variable costs are \$1,916 in year 0, with an additional \$328 of cash fixed costs for a total cash cost of \$2,244 per acre. In year 0, the old orchard trees are removed, and the ground is prepared for planting

young trees the following year.

A positive cash flow begins in year 5 with gross income exceeding total cash costs by \$1,836 per acre. However, the orchard does not return a sufficient gross income to pay all previous years' cash costs at full production. There is \$11,289 per acre of cumulative cash flows remaining over and above prior expenses.

The major cost components to total cash costs are shown in Table 8HD, page 20. Harvest costs represents 25 percent of the total cash costs to establish this orchard. Fertilizer and chemicals are the second-largest item, making up 18 percent of the total cash costs. Trees and labor, not including harvest labor, is 15 and 14 percent, respectively, of the cash costs. The remaining four items comprise about 28 percent of the total cash costs.

Economic costs and returns

The economic costs and returns for establishing a high-density cherry orchard are shown in Appendix C, Table 7HD, page 17. Economic costs include all cash out-of-

pocket and ownership costs, which consist of a combination of principal and interest payments and a return on investment to the grower, or both, for machinery, housing, land, and funds to pay previous years' establishment costs. The gross income and variable cash costs remain the same as in Table 6HD, except the irrigation system are amortized over their productive life and included in fixed costs.

Net projected returns (gross income minus total costs) become positive at full production, with gross income exceeding total costs of \$415 per acre. At the end of the establishment period, \$27,723 per acre remains to repay all previous establishment costs. This cost is amortized over 25 years as an annual payment of \$1,652 per acre, including principal and interest, to recover the capital investment of establishing the orchard.

The major cost components as a percent of total economic cost are shown in Table 8HD, page 20. When all expenses are

included, the top two items are charges and harvest costs at about 23 and 18 percent, respectively. Fertilizer and chemicals, trees, and machine costs follow at 13, 11, and 10 percent, respectively. The remaining four cost items comprise about 25 percent of the total economic costs.

Summary of establishing a high-density orchard

Figure 1, page 20, shows the cumulative cash flow and economic costs of establishing a high-density orchard. The light and darker blue lines denote these results. The cumulative cash flow turns positive by \$661 in year 8, and the cumulative economic returns by \$7,508 in year 10. Appendix D, Tables 9HD-15HD, pages 21-27, contains the annual cost and return budgets for establishing this high-density orchard.

Results of establishing a Ultra-high-density cherry orchard

Cash flow analysis

A cash flow analysis for establishing an ultra-high-density cherry orchard is presented in Appendix C, Table 6UHD, page 18. It shows the cash costs required to develop this type of orchard. Cash costs include labor, trees, irrigation system, trellis, fertilizer, chemicals, beehives, machinery repairs, fuel, lube and oil, labor housing repairs and maintenance, operating (short-term) interest, machinery and whole-farm insurance, irrigation water assessments, and property taxes. The income, variable costs, and cash fixed costs are shown for each of the four establishment years plus the first full production year. Total variable costs are \$2,062 in year 0, with an additional \$328 of

cash fixed costs for a total cash cost of \$2,390 per acre. As in the high-density system, in year 0, the old orchard trees are removed, and the ground is prepared for planting young trees the following year.

A positive cash flow begins at full production with gross income exceeding total cash costs by \$9,596 per acre. However, the orchard does not return a sufficient gross income to pay all previous years' cash costs; there is \$20,306 per acre remaining over and above prior expenses.

The major cost components to total cash costs are shown in Table 8UHD, page 20. Tree costs represents 23 percent of the total cash costs to establish this orchard. Harvest costs are the second-largest item, making up 20 percent of the total cash costs. The trellis system, fertilizer and chemicals, and all labor, not including harvest labor, is 16, 11,

and 10 percent, respectively. The remaining five items comprise about 20 percent of the total economic costs.

Economic costs and returns

The economic costs and returns for establishing an ultra-high-density cherry orchard are shown in Appendix C, Table 7UHD, page 19. Economic costs include all cash out-of-pocket and ownership costs, which consist of a combination of principal and interest payments and a return on investment, or both, to the grower for machinery, housing, land, and funds to pay previous years' establishment costs. The gross income and variable cash costs remain the same as in Table 6UHD, except the irrigation system and trellis are amortized over their productive life and included in fixed costs.

Net projected returns (gross income minus total costs) become positive at full production, with gross income exceeding total costs of \$4,530 per acre. At the end of the establishment period, \$27,606 per acre remains to repay all previous establishment costs. This cost is amortized over 20 years as an annual payment of \$2,802 per acre,

including principal and interest, to recover the capital investment of establishing the orchard.

The major cost components as a percent of total economic cost are shown in Table 8HD, page 20. When all expenses are included, the top item is trees at 20 percent of the total economic costs. Next, interest charges and harvest costs are 18 and 17 percent, followed by machine costs and fertilizer and chemical costs at 15 and 9 percent, respectively. The remaining four cost items comprise about 21 percent of the total economic costs.

Summary of establishing an ultra-high-density orchard

Figure 1, page 20, shows the cumulative cash flow and net returns of establishing an ultra-high-density orchard. The light and darker green lines denote these results. The cumulative cash flow turns positive by \$93 in year 6, and the cumulative economic returns by \$13,194 in year 7. Appendix E, Tables 9UHD-13UHD, pages 28-32, contain the annual cost and return budgets for establishing this ultra-high-density sweet cherry orchard.

Conclusion

Historically, growers in Wasco County renew orchards when production levels no longer cover the cash variable costs of producing cherries. However, as higher density systems have been proven economically in the area, interest in replacing old trees with modern, higher-density cherry orchards has increased.

Ultra-high-density orchards can offer higher net returns with higher yields that are obtained earlier in the life of the investment. The trade-off, however, is a higher risk due to more considerable up-front costs and higher management requirements.

There are two key concepts to consider when planting an orchard: profitability and financial feasibility. Profitability determines if future revenues exceed expenses based on the time value of money. Financial feasibility establishes whether the grower has the equity or can borrow funds for the investment. The following are economic theory and financial concepts, focusing on the outcomes of this study, that growers should find valuable in determining management strategies for long-term business success.

Profit Maximization Theory and Measuring Profitability

There are three critical factors to maximizing profits when planting and establishing tree fruit crops. They are in order of importance:

1. fruit prices received.
2. yields, not only how much is produced annually but, more importantly, early yields in the life of an establishment period, and
3. establishment costs.

What is often misunderstood is that there is an absolute either/or trade-off to maximize profits. This misunderstanding results in growers concluding that the only way to increase profits is to avoid or cut costs. There are two flaws to this reasoning. First, it may be necessary to increase operating expenses to increase profits in some situations. This is possible if these increases in input costs result in an increase in revenues. The second flaw in this cost-minimizing "penny-wise, pound-foolish" mental trap relates to attitudes about risks. Spending money on more costly inputs may increase perceived and/or actual risks. Hence, many producers are good at minimizing costs but cannot maximize profits because they are not investing in technology, genetics, quality products, or scale (expansion). It is logical for producers to be risk-averse. Still, if done in excess, it can impede the adoption of much-needed investments. The farm operation will not be able to compete with other producers who make the investments and associated changes. Therefore, risk aversion may create more risk than otherwise would be. This can lead growers to focus on avoiding or reducing expenses when they should be seeking profit-maximizing strategies by investing dollars in:

1. growing high, quality fruit.
2. technologies that achieve early and higher yields.

3. techniques that result in increased efficiencies.

Economic theory suggests that dollars be invested if marginal revenues exceed marginal costs. A few examples would be investing in the following if the producer applies the profit maximization theory:

1. higher quality nursery stock.
2. support systems.
3. additional detailed pruning.
4. precision irrigation systems.

As the adage goes, sometimes it takes money to make money!

Another mental trap is thinking only about ongoing costs and concluding that all is well if profits are defined as gross income minus operating expenses. But this reasoning does not consider the profitability of the orchard. As with most perennial crop investments, there are both up-front investments and ongoing costs. The financial metric of net present value captures an investment's total up-front investments and stream of future net cash flows to measure profitability. While profit is an absolute measure of a positive gain from an investment, profitability is the profit relative to the size of the investment. For example, compare two investments when both earn \$1,000 in profits. One of these investments was for \$10,000, and the other was for \$100,000. The \$10,000 investment had better profitability, even though both investments generated equal profits. Profitability measures the efficiency of the investment to generate profit, as in an internal rate of return. Unlike profit, profitability is a relative measure of the rate of return expected on investments, or the size of the return, compared to what could have been obtained from an alternative investment (opportunity cost). Therefore, projections could indicate that a new planting may generate a net profit, but not necessarily provide long-term profitability

when considering the opportunity cost of the capital invested.

Addition through Subtraction

It is not uncommon for growers to remove and plant trees based on available annual cash flows, which runs counter to determining replacement based on the economic life of an orchard. This renewal strategy can lead to many unproductive orchards, which creates a challenge for the farm to survive in the long run.

There is a two-prong approach when evaluating orchards and renewal: addition through subtraction and applying financial management principles to existing resources to fund more planted acres. The addition through subtraction concept suggests removing orchards when revenues do not exceed cash variable costs, which could result in several acres without fruit trees. However, this strategy allows growers to allocate resources to the more productive orchards, applying the profit maximization theory described above. Many times, this allocation of resources can increase overall net farm income.

The other strategy is to analyze the business's financial strength and set limits to key financial ratios and performance measures to determine the funds available to invest in more acres of fruit trees. Over the long run, this strategy will create opportunities to replace orchards sooner, resulting in a higher orchard renewal rate by increasing net farm incomes.

Takeaways from this study

Cherry growers understand the risks involved in farming tree fruits, recognizing most times, they could make more money in alternative investments of similar risk and receiving a much higher return on their investment. The high capital investments in both orchard systems in this study may explain the low removal rates of cherry orchards.

One reason why these systems are so profitable is they do follow the three critical factors to successful orchard renewal discussed earlier due to:

1. planting varieties that provide a premium price to the grower.
2. planting variety, rootstock, and training system combinations that obtain early and higher yields.
3. integrating technologies and techniques that create efficiencies in the production system.

A criticism of university cost studies is they do not include all the regulatory costs incurred by growers. Although we recognize these additional costs exist, it is challenging to itemize them due to the diversity of growing crops, hiring labor, and providing housing or not. Another criticism is these studies do not reflect a specific grower's costs for their farm. In addition, they include too many economic costs and assumptions that some growers do not have. The following section will discuss how growers can use the *AgBiz Logic* decision tool to modify the information from this study as their own.

Using AgBizLogic™ to Analyze Different Price and Yield Scenarios

Different price and yield scenarios can give growers a greater appreciation of the financial risk involved in orchard establishment or renewal. In addition, numerous factors and unforeseen events (e.g., damage from a freeze, rain, hail, changes in market conditions) can impact yield and price, which are ignored in this study.

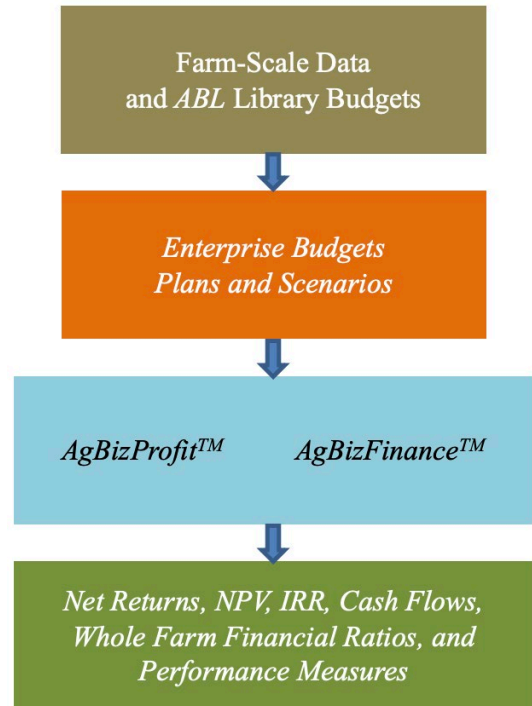
AgBiz Logic™ (ABL) is an online decision tool that considers economic and financial factors when analyzing investments. The following schematic shows the data flow and results from the ABL decision tool. Grower farm-level data is collected from the tax form Schedule F (Form 1040) to generate enterprise budgets.

In addition, enterprise budgets from universities, industry and USDA-ERS are stored in the ABL Library for grower use when returns and inputs are unknown (brown). Enterprise budgets are sequenced in ABL plans and adjusted for inflation, discount rates, and beginning and ending investment values which provide the basis for a capital investment analysis (orange). Scenarios consist of several plans that can be compared and are required for the ABL tools (blue) to calculate the economic and financial outputs (green).

The *AgBizProfit*TM module enables users to make capital investment decisions by measuring an investment's profitability based on its Net Present Value, Internal Rate of Return, and cash flow breakeven.

The module *AgBizFinance*TM empowers producers to make whole-farm investment decisions based on 20 financial ratios and performance measures. In addition, this program lets users input their current balance sheet information, loans, and capital leases.

AgBizFinance uses this information with plans and scenarios to generate up to 10 years of proforma cash flow statements, balance sheets, and income statements. As a result, growers can evaluate how orchard renewal plans can impact their short- and long-term finances and how best to fund capital investments.



These *AgBizLogic* decision tools can currently be accessed at <https://www.agbizlogic.com> or <https://www.agbizlogic.oregonstate.edu> at no cost. Also, budgets from this study will be available in the ABL Library.

It is recommended that before investing in any long-run perennial crop, the potential investor use *AgBiz Logic* modules to thoroughly analyze the profitability and financial feasibility of potential investments under varying price and yield scenarios.

***AgBiz Logic* Example**

From a horticultural perspective, finding the appropriate variety, rootstock, and training system combination is critical to orchard renewal. These factors can generate large, firm fruit, early and higher annual yields, and orchard labor efficiencies. However, problems arising from mismatched training systems or rootstocks can be a horticultural nightmare. Some of the issues can be poor quality fruit and/or

reduced yields, which results in lower returns to the grower. Labor requirements can also increase, which drives up costs of production.

The question growers face is whether to remove a young orchard and start over or graft or perform heavy pruning to prune trees to a different training system. Although the former generated a profit during its early life, it may not have yielded sufficient net

returns to provide an acceptable rate of return on investment to the grower. The latter can be less expensive and has the potential to reach full production much earlier. However, other factors, such as labor inputs, could be higher in the future.

This dilemma is an excellent example of how *AgBiz Logic* can assist growers in these situations. This tool can generate an economic and financial assessment of whether to replant to a new orchard or stay the course with the variety and rootstock but perform heavy pruning to a new training system. The following are assumptions used in *AgBiz Logic* budgets and scenarios to conduct such an analysis. Next, the *AgBizProfit* module will generate a net present value analysis to compare the profitability and costs of establishing each system.

Assumptions

1. **New Orchard.** The returns and costs of establishing a new orchard will come from this study as described in the high-density sweet cherry system.
2. **Steep Leader System.** The costs to perform heavy pruning are estimated to be \$500 per acre, which includes the labor to make the significant cuts, load, and haul limbs from the field.
3. The costs to maintain the trees will be the same as in the full production year of the high-density system. However, there will be no pest and disease control costs, and fertilizer inputs will decrease by 50 percent until the trees begin to bear fruit. These costs then increase with annual production, as in the high-density orchard.
4. Harvest and beehive costs are excluded until reaching commercial yields.
5. Labor increases by 30 percent for all tasks in the orchard.
6. Production begins in year 3 with 1,000 pounds, 4,000 in year 4, 8,000 in year 5, 10,000 in year 6, and reaches full production in year 7 with 14,000 pounds per acre.
7. The time horizon to evaluate these investments will be 20 years.
8. The discount rate will be six percent.
9. The beginning investment value will be \$15,000 per acre for the new orchard and \$20,000 for the heavy pruning option. The ending investment value will be \$30,000 for each orchard system.

RESULTS

An *AgBizProfit* analysis compares multiple investments simultaneously, which allows the grower to quickly evaluate each on its own merits. Table ABL1, page 10, shows planting a new orchard system has a higher net present value, although negative, than the heavy pruning option. The net present value to renew the orchard is -\$105 per acre, while the steep leader conversion is -\$3,814. Tables ABL2 and ABL3, pages 10 and 11, show the annual returns, costs, and net returns, as well as the present value of each year and the accumulated net returns before discounting. The year that returns are greater than the total costs of previous years is 12 for the new orchard and 11 for the conversion.

Although there are numerous combinations of varieties, rootstocks, and training systems to convert young but unprofitable orchards, this is one example of how to use the *AgBiz Logic* program. The ABL budgets used in this analysis are located in the *AgBiz Logic* library. Look for “EXTENSION” in the budget title, followed by “Steep Leader” ...”.

We encourage growers to create an *AgBiz Logic* account to evaluate the economics and financial implications of similar situations.

Table ABL1. Total Net Returns and Net Present Value to Establish a High-Density Orchard and Converting an Orchard to a Steep Leader Training System.

Plan	Net Returns	Net Present Value
Plan1: HD Sweet Cherries, New Orchard	\$42,455.85	-\$104.91
Plan2: Cherries, Steep Leader Conversion	\$35,701.26	-\$3,813.71

Table ABL2. Annual Returns, Costs, and Net Returns, Present Values, and Accumulated Net Returns Before Discounting to Establish a New High-Density Orchard.

Year	Annual Returns	Annual Cost	Annual Net Returns	Present Value	Accumulated Net Returns
1	\$0.00	\$2,320.14	-\$2,320.14	-\$2,188.82	-\$2,320.14
2	\$0.00	\$10,799.33	-\$10,799.33	-\$9,611.37	-\$13,119.47
3	\$0.00	\$1,756.47	-\$1,756.47	-\$1,474.77	-\$14,875.94
4	\$850.00	\$4,549.06	-\$3,699.06	-\$2,930	-\$18,575
5	\$4,250.00	\$5,428.98	-\$1,178.98	-\$881	-\$19,753.98
6	\$8,500.00	\$7,279.93	\$1,220.07	\$860.10	-\$18,533.91
7	\$11,900.00	\$8,372.37	\$3,527.63	\$2,346.07	-\$15,006.28
8	\$11,900.00	\$8,405.39	\$3,494.61	\$2,192.56	-\$11,511.67
9	\$11,900.00	\$8,439.40	\$3,460.60	\$2,048.32	-\$8,051.07
10	\$11,900.00	\$8,474.43	\$3,425.57	\$1,912.82	-\$4,625.5
11	\$11,900.00	\$8,510.52	\$3,389.48	\$1,785.54	-\$1,236.02
12	\$11,900.00	\$8,547.68	\$3,352.32	\$1,666.00	\$2,116.30
13	\$11,900.00	\$8,585.96	\$3,314.04	\$1,553.75	\$5,430.34
14	\$11,900.00	\$8,625.39	\$3,274.61	\$1,448.36	\$8,704.95
15	\$11,900.00	\$8,666.00	\$3,234.00	\$1,349.44	\$11,938.95
16	\$11,900.00	\$8,707.83	\$3,192.17	\$1,256.59	\$15,131.12
17	\$11,900.00	\$8,750.91	\$3,149.09	\$1,169.46	\$18,280.21
18	\$11,900.00	\$8,795.29	\$3,104.71	\$1,087.72	\$21,384.92
19	\$11,900.00	\$8,840.99	\$3,059.01	\$1,011.04	\$24,443.93
20	\$11,900.00	\$8,888.07	\$3,011.93	\$10,293.28	\$27,455.86

Table ABL3. Annual Returns, Costs, and Net Returns, Present Values, and Accumulated Net Returns Before Discounting to Convert an Existing Orchard to a Steep Leader Training System.

Year	Annual Returns	Annual Cost	Annual Net Returns	Present Value	Accumulated Net Returns
1	\$0.00	\$3,238.31	-\$3,238.31	-\$3,055.01	-\$3,238.31
2	\$0.00	\$1,889.60	-\$1,889.6	-\$1,681.74	-\$5,127.91
3	\$0.00	\$2,385.07	-\$2,385.07	-\$2,002.55	-\$7,512.98
4	\$850.00	\$4,885.98	-\$4,035.98	-\$3,196.87	-\$11,548.96
5	\$3,400.00	\$5,245.63	-\$1,845.63	-\$1,379.16	-\$13,394.59
6	\$6,800.00	\$6,836.65	-\$36.65	-\$25.84	-\$13,431.24
7	\$8,500.00	\$7,635.10	\$864.90	\$575.21	-\$12,566.34
8	\$11,900.00	\$8,745.50	\$3,154.50	\$1,979.18	-\$9,411.84
9	\$11,900.00	\$8,789.71	\$3,110.29	\$1,840.98	-\$6,301.55
10	\$11,900.00	\$8,435.13	\$3,464.87	\$1,934.77	-\$2,836.68
11	\$11,900.00	\$8,882.16	\$3,017.84	\$1,589.76	\$181.16
12	\$11,900.00	\$8,930.47	\$2,969.53	\$1,475.77	\$3,150.69
13	\$11,900.00	\$8,980.23	\$2,919.77	\$1,368.90	\$6,070.46
14	\$11,900.00	\$8,435.13	\$3,464.87	\$1,532.52	\$9,535.33
15	\$11,900.00	\$9,084.28	\$2,815.72	\$1,174.90	\$12,351.05
16	\$11,900.00	\$9,138.66	\$2,761.34	\$1,086.99	\$15,112.39
17	\$11,900.00	\$9,194.67	\$2,705.33	\$1,004.66	\$17,817.72
18	\$11,900.00	\$9,252.35	\$2,647.65	\$927.59	\$20,465.37
19	\$11,900.00	\$9,252.35	\$2,647.65	\$875.08	\$23,113.02
20	\$11,900.00	\$9,311.77	\$2,588.23	\$10,161.16	\$25,701.25

APPENDIX A

Machinery and Equipment Assumptions and Cost Calculations for a 100-acre Orchard in Wasco County.

Table 1. Machinery Cost Assumptions

Machine	Size or Description	Market Value	Hours or Miles of Annual Use	Expected Life (yrs)	Salvage Value
Tractor	4 Wheel Dr 90hp, 2 Units, New	\$110,000	517	10	\$32,492
Tractor	4 Wheel Dr 75hp, Older	20,000	28	20	2,566
Air-blast sprayer	400 Gallon Unit, PTO, 2 Units	36,000	210	10	6,366
Flail chopper	8' Unit	10,000	88	7	2,551
Grass Cutter	9' Unit	8,000	219	10	1,415
Tank sprayer for ATV		1,500	194	10	265
Gopher machine	1 Unit	4,000	28	20	208
Pickup	3/4 Ton 4X4, New	50,000	15,000	10	18,908
ATV	4 Wheeler, New	5,500	3,000	5	2,465
5th Wheel Trailer	Flatbed	14,000	N/A	20	2,107
Auger		1,700	50	20	89
Field toilets	3 Units	18,000	N/A	15	0
Weather station	1 Units	2,500	N/A	5	0
Bin trailer	2 Units, per 100 acres	15,000	300	10	2,653
Front-End loader and backforks		2,000	300	10	354
Ladders	80 Units, per 100 acres	13,600	N/A	10	0
Picking buckets/hamess	per 100 acres	2,880	N/A	5	0
Pruning equipment	Various tools	6,000	N/A	3	0
Irrigation filtration system	per 100-acres	4,000	N/A	30	0
Irig. system, High-Density	Micro-sprinklers plus double drip, per acre	1,700	N/A	25	0
Irig. system, Ultra-High-Density	Micro-sprinklers plus double drip, per acre	2,000	N/A	20	0
Trellis system, Ultra-High-Density	Installation included, per acre	7,200	N/A	20	0
Wind machine	2 unit, propane, per 100 acres	70,000	35	30	1,792
Shop with tools	20' x 40', per 100 acres	60,000	N/A	30	0
Pesticide storage shed	8' x 40', per 100 acres	6,000	N/A	30	0
Seasonal housing facilities	16 Units, per 100 acres	800,000	N/A	30	0

Table 2. Machinery Cost Calculations

Machine	Size or Description	-- Variable Costs --		-- Fixed Costs --		Total Cost
		Fuel & Lube	Repairs & Maint.	Depreciation	Interest	
----- Costs per Hour -----						
Tractor	4 Wheel Dr 90hp, 2 Units, New	\$15.09	\$1.71	\$15.00	\$11.03	\$42.83
Tractor	4 Wheel Dr 75hp, Older	15.09	0.08	31.36	32.47	78.99
Air-blast sprayer	400 Gallon Unit, PTO, 2 Units	0.00	18.44	14.11	8.07	40.62
Flail chopper	8' Unit	0.00	2.70	12.15	5.73	20.57
Grass Cutter	9' Unit	0.00	6.37	3.01	1.72	11.10
Tank sprayer for ATV		0.00	0.75	0.64	0.36	1.75
Gopher machine	1 Unit	0.00	0.98	6.82	6.06	13.85
----- Costs per Mile -----						
Pickup	3/4 Ton 4X4, New	\$0.38	\$0.04	\$0.21	\$0.18	\$0.81
ATV	4 Wheeler, New	0.48	0.02	0.20	0.11	0.81
----- Costs per Acre -----						
5th Wheel Trailer	Flatbed	\$0.00	\$8.40	\$5.95	\$6.44	\$20.79
Auger		0.00	1.02	0.81	0.72	2.54
Field toilets	3 Units	0.00	10.80	12.00	7.20	30.00
Weather station	1 Units	0.00	1.50	5.00	1.00	7.50
Bin trailer	2 Units, per 100 acres	0.00	9.00	12.35	7.06	28.41
Front-End loader and backforks		0.00	1.20	1.65	0.94	3.79
Ladders	80 Units, per 100 acres	0.00	8.16	13.60	5.44	27.20
Picking buckets	per 100 acres	0.00	1.73	5.76	1.15	8.64
Pruning equipment	Various tools	6.90	3.60	20.00	2.40	32.90
Irrigation filtration system	per 100-acres	0.00	40.00	1.33	1.60	42.93
Irig. system, High-Density	Micro-sprinklers plus double drip, per acre	0.00	17.00	68.00	68.00	153.00
Irig. system, Ultra High-Density	Micro-sprinklers plus double drip, per acre	0.00	20.00	100.00	80.00	200.00
Trellis system, Ultra High-Densit	Installation included, per acre	0.00	72.00	72.00	288.00	432.00
Wind machine	2 unit, propane, per 100 acres	10.87	70.00	22.74	28.72	132.32
Shop with tools	20' x 40', per 100 acres	0.00	6.00	20.00	9.00	35.00
Pesticide storage shed	8' x 40', per 100 acres	0.00	4.80	2.00	0.90	7.70
Seasonal housing facilities	16 Units, per 100 acres	0.00	160.00	266.67	120.00	546.67

Table 3DD. Estimated Cost of Each Operation with Power-Unit in a High-Density Orchard, \$/acre, 16' between row spacing.

Operation	Tractor	Miles per hour	Acres per hour	Labor cost per acre	-- Machine Costs --		Total cost per acre
					Variable cost per acre	Fixed cost per acre	
Air-blast sprayer	4 Wheel Dr 90hp	2.25	2.62	\$8.22	\$13.46	\$18.41	\$40.09
Flail chopper	4 Wheel Dr 90hp	1.50	1.24	17.42	15.76	35.51	68.69
Grass Cutter	4 Wheel Dr 90hp	3.00	2.47	8.71	9.37	12.44	30.51
Tank sprayer for ATV	ATV	2.50	1.82	11.84	1.80	1.40	15.04
Gopher machine	4 Wheel Dr 75hp	2.00	3.30	6.53	4.90	23.26	34.69

Table 3UHD. Estimated Cost of Each Operation with Power-Unit in a Ultra-High-Density Orchard, \$/acre, 11' between row spacing.

Operation	Tractor	Miles per hour	Acres per hour	Labor cost per acre	-- Machine Costs --		Total cost per acre
					Variable cost per acre	Fixed cost per acre	
Air-blast sprayer	4 Wheel Dr 90hp	2.25	1.96	\$10.74	\$17.94	\$22.36	\$51.04
Flail chopper	4 Wheel Dr 90hp	1.50	1.85	11.37	10.51	23.67	45.56
Grass Cutter	4 Wheel Dr 90hp	3.00	3.71	5.69	6.24	8.29	20.22
Tank sprayer for ATV	ATV	2.50	2.73	7.73	1.56	1.94	11.24
Gopher machine	4 Wheel Dr 75hp	2.50	2.73	7.73	5.92	28.12	41.77

APPENDIX B

Input Assumptions for Establishing a High-Density and Ultra-High-Density Sweet Cherry Orchard in Wasco County.

	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	\$16.75	\$16.92	\$17.10	\$17.27	\$17.45	\$17.63	\$17.81
Cost of equipment operators, per hour	\$20.25	\$20.46	\$20.67	\$20.88	\$21.10	\$21.31	\$21.53
Cost of supervisors, per hour	\$24.50	\$24.75	\$25.01	\$25.26	\$25.53	\$25.79	\$26.05
Cost of harvest, labor, per lb	\$0.26	\$0.26	\$0.27	\$0.27	\$0.27	\$0.27	\$0.28
Cost of harvest, equipment & fuel, per lb	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01
Cost of harvest, housing maintenance, per lb	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02
Hours of pruning labor	0.00	0.00	0.00	0.00	20.00	32.00	32.00
Hours of training labor	0.00	7.00	15.00	15.00	0.00	0.00	0.00
Hours of injecting fertilizer labor	0.00	0.06	0.06	0.06	0.06	0.06	0.06
Hours of frost protection	0.00	0.00	0.00	2.00	2.00	2.00	2.00
Hours of irrigating labor	0.00	4.50	4.50	4.50	4.50	4.50	4.50
Hours to remove & replace tree labor	0.00	0.00	0.20	0.30	0.30	0.30	0.30
Hours for rodent control (trapping) labor	0.00	3.00	3.00	3.00	3.00	3.00	3.00
Cost of liquid fertilizer - injected w/ irrigation	\$0.00	\$55.00	\$110.00	\$110.00	\$110.00	\$110.00	\$110.00
Cost of fertilizer - foliar applied	\$0.00	\$0.00	\$70.00	\$140.00	\$140.00	\$140.00	\$140.00
Cost of herbicide - strip maintenance	\$0.00	\$85.00	\$50.00	\$200.00	\$200.00	\$200.00	\$200.00
Cost of insect and disease control	\$0.00	\$0.00	\$0.00	\$900.00	\$900.00	\$900.00	\$900.00
Cost of rodent materials	\$0.00	\$10.00	\$10.00	\$20.00	\$20.00	\$20.00	\$20.00
Cost per bee hive	\$0.00	\$0.00	\$0.00	\$55.00	\$55.00	\$55.00	\$55.00
Times for herbicide strip spray - ATV	0.00	4.00	4.00	4.00	4.00	4.00	4.00
Times for insect and disease control	0.00	2.00	2.00	6.00	6.00	6.00	6.00
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	1.00	1.00	1.00	1.00
Times for rotary mowing orchard floor	0.00	1.00	3.00	3.00	3.00	3.00	3.00
Planted trees	0	340	2	2	2	2	2

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

	Year 0	Year 1	Year 2	Year 3	Full Prod
Prices per Pound	\$0.85	\$0.85	\$0.85	\$0.85	\$0.85
Pounds per acre	0	0	1,500	4,000	24,000
Cost of general orchard labor, per hour	\$16.75	\$16.92	\$17.10	\$17.27	\$17.45
Cost of equipment operators, per hour	\$20.25	\$20.46	\$20.67	\$20.88	\$21.10
Cost of supervisors, per hour	\$24.50	\$24.75	\$25.01	\$25.26	\$25.53
Cost of harvest, labor, per lb	\$0.26	\$0.26	\$0.27	\$0.27	\$0.27
Cost of harvest, equipment & fuel, per lb	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01
Cost of harvest, housing maintenance, per lb	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02
Hours of pruning labor	0.00	0.00	0.00	15.00	15.00
Hours of training labor	0.00	10.00	20.00	25.00	15.00
Hours of injecting fertilizer labor	0.00	0.06	0.06	0.06	0.06
Hours of frost protection	0.00	0.00	0.00	2.00	2.00
Hours of inigating labor	0.00	4.50	4.50	4.50	4.50
Hours for rodent control (trapping) labor	0.00	10.00	10.00	10.00	10.00
Cost of liquid fertilizer - injected w/ irigation	\$0.00	\$75.00	\$75.00	\$75.00	\$110.00
Cost of fertilizer - foliar applied	\$0.00	\$0.00	\$140.00	\$140.00	\$140.00
Cost of herbicide - strip maintenance	\$0.00	\$50.00	\$200.00	\$200.00	\$200.00
Cost of disease control	\$0.00	\$0.00	\$900.00	\$900.00	\$900.00
Cost of rodent materials	\$0.00	\$20.00	\$20.00	\$20.00	\$20.00
Cost per bee hive	\$0.00	\$0.00	\$55.00	\$55.00	\$55.00
Times for herbicide strip spray - ATV	0.00	5.00	5.00	5.00	5.00
Times for disease & insect control - ground	0.00	2.00	6.00	6.00	6.00
Times for applying rodent control	0.00	2.00	2.00	2.00	2.00
Number of bee hives per acre	0.00	0.00	1.00	1.00	2.00
Times for flailing chopping orchard floor	0.00	0.00	1.00	1.00	1.00
Times for rotary mowing orchard floor	0.00	1.00	3.00	3.00	3.00
Planted trees	0	660	0	0	0

Table 5. Fixed cost input assumptions for establishing both a high- and ultra-high-density sweet cherry orchard.

Property taxes, including buildings	\$90.00
Property insurance	\$70.00
Land values	\$15,000
Irrigation assessment	\$168.00
Miscellaneous	\$150.00
Tree cost	\$16.00
Gasoline price, per gallon	\$4.00
Diesel fuel price, per gallon	\$4.00
Propane price, per gallon	\$2.25
Operating interest rate	8.00%
Machinery interest rate	8.00%
Housing interest rate	3.00%
Land interest rate	4.00%
Establishment interest rate	6.00%
% of operating capital borrowed	50.00%
Months to borrow operating capital	6.0

APPENDIX C

Cash Costs and Economic Returns and Costs to Establish a High-Density and Ultra-High-Density Sweet Cherry Orchard.

Income:	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Full Prod
Yield (tons/acre)	0	0	0	1,000	5,000	10,000	14,000
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 (per acre):							
Field preparation	\$418.93	\$40.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Trees	0.00	5,440.00	32.00	32.00	32.00	32.00	32.00
Irrigation system	0.00	1,700.00	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	254.00	85.00	110.00	250.00	250.00	250.00	250.00
Chemicals	605.00	55.00	50.00	1,100.00	1,100.00	1,100.00	1,100.00
Bee rental	0.00	0.00	0.00	55.00	110.00	110.00	110.00
Rodent materials	0.00	10.00	10.00	20.00	20.00	20.00	20.00
Harvest costs	0.00	0.00	0.00	393.55	1,599.83	3,132.12	4,155.43
Other labor	167.50	1,085.61	464.75	997.83	659.09	877.44	894.94
Other machine costs	112.18	463.83	196.52	369.38	369.38	369.38	365.71
Seasonal housing, shop, & pesticide storage shed	170.80	170.80	170.80	170.80	170.80	170.80	170.80
Miscellaneous and overhead	150.00	150.00	150.00	150.00	150.00	150.00	150.00
Interest: operating capital	37.57	150.80	23.68	71.57	89.22	124.23	143.29
Total Variable Costs	\$1,915.98	\$9,391.04	\$1,207.75	\$3,650.13	\$4,550.32	\$6,335.98	\$7,392.17
Gross Income - Variable Cost	-\$1,915.98	-\$9,391.04	-\$1,207.75	-\$2,800.13	-\$300.32	\$2,164.02	\$4,507.83
Cash fixed costs (per acre):							
Water assessment	\$168.00	\$168.00	\$168.00	\$168.00	\$168.00	\$168.00	\$168.00
Property Insurance	70.00	70.00	70.00	70.00	70.00	70.00	70.00
Property taxes	90.00	90.00	90.00	90.00	90.00	90.00	90.00
Total fixed cost	\$328.00	\$328.00	\$328.00	\$328.00	\$328.00	\$328.00	\$328.00
Total cost	\$2,243.98	\$9,719.04	\$1,535.75	\$3,978.13	\$4,878.32	\$6,663.98	\$7,720.17
Net projected returns	-\$2,243.98	-\$9,719.04	-\$1,535.75	-\$3,128.13	-\$628.32	\$1,836.02	\$4,179.83
Cumulative returns	-\$2,243.98	-\$11,963.01	-\$13,498.76	-\$16,626.89	-\$17,255.21	-\$15,419.19	-\$11,239.37

Table 7HD. Economic Costs and Returns of Establishing a High-Density Sweet Cherry Orchard, \$/acre.

Income	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Full Prod
Yield (tons/acre)	0	0	0	1,000	5,000	10,000	14,000
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	\$418.93	\$40.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Trees	0.00	5,440.00	32.00	32.00	32.00	32.00	32.00
Paint trees	0.00	40.00	0.00	40.00	0.00	0.00	0.00
Fertilizer	254.00	85.00	110.00	250.00	250.00	250.00	250.00
Chemicals	605.00	55.00	50.00	1,100.00	1,100.00	1,100.00	1,100.00
Bee rental	0.00	0.00	0.00	55.00	110.00	110.00	110.00
Rodent materials	0.00	10.00	10.00	20.00	20.00	20.00	20.00
Harvest costs	0.00	0.00	0.00	393.55	1,599.83	3,132.12	4,155.43
Other labor	167.50	1,085.61	464.75	997.83	659.09	877.44	894.94
Other machine costs	112.18	463.83	196.52	369.38	369.38	369.38	365.71
Seasonal housing, shop, & pesticide storage shed	170.80	170.80	170.80	170.80	170.80	170.80	170.80
Miscellaneous and overhead	150.00	150.00	150.00	150.00	150.00	150.00	150.00
Interest: operating capital	<u>37.57</u>	<u>150.80</u>	<u>23.68</u>	<u>71.57</u>	<u>89.22</u>	<u>124.23</u>	<u>143.29</u>
Total Variable Costs	\$1,915.98	\$7,691.04	\$1,207.75	\$3,650.13	\$4,550.32	\$6,335.98	\$7,392.17
Gross Income - Variable Cost	-\$1,915.98	-\$7,691.04	-\$1,207.75	-\$2,800.13	-\$300.32	\$2,164.02	\$4,507.83
Fixed Costs:							
Water assessment	\$168.00	\$168.00	\$168.00	\$168.00	\$168.00	\$168.00	\$168.00
Property Insurance	70.00	70.00	70.00	70.00	70.00	70.00	70.00
Property taxes	90.00	90.00	90.00	90.00	90.00	90.00	90.00
Machine costs	207.89	1,191.72	355.17	626.61	626.61	626.61	626.61
Seasonal housing, shop, & pesticide storage shed	418.57	418.57	418.57	418.57	418.57	418.57	418.57
Land interest cost	600.00	600.00	600.00	600.00	600.00	600.00	600.00
Interest on establishment costs	0.00	208.23	834.48	1,059.12	1,409.06	1,630.02	1,652.00
Total fixed cost	\$1,554.45	\$2,746.51	\$2,536.21	\$3,032.29	\$3,382.24	\$3,603.19	\$3,625.18
Total cost	\$3,470.43	\$10,437.55	\$3,743.96	\$6,682.42	\$7,932.55	\$9,939.17	\$11,017.35
Net projected returns	-\$3,470.43	-\$10,437.55	-\$3,743.96	-\$5,832.42	-\$3,682.55	-\$1,439.17	\$882.65
Cumulative returns	-\$3,470.43	-\$13,907.98	-\$17,651.94	-\$23,484.36	-\$27,166.92	-\$28,606.09	-\$27,723.44

¹This cost is an annual payment, amortized over a 2.5-year period, which includes principal and interest to recover the capital investment of establishing this orchard in years 0 through 5.

Table 6UHD. Cash Costs and Returns of Establishing a Ultra-High-Density Sweet Cherry Orchard, \$/acre.

Income:	Year 0	Year 1	Year 2	Year 3	Full Prod
Yield (tons/acre)	0	0	1,500	4,000	24,000
Price (dollars/pound)	<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	\$1,275.00	\$3,400.00	\$20,400.00
Variable Costs (per acre):					
Field preparation	\$428.53	\$40.00	\$0.00	\$0.00	\$0.00
Trees	0.00	10,560.00	0.00	0.00	0.00
Irrigation system	0.00	2,000.00	0.00	0.00	0.00
Trellis system	0.00	7,200.00	0.00	0.00	0.00
Paint trees	0.00	40.00	0.00	40.00	0.00
Fertilizer	254.00	75.00	215.00	215.00	250.00
Chemicals	605.00	50.00	1,100.00	1,100.00	1,100.00
Bee rental	0.00	0.00	55.00	55.00	110.00
Rodent materials	0.00	20.00	20.00	20.00	20.00
Harvest costs	0.00	0.00	538.51	1,287.90	7,316.52
Other labor	301.50	1,213.54	752.89	1,611.02	692.11
Other machine costs	112.18	558.57	573.39	468.44	461.45
Seasonal housing, shop, & pesticide storage shed	170.80	170.80	170.80	170.80	170.80
Miscellaneous and overhead	150.00	150.00	150.00	150.00	150.00
Interest: operating capital	<u>40.44</u>	<u>257.56</u>	<u>71.51</u>	<u>102.36</u>	<u>205.42</u>
Total Variable Costs	\$2,062.45	\$22,335.47	\$3,647.10	\$5,220.53	\$10,476.29
Gross Income - Variable Cost	-\$2,062.45	-\$22,335.47	-\$2,372.10	-\$1,820.53	\$9,923.71
Cash fixed costs (per acre):					
Water assessment	\$168.00	\$168.00	\$168.00	\$168.00	\$168.00
Property Insurance	70.00	70.00	70.00	70.00	70.00
Property taxes	<u>90.00</u>	<u>90.00</u>	<u>90.00</u>	<u>90.00</u>	<u>90.00</u>
Total fixed cost	\$328.00	\$328.00	\$328.00	\$328.00	\$328.00
Total cost	\$2,390.45	\$22,663.47	\$3,975.10	\$5,548.53	\$10,804.29
Net projected returns	-\$2,390.45	-\$22,663.47	-\$2,700.10	-\$2,148.53	\$9,595.71
Cumulative returns	-\$2,390.45	-\$25,053.92	-\$27,754.02	-\$29,902.55	-\$20,306.84

Table 7UHD. Economic Costs and Returns of Establishing a Ultra-High-Density Sweet Cherry Orchard, \$/acre.

Income:	Year 0	Year 1	Year 2	Year 3	Full Prod
Yield (tons/acre)	0	0	1,500	4,000	24,000
Price (dollars/pound)	<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	\$1,275.00	\$3,400.00	\$20,400.00
Variable Costs:					
Field preparation	\$428.53	\$40.00	\$0.00	\$0.00	\$0.00
Trees	0.00	10,560.00	0.00	0.00	0.00
Paint trees	0.00	40.00	0.00	40.00	0.00
Fertilizer	254.00	75.00	215.00	215.00	250.00
Chemicals	605.00	50.00	1,100.00	1,100.00	1,100.00
Bee rental	0.00	0.00	55.00	55.00	110.00
Rodent materials	0.00	20.00	20.00	20.00	20.00
Harvest costs	0.00	0.00	538.51	1,287.90	7,316.52
Other labor	301.50	1,213.54	752.89	1,611.02	692.11
Other machine costs	112.18	558.57	573.39	468.44	461.45
Seasonal housing, shop, & pesticide storage shed	170.80	170.80	170.80	170.80	170.80
Miscellaneous and overhead	150.00	150.00	150.00	150.00	150.00
Interest: operating capital	<u>40.44</u>	<u>257.56</u>	<u>71.51</u>	<u>102.36</u>	<u>205.42</u>
Total Variable Costs	\$2,062.45	\$13,135.47	\$3,647.10	\$5,220.53	\$10,476.29
Gross Income - Variable Cost	-\$2,062.45	-\$13,135.47	-\$2,372.10	-\$1,820.53	\$9,923.71
Fixed Costs:					
Water assessment	\$168.00	\$168.00	\$168.00	\$168.00	\$168.00
Property Insurance	70.00	70.00	70.00	70.00	70.00
Property taxes	90.00	90.00	90.00	90.00	90.00
Machine costs	204.95	1,804.19	1,111.22	1,245.37	1,245.37
Seasonal housing, shop, & pesticide storage shed	418.57	418.57	418.57	418.57	418.57
Land interest cost	600.00	600.00	600.00	600.00	600.00
Interest on establishment costs	<u>0.00</u>	<u>216.84</u>	<u>1,207.02</u>	<u>1,569.24</u>	<u>¹2,801.73</u>
Total fixed cost	\$1,551.52	\$3,367.59	\$3,664.81	\$4,161.17	\$5,393.67
Total cost	\$3,613.97	\$16,503.06	\$7,311.91	\$9,381.70	\$15,869.96
Net projected returns	-\$3,613.97	-\$16,503.06	-\$6,036.91	-\$5,981.70	\$4,530.04
Cumulative returns	-\$3,613.97	-\$20,117.03	-\$26,153.94	-\$32,135.64	-\$27,605.61

¹This cost is an annual payment, amortized over a 20-year period, which includes principal and interest to recover the capital investment of establishing this orchard in years 0 through 3.

Table 8HD. Cash and Economic Costs to Establish a High-Density Sweet Cherry for the First Seven Years, \$/acre

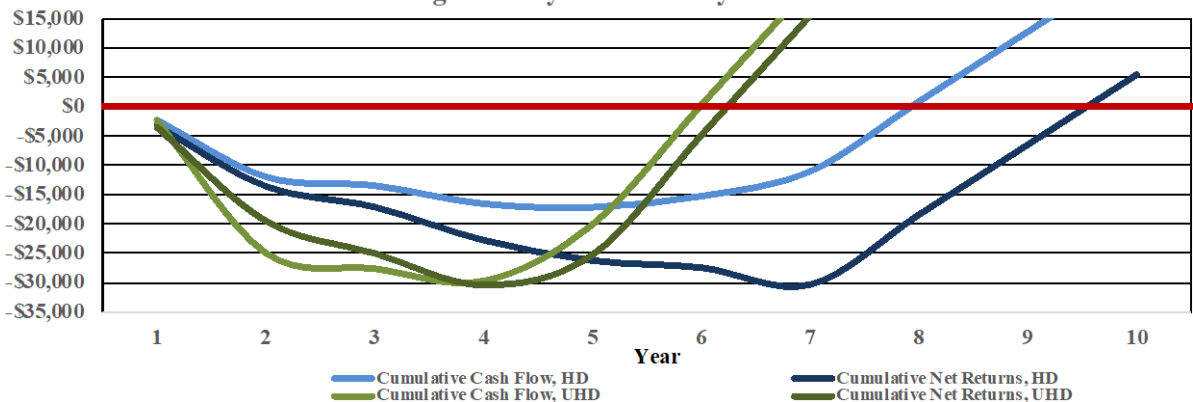
Cost Item	Cash Costs ¹	Percent of Total	Economic Costs ¹	Percent of Total
Trees	\$5,600	15.24%	\$5,600	10.43%
Irrigation system	1,700	4.63%	N/A	0.00%
Fertilizer and chemicals	6,559	17.85%	6,559	12.22%
Labor, not including harvest	5,147	14.01%	5,147	9.59%
Machine costs	2,246	6.11%	6,508	12.12%
Harvest costs, including labor	9,281	25.26%	9,281	17.29%
Housing, shop, & pesticide storage shed	1,196	3.25%	4,126	7.68%
Interest: Loans, establishment & land charges	640	1.74%	12,101	22.54%
Other	<u>4,370</u>	11.89%	<u>4,370</u>	8.14%
Totals	\$36,739		\$53,692	

Table 8UHD. Cash and Economic Costs to Establish a Ultra-High-Density Sweet Cherry Orchard for the First Five Years, \$/acre

Cost Item	Cash Costs ¹	Percent of Total	Economic Costs ¹	Percent of Total
Trees	\$10,560	23.27%	\$10,560	20.05%
Irrigation system	\$2,000	4.41%	N/A	0.00%
Trellis	\$7,200	15.87%	N/A	0.00%
Fertilizer and chemicals	4,964	10.94%	4,964	9.42%
Labor, not including harvest	4,571	10.07%	4,571	8.68%
Machine costs	2,174	4.79%	7,785	14.78%
Harvest costs, including labor	9,143	20.15%	9,143	17.36%
Housing, shop, & pesticide storage shed	854	1.88%	2,947	5.59%
Interest: Loans, establishment & land charges	677	1.49%	9,472	17.98%
Other	<u>3,239</u>	7.14%	<u>3,239</u>	6.15%
Totals	\$45,382		\$52,681	

¹The irrigation system and trellis are long-term assets that are cash expenditures in the year of planting but, as an economic cost, are depreciated over the orchard's life.

Figure 1. Cumulative Cash Flows and Net Returns for High-Density and Ultra-High-Density Sweet Cherry Orchards



APPENDIX D

Annual Enterprise Budgets to Establish a **High-Density** Sweet Cherry Orchard.

Table 9HD. Year 0, Sweet Cherries, High-Density, \$/Acre Economic Costs and Returns.					
<u>VARIABLE CASH COSTS</u>	<u>Description</u>	<u>Labor</u>	<u>Machinery</u>	<u>Materials</u>	<u>Total</u>
Remove trees, roots, and rip (2x)	Custom	\$0.00	\$0.00	\$400.00	\$400.00
Disc	4.0 appl.	33.50	33.59	0.00	67.09
Staking	340.0 stakes	134.00	0.00	10.20	144.20
Soil sampling	0.2 x/acre	0.00	0.00	8.73	8.73
Fertilizer (broadcast applied)	Custom	0.00	0.00	100.00	100.00
Lime	Custom	0.00	0.00	154.00	154.00
Fumigation	Custom	0.00	0.00	605.00	605.00
Pickup & ATV		0.00	78.59	0.00	78.59
Seasonal housing, shop, & pesticide storage shed		0.00	0.00	170.80	170.80
Miscellaneous and overhead		0.00	0.00	150.00	150.00
Interest: operating capital	6.0 mons	<u>0.00</u>	<u>0.00</u>	<u>37.57</u>	<u>37.57</u>
Total variable costs		\$167.50	\$112.18	\$1,636.30	\$1,915.98
<u>FIXED CASH COSTS</u>				<u>Unit</u>	<u>Total</u>
Water assessment				acre	\$168.00
Property insurance				acre	70.00
Property taxes				acre	<u>90.00</u>
Total cash costs					\$328.00
<u>FIXED NON-CASH COSTS</u>				<u>Unit</u>	<u>Total</u>
Machinery and equipment - depreciation & interest				acre	\$139.97
Pickup & ATV - depreciation & interest				acre	67.91
Seasonal housing, shop & pesticide storage shed				acre	418.57
Land interest charge				acre	<u>600.00</u>
Total non-cash costs					\$1,226.45
Total fixed costs					\$1,554.45
Total of All Costs Per Acre					\$3,470.43

Table 10HD. Year 1, Sweet Cherries, High-Density, \$/Acre Economic Costs and Returns.

<u>VARIABLE CASH COSTS</u>	<u>Description</u>	<u>Labor</u>	<u>Machinery</u>	<u>Materials</u>	<u>Total</u>
Dig holes	14.0 hours	\$261.67	\$213.34	\$0.00	\$475.01
Planting trees	22.0 hours	411.19	83.41	5,440.00	5,934.60
Painting trees	7.0 hours	118.46	0.00	40.00	158.46
Training trees	7.0 hours	118.46	0.00	0.00	118.46
Fertilizer (liquid, injected)	0.1 appl.	1.49	0.00	55.00	56.49
ATV herbicide maintenance	4.0 appl.	45.00	7.18	85.00	137.19
Seed cover crop (Companion Grass)	20.0 Lbs	10.23	7.58	40.00	57.81
Grass cutter	1.0 times	8.27	9.37	0.00	17.64
Rodent control	3.0 hours	34.69	7.34	10.00	52.03
Irrigation	4.5 hours	76.15	57.00	0.00	133.15
Pickup & ATV		0.00	78.59	0.00	78.59
Seasonal housing, shop, & pesticide storage shed		0.00	0.00	170.80	170.80
Miscellaneous and overhead		0.00	0.00	150.00	150.00
Interest: operating capital	6.0 mons	<u>0.00</u>	<u>0.00</u>	<u>150.80</u>	<u>150.80</u>
Total variable costs		\$1,085.61	\$463.83	\$6,141.60	\$7,691.04
<u>FIXED CASH COSTS</u>					
				<u>Unit</u>	<u>Total</u>
Water assessment				acre	\$168.00
Property insurance				acre	70.00
Property taxes				acre	<u>90.00</u>
Total cash costs					\$328.00
<u>FIXED NON-CASH COSTS</u>					
				<u>Unit</u>	<u>Total</u>
Machinery and equipment - depreciation & interest				acre	\$1,123.81
Pickup & ATV - depreciation & interest				acre	67.91
Seasonal housing, shop & pesticide storage shed				acre	418.57
Land interest charge				acre	600.00
Prior year's establishment costs				acre	<u>208.23</u>
Total non-cash costs					\$2,418.51
Total fixed costs					\$2,746.51
Total of All Costs Per Acre					\$10,437.55

Table 11HD. Year 2, Sweet Cherries, High-Density, \$/Acre Economic Costs and Returns.

<u>VARIABLE CASH COSTS</u>	<u>Description</u>	<u>Labor</u>	<u>Machinery</u>	<u>Materials</u>	<u>Total</u>
Training trees	15.0 hours	\$256.45	\$0.00	\$0.00	\$256.45
Tree removal & tree replacement	0.2 hours	7.55	2.54	32.00	42.09
Flail chopping	1.0 x/acre	16.72	15.76	0.00	32.48
Fertilizer (liquid, injected)	0.1 appl.	1.50	0.00	110.00	111.50
ATV herbicide maintenance	4.0 appl.	45.47	7.18	50.00	102.65
Grass cutter	3.0 times	25.07	28.10	0.00	53.17
Rodent control	3.0 hours	35.05	7.34	10.00	52.39
Irrigation	4.5 hours	76.94	57.00	0.00	133.94
Pickup & ATV		0.00	78.59	0.00	78.59
Seasonal housing, shop, & pesticide storage shed		0.00	0.00	170.80	170.80
Miscellaneous and overhead		0.00	0.00	150.00	150.00
Interest: operating capital	6.0 mons	<u>0.00</u>	<u>0.00</u>	<u>23.68</u>	<u>23.68</u>
Total variable costs		\$464.75	\$196.52	\$546.48	\$1,207.75
<u>FIXED CASH COSTS</u>					
				<u>Unit</u>	<u>Total</u>
Water assessment				acre	\$168.00
Property insurance				acre	70.00
Property taxes				acre	<u>90.00</u>
Total cash costs					\$328.00
<u>FIXED NON-CASH COSTS</u>					
				<u>Unit</u>	<u>Total</u>
Machinery and equipment - depreciation & interest				acre	\$287.26
Pickup & ATV - depreciation & interest				acre	67.91
Seasonal housing, shop & pesticide storage shed				acre	418.57
Land interest charge				acre	600.00
Prior year's establishment costs				acre	<u>834.48</u>
Total non-cash costs					\$2,208.21
Total fixed costs					\$2,536.21
Total of All Costs Per Acre					\$3,743.96

Table 12HD. Year 3, Sweet Cherries, High-Density, \$/Acre Economic Costs and Returns.

<u>GROSS INCOME</u>						
	<u>Quantity</u>	<u>Unit</u>	<u>\$/Unit</u>	<u>Total</u>	<u>Price/Lb</u>	
Sweet Cherries	1,000	pounds	0.85	850.00	\$0.8500	
Total gross income				850.00	\$0.8500	
<u>VARIABLE CASH COSTS</u>						
	<u>Description</u>	<u>Labor</u>	<u>Machinery</u>	<u>Materials</u>	<u>Total</u>	<u>Cost/Lb</u>
Pruning trees	15.0 hours	\$259.09	\$10.50	\$0.00	\$269.59	\$0.2696
Painting trees	10.0 hours	172.73	0.00	40.00	212.73	0.2127
Training trees	15.0 hours	259.09	0.00	0.00	259.09	0.2591
Tree removal & tree replacement	0.3 hours	5.72	3.29	32.00	41.02	0.0410
Flail chopping	1.0 x/acre	16.89	15.76	0.00	32.65	0.0327
Fertilizer (liquid, injected)	0.1 appl.	1.52	0.00	110.00	111.52	0.1115
Fertilizer (foliar applied)		0.00	0.00	140.00	140.00	0.1400
ATV herbicide maintenance	4.0 appl.	45.94	7.18	200.00	253.12	0.2531
Insecticide and disease control	6.0 appl.	47.85	80.73	900.00	1,028.58	1.0286
Bee rental	1.0 hives	0.00	0.00	55.00	55.00	0.0550
Grass cutter	3.0 times	25.33	28.10	0.00	53.43	0.0534
Rodent control	3.0 hours	35.41	7.34	20.00	62.75	0.0628
Frost protection	2.0 hours	50.53	80.87	0.00	131.40	0.1314
Irrigation	4.5 hours	77.73	57.00	0.00	134.73	0.1347
Harvesting costs	0.5 tons	268.12	105.43	20.00	393.55	0.3936
Pickup & ATV		0.00	78.59	0.00	78.59	0.0786
Seasonal housing, shop, & pesticide storage shed		0.00	0.00	170.80	170.80	0.1708
Miscellaneous and overhead		0.00	0.00	150.00	150.00	0.1500
Interest: operating capital	6.0 mons	<u>0.00</u>	<u>0.00</u>	<u>71.57</u>	<u>71.57</u>	<u>0.0716</u>
Total variable costs		\$1,265.94	\$474.81	\$1,909.37	\$3,650.13	\$3.6501
<u>FIXED CASH COSTS</u>				<u>Unit</u>	<u>Total</u>	<u>Cost/Lb</u>
Water assessment				acre	\$168.00	\$0.1680
Property insurance				acre	70.00	0.0700
Property taxes				acre	<u>90.00</u>	<u>0.0900</u>
Total cash costs					\$328.00	\$0.3280
<u>FIXED NON-CASH COSTS</u>				<u>Unit</u>	<u>Total</u>	<u>Cost/Lb</u>
Machinery and equipment - depreciation & interest				acre	\$558.70	\$0.5587
Pickup & ATV - depreciation & interest				acre	67.91	0.0679
Seasonal housing, shop & pesticide storage shed				acre	418.57	0.4186
Land interest charge				acre	600.00	0.6000
Prior year's establishment costs				acre	<u>1,059.12</u>	<u>1.0591</u>
Total non-cash costs					\$2,704.29	\$2.7043
Total fixed costs					\$3,032.29	\$3.0323
Total of All Costs Per Acre					\$6,682.42	\$6.6824
Net Projected Returns					-\$5,832.42	-\$5.8324

Table 13HD. Year 4, Sweet Cherries, High-Density, \$/Acre Economic Costs and Returns.

<u>GROSS INCOME</u>						
	<u>Quantity</u>	<u>Unit</u>	<u>\$/Unit</u>	<u>Total</u>	<u>Price/Lb</u>	
Sweet Cherries	5,000	pounds	0.85	4,250.00	\$0.8500	
Total gross income				4,250.00	\$0.8500	
<u>VARIABLE CASH COSTS</u>						
	<u>Description</u>	<u>Labor</u>	<u>Machinery</u>	<u>Materials</u>	<u>Total</u>	<u>Cost/Lb</u>
Pruning trees	20.0 hours	\$349.02	\$10.50	\$0.00	\$359.52	\$0.0719
Tree removal & tree replacement	0.3 hours	5.78	3.29	32.00	41.08	0.0082
Flail chopping	1.0 x/acre	17.06	15.76	0.00	32.83	0.0066
Fertilizer (liquid, injected)	0.1 appl.	1.53	0.00	110.00	111.53	0.0223
Fertilizer (foliar applied)		0.00	0.00	140.00	140.00	0.0280
ATV herbicide maintenance	4.0 appl.	46.41	7.18	200.00	253.59	0.0507
Insecticide and disease control	6.0 appl.	48.34	80.73	900.00	1,029.08	0.2058
Bee rental	2.0 hives	0.00	0.00	110.00	110.00	0.0220
Grass cutter	3.0 times	25.59	28.10	0.00	53.69	0.0107
Rodent control	3.0 hours	35.77	7.34	20.00	63.12	0.0126
Frost protection	2.0 hours	51.05	80.87	0.00	131.92	0.0264
Irrigation	4.5 hours	78.53	57.00	0.00	135.53	0.0271
Harvesting costs	2.5 tons	1,354.39	145.43	100.00	1,599.83	0.3200
Pickup & ATV		0.00	78.59	0.00	78.59	0.0157
Seasonal housing, shop, & pesticide storage shed		0.00	0.00	170.80	170.80	0.0342
Miscellaneous and overhead		0.00	0.00	150.00	150.00	0.0300
Interest: operating capital	6.0 mons	0.00	0.00	89.22	89.22	0.0178
Total variable costs		\$2,013.48	\$514.81	\$2,022.02	\$4,550.32	\$0.9101
<u>FIXED CASH COSTS</u>						
Water assessment				acre	\$168.00	\$0.0336
Property insurance				acre	70.00	0.0140
Property taxes				acre	90.00	0.0180
Total cash costs					\$328.00	\$0.0656
<u>FIXED NON-CASH COSTS</u>						
Machinery and equipment - depreciation & interest				acre	\$558.70	\$0.1117
Pickup & ATV - depreciation & interest				acre	67.91	0.0136
Seasonal housing, shop & pesticide storage shed				acre	418.57	0.0837
Land interest charge				acre	600.00	0.1200
Prior year's establishment costs				acre	1,409.06	0.2818
Total non-cash costs					\$3,054.24	\$0.6108
Total fixed costs					\$3,382.24	\$0.6764
Total of All Costs Per Acre					\$7,932.55	\$1.5865
Net Projected Returns					-\$3,682.55	-\$0.7365

Table 14HD. Year 5, Sweet Cherries, High-Density, \$/Acre Economic Costs and Returns

<u>GROSS INCOME</u>						
	<u>Quantity</u>	<u>Unit</u>	<u>\$/Unit</u>	<u>Total</u>	<u>Price/Lb</u>	
Sweet Cherries	10,000	pounds	0.85	8,500.00	\$0.8500	
Total gross income				8,500.00	\$0.8500	
<u>VARIABLE CASH COSTS</u>						
	<u>Description</u>	<u>Labor</u>	<u>Machinery</u>	<u>Materials</u>	<u>Total</u>	<u>Cost/Lb</u>
Pruning trees	32.0 hours	\$564.18	\$10.50	\$0.00	\$574.68	\$0.0575
Tree removal & tree replacement	0.3 hours	5.84	3.29	32.00	41.14	0.0041
Flail chopping	1.0 x/acre	17.24	15.76	0.00	33.00	0.0033
Fertilizer (liquid, injected)	0.1 appl.	1.55	0.00	110.00	111.55	0.0112
Fertilizer (foliar applied)		0.00	0.00	140.00	140.00	0.0140
ATV herbicide maintenance	4.0 appl.	46.89	7.18	200.00	254.07	0.0254
Insecticide and disease control	6.0 appl.	48.84	80.73	900.00	1,029.57	0.1030
Bee rental	2.0 hives	0.00	0.00	110.00	110.00	0.0110
Grass cutter	3.0 times	25.86	28.10	0.00	53.96	0.0054
Rodent control	3.0 hours	36.14	7.34	20.00	63.49	0.0063
Frost protection	2.0 hours	51.58	80.87	0.00	132.44	0.0132
Irrigation	4.5 hours	79.34	57.00	0.00	136.34	0.0136
Harvesting costs	5.0 tons	2,736.69	195.43	200.00	3,132.12	0.3132
Pickup & ATV		0.00	78.59	0.00	78.59	0.0079
Seasonal housing, shop, & pesticide storage shed		0.00	0.00	170.80	170.80	0.0171
Miscellaneous and overhead		0.00	0.00	150.00	150.00	0.0150
Interest: operating capital	6.0 mons	0.00	0.00	124.23	124.23	0.0124
Total variable income		\$3,614.13	\$564.81	\$2,157.03	\$6,335.98	\$0.6336
<u>FIXED CASH COSTS</u>						
Water assessment				acre	\$168.00	\$0.0168
Property insurance				acre	70.00	0.0070
Property taxes				acre	90.00	0.0090
Total cash costs					\$328.00	\$0.0328
<u>FIXED NON-CASH COSTS</u>						
Machinery and equipment - depreciation & interest				acre	\$558.70	\$0.0559
Pickup & ATV - depreciation & interest				acre	67.91	0.0068
Seasonal housing, shop & pesticide storage shed				acre	418.57	0.0419
Land interest charge				acre	600.00	0.0600
Prior year's establishment costs				acre	1,630.02	0.1630
Total non-cash costs					\$3,275.19	\$0.3275
Total fixed costs					\$3,603.19	\$0.3603
Total of All Costs Per Acre					\$9,939.17	\$0.9939
Net Projected Returns					-\$1,439.17	-\$0.1439

Table 15HD. Full Production, Sweet Cherries, High-Density, \$/Acre Economic Costs and Returns.

<u>GROSS INCOME</u>		<u>Quantity</u>	<u>Unit</u>	<u>\$/Unit</u>	<u>Total</u>	<u>Price/Lb</u>	
Sweet Cherries		14,000	pounds	0.85	<u>11,900.00</u>	<u>\$0.8500</u>	
Total gross income					11,900.00	\$0.8500	
<u>VARIABLE CASH COSTS</u>		<u>Description</u>	<u>Labor</u>	<u>Machinery</u>	<u>Materials</u>	<u>Total</u>	<u>Cost/Lb</u>
Pruning trees		32.0 hours	\$569.99	\$10.50	\$0.00	\$580.49	\$0.0415
Tree removal & tree replacement		0.3 hours	5.90	3.29	32.00	41.20	0.0029
Flail chopping		1.0 x/acre	17.42	15.76	0.00	33.18	0.0024
Fertilizer (liquid, injected)		0.1 appl.	1.56	0.00	110.00	111.56	0.0080
Fertilizer (foliar applied)			0.00	0.00	140.00	140.00	0.0100
ATV herbicide maintenance		4.0 appl.	47.37	7.18	200.00	254.55	0.0182
Insecticide and disease control		6.0 appl.	49.34	80.73	900.00	1,030.08	0.0736
Bee rental		2.0 hives	0.00	0.00	110.00	110.00	0.0079
Grass cutter		3.0 times	26.12	28.10	0.00	54.22	0.0039
Rodent control		3.0 hours	44.98	3.67	20.00	68.65	0.0049
Frost protection		2.0 hours	52.11	80.87	0.00	132.97	0.0095
Irrigation		4.5 hours	80.15	57.00	0.00	137.15	0.0098
Harvesting costs		7.0 tons	3,870.82	235.43	280.00	4,155.43	0.2968
Pickup & ATV			0.00	78.59	0.00	78.59	0.0056
Seasonal housing, shop, & pesticide storage shed			0.00	0.00	170.80	170.80	0.0122
Miscellaneous and overhead			0.00	0.00	150.00	150.00	0.0107
Interest: operating capital		6.0 mons	<u>0.00</u>	<u>0.00</u>	<u>149.59</u>	<u>143.29</u>	<u>0.0102</u>
Total variable costs			\$4,765.77	\$601.14	\$2,262.39	\$7,392.17	0.5279
<u>FIXED CASH COSTS</u>				<u>Unit</u>	<u>Total</u>	<u>Cost/Lb</u>	
Water assessment				acre	\$168.00	\$0.0120	
Property insurance				acre	70.00	0.0050	
Property taxes				acre	<u>90.00</u>	<u>0.0064</u>	
Total cash costs					\$328.00	0.0234	
<u>FIXED NON-CASH COSTS</u>				<u>Unit</u>	<u>Total</u>	<u>Cost/Lb</u>	
Machinery and equipment - depreciation & interest				acre	\$558.70	\$0.0301	
Pickup & ATV - depreciation & interest				acre	67.91	0.0049	
Seasonal housing, shop & pesticide storage shed - depreciation & interest				acre	418.57	0.0299	
Land interest charge				acre	600.00	0.0429	
Amortized establishment cost				acre	<u>1,652.00</u>	<u>0.1514</u>	
Total non-cash costs					\$3,297.18	\$0.2592	
Total fixed costs					\$3,625.18	\$0.2826	
Total of all costs per acre					\$11,017.35	\$0.8105	
Net projected returns					\$882.65	\$0.0395	

APPENDIX E

Annual Enterprise Budgets to Establish an Ultra-High-Density Sweet Cherry Orchard

Table 9UHD. Year 0, Sweet Cherries, High-Density, \$/Acre Economic Costs and Returns.					
<u>VARIABLE CASH COSTS</u>	<u>Description</u>	<u>Labor</u>	<u>Machinery</u>	<u>Materials</u>	<u>Total</u>
Remove trees, roots, and rip (2x)	Custom	\$0.00	\$0.00	\$400.00	\$400.00
Disc	4.0 appl.	33.50	33.59	0.00	67.09
Staking	660.0 stakes	268.00	0.00	19.80	287.80
Soil sampling	0.2 x/acre	0.00	0.00	8.73	8.73
Fertilizer (broadcast applied)	Custom	0.00	0.00	100.00	100.00
Lime	Custom	0.00	0.00	154.00	154.00
Fumigation	Custom	0.00	0.00	605.00	605.00
Pickup & ATV		0.00	78.59	0.00	78.59
Seasonal housing, shop, & pesticide storage shed		0.00	0.00	170.80	170.80
Miscellaneous and overhead		0.00	0.00	150.00	150.00
Interest: operating capital	6.0 mons	<u>0.00</u>	<u>0.00</u>	<u>40.44</u>	<u>40.44</u>
Total variable costs		\$301.50	\$112.18	\$1,648.77	\$2,062.45
<u>FIXED NON-CASH COSTS</u>				<u>Unit</u>	<u>Total</u>
Water assessment				acre	\$168.00
Property insurance				acre	70.00
Property taxes				acre	<u>90.00</u>
Total cash costs					\$328.00
<u>FIXED CASH COSTS</u>				<u>Unit</u>	<u>Total</u>
Machinery and equipment - depreciation & interest				acre	\$137.04
Pickup & ATV - depreciation & interest				acre	67.91
Seasonal housing, shop, & pesticide storage shed				acre	418.57
Land interest charge				acre	<u>600.00</u>
Total non-cash costs					\$1,223.52
Total fixed costs					\$1,551.52
Total of All Costs Per Acre					\$3,613.97

Table 10 UHD. Year 1, Sweet Cherries, High-Density, \$/Acre Economic Costs and Returns.

<u>VARIABLE CASH COSTS</u>	<u>Description</u>	<u>Labor</u>	<u>Machinery</u>	<u>Materials</u>	<u>Total</u>	
Dig holes	14.0 hours	\$261.67	\$213.34	\$0.00	\$475.01	
Planting trees	22.0 hours	411.19	83.41	10,560.00	11,054.60	
Painting trees	7.0 hours	118.46	0.00	40.00	158.46	
Training trees	10.0 hours	169.23	0.00	0.00	169.23	
Fertilizer (liquid, injected)	0.1 appl.	1.49	0.00	75.00	76.49	
ATV herbicide maintenance	5.0 appl.	37.50	7.80	50.00	95.30	
Seed cover crop (Companion Grass)	20.0 Lbs	10.23	7.58	40.00	57.81	
Grass cutter	1.0 times	5.52	6.24	0.00	11.76	
Rodent control	10.0 hours	122.12	29.59	20.00	171.71	
Irrigation	4.5 hours	76.15	60.00	0.00	136.15	
Trellis repair and maintenance	0.0 hours	0.00	72.00	0.00	72.00	
Pickup & ATV		0.00	78.59	0.00	78.59	
Seasonal housing, shop, & pesticide storage shed		0.00	0.00	170.80	170.80	
Miscellaneous and overhead		0.00	0.00	150.00	150.00	
Interest: operating capital	6.0 mons	<u>0.00</u>	<u>0.00</u>	<u>257.56</u>	<u>257.56</u>	
Total variable costs		\$1,213.54	\$558.57	\$11,363.36	\$13,135.47	
<u>FIXED CASH COSTS</u>					<u>Unit</u>	<u>Total</u>
Water assessment				acre	\$168.00	
Property insurance				acre	70.00	
Property taxes				acre	<u>90.00</u>	
Total cash costs					\$328.00	
<u>FIXED NON-CASH COSTS</u>					<u>Unit</u>	<u>Total</u>
Machinery and equipment - depreciation & interest				acre	\$1,736.27	
Pickup & ATV - depreciation & interest				acre	67.91	
Seasonal housing, shop & pesticide storage shed				acre	418.57	
Land interest charge				acre	600.00	
Prior year's establishment costs				acre	<u>216.84</u>	
Total non-cash costs					\$3,039.59	
Total fixed costs					\$3,367.59	
Total of All Costs Per Acre					\$16,503.06	

Table 11UHD. Year 2, Sweet Cherries, High-Density, \$/Acre Economic Costs and Returns.

<u>GROSS INCOME</u>		<u>Quantity</u>	<u>Unit</u>	<u>\$/Unit</u>	<u>Total</u>	<u>Price/Lb</u>	
Sweet Cherries		1,500	pounds	0.85	<u>1,275.00</u>	<u>\$0.8500</u>	
Total gross income					1,275.00	\$0.8500	
<u>VARIABLE CASH COSTS</u>		<u>Description</u>	<u>Labor</u>	<u>Machinery</u>	<u>Materials</u>	<u>Total</u>	<u>Cost/Lb</u>
Training trees		20.0 hours	\$341.94	\$0.00	\$0.00	\$341.94	\$0.2280
Flail chopping		1.0 x/acre	11.14	10.51	0.00	21.65	0.0144
Fertilizer (liquid, injected)		0.1 appl.	1.50	0.00	75.00	76.50	0.0510
Fertilizer (foliar applied)			0.00	0.00	140.00	140.00	0.0933
ATV herbicide maintenance		5.0 appl.	37.89	7.80	200.00	245.69	0.1638
Insecticide and disease control		6.0 appl.	63.15	107.65	900.00	1,070.79	0.7139
Bee rental		1.0 hives	0.00	0.00	55.00	55.00	0.0367
Grass cutter		3.0 times	16.72	18.73	0.00	35.45	0.0236
Rodent control		10.0 hours	123.37	29.59	20.00	172.97	0.1153
Frost protection		0.0 hours	0.00	80.87	0.00	80.87	0.0539
Irrigation		4.5 hours	76.94	60.00	0.00	136.94	0.0913
Trellis repair and maintenance		1.0 hours	17.10	72.00	0.00	89.10	0.0594
Harvesting costs		0.8 tons	398.08	110.43	30.00	538.51	0.3590
Pickup & ATV			0.00	78.59	0.00	78.59	0.0524
Seasonal housing, shop, & pesticide storage shed			0.00	0.00	170.80	170.80	0.1139
Miscellaneous and overhead			0.00	0.00	150.00	150.00	0.1000
Interest: operating capital		6.0 mons	<u>0.00</u>	<u>0.00</u>	<u>71.51</u>	<u>71.51</u>	<u>0.0477</u>
Total variable costs			\$1,150.96	\$683.82	\$1,812.31	\$3,647.10	\$2.43
<u>FIXED CASH COSTS</u>				<u>Unit</u>	<u>Total</u>	<u>Cost/Lb</u>	
Water assessment				acre	\$168.00	\$0.11	
Property insurance				acre	70.00	\$0.05	
Property taxes				acre	<u>90.00</u>	<u>\$0.06</u>	
Total cash costs					\$328.00	\$0.22	
<u>FIXED NON-CASH COSTS</u>				<u>Unit</u>	<u>Total</u>	<u>Cost/Lb</u>	
Machinery and equipment - depreciation & interest				acre	\$1,043.31	\$0.70	
Pickup & ATV - depreciation & interest				acre	67.91	\$0.05	
Seasonal housing, shop & pesticide storage shed				acre	418.57	\$0.28	
Land interest charge				acre	600.00	\$0.40	
Prior year's establishment costs				acre	<u>1,207.02</u>	<u>\$0.80</u>	
Total non-cash costs					\$3,336.81	\$2.22	
Total fixed costs					\$3,664.81	\$2.44	
Total of All Costs Per Acre					\$7,311.91	\$4.87	
Net Projected Returns					-\$6,036.91	-\$4.02	

Table 12UHD. Year 3, Sweet Cherries, High-Density, \$/Acre Economic Costs and Returns.

<u>GROSS INCOME</u>						
	<u>Quantity</u>	<u>Unit</u>	<u>\$/Unit</u>	<u>Total</u>	<u>Price/Lb</u>	
Sweet Cherries	4,000	pounds	0.85	3,400.00	\$0.8500	
Total gross income				3,400.00	\$0.8500	
<u>VARIABLE CASH COSTS</u>						
	<u>Description</u>	<u>Labor</u>	<u>Machinery</u>	<u>Materials</u>	<u>Total</u>	<u>Cost/Lb</u>
Pruning trees	25.0 hours	\$431.82	\$10.50	\$0.00	\$442.32	\$0.1106
Painting trees	20.0 hours	345.46	0.00	40.00	385.46	0.0964
Training trees	25.0 hours	431.82	0.00	0.00	431.82	0.1080
Flail chopping	1.0 x/acre	11.26	10.51	0.00	21.77	0.0054
Fertilizer (liquid, injected)	0.1 appl.	1.52	0.00	75.00	76.52	0.0191
Fertilizer (foliar applied)		0.00	0.00	140.00	140.00	0.0350
ATV herbicide maintenance	5.0 appl.	38.28	0.00	200.00	238.28	0.0596
Insecticide and disease control	6.0 appl.	63.80	107.65	900.00	1,071.44	0.2679
Bee rental	1.0 hives	0.00	0.00	55.00	55.00	0.0138
Grass cutter	3.0 times	16.89	18.73	0.00	35.62	0.0089
Rodent control	10.0 hours	124.64	29.59	20.00	174.24	0.0436
Frost protection	2.0 hours	50.53	80.87	0.00	131.40	0.0328
Irrigation	4.5 hours	77.73	60.00	0.00	137.73	0.0344
Trellis repair and maintenance	1.0 hours	17.27	72.00	0.00	89.27	0.0223
Harvesting costs	2.0 tons	1,072.47	135.43	80.00	1,287.90	0.3220
Pickup & ATV		0.00	78.59	0.00	78.59	0.0196
Seasonal housing, shop, & pesticide storage shed		0.00	0.00	170.80	170.80	0.0427
Miscellaneous and overhead		0.00	0.00	150.00	150.00	0.0375
Interest: operating capital	6.0 mons	<u>0.00</u>	<u>0.00</u>	<u>102.36</u>	<u>102.36</u>	<u>0.0256</u>
Total variable costs		\$2,683.49	\$603.88	\$1,933.16	\$5,220.53	\$1.3051
<u>FIXED CASH COSTS</u>						
			<u>Unit</u>	<u>Total</u>	<u>Cost/Lb</u>	
Water assessment			acre	\$168.00	\$0.0420	
Property insurance			acre	70.00	0.0175	
Property taxes			acre	<u>90.00</u>	<u>0.0225</u>	
Total cash costs				\$328.00	\$0.0820	
<u>FIXED NON-CASH COSTS</u>						
			<u>Unit</u>	<u>Total</u>	<u>Cost/Lb</u>	
Machinery and equipment - depreciation & interest			acre	\$1,177.46	\$0.2944	
Pickup & ATV - depreciation & interest			acre	67.91	0.0170	
Seasonal housing, shop & pesticide storage shed			acre	418.57	0.1046	
Land interest charge			acre	600.00	0.1500	
Prior year's establishment costs			acre	<u>1,569.24</u>	<u>0.3923</u>	
Total non-cash costs				\$3,833.17	\$0.9583	
Total fixed costs				\$4,161.17	\$1.0403	
Total of All Costs Per Acre				\$9,381.70	\$2.3454	
Net Projected Returns				-\$5,981.70	-\$1.4954	

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

<u>GROSS INCOME</u>		<u>Quantity</u>	<u>Unit</u>	<u>\$/Unit</u>	<u>Total</u>	<u>Price/Lb</u>	
Sweet Cherries		24,000	pounds	0.85	20,400.00	\$0.8500	
Total gross income					20,400.00	\$0.8500	
<u>VARIABLE CASH COSTS</u>		<u>Description</u>	<u>Labor</u>	<u>Machinery</u>	<u>Materials</u>	<u>Total</u>	<u>Cost/Lb</u>
Pruning trees	15.0 hours		\$261.76	\$10.50	\$0.00	\$272.26	\$0.0113
Flail chopping	1.0 x/acre		11.37	10.51	0.00	21.88	0.0009
Fertilizer (liquid, injected)	0.1 appl.		1.53	0.00	110.00	111.53	0.0046
Fertilizer (foliar applied)			0.00	0.00	140.00	140.00	0.0058
ATV herbicide maintenance	5.0 appl.		38.67	7.80	200.00	246.48	0.0103
Insecticide and disease control	6.0 appl.		64.46	107.65	900.00	1,072.10	0.0447
Bee rental	2.0 hives		0.00	0.00	110.00	110.00	0.0046
Grass cutter	3.0 times		17.06	18.73	0.00	35.80	0.0015
Rodent control	10.0 hours		150.22	14.80	20.00	185.02	0.0077
Frost protection	2.0 hours		51.05	80.87	0.00	131.92	0.0055
Irrigation	4.5 hours		78.53	60.00	0.00	138.53	0.0058
Trellis repair and maintenance	1.0 hours		17.45	72.00	0.00	89.45	0.0037
Harvesting costs	12.0 tons		6,501.09	335.43	480.00	7,316.52	0.3049
Pickup & ATV			0.00	78.59	0.00	78.59	0.0033
Seasonal housing, shop, & pesticide storage shed			0.00	0.00	170.80	170.80	0.0071
Miscellaneous and overhead			0.00	0.00	150.00	150.00	0.0063
Interest: operating capital	6.0 mons		<u>0.00</u>	<u>0.00</u>	<u>205.42</u>	<u>205.42</u>	<u>0.0086</u>
Total variable costs			\$7,193.20	\$796.88	\$2,486.22	\$10,476.29	0.4365
<u>FIXED CASH COSTS</u>				<u>Unit</u>	<u>Total</u>	<u>Cost/Lb</u>	
Water assessment				acre	\$168.00	\$0.0070	
Property insurance				acre	70.00	0.0029	
Property taxes				acre	<u>90.00</u>	<u>0.0038</u>	
Total cash costs					\$328.00	0.0137	
<u>FIXED NON-CASH COSTS</u>				<u>Unit</u>	<u>Total</u>	<u>Cost/Lb</u>	
Machinery and equipment - depreciation & interest				acre	\$1,177.46	\$0.0491	
Pickup & ATV - depreciation & interest				acre	67.91	0.0028	
Seasonal housing, shop & pesticide storage shed - depreciation & interest				acre	418.57	0.0174	
Land interest charge				acre	600.00	0.0250	
Amortized establishment cost				acre	<u>2,801.73</u>	<u>0.1167</u>	
Total non-cash costs					\$5,065.67	\$0.2111	
Total fixed costs					\$5,393.67	\$0.2247	
Total of all costs per acre					\$15,869.96	\$0.6612	
Net projected returns					\$4,530.04	\$0.1888	