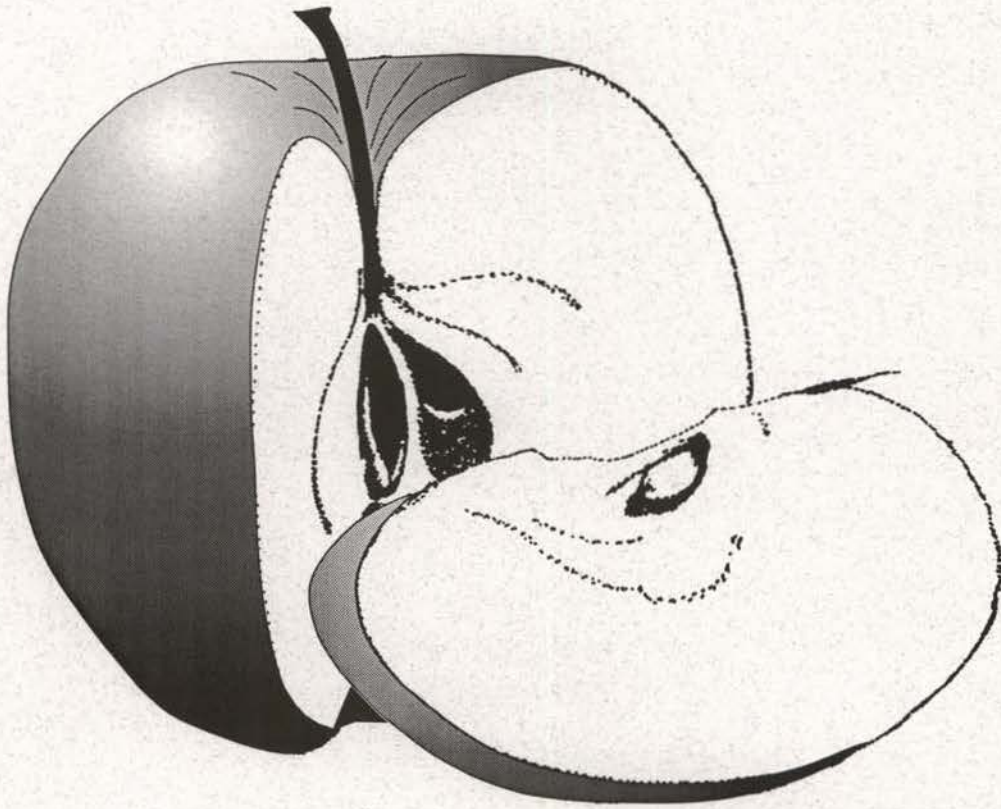


Economic Feasibility of Growing High-Density Fuji Apples in Southwestern Idaho



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Disclaimer

Pesticide Residues—These recommendations for use are based on currently available labels for each pesticide listed. If followed carefully, residues should not exceed the established tolerances. To avoid excessive residues, follow label directions carefully with respect to rate, number of applications, and minimum interval between application and reentry or harvest.

Groundwater—To protect groundwater, when there is a choice of pesticides, the applicator should use the product least likely to leach.

Trade Names—To simplify information, trade names have been used. No endorsement of named products is intended nor is criticism implied of similar products not mentioned.

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Robert Smathers & Michael Colt



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Introduction

Commercial apple production is a relatively minor agricultural crop in Idaho in comparison to commodities like potatoes, sugarbeets, and grain, but is a significant crop in the southwestern region of the state. Ninety-three percent of the 68.7 million pounds of apples produced in Idaho in 1992 (Census of Agriculture, 1992) were grown in a three-county area including Canyon, Gem, and Payette counties. Cultivars of apples commonly grown in these counties include Red Delicious, Jonathans, and Romes. Newer cultivars such as Fuji and Gala are also becoming more common as markets for these varieties continue to grow.

The objective of this study is to estimate the cost of replanting a 10-acre block of existing trees to a high-density Fuji stand. While the acreage and cultural practices may not fit all situations, they are representative of current trends.

Trends in the Apple Industry

Production and financial risks are greater for orchard crops than for other types of agricultural crops because of the time lag between planting and full production. There is a lag of 5 to 10 years before income is earned from new trees, resulting in high capital costs. Lenders have been reluctant to finance new orchard establishment because of this lag; therefore, many growers are only able to finance replacing small blocks of trees.

The recent trend of planting high-density apple stands has taken some of the "bite" out of financing new establishments. It shortens the time between planting and first production, and the time it takes growers to recover their initial investment. High-density plantings (more trees per acre), using appropriate rootstocks, results in accelerated production, lower labor requirements, and increased efficiency. A disadvantage is higher initial investment.

A second beneficial trend in the commercial apple industry is greater varietal diversification. New varieties of apples that differ in shape, texture, color, and taste have been developed and proven successful in the marketplace. This

success has prompted gradual replacement by growers of older tree varieties and strains with newer varieties. This replacement, however, is costly and risky because the time lag mentioned above makes it difficult for growers to finance such investments. With the growth of markets for these newer cultivars, and the high initial cost of replanting, growers should be careful to assess the economics of keeping existing blocks of apples versus planting newer varieties.

Assumptions

The assumptions used in this study were based upon the experience of Idaho growers and extension specialists, and information published by other Northwest universities. The cultural practices and chemicals specified are representative of typical operations. The inputs and levels of inputs are not University of Idaho recommendations.

Due to variations in individual orchards (site characteristics, size, degree of technology, tree densities, age of equipment, varietal selection, etc.) the costs associated with establishment and production will differ. The costs and returns for producing apples in this study are based on the following assumptions.

1. The size of orchard is 100 acres, with 50 acres in Red Delicious apples, 15 acres in Jonathans, 25 acres in Romes, and 10 acres to be replanted to Fujis.
2. Based on recent trends in the apple industry, a high density stand was used. A dwarfing rootstock adaptable to the soil, site, and climactic conditions prevalent in southwest Idaho is planted in 5 X 14 foot spaces, resulting in 622 trees per planted acre. The selected apple variety and rootstock will produce smaller trees that will reach bearing age more quickly, but will require intensive managerial expertise, extensive supports, and greater capital outlay. However, these trees will generate a positive cash flow much sooner and will generally be easier to prune, thin, spray, and harvest. Since the new trees will be planted into old orchard ground, it will be necessary to fumigate, remove trees and roots, and cleanup.

3. All hourly labor in the operation is valued at \$7.20 per hour and includes a base wage plus 20 percent for Social Security, Medicare, unemployment insurance, and other labor overhead expenses. A charge for management is not included in this study.

The orchard will use migrant labor, but will not supply housing.

4. Table 1 lists the machinery and equipment used in the orchard operation. All items are valued at new replacement cost. Fuel costs are based on a diesel price of \$.88 per gallon and an unleaded gasoline price of \$1.38.

A miscellaneous category includes tools, bins, and other equipment.

5. Interest on operating capital is charged at 10.25 percent from the time inputs are used until the month that capital is recovered. Interest on investment capital is calculated at a rate of 10 percent. Interest on carryover in the cost and return tables (Tables B2 through B5, Appendix B) is interest on accumulated investment in establishing the orchard. This interest is incurred as an expense from the beginning of year 2 until the first year of full production. It is then added to other establishment costs and allocated over the full production years (15 years). This pro-rated cost is labeled amortized establishment cost in years 6 through 20, (Table B6).

Table 1. Equipment and Building Investment for a 100-Acre Apple Operation.

Description	1997 Purchase Price (\$)	Expected Years Life	Annual Use
Machinery			
Narrow profile 65 HP tractor	35,000	15	550 hours
30 HP 2wd tractor	22,000	15	700 hours
65 HP 2wd tractor	29,200	15	550 hours
Blast sprayer 400 gallon-2 units	11,000	10	200 hours
Weed sprayer w/boom - 100 gallon	2,100	15	190 hours
Fertilizer spreader	3,100	15	20 hours
Rotary mower, 6'	4,000	7	100 hours
Pickup, 1/2 ton	26,500	6	12,000 miles
Truck, 5 ton (used)	30,000	15	2,700 miles
Equipment and Buildings			
ATV	5,000	5	—
Backfork	1,200	15	—
Bin trailer (2 units)	5,400	15	—
Bins (1,200 units)	48,600	15	—
Pole pruners (6 chainsaw units)	3,600	5	—
Irrigation system (includes pumps)	162,000	20	—
Ladders (35 - 6', and 35 - 8')	5,000	20	—
Picking equipment (25 bags)	600	5	—
Machine shed and shop	30,000	20	—
Tools	10,000	15	—
Miscellaneous	2,000	20	—
Wind machines (3 units)	50,000	20	—
Trellis system	117,500	20	—
Land	200,000	—	—

Sources for equipment and building information include growers and extension specialists.

6. An opportunity cost for land is included in the cost and return estimate, based on an interest rate of 10 percent and a land value of \$2,000 per acre. A cost is also included for land taxes.
7. Fuji apples in this study are valued at \$160.00 per bin. The average price in recent years has been considerably above this level for Fujis, but may trend downward in future years as more Fuji acres are established.
8. Herbicides for strip maintenance are applied on one third of each acre and formulations reflect this coverage.
9. A trellis system with a 20-year useful life is installed in year 1 to support the new trees. Installation cost excluding stringing wires is included.
10. An underground solid set irrigation system is installed the same year and capital recovery is used to calculate depreciation and interest (Appendix A). The system has a 20-year useful life with no salvage value at the end. Labor to install the system is included in its cost.
11. Three wind machines, including smudge pots for frost protection, are included and valued at \$50,000.

Labor Requirements

An adequate labor supply is essential for pruning and training branches, and thinning apples. Pruning and training are generally performed during the winter and spring months. Thinning can start as early as August and end in October, depending on the variety of apple.

Pruning and training costs vary with the age of the tree. In the early years, it is crucial that time is spent training and pruning for a certain tree shape. This is needed to achieve optimum light penetration, which leads to higher quality and quantity of fruit. The shape of the tree should be complete when full bearing is reached, requiring only a maintenance program for pruning. Smaller rootstocks make pruning, tree training, thinning, and harvesting more efficient and easier to perform. This provides an important advantage in an uncertain labor market. See Table 2 for labor requirements.

As trees come into bearing, growers must thin apples for optimum size and quality standards. In the past, chemical thinners worked effectively in thinning clusters of apples to singles or doubles which resulted in large-size, higher quality fruit in the marketplace. However, the Environmental Protection Agency has limited the use of certain chemical thinners, and growers must now rely on hand labor to thin apple clusters that the current chemical thinners do not thin. The size of the crop determines the amount of labor required to thin the apples.

Table 2. Labor Requirements for Pruning, Training, and Thinning Medium-Density Fuji Apples.¹

	Year 1	Year 2	Year 3	Year 4	Year 5	Years 6-20
	(hours per acre)					
Pruning	4	6	16	21	21	21
Training	24	28	28	21	0	0
Thinning	0	0	12	19	32	43
Other ²	80	54	53	47	55	58
Total ³	108	88	109	108	108	122

¹Harvest labor costs are not included in this table because they are computed on a cost per-bin basis.

See tables B2-B6 for a summary of all labor costs.

²Other labor includes labor to apply inputs, irrigate trees, mow orchard floor, etc.

³Sources for labor information included growers and extension specialists.

Harvest labor requirements also increase with the size of the crop. Pickers are usually paid by the bin to remove apples from the tree and place them into a bin. This study uses a rate of \$25 per bin. Occasionally, pickers are paid by the hour to reduce fruit bruising when placing the apples into a bin or to slow down harvest so that apples can be picked for color to maximize profits to the grower. Additional harvest labor includes tractor drivers to move bins to and from the field, workers to load bins onto trucks, and supervisors. These laborers are paid by the hour. Hourly paid labor also increases with the size of the crop.

There are also labor requirements to apply chemicals, irrigate trees, mow the orchard floor, and fertilize. However, the largest amount of labor hours are spent to prune, train, thin and harvest the apples. Typical of the tree fruit industry is the need for large amounts of labor for a short period of time: February and March for pruning; June and July for training; June for thinning apples; and August and September for harvesting.

Marketing

A packinghouse will market the fruit for the grower. They find brokers, buyers and merchandisers to buy the fruit. The packinghouse charges the grower a fee to unload the trucks, store, pack, and sell the apples. These fees are subtracted from F.O.B. prices received by the packinghouse, which results in a grower return on a per box basis. The grower usually receives an advance to pay the pickers at delivery of the apples, and additional money is gradually dispersed to the growers when the apples are sold and usually all apples are sold by July the following year.

Costs and Returns Estimates

The costs and returns estimates developed in this study for Fuji apples are shown in Appendix B. These include separate budgets for five years of establishment and one year of full production, Tables B1-B6. The establishment years are characterized by high capital costs and zero-to-moderate yields. Fuji production is negligible until year 3, when 10 bins of apples are produced, but gradually increases until year

6, when it peaks at 45 bins per acre. Apple yields will average 45 bins per acre through year 20, given proper management.

The costs in Tables B1 - B6 (Appendix B), are categorized as operating and ownership costs. Operating costs are the costs that occur because of the day-to-day maintenance and operations of the orchard. These costs include items such as fertilizer, chemicals, hired labor, fuel, training materials, and repair costs. Ownership costs are costs that pertain to ownership of machinery, equipment, buildings, land, tools, and so forth. These costs are depreciation, interest on investment, property taxes, and property insurance. Even if production does not take place, the costs associated with ownership are still incurred.

Returns above operating costs are necessary for the producer to stay in business in the short-run. If returns received by the producer do not equal or exceed his operating costs, then producing apples becomes uneconomical in the short-run, not to mention the long-run. In other words, the added costs of producing apples are greater than the added returns in the short-run.

In the long-run, returns must meet or exceed both operating and ownership costs for the orchard to be economically viable. If returns are just equal to the sum of operating and ownership costs (total costs) which means the enterprise is at break-even, then the grower is recovering all out-of-pocket expenses and realizing a competitive return on his capital invested in land, equipment, trees, and buildings. Failure to meet this breakeven means that the grower could earn a better return on his investment in an alternative use. If the breakeven is exceeded, the grower earns a residual to management and risk.

Year 1

The 10-acre site to be planted was previously in apple production, so tree removal, burning, tillage, and fumigation are required to prepare the site.

Young Fuji trees are planted in 5 X 14 feet spaces, with 622 trees per acre. In addition, 56 pollenizing trees are also planted on each acre of ground. The trees are taken from a dwarfing

rootstock that limits growth to 10 to 12 feet high. Management's goal is to grow trees no taller than the width of the row to allow maximum light penetration. Trees are planted with a rented planter and labor provided by the orchard. The planter cost is \$102.25 per acre and tree cost is \$3,732 per acre.

After planting trees, a solid set irrigation system is installed at a cost of \$1,620 per acre for materials and labor. A trellis system is also installed at a cost of \$1,175 per acre for materials and labor. Grass is seeded between the tree rows after irrigation and trellis systems are installed in 8 to 9 feet wide strips. Grass is not mowed in the establishment year, but will be in subsequent years with a tractor and rotary mower.

Weed spraying is necessary to maintain the strips under the trees where grass is not planted. The cash cost for each spray operation is about \$17.52 per acre including machinery, labor, and materials. The orchard is sprayed three times in year 1. See Tables C1-C6 (Appendix C), for monthly cash expense summaries for orchard operations.

Fertilizer is applied in one operation during year 1. The quantities reported in this study are based on surveys with Idaho growers, but may differ given site specific soil fertility. Soil testing should always be done to determine fertilizer needs. The cash cost in year 1 for application, labor, machinery, and materials, as shown in Table C1, is \$70.14 per acre.

Additional labor is required in year 1 to layout and stake plantings, hoe around trees, install tree wraps, train trees, tie leaders for the trellis system, prune, irrigate, and control rodents. Total labor cost for the year is \$780, (Table B1).

Total cost of establishing the orchard in year 1 is \$7,222 per acre as shown in Table B1.

Year 2

Table B2 shows the projected costs and returns for establishment of Fuji apples in year 2. Five bins of apples are produced in year 2 and sold at an average price of \$160.00 per bin for projected gross returns of \$800 per acre.

Orchard operations performed in year 2 include fertilization, spraying, and mowing. Fertilizer application is split between two seasonal operations: spring and summer, and applied at a cash cost of \$48.55 for machinery, labor, and materials (Table C2). Dormant spray is applied in April with a blast sprayer and tractor at a cash cost of \$40.80 per acre. Insecticides and fungicides are also applied to control insects and mildew.

Herbicide is sprayed on strips three times in year 2 for weed control. This is accomplished with a 100-gallon weed sprayer pulled by a 65-horsepower tractor. The cash cost for the machinery, labor, and materials is \$17.52 per acre for each spray operation.

Micronutrients are applied two times per year at a cost of \$31.54 per acre for each operation.

Mowing is done using the 65-horsepower tractor and an 6 foot rotary mower. Row centers are mowed two times in year 2 at a cost of \$5.34 per acre for each operation. Additional labor is used throughout year 2 for pruning, tree training, picking apples, and controlling rodents. Apples are picked in September at a labor cost of \$25 per bin. Additional labor for hauling bins and supervising pickers is also used.

Total operating and ownership costs per acre in year 2 are \$1,325 and \$1,665 respectively. Total costs per acre (the sum of operating and ownership costs) are \$2,990. Interest on the costs carried over from year 1 (\$722 per acre) is included in non-cash ownership costs.

Year 3

Fuji apple production in year 3 increases to 10 bins per acre resulting in a projected gross return of \$1,600 (Table B3).

The number of orchard operations performed and the costs per operation for fertilizing, spraying, and mowing are not significantly different from year 2 with the exception of an additional cover spray. However, labor costs are significantly higher than year 2 because of additional harvest labor. Total labor costs in year 3 are \$946 compared to \$726 in year 2.

Total operating and ownership costs in year 3 are \$1,468 and \$1,903 per acre, respectively, with a total cost of \$3,371. Interest on expenses carried over from years 1 and 2 is \$869 per acre.

Year 4

In year 4, Fuji apple production grows to 25 bins per acre resulting in projected gross returns of \$4,000 per acre (Table B4).

Most orchard operations remain unchanged from year 3, with the exception of one additional cover spray operation for insects. The narrow-base tractor is used to pull the blast sprayer starting in years 3 and 4 because the high density tree spacing limits access. The machinery, labor, and material costs are \$28.31 per acre for each insect spray operation, as shown in table C4.

Labor cost in year 4 is \$1,405 per acre. Most of the difference from year 3 is additional harvest and thinning labor.

Total operating and ownership costs in year 4 are \$2,002 and \$2,028 respectively, resulting in a total cost of \$4,030 per acre. Interest on capital carried over from previous years is \$959.

Year 5

Year 5 is the final year of establishing the Fuji apple orchard before full production is reached. The yield in year 5, shown in Table B5, is now up to 35 bins per acre, with projected gross returns of \$5,600. This is the first year that projected returns exceed projected costs.

Orchard operations are unchanged from year 4, with the exception of a chemical thinning

operation. This operation uses the narrow-base tractor and blast sprayer and costs \$14.53 per acre, as shown in table C5.

Orchard labor is up \$250 per acre from year 4 to \$1,655. Most of the difference is again due to an increase in harvest and hand thinning costs.

Total operating and ownership costs in year 5 are \$2,331 and \$1,972 respectively, for a total cost of \$4,303 per acre. Interest on capital carried over from previous years is \$866.

Year 6

Year 6 is the first year of full production. The average yield for years 6 through 20 is 45 bins per acre (Table B6). At \$160 per bin, the projected gross return is \$7,200 per acre. It is assumed that a yield of 45 bins will be maintained through the next 15 years of the orchard's life. Pruning, thinning, fertilizer, and herbicide programs remain unchanged from year 5. The insecticide and thinning spray programs changed slightly and harvest costs increased due to the increase in orchard production.

Total net establishment cost for years 1 through 5 is \$9,916 per acre. This represents the total net investment required to establish one acre of Fuji apples. The projected annual cost of this investment in the orchard over 15 years of production is \$1,304 per acre and includes stand depreciation plus interest on investment. This is calculated using the capital recovery approach shown in Appendix A and labeled as amortized establishment cost in the full production budget (Table B6).

Total annual operating and ownership costs in years 6 through 20 are about \$2,689 and \$2,436

Table 3. Cash Flow Analysis, Fuji Apples in Southwestern Idaho*, per acre.

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Gross Income	0	800	1,600	4,000	5,600	7,200
Cash Operating Costs	6,292	1,325	1,468	2,002	2,331	2,689
Cash Ownership Costs	282	168	182	197	207	217
Total Cash Costs	6,574	1,493	1,650	2,199	2,538	2,906
Annual Cash Flow	-6,574	-693	-50	1,801	3,062	4,294
Cumulative Cash Flow	-6,574	-7,267	-7,317	-5,516	-2,454	1,840

*The total cost of trees are included in this cash flow analysis.

respectively, for a total annual cost of \$5,125 per acre. The average net return for Fuji apples over the 15 production years is projected at \$2,075 per acre. (Note that this analysis does not take into account inflation.)

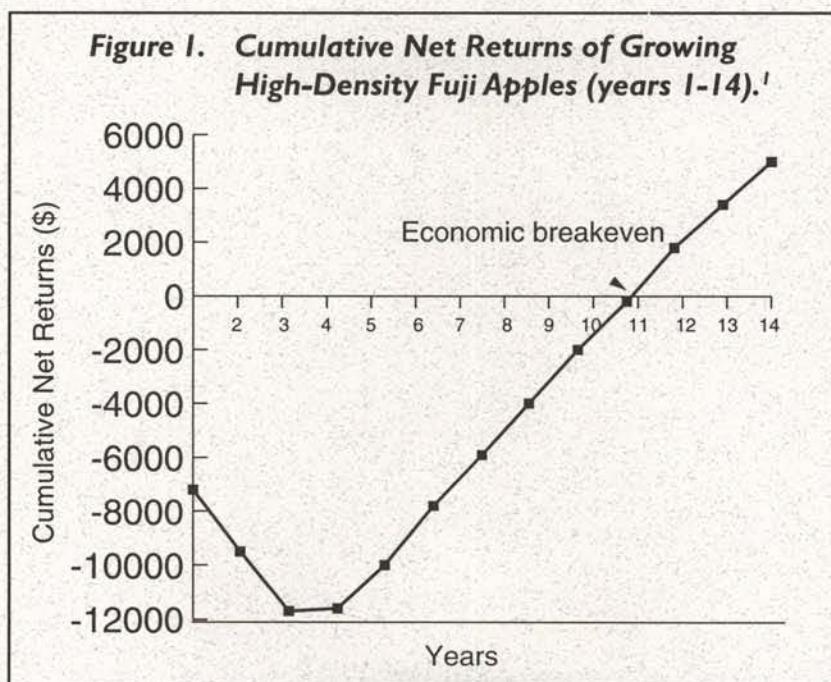
Summary

The analysis in Table 3, generated from Tables C1-C6, summarizes the first six years of cash flows for an acre of high-density Fuji apples grown in southwestern Idaho. As shown in Table 3, the enterprise does not generate a positive annual cash flow until year 4. This is the first year during establishment that gross income exceeds total cash costs. It's not until

year 6 that cumulative gross returns exceed cumulative cash costs. This is not to declare year 6 as the economic break-even point; it's simply the year that initial cash investment is fully recovered.

A cash flow analysis is a good indicator of the cash requirements needed to establish an acre of apples and when sufficient income will be available to recover initial cash investment. Enterprise profit or the economic break-even point cannot be projected using a cash flow analysis because non-cash items such as depreciation and interest are not included.

Table 4 is a summary of the economic costs presented in Tables B1-B5. It summarizes



¹ Economic breakeven occurs in the years when cumulative net returns reaches zero.

Table 4. Economic Costs and Returns of Establishing High-Density Fuji Apples Using a Three-Wire Trellis System in Southwestern Idaho, per acre.

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Total cumulative costs and returns
Gross income	\$0	\$800	\$1,600	\$4,000	\$5,600	\$12,000
Operating costs	6,292	1,325	1,468	2,002	2,331	13,418
Ownership costs	930	1,665	1,904	2,028	1,972	8,498
Total costs	7,222	2,990	3,371	4,030	4,303	21,916
Net Projected Returns	-7,222	-2,190	-1,771	-30	1,297	—
Cumulative net returns	-7,222	-9,412	-11,183	-11,213	-9,916	—

projected gross income, total costs, net projected returns, and cumulative net returns. Total costs to establish Fuji apples (the sum of cumulative operating and ownership costs) are \$21,916 per acre. Cumulative net returns are the sum of net projected returns and amount to the cumulative net cost of establishment. The economic break-even point occurs in the year that cumulative net returns become positive, which is about year 10, as shown in Figure 1. This is the year when total costs of establishing the orchard (\$21,916 per acre) are fully recovered.

The pie charts in Figures 2 and 3 show the allocation of the establishment costs summarized in table 4. Figure 2 summarizes accumulated operating costs and shows that hired labor and tree expenses were the two largest expenses, 41 and 30 percent, respectively. All other items amount to about 29 percent of cumulative operating costs.

Figure 3 summarizes cumulative operating and ownership costs of establishment. Hired labor, trees, and interest costs represent 62 percent of the total.

Conclusion

The production and financial risks associated with apple production are well known by those in the industry. Considerable time lags between planting trees and realization of profits make it difficult and risky to finance orchard renewal. The availability of new "quicker yielding apple varieties" and more diverse varieties has helped, but the capital needs are still considerable. Because of the expense and risk associated with orchard renewal, growers should be careful to assess the economics of keeping versus replacing older blocks of trees.

The costs and return estimates generated in Tables B1-B6 are based on the assumptions outlined in this study. They should be revised to reflect any changes in the conditions that might influence the underlying assumptions. Changes in factor prices, market fluctuations, labor availability, cost of capital, and weather could have substantial influences on orchard profitability.

Figure 2. Cumulative Operating Costs Per Acre for Fuji Establishment (years 1-5)

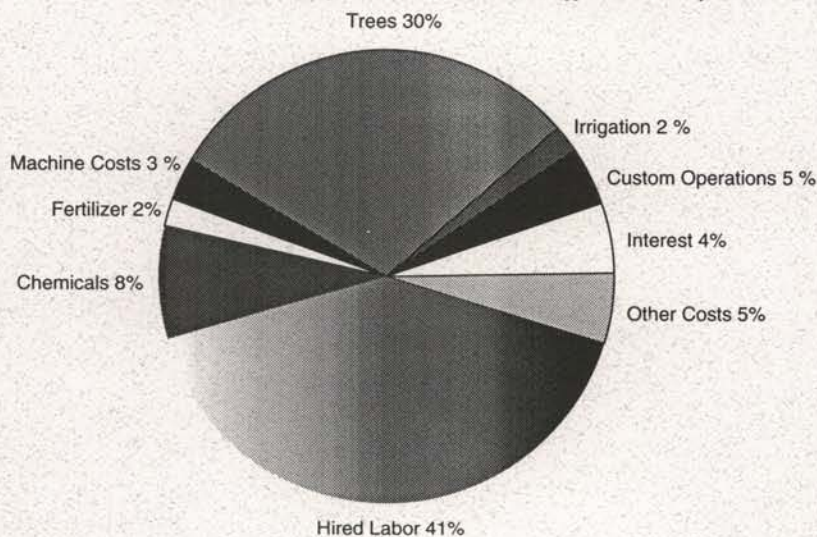
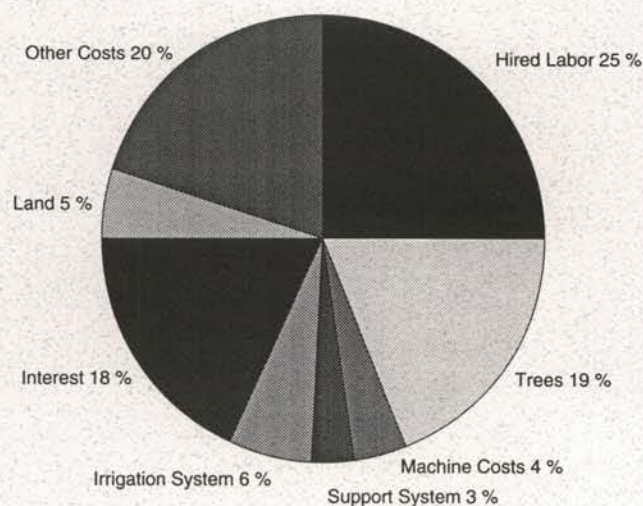


Figure 3. Cumulative Operating and Ownership Costs Per Acre for Fuji Establishment (years 1-5)



Appendix A. Ownership Cost Calculations

Ownership costs for an asset lasting more than one year must be allocated over its useful life to derive an annual ownership cost. Ownership costs include both the decline in value over time based on expected use or obsolescence (depreciation) and the opportunity interest on the value of the asset. Ownership costs also include property tax and casualty insurance.

The following methods for calculating depreciation and interest and for calculating taxes and insurance are consistent with the recommendations of the National Task Force on Commodity Costs and Returns Measurement Methods sponsored by the American Agricultural Economics Association. Consistent with their recommendations, a real rather than a nominal interest rate is used.

Depreciation and Interest

Depreciation and interest were calculated using the annual equivalent capital recovery technique. This method is recommended over the estimation technique using straight-line depreciation (repayment) plus return on the average investment.

$$\begin{aligned} \text{Depreciation and Interest} &= B^{(a/p)} - V^{(a/f)} \\ \text{where: } B &= \text{initial investment} \\ V &= \text{salvage value} \\ i &= \text{interest rate in decimal form} \\ n &= \text{years of useful life} \\ (a/p) &= i(1+i)^n / [(1+i)^n - 1] = \text{uniform series end-of-period amount (a) equivalent to present sum (p); or capital recovery factor.} \\ (a/f) &= i / [(1+i)^n - 1] = \text{uniform series end of period amount (a) equivalent to future sum (f); or sinking fund factor.} \end{aligned}$$

Source: Thuesen, H. G., W. J. Fabrycky, and G. J. Thuesen. 1971. *Engineering Economy*. New York: Prentice-Hall.

Taxes and Insurance

Insurance

The property tax and insurance cost calculations were made using rates of 1.0 and 0.6 percent, respectively, applied to the average level of investment.

$$\begin{aligned} \text{Insurance} &= I[(B+V)/2] & \text{Taxes} &= T[B+V/2] \\ \text{where: } B &= \text{initial investment} & \text{where: } B &= \text{initial investment} \\ V &= \text{salvage value} & V &= \text{salvage value} \\ I &= \text{insurance rate} & T &= \text{personal property tax rate} \end{aligned}$$

Appendix B. Costs and Returns Estimates

Table B1. Costs And Returns Per Acre to Establish Fuji Apples - Year 1

	Quantity Per Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
Gross Returns					
Fuji Apples	0.00	bin	160.00	0.00	_____
Total Gross Returns for Fuji Apples				0.00	_____
Operating Costs					
Custom:					
Tree removal	1.00	acre	250.00	250.00	_____
Root removal	1.00	acre	50.00	50.00	_____
Ripping	1.00	acre	110.00	110.00	_____
Plow	1.00	acre	21.50	21.50	_____
Disc	2.00	acre	8.00	16.00	_____
Seed and harrow	1.00	acre	9.00	9.00	_____
Fertilizer:					
Nitrogen	100.00	lb	0.35	35.00	_____
Phosphate	60.00	lb	0.24	14.40	_____
Sulfur	60.00	lb	0.15	9.00	_____
Potash	70.00	lb	0.14	9.80	_____
Fumigant:					
Vapam	90.00	gal	3.65	328.50	_____
Rent:					
Rent tree planter	1.00	acre	102.25	102.25	_____
Tree:					
Trees	622.00	tree	6.00	3732.00	_____
Pollinizing trees	56.00	tree	4.50	252.00	_____
Training:					
Tree wraps	622.00	tree	0.06	37.32	_____
Training material	1.00	acre	25.00	25.00	_____
Water:					
Irrigation power	36.00	acin	0.69	24.84	_____
Water assessment	1.00	acre	30.00	30.00	_____
Herbicide:					
Gramoxone	1.89	qt	8.78	16.59	_____
Seed:					
Grass seed	20.00	lb	1.55	31.00	_____
Rodenticide:					
Rodent control	1.00	acre	5.00	5.00	_____
Labor (machine)	7.20	hrs	7.20	51.84	_____
Labor (non-machine)	101.20	hrs	7.20	728.64	_____
Fuel - diesel	15.25	gal	0.88	13.42	_____
Lube					
Machinery Repair				2.01	_____
Interest on Operating Capital @ 10.25%				14.00	_____
Interest on Operating Capital @ 10.25%				373.04	_____
Total Operating Costs/Acre				6292.17	_____
Net Returns Above Operating Costs				-6292.17	_____
Cash Ownership Costs					
Overhead				160.33	_____
Property taxes (machinery)				30.45	_____
Property insurance				9.28	_____
Investment repairs				81.54	_____
Total Cash Ownership Costs/Acre				281.60	_____
Non-Cash Ownership Costs (Depreciation and Interest)					
Irrigation system				190.28	_____
Miscellaneous tools and equipment				37.78	_____
Machine shed and shop				34.71	_____
Land				200.00	_____
Trellis system				138.01	_____
Machinery				47.46	_____
Total Non-Cash Ownership Costs/Acre				648.25	_____
Total Costs/Acre				7222.01	_____
Returns to Risk and Management				-7222.01	_____

Table B2. Costs And Returns Per Acre to Establish Fuji Apples - Year 2

	Quantity Per Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
Gross Returns					
Fuji Apples	5.00	bin	160.00	800.00	
Total Gross Returns for Fuji Apples				800.00	
Operating Costs					
Fungicide:					
Microthiol	12.00	lb	0.65	7.80	
Rally 40W	6.00	oz	4.50	27.00	
Fertilizer:					
Nitrogen	100.00	lb	0.35	35.00	
Phosphate	60.00	lb	0.24	14.40	
Potash	60.00	lb	0.14	8.40	
Sulfur	70.00	lb	0.15	10.50	
Micro nutrients	2.50	acre	24.00	60.00	
Tree:					
Tree replacement	12.00	acre	6.00	72.00	
Insecticide:					
Lorsban 4E	2.00	qt	12.13	24.26	
Oil	3.00	gal	3.00	9.00	
Guthion	1.00	lb	7.10	7.10	
Stopit calcium	0.50	gal	6.50	3.25	
Provado	2.00	oz	3.52	7.04	
Herbicide:					
Gramoxone	1.89	qt	8.78	16.59	
Rent:					
Bee hives	4.00	each	15.00	60.00	
Forklift, rental	1.00	acre	12.00	12.00	
Training:					
Training material	0.50	acre	50.00	25.00	
Water:					
Irrigation power	36.00	acin	0.69	24.84	
Water assessment	1.00	acre	30.00	30.00	
Harvest cost:					
Pick apples	5.00	bin	25.00	125.00	
Rodenticide:					
Rodent control	1.00	acre	5.00	5.00	
Labor (machine)	13.18	hrs	7.20	94.90	
Labor (non-machine)	75.27	hrs	7.20	541.94	
Fuel - diesel	32.72	gal	0.88	28.80	
Lube				4.32	
Machinery Repair				26.26	
Interest on Operating Capital @ 10.25%				44.88	
Total Operating Costs/Acre				1325.28	
Net Returns Above Operating Costs				-525.28	
Cash Ownership Costs					
Overhead				36.42	
Property taxes (machinery)				35.53	
Property insurance				11.82	
Investment repairs				84.14	
Total Cash Ownership Costs/Acre				167.91	
Non-Cash Ownership Costs (Depreciation and Interest)					
Irrigation system				190.28	
Miscellaneous tools and equipment				116.24	
Machine shed				34.71	
Land				200.00	
Trellis system				138.01	
Interest on carryover				722.00	
Machinery				95.48	
Total Non-Cash Ownership Costs/Acre				1496.72	
Total Costs/Acre				2989.91	
Total Costs/Bin				597.98	
Returns to Risk and Management				-2189.91	

Table B3. Costs And Returns Per Acre to Establish Fuji Apples - Year 3

	Quantity Per Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
Gross Returns					
Fuji Apples	10.00	bin	160.00	1600.00	
Total Gross Returns for Fuji Apples				1600.00	
Operating Costs					
Fungicide:					
Microthiol	18.00	lb	0.65	11.70	
Rally 40W	9.00	oz	4.50	40.50	
Fertilizer:					
Nitrogen	60.00	lb.	0.35	21.00	
Phosphate	60.00	lb	0.24	14.40	
Potash	60.00	lb	0.14	8.40	
Sulfur	60.00	lb	0.15	9.00	
Micro nutrients	2.00	acre	24.00	48.00	
Tree:					
Tree replacement	3.00	acre	7.00	21.00	
Insecticide:					
Lorsban 4E	2.00	qt	12.13	24.26	
Oil	3.00	gal	3.00	9.00	
Provado	3.00	oz	3.52	10.56	
Guthion	2.00	lb	7.10	14.20	
Stopit calcium	1.00	gal	6.50	6.50	
Herbicide:					
Gramoxone	1.89	qt	8.78	16.59	
Training:					
Training material	1.00	acre	50.00	50.00	
Rent:					
Bee hives	2.00	each	15.00	30.00	
Water:					
Irrigation power	36.00	acin	0.69	24.84	
Water assessment	1.00	acre	30.00	30.00	
Rodenticide:					
Rodent control	1.00	acre	5.00	5.00	
Harvest cost:					
Pick apples	10.00	bin	25.00	250.00	
Rent forklift	1.00	acre	12.00	12.00	
Labor (machine)	17.00	hrs	7.20	122.40	
Labor (non-machine)	79.77	hrs	7.20	574.34	
Fuel - diesel	40.94	gal	0.88	36.03	
Lube				5.40	
Machinery Repair				30.35	
Interest on Operating Capital @ 10.25%				42.03	
Total Operating Costs/Acre				1467.50	
Net Returns Above Operating Costs				132.50	
Cash Ownership Costs					
Overhead				40.24	
Property taxes (machinery)				39.20	
Property insurance				13.65	
Investment repairs				89.14	
Total Cash Ownership Costs/Acre				182.22	
Non-Cash Ownership Costs (Depreciation and Interest)					
Irrigation system				190.28	
Miscellaneous tools and equipment				174.10	
Machine shed				34.71	
Land				200.00	
Interest on carryover				869.00	
Trellis system				138.01	
Machinery				115.30	
Total Non-Cash Ownership Costs/Acre				1721.40	
Total Costs/Acre				3371.12	
Total Costs/Bin				337.11	
Returns to Risk and Management				-1771.12	

Table B4. Costs And Returns Per Acre to Establish Fuji Apples - Year 4

	Quantity Per Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
Gross Returns					
Fuji Apples	25.00	bin	160.00	4000.00	
Total Gross Returns for Fuji Apples				4000.00	
Operating Costs					
Fungicide:					
Microthiol	24.00	lb	0.65	15.60	
Rally 40W	12.00	oz	4.50	54.00	
Fertilizer:					
Nitrogen	40.00	lb.	0.35	14.00	
Phosphate	60.00	lb	0.24	14.40	
Potash	30.00	lb	0.14	4.20	
Sulfur	60.00	lb	0.15	9.00	
Micro nutrients	2.00	acre	24.00	48.00	
Insecticide:					
Lorsban 4E	2.00	qt	12.13	24.26	
Oil	3.00	gal	3.00	9.00	
Provado	4.00	oz	3.52	14.08	
Guthion	6.00	lb	7.10	42.60	
Stopit calcium	3.00	gal	6.50	19.50	
Herbicide:					
Gramoxone	1.89	qt	8.78	16.59	
Rent:					
Bee hives	2.00	each	15.00	30.00	
Bins	10.00	bin	4.00	40.00	
Forklift, rental	2.00	acre	12.00	24.00	
Water:					
Irrigation power	36.00	acin	0.69	24.84	
Water assessment	1.00	acre	30.00	30.00	
Training:					
Training material	1.00	acre	25.00	25.00	
Harvest cost:					
Pick apples	25.00	bin	25.00	625.00	
Rodenticide:					
Rodent control	1.00	acre	5.00	5.00	
Labor (machine)	20.28	hrs	7.20	146.02	
Labor (non-machine)	88.10	hrs	7.20	634.32	
Fuel - diesel	46.42	gal	0.88	40.85	
Lube				6.12	
Machinery Repair				35.18	
Interest on Operating Capital @ 10.25%				50.59	
Total Operating Costs/Acre				2002.14	
Net Returns Above Operating Costs				1997.86	
Cash Ownership Costs					
Overhead				53.64	
Property taxes (machinery)				40.12	
Property insurance				14.11	
Investment repairs				89.14	
Total Cash Ownership Costs/Acre				197.01	
Non-Cash Ownership Costs (Depreciation and Interest)					
Irrigation system				190.28	
Miscellaneous				174.09	
Land				200.00	
Interest on carryover				959.00	
Trellis system				138.01	
Machine shed				34.71	
Machinery				135.15	
Total Non-Cash Ownership Costs/Acre				1831.25	
Total Costs/Acre				4030.40	
Total Costs/Bin				161.22	
Returns to Risk and Management				-30.40	

Table B5. Costs And Returns Per Acre to Establish Fuji Apples - Year 5

	Quantity Per Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
Gross Returns					
Fuji Apples	35.00	bin	160.00	5600.00	_____
Total Gross Returns for Fuji Apples				5600.00	_____
Operating Costs					
Fungicide:					
Microthiol	30.00	lb	0.65	19.50	_____
Rally 40W	15.00	oz	4.50	67.50	_____
Fertilizer:					
Nitrogen	20.00	lb.	0.35	7.00	_____
Phosphate	60.00	lb	0.24	14.40	_____
Potash	30.00	lb	0.14	4.20	_____
Sulfur	60.00	lb	0.15	9.00	_____
Micro nutrients	3.00	acre	24.00	72.00	_____
Insecticide:					
Lorsban 4E	2.00	qt	12.13	24.26	_____
Oil	3.00	gal	2.85	8.55	_____
Provado	5.00	oz	3.52	17.60	_____
Guthion	6.00	lb	7.10	42.60	_____
Thiodan	2.00	lb	6.65	13.30	_____
Stopit calcium	3.00	gal	6.50	19.00	_____
Chemical thin:					
Sevin	1.00	lb	3.00	3.00	_____
NAA 200	1.33	pint	11.88	15.80	_____
Herbicide:					
Roundup	2.25	qt	13.25	29.81	_____
Rent:					
Bee hives	2.00	each	15.00	30.00	_____
Bins	10.00	bin	4.00	40.00	_____
Forklift, rental	2.00	acre	12.00	24.00	_____
Water:					
Irrigation power	36.00	acin	0.69	24.84	_____
Water assessment	1.00	acre	30.00	30.00	_____
Harvest cost:					
Pick apples	35.00	bin	25.00	875.00	_____
Rodenticide:					
Rodent control	1.00	acre	5.00	5.00	_____
Labor (machine)	24.24	hrs	7.20	174.53	_____
Labor (non-machine)	84.06	hrs	7.20	605.23	_____
Fuel - diesel	57.07	gal	0.88	50.22	_____
Lube					
Machinery Repair				42.19	_____
Interest on Operating Capital @ 10.25%				54.66	_____
Total Operating Costs/Acre				2330.70	_____
Net Returns Above Operating Costs				3269.30	_____
Cash Ownership Costs					
Overhead				61.90	_____
Property taxes (machinery)				41.35	_____
Property insurance				14.73	_____
Investment repairs				89.14	_____
Total Cash Ownership Costs/Acre				207.12	_____
Non-Cash Ownership Costs (Depreciation and Interest)					
Irrigation system				190.28	_____
Miscellaneous tools and equipment				174.08	_____
Land				200.00	_____
Interest on carryover				866.00	_____
Trellis system				138.01	_____
Machine shed				34.71	_____
Machinery				161.72	_____
Total Non-Cash Ownership Costs/Acre				1764.82	_____
Total Costs/Acre				4302.63	_____
Total Costs/Bin				122.93	_____
Returns to Risk and Management				1297.37	_____

Table B6. Costs And Returns Per Acre to Produce Fuji Apples - Full Production

	Quantity Per Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
Gross Returns					
Fuji Apples	45.00	bin	160.00	7200.00	
Total Gross Returns for Fuji Apples				7200.00	
Operating Costs					
Fungicide:					
Microthiol	30.00	lb	0.65	19.50	
Rally 40W	15.00	oz	4.50	67.50	
Fertilizer:					
Nitrogen	20.00	lb	0.35	7.00	
Phosphate	60.00	lb	0.24	14.40	
Potash	30.00	lb	0.14	4.20	
Sulfur	60.00	lb	0.15	9.00	
Micro nutrients	3.00	acre	22.00	66.00	
Insecticide:					
Lorsban 4E	2.00	qt	12.13	24.26	
Oil	3.00	gal	2.85	8.55	
Provado	5.00	oz	3.52	17.60	
Guthion	6.00	lb	7.10	42.60	
Thiodan	2.00	lb	6.65	13.30	
Stopit calcium	3.00	gal	6.50	19.00	
Chemical thin:					
Sevin	1.20	lb	3.00	3.60	
NAA 200	1.33	pint	11.88	15.80	
Herbicide:					
Roundup	2.25	qt	13.25	29.81	
Rent:					
Bee hives	2.00	each	15.00	30.00	
Bins	10.00	bin	4.00	40.00	
Forklift, rental	2.00	acre	12.00	24.00	
Water:					
Irrigation power	36.00	acin	0.69	24.84	
Water assessment	1.00	acre	30.00	30.00	
Harvest cost:					
Pick apples	45.00	bin	25.00	1125.00	
Rodenticide:					
Rodent control	1.00	acre	5.00	5.00	
Labor (machine)	27.00	hrs	7.20	194.40	
Labor (non-machine)	95.09	hrs	7.20	684.65	
Fuel - diesel	63.71	gal	0.88	56.06	
Lube				8.40	
Machinery Repair				45.22	
Interest on Operating Capital @ 10.25%				59.63	
Total Operating Costs/Acre				2689.30	
Net Returns Above Operating Costs				4510.70	
Cash Ownership Costs					
Overhead				70.81	
Property taxes (machinery)				42.11	
Property insurance				15.11	
Investment repairs				89.14	
Total Cash Ownership Costs/Acre				217.17	
Non-Cash Ownership Costs (Depreciation and Interest)					
Irrigation system				190.28	
Miscellaneous tools and equipment				174.09	
Land				200.00	
Amortized establishment cost				1303.74	
Trellis system				138.01	
Machine shed				34.71	
Machinery				177.69	
Total Non-Cash Ownership Costs/Acre				2218.52	
Total Costs/Acre				5124.99	
Total Costs/Bin				113.89	
Returns to Risk and Management				2075.01	

Appendix C. Cash Flow, years 1-6

Table C1. Monthly Summary of Cash Expenses per Acre - Establishment Year 1

	Oct 97	Nov 97	Dec 97	Jan 98	Feb 98	Mar 98	Apr 98	May 98	Jun 98	Jul 98	Aug 98	Sep 98	Total
Prep:													
Tree removal	300.00												300.00
Ripping	110.00												110.00
Plow	21.50												21.50
Disc	16.00												16.00
Fumigate site	363.06												363.06
Total Prep Costs	810.56												810.56
Cultural:													
Fertilize	70.14												70.14
Layout and stake						25.20							25.20
Plant trees						4237.45							4237.45
Protect trees						87.72							87.72
Tie leaders								129.60					129.60
Prune trees								25.20					25.20
Irrigate								112.44					112.44
Weed control								17.52		17.52	17.52		52.57
Tree training									197.80				197.80
Hoe around trees										61.20			61.20
Pickup use											57.04		57.04
Plant grass seed												40.00	40.00
Rodent control												12.20	12.20
Total Cultural Costs	70.14					4350.37		284.76	197.80	78.72	74.56	52.20	5108.56
Interest on Operating Capital	7.52	7.52	7.52	7.52	7.52	44.68	44.68	47.11	48.80	49.48	50.11	50.56	373.04
Operating Costs/Acre	888.23	7.52	7.52	7.52	7.52	4395.05	44.68	331.88	246.60	128.20	124.68	102.76	6292.17
Cash Ownership													
Cash overhead									160.33				160.33
Property taxes (machinery)			15.23						15.23				30.45
Property insurance			4.64						4.64				9.28
Investment repairs	6.80	6.80	6.80	6.80	6.80	6.80	6.80	6.80	6.80	6.80	6.80	6.80	81.54
Cash Ownership Costs	6.80	6.80	26.66	6.80	6.80	6.80	6.80	6.80	186.99	6.80	6.80	6.80	281.60
Total Cash Costs/Acre	895.02	14.32	34.18	14.32	14.32	4401.85	51.48	338.67	433.59	134.99	131.47	109.55	6573.77

Table C2. Monthly Summary of Cash Expenses per Acre for Fuji Apples - Establishment Year 2

	Feb 98	Mar 98	Apr 98	May 98	Jun 98	Jul 98	Aug 98	Sep 98	Oct 98	Nov 98	Dec 98	Jan 99	Total
Cultural:													
Prune trees	39.60												39.60
Mildew spray		19.14	38.28										57.42
Fertilize		48.55		48.55									97.10
Replace dead trees		86.40											86.40
Dormant spray		40.80											40.80
Weed control				17.52		17.52		18.76					53.81
Pollinate trees				60.00									60.00
Cover spray					17.89								17.89
Aphid spray					14.58								14.58
Tree training					226.60								226.60
Spray nutrients					31.54	31.54	19.54						82.62
Hoe around trees					144.00								144.00
Irrigate					112.44								112.44
Mow row centers					5.34			5.34					10.68
Pickup use							57.04						57.04
Rodent control								12.20					12.20
Total Cultural Costs	39.60	194.89	38.28	126.07	552.39	49.06	76.58	36.30					1113.18
Harvest:													
Pick fruit								164.67					164.67
Haul fruit								2.56					2.56
Total Harvest Costs								167.22					167.22
Interest on Operating Capital	0.34	2.00	2.33	3.41	8.13	8.54	9.20	10.94					44.88
Operating Costs/Acre	39.94	196.89	40.61	129.48	560.52	57.61	85.78	214.46					1325.28
Cash Ownership													
Cash overhead					36.42								36.42
Property taxes (machinery)					17.77						17.77		35.53
Property insurance					5.91						5.91		11.82
Investment repairs	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	7.01	84.14
Cash Ownership Costs	7.01	7.01	7.01	7.01	67.11	7.01	7.01	7.01	7.01	7.01	30.69	7.01	167.91
Total Cash Costs/Acre	46.95	203.91	47.62	136.49	627.62	64.62	92.79	221.47	7.01	7.01	30.69	7.01	1493.19

Table C3. Monthly Summary of Cash Expenses per Acre for Fuji Apples - Establishment Year 3

	Mar 98	Apr 98	May 98	Jun 98	Jul 98	Aug 98	Sep 98	Oct 98	Nov 98	Dec 98	Jan 99	Feb 99	Total
Cultural:													
Mildew spray	49.88	24.94											74.82
Fertilize	41.66			40.80									82.46
Replace dead trees	28.20												28.20
Dormant spray		40.87											40.87
Weed control			17.52		17.52		17.52						52.57
Tree training			125.80		125.80								251.60
Pollinate trees			30.00										30.00
Prune trees				115.20									115.20
Irrigate				126.84									126.84
Mow row centers				5.34	5.39	5.39	5.39						21.51
Spray nutrients				31.61		31.61							63.22
Aphid spray				18.10									18.10
Hand thin				86.40									86.40
Cover spray				17.96	17.96								35.92
Pickup use						57.04							57.04
Rodent control							12.20						12.20
Total Cultural Costs	119.74	65.81	173.32	442.25	166.68	94.04	35.11						1096.97
Harvest:													
Pick fruit							323.40						323.40
Haul fruit							5.11						5.11
Total Harvest Costs							328.51						328.51
Interest on Operating Capital	1.02	1.58	3.07	6.84	8.27	9.07	12.18						42.03
Operating Costs/Acre	120.77	67.40	176.39	449.10	174.94	103.11	375.80						1467.50
Cash Ownership													
Cash overhead				40.24									40.24
Property taxes (machinery)				19.60						19.60			39.20
Property insurance				6.82						6.82			13.65
Investment repairs	7.43	7.43	7.43	7.43	7.43	7.43	7.43	7.43	7.43	7.43	7.43	7.43	89.14
Cash Ownership Costs	7.43	7.43	7.43	74.09	7.43	7.43	7.43	7.43	7.43	33.85	7.43	7.43	182.22
Total Cash Costs/Acre	128.20	74.83	183.82	523.19	182.37	110.54	383.23	7.43	7.43	33.85	7.43	7.43	1649.73

Table C4. Monthly Summary of Cash Expenses per Acre for Fuji Apples - Establishment Year 4

	Feb 98	Mar 98	Apr 98	May 98	Jun 98	Jul 98	Aug 98	Sep 98	Oct 98	Nov 98	Dec 98	Jan 99	Total
Cultural:													
Prune trees	151.20												151.20
Mildew spray		30.81	61.62										92.44
Fertilize		35.20		36.06									71.26
Dormant spray		40.87											40.87
Weed control				17.52		17.52		17.52					52.57
Pollinate trees				30.00									30.00
Irrigate					126.84								126.84
Hand thin					136.80								136.80
Mow row centers				5.34	5.39	5.39	5.39	5.39					21.51
Spray nutrients				31.61		31.61							63.22
Aphid spray				21.69									21.69
Cover spray				28.31	28.31	28.31							84.94
Tree training						176.20							176.20
Pickup use							57.04						57.04
Rodent control								12.20					12.20
Total Cultural Costs	151.20	106.88	61.62	83.59	350.60	227.43	122.35	35.11					1138.78
Harvest:													
Pick fruit								800.84					800.84
Haul fruit								11.93					11.93
Total Harvest Costs								812.77					812.77
Interest on Operating Capital	1.29	2.20	2.73	3.44	6.44	8.38	9.43	16.67					50.59
Operating Costs/Acre	152.49	109.09	64.35	87.03	357.04	235.81	131.78	864.55					2002.14
Cash Ownership													
Cash overhead					53.64								53.64
Property taxes (machinery)					20.06						20.06		40.12
Property insurance					7.06						7.06		14.11
Investment repairs	7.43	7.43	7.43	7.43	7.43	7.43	7.43	7.43	7.43	7.43	7.43	7.43	89.14
Cash Ownership Costs	7.43	7.43	7.43	7.43	88.19	7.43	7.43	7.43	7.43	7.43	34.55	7.43	197.01
Total Cash Costs/Acre	159.92	116.52	71.78	94.46	445.22	243.24	139.21	871.98	7.43	7.43	34.55	7.43	2199.15

Table C5. Monthly Summary of Cash Expenses per Acre for Fuji Apples - Establishment Year 5

	Feb 98	Mar 98	Apr 98	May 98	Jun 98	Jul 98	Aug 98	Sep 98	Oct 98	Nov 98	Dec 98	Jan 99	Total
Cultural:													
Prune trees	151.20												151.20
Mildew spray		36.61	73.22										109.84
Fertilize		31.70			31.70								63.40
Dormant spray		40.42											40.42
Thin with chemicals				14.53									14.53
Weed control				21.93		21.93		21.93					65.79
Pollinate trees				30.00									30.00
Aphid spray					25.21								25.21
Irrigate					126.84								126.84
Hand thin					230.40								230.40
Mow row centers					5.39	5.39	5.39	5.39					21.56
Spray nutrients					31.61	31.61	31.61						94.84
Cover spray					35.11	28.31	28.31						91.74
Pickup use								57.04					57.04
Stop drop spray							25.28						25.28
Rodent control								12.20					12.20
Total Cultural Costs	151.20	108.73	73.22	66.46	486.27	87.24	147.63	39.52					1160.28
Harvest:													
Pick fruit								1097.02					1097.02
Haul fruit								18.74					18.74
Total Harvest Costs								1115.76					1115.76
Interest on Operating Capital	1.29	2.22	2.85	3.41	7.57	8.31	9.57	19.44					54.66
Operating Costs/Acre	152.49	110.95	76.07	69.87	493.83	95.56	157.20	1174.72					2330.70
Cash Ownership													
Cash overhead					61.90								61.90
Property taxes (machinery)					20.68						20.68		41.35
Property insurance					7.36						7.36		14.73
Investment repairs	7.43	7.43	7.43	7.43	7.43	7.43	7.43	7.43	7.43	7.43	7.43	7.43	89.14
Cash Ownership Costs	7.43	7.43	7.43	7.43	97.37	7.43	7.43	7.43	7.43	7.43	35.47	7.43	207.12
Total Cash Costs/Acre	159.92	118.38	83.50	77.30	591.20	102.98	164.63	1182.15	7.43	7.43	35.47	7.43	2537.82

Table C6. Monthly Summary of Cash Expenses per Acre for Fuji Apples - Full Production

	Feb 98	Mar 98	Apr 98	May 98	Jun 98	Jul 98	Aug 98	Sep 98	Oct 98	Nov 98	Dec 98	Jan 99	Total
Cultural:													
Prune trees	151.20												151.20
Mildew spray		36.61	73.22										109.84
Fertilize		31.70			31.70								63.40
Dormant spray		40.42											40.42
Thin with chemicals				15.13									15.13
Weed control				21.93		21.93		21.93					65.79
Pollinate trees				30.00									30.00
Aphid spray					25.21								25.21
Irrigate					126.84								126.84
Hand thin					309.60								309.60
Mow row centers					5.39	5.39	5.39	5.39					21.56
Spray nutrients					29.61	29.61	29.61						88.84
Cover spray					35.11	28.31	28.31						91.74
Pickup use							57.04						57.04
Stop drop spray							25.42						25.42
Rodent control											12.20		12.20
Total Cultural Costs	151.20	108.73	73.22	67.06	563.47	85.24	145.77	39.52					1234.22
Harvest:													
Pick fruit								1371.59					1371.59
Haul fruit								23.85					23.85
Total Harvest Costs								1395.44					1395.44
Interest on Operating Capital	1.29	2.22	2.85	3.42	8.23	8.96	10.20	22.46					59.63
Operating Costs/Acre	152.49	110.95	76.07	70.48	571.70	94.20	155.98	1457.42					2689.30
Cash Ownership													
Cash overhead					70.81								70.81
Property taxes (machinery)					21.06						21.06		42.11
Property insurance					7.55						7.55		15.11
Investment repairs	7.43	7.43	7.43	7.43	7.43	7.43	7.43	7.43	7.43	7.43	7.43	7.43	89.14
Cash Ownership Costs	7.43	7.43	7.43	7.43	106.85	7.43	7.43	7.43	7.43	7.43	36.04	7.43	217.17
Total Cash Costs/Acre	159.92	118.38	83.50	77.91	678.55	101.63	163.41	1464.85	7.43	7.43	36.04	7.43	2906.47

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