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EB 1735

Estimated Cost and Returns of Replanting an Apple Orchard to a Double Row V-Trellis High Density System in Central Washington

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PREFACE

Enterprise costs and returns vary from one location to the next and over time for any particular farming operation. Variability stems from differences in the following:

- Capital, labor, and natural resources
- Type and size of machinery complement
- Cultural practices
- Size of farm enterprise
- Crop yields
- Input prices
- Commodity prices
- Management skill

Costs can also be calculated differently depending on how you intend to use the cost estimate. Information in this publication serves as a general guide for establishing and producing apples under a double row V-trellis high density system in central Washington over the first 5 years of orchard life. To avoid drawing unwarranted conclusions for any particular farm or group of farms, you must examine closely the assumptions used. If they are not appropriate for the situation under consideration, you should adjust the costs and/or returns.

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ESTIMATED COST AND RETURNS OF REPLANTING AN APPLE ORCHARD TO A DOUBLE ROW V-TRELLIS HIGH DENSITY SYSTEM IN CENTRAL WASHINGTON

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Introduction

Global competition from other fruit producing areas has spurred consumer interest in new and different kinds of apples. Several new varieties, including Gala, Fuji, and Braeburn, have entered the market at relatively high prices. Washington growers have responded by planting more of these fruits and less of the predominant Red Delicious and Golden Delicious.

Besides planting new varieties, many growers have experimented with high density orchard planting systems. In spite of relatively high establishment costs, growers depend on early returns from these orchards to quickly offset their initial investments.

Over the past two decades, there has been a gradual trend toward higher density plantings in Washington apple orchards. This trend has accelerated in recent years. According to a 1990 survey of tree fruit nurseries, the percentage of trees sold on rootstocks suitable for high density plantings (M26, M9, and Mark) increased from 20.2% in 1986 to 56.9% projected for 1992. Sales of rootstocks suitable for medium density plantings (MM106, M7, and M4) remained stable at 40% from 1986 to 1990, although they are projected to drop to 26.8% by 1992. Sales of low density type rootstocks (seedlings, MM111, and M2) have dropped significantly from 42.0% in 1986 to a projected 16.3% in 1992. These numbers clearly reveal a decline in low and medium density plantings in favor of high density plantings. The survey defined low density plantings as under 200 trees per acre, medium densities were 200 to 500 trees per acre, high densities were over 500 trees per acre.

This study estimated the cost of replanting an apple orchard to a double row V-trellis high density system in central Washington. This orchard system is a modified version of the "Tatura Trellis," originally designed by horticultural researchers in Australia. For study purposes, we assume that Fuji apples on M9 rootstock are the variety being planted. Growers, prospective growers, agricultural lenders, and others involved with the Washington apple industry should find the information helpful in estimating physical and financial requirements to establish a double row V-trellis high density planting of Fuji and other non-spur apples. Non-spur apples, being more vigorous than spur type apples, require a more dwarfing rootstock than a spur type apple

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variety. While the orchard configuration and production practices outlined may not fit all conditions, they represent current trends.

Advantages and Disadvantages of the V-Trellis Planting System

As more fully explained later, the V-trellis planting system is a design in which a double row of trees is planted 2 feet apart with 4 feet between trees in each tree row and with 13-foot drive middles. This results in a total of 15 feet between each double row center. The main leaders are trained to grow at a 65-70 degree angle by tieing them to trellis wires. Secondary limbs are taped along the trellis wires in a horizontal position while secondary shoots fill up the space between the trellis wires, forming a uniform and shallow canopy.

Give considerable thought to the decision to convert to a double row V-trellis high density system. You should evaluate your own site, management experience, and finances before beginning a high density planting. The following advantages and disadvantages will help you make that decision.

Advantages:

1) Earlier returns on the orchard investment are very likely. First commercial yields of 5 to 10 bins in the second leaf year are possible. On free standing orchards, first commercial yields of this size do not occur until year 4 or 5 at the earliest.

2) At a minimum, per-acre yields at peak levels are comparable with more conventional orchard systems or other high density systems.

3) Quality can be higher due to more efficient light interception. Fruit is protected from sunburn since it hangs under the canopy and there is less wind damage because the limbs are tied down.

4) Because of high yields in the early life of the planting, growers have increased flexibility to convert orchards to more marketable varieties later than they do with conventional orchards that typically require more time to reach full production.

5) Labor efficiency is greater due to smaller trees and a uniform and shallow canopy. Worker safety is improved (much less ladder work), which also broadens the labor pool. It is relatively easy to teach work crews how to prune, train, thin, and harvest due to the uniformity of the tree canopy. Mechanical aids, such as mobile (tractor pulled) work platforms, also are more practical because the canopy is uniform.

6) Chemical application is more efficient due to the uniform and shallow canopy.

Disadvantages:

1) Establishment costs are very expensive when compared to conventional systems. For this model, the first year costs were nearly $16,600 per acre. This is due mainly to the trellis cost and the large number of trees planted. On a conventional free standing system of 360 trees per acre, establishment costs per acre are about $4,600.

2) Due to unfamiliarity with the system, new management skills are required.

Because new management skills are required and high financial risk is involved with this system, individual growers will find it beneficial to experiment on small plots before adopting this approach in full scale commercial production.

Sources of Information

The assumptions used in this study were obtained from a group of experienced fruit producers who have recently established V-trellis high density systems and other high density trellis systems to produce Fuji apples. Their current and projected future production practices and requirements for labor, equipment, and supplies are the basis for assumptions used in this study and represent what this group of fruit growers collectively consider to be the latest developments. Central Washington suppliers provided information on current prices for machinery, equipment, custom operations, chemicals, and power.

Budget Assumptions

The assumptions used in this study are the following:

1. The double row V-trellis planting system is established on 11 acres of an existing 110-acre orchard, on which 100 acres are actually planted to trees. On this 11 acres, 10 acres of existing trees had to be removed before the double row V-trellis existing system was established. The newly planted trees is 675 feet by 630 feet, which computes to a total of 9.76 acres. Due to the space needed for end assembly of the trellis, including the anchors, anchor poles and related material, the actual trellis system comprises an area 675 feet by 660 feet, which computes to a total of 10.2 acres. Approximately 0.8 acre is devoted to roads, etc.

Therefore, reference to a "per-acre" cost in this bulletin, unless otherwise specified, refers to a land area of 1.1 acres, a trellised area of 1.02 acres, and an actual planted area of 0.976 acre.

2. Fuji apples on M9-NAKB337 rootstock are planted at a spacing of 2 feet between tree rows within the double rows and 4 feet between trees in each tree row, with 13-foot drive middles. This results in a total of 15 feet between each double row center. A total of 1,422 Fuji trees are planted per acre. It is assumed that there are 45 double rows in the 10.2-acre trellis system. Each double row averages 660 feet long, 630 feet of which is planted.

3. The orchard is located in the apple growing region of central Washington. Because Fuji requires a relatively long growing season, not all orchard sites within the apple growing regions of Washington will be ideal for producing Fuji. Nevertheless, costs to establish a double row V-trellis apple orchard will not vary significantly from one apple growing district to another within Washington.

4. Forty-seven Manchurian crabapple trees and 24 Snowdrift trees per acre are used as pollenizers. These pollenizers are planted between the normal spacings and do not replace any Fuji trees.

5. A solid set under-tree irrigation system is installed at a per-acre cost of $550 for the irrigation pump and mainlines and $875 for materials (laterial lines, sprinkler heads, etc.). In addition, 20 hours of labor plus one hour of tractor time is used to install this system. Mini-sprinklers are set every 15 feet within every double row in a diamond pattern. The system is capable of being converted to an overhead system if the conditions require it.

6. The double row V-trellis is custom installed at a cost of $1,616 for materials and $908 for labor, design, and construction supervision. See Appendix II for a detailed description of costs.

7. The 10-acre Fuji orchard and its respective support system and irrigation system have a 20-year life. Without winter cold damage and under good management, the economic life of this Fuji orchard could be longer.

8. Excluding trees, land is valued at $2,500 per actual acre.

9. Per acre yield and price estimates for years one through five are the following:

Year 1:	0 bins	
Year 2:	7 bins	$325 per bin
Year 3:	20 bins	$292 per bin
Year 4:	40 bins	$263 per bin
Year 5:	45 bins	$237 per bin

Price estimates are based on entering the Fuji apple market by 1994. As Fuji apple production throughout the state increases, prices are expected to decrease. The summary results of other price and yield scenarios are presented in Table 3 of this study.

10. The required return on the investment (interest on loans and return to equity) is 9%, with the exception of land. The required return to land is 6%, since land is expected to appreciate on an average of 3% or more per year.

11. Management cost of $225 per acre is based on a manager being paid $45,000 per year to manage two 100 acre orchard plots (a total of 200 acres).

12. Machinery and buildings are valued at new or used replacement value depending on how they are typically replaced. While this may overstate current production costs, it indicates the enterprise's ability to generate earnings needed to replace depreciable assets. When an enterprise is evaluated to determine its long-run viability, it is important to consider its ability to replace depreciable assets on a replacement cost basis.

Summary of Results

This study covers only the first 5 years of orchard life because few, if any, producers in Washington have a double row V-trellis high density apple orchard more than 3 years old. Thus, the projected cost and production levels used in this study are what the producer panel speculates to be the case. The purpose of this study is to project the cost of establishing and producing a double row, V-trellis high density Fuji apple orchard over the first 5 years of orchard life given different price and production levels. The results of this 5-year study show the high costs involved with high density plantings and provide a basis for estimating the yield and/or prices needed over the remaining life of the orchard to make double row V-trellis high density apple orchards profitable ventures.

Table 1 presents a per-acre summary of the costs and returns involved during the first 5 years of orchard life under the assumptions adopted for this study. Costs are categorized as variable-nonharvest, variable-harvest, fixed, total costs, net cost and accumulated net cost. Expenses listed under variable cost reflect the annual cash costs incurred during the year plus investments in the orchard that have the same life as the orchard, e.g., trees, trellis support system, and irrigation system. Thus, total variable cost indicates the added cash cost on a per-year basis required to establish and produce apples with a double row V-trellis planting system.

On the other hand, fixed cost reflects the per-acre portion of costs of equipment and land already owned by the business that should be allocated to the double row V-trellis high density apple enterprise. These are costs that the business would encounter regardless if the business replanted to a double row V-trellis high density apple orchard or used the land for some other enterprise. See "Detailed Results" for a complete description of how variable and fixed costs are allocated within the yearly budgets.

Under the yield and price assumptions of this study, as shown in Table 1, the orchard has an accumulated net cost of $5,525 per acre by the end of year 5 (Table 1). Table 2 shows the price per bin needed during years 6 through 20 to break even by the end of year 20 under different average annual yield scenarios. The assumption is that all costs in year 5, except for variable harvest costs, are the same throughout the remaining 15 years of orchard life. Under the given base assumptions, price and/or yield must drop significantly before the orchard becomes unprofitable.

Expected price was based on entering the market by 1994; expected yield is based on what experienced, knowledgeable fruit growers anticipate they can produce with this high density Fuji apple planting. However, this is unlikely to be the case for new growers contemplating entering the Fuji market. Prices are likely to be lower than given in the base assumptions because these growers will not enter the market until after 1994. For the inexperienced grower, the expected production levels through the first 5 years are not likely to be as high as can be expected from an experienced grower. On the other hand, some experienced growers may actually obtain yields higher than those in the base assumptions.

Table 3 presents the accumulated cost after 5 years of orchard life at 40 through 120% of assumed yields, given different average prices per bin received by the grower. Table 3 also lists the average yield needed in years 6 through 20 at different assumed 20-year price levels to break even with the orchard investment over the 20-year life. Note that the accumulated cost and break-even yield estimates include all interest costs (real and opportunity). In making the yield break-even calculation for years 6 through 20, it is assumed that production costs, except for harvest cost and interest on establishment cost, are the same as for year 5. Harvest cost is calculated as average per bin harvest cost for year 5 times the number of bins produced.

Table 1. Per-Acre Cost of Establishing and Producing Fuji Apples on a Double Row V-Trellis Planting System During the First Five Years of Orchard Life.

	Year 1	Year 2	Year 3	Year 4	Year 5
	$	$	$	$	$
Variable Costs, Non-Harvest					
Land Preparation	1,142.00				
Trees	7,429.50	75.00			
Rented Machinery	53.00				
Irrigation System and Pump	1,425.00				
Trellis, Custom Installed	2,524.00				
Tree Training Materials	24.00				
Labor	967.44	574.96	794.93	789.32	684.49
Fertilizer	98.78	53.73	55.70	52.32	50.94
Chemicals	81.78	86.79	112.44	200.69	220.99
Bee Hives		25.00	50.00	50.00	50.00
Irrigation Charge and Elect.	130.00	130.00	130.00	130.00	130.00
Machinery Cost (Repair, Fuel, Lube)	173.45	150.67	145.70	150.31	145.49
Other	50.00				
Operating Interest	728.24	42.30	47.30	54.57	52.91
Overhead (Utilities, Legal, Acct., etc.)	1,124.59	106.58	151.75	210.15	216.12
Total Non-Harvest Variable Cost	15,939.21	1,245.01	1,487.82	1,637.36	1,574.16
Variable Costs, Harvest					
Picking		175.00	500.00	1,000.00	1,125.00
Hauling		17.50	50.00	100.00	112.50
Other Labor		69.95	105.27	210.71	237.16
Machinery Cost		20.22	32.07	64.14	72.15
Total Harvest Variable Cost	0.00	282.67	687.34	1,374.85	1,546.81
Total Variable Cost	15,939.21	1,527.68	2,175.16	3,012.21	3,097.75
Fixed Costs					
Machinery Cost (Depr., Int., Ins., Taxes)	204.45	211.40	224.79	278.50	284.48
Land Cost (1.1 acres)	165.00	165.00	165.00	165.00	165.00
Land Taxes (1.1 acres)	58.00	58.00	58.00	58.00	58.00
Management	225.00	225.00	225.00	225.00	225.00
Interest on Accum. Net Cost		1,493.25	1,619.73	1,496.22	1,020.56
Total Fixed Cost	652.45	2,152.65	2,292.52	2,222.72	1,753.04
Total Cost	16,591.66	3,680.33	4,467.68	5,234.93	4,850.79
Value of Production		2,275.00	5,840.00	10,520.00	10,665.00
Net Cost	16,591.66	1,405.33	(1,372.32)	(5,285.07)	(5,814.21)
Accumulated Net Cost	16,591.66	17,996.99	16,624.67	11,339.60	5,525.39

Table 2: Break-Even Prices at Varying Average Production Levels for Years 6 through 20.*

Average Yield Per Acre	Break-Even Price Per Bin
	$
25 Bins	153.13
30 Bins	133.33
35 Bins	119.20
40 Bins	108.59
45 Bins	100.34
50 Bins	93.75
55 Bins	88.35
60 Bins	83.85

* Assuming year 5 costs with the exception of harvest cost. Harvest cost was calculated using average per bin harvest cost for year 5 multiplied by the average yield per acre.

For instance, if production during the first 5 years of orchard life was 80% of that assumed in the base study and the average per bin price received by the farmer over the life of the orchard was $200 per bin, the total accumulated cost of the orchard after 5 years would be $17,268 per acre. The orchardist would need to produce an average of 26.72 bins per acre to break even with the orchard investment over the last 15 years of orchard life.

The significance of Table 3 is that it illustrates that if a producer does not receive the price and/or yields expected when the orchard is established, a double row V-trellis high density orchard operation can become a very expensive venture. For instance, if only 50% of the expected production is achieved over the first 5 years of orchard life and an average price of $125 per bin is received by the producer, after the fifth year the orchardist has $27,910 per acre invested and must produce an average 63.40 bins per acre for the following 15 years to break even over the 20-year life of the orchard.

On the other hand, if yields are as expected and reasonable prices are received per bin, a double row V-trellis high density orchard can be a very profitable enterprise. For instance, if the yields for the first 5 years of orchard life are as given in the original assumptions and the average price per bin received by the producer is $275, after the fifth year the producer has only $4,149 per acre invested in the orchard and needs an average annual production level of only 11.63 bins to break even over the life of the orchard. However, if an average production level of 45 bins per acre is maintained over the remaining 15 years of orchard life, the orchard will break even in the sixth year and accumulated net returns by the end of the twentieth year will reach over $124,000

Table 3: Five-Year Accumulated Per-Acre Cost of Establishing and Producing a Double Row V-Trellis High Density Fuji Apple Orchard at Varying Price and Yield Levels, and the Average Break-Even Yield at the Given Price Level for Years 6 through 20.*

Average Bin Price	$125		$150		$175		$200	
Percent of Base Yield Level (Yrs 1 - 5)	Accum. 5-Yr. Net Cost	Break-Even Yield Yrs. 6-20 (Bin/Acre)	Accum. 5-Yr. Net Cost	Break-Even Yield Yrs. 6-20 (Bin/Acre)	Accum. 5-Yr. Net Cost	Break-Even Yield Yrs. 6-20 (Bin/Acre)	Accum. 5-Yr. Net Cost	Break-Even Yield Yrs. 6-20 (Bin/Acre)
40	28,991	64.88	27,776	49.55	26,562	39.67	25,348	32.77
50	27,910	63.40	26,392	48.06	24,874	38.18	23,356	31.28
60	26,744	61.80	24,922	46.49	23,101	36.62	21,279	29.72
70	25,648	60.30	23,523	44.99	21,399	35.11	19,274	28.22
80	24,553	58.80	22,124	43.49	19,696	33.61	17,268	26.72
90	23,458	57.30	20,726	41.98	17,994	32.11	15,262	25.22
100	22,363	55.81	19,328	40.48	16,291	30.61	13,256	23.72
110	21,268	54.31	17,929	38.98	14,590	29.11	11,251	22.21
120	20,173	52.81	16,530	37.48	12,888	27.61	9,245	20.71

Table 3: Continued.

Average Bin Price	$225		$250		$275		$300	
Percent of Base Yield Level (Yrs 1 - 5)	Accum. 5-Yr. Net Cost	Break-Even Yield Yrs. 6-20 (Bin/Acre)	Accum. 5-Yr. Net Cost	Break-Even Yield Yrs. 6-20 (Bin/Acre)	Accum. 5-Yr. Net Cost	Break-Even Yield Yrs. 6-20 (Bin/Acre)	Accum. 5-Yr. Net Cost	Break-Even Yield Yrs. 6-20 (Bin/Acre)
40	24,133	27.68	22,919	23.78	21,705	20.68	20,491	18.16
50	21,838	26.19	20,321	22.28	18,803	19.18	17,285	16.67
60	19,458	24.64	17,636	20.74	15,815	17.64	13,994	15.13
70	17,149	23.14	15,024	19.23	12,899	16.14	10,774	13.63
80	14,839	21.64	12,411	17.73	9,982	14.64	7,554	12.12
90	12,530	20.13	9,798	16.23	7,066	13.13	4,334	10.62
100	10,221	18.63	7,185	14.72	4,149	11.63	1,114	9.12
110	7,911	17.13	4,572	13.23	1,234	10.12	(2,106)	8.60
120	5,602	15.62	1,959	11.72	(1,684)	9.49	(5,326)	8.60

*Assuming Year 5 costs with the exception of harvest cost. Harvest cost is calculated by multiplying the average per bin harvest cost for Year 5 by the average yield per acre.

per acre, excluding any returns that might be made by investing the annual profits. The implications of other price and yield scenarios can be derived from close examination of Table 3.

Detailed Results

The detailed estimated costs for the first 5 years of orchard life are shown in Appendix I. Tables 4.1 through 4.5 outline the schedule of orchard operations and per-acre costs by calendar month, the type of machinery and labor used, and the hours used per acre on an annual basis. Field operations costs fall in two categories, fixed and variable. Fixed costs include annual cost of machinery, equipment, buildings, management, and land ownership. Variable costs include costs associated with operating machinery, hiring labor, and purchasing services and materials. Total cost is the sum of fixed costs and variable costs.

Machinery, equipment, and building fixed costs include depreciation, interest on the average investment, property taxes, and insurance. These costs are incurred whether or not a crop is grown and do not vary, given ownership of specific equipment and buildings. Per-hour fixed costs for machinery were determined by dividing the total annual fixed cost per machine by the annual hours of machinery use for the representative farm. Machinery fixed costs for a specific orchard operation were determined by multiplying the machine hours per acre times the per-hour machinery fixed cost figure (Table 8). Fixed costs per acre for the machine shed, shop, and shop tools were determined by dividing the total annual fixed cost by the number of acres.

Land fixed cost includes taxes and a 6% return on the value of the land at the time the enterprise is established. This cost represents the minimum return the owner-operator desires on the original investment in land, apart from appreciation of land value. Land cost is termed an opportunity cost to indicate that it is not an out-of-pocket expense, but a return foregone by the producer as a result of investing in this enterprise. Alternately, this amount could be considered rent if the grower does not own the land. A fixed management charge of $225 per acre is also incurred by the operation. This represents the salary for a manager responsible for 200 acres of orchard. Beginning with year 2, a fixed cost of 9% of the previous year(s)' accumulated net cost is charged against the investment. This cost represents the interest paid on capital invested in the apple orchard, or returns foregone by investing in the apple orchard rather than in an alternative investment that would give immediate returns.

Variable costs occur only as the enterprise is maintained and harvested. These costs include fuel, oil, repairs, fertilizer, chemicals, custom work, labor, overhead (utilities, legal, and accounting fees, etc.), and 9% interest on operating capital. Trees, trellis, and irrigation materials installed in year 1 and with the same life as the orchard were also included as variable costs.

The second set of tables in Appendix I (Tables 5.1 through 5.5) present an itemized list of the costs in each respective schedule of operations (Tables 4.1 through 4.5). Most items are self-explanatory or have been defined previously. However "Tractor Interest" and "Machinery Interest" warrant additional explanation. These values represent opportunity costs (returns foregone by investment in a given equipment and building complement rather than in alternative investments) or interest paid to finance the given equipment and building complement -- or both. The 9% interest charge made against the average value of these items over their respective lives represents total interest costs. These interest costs are fixed costs and their per-hour and per-acre allocations were calculated in the manner as described on the previous page for building, equipment, and machinery fixed cost.

First Year (Tables 4.1, 5.1)

Since it is assumed the land was previously in apple production, pre-plant operations during the fall consist of clearing and burning trees, as well as ripping, discing, and fumigating the soil. In February, 400 pounds per acre of mono ammonium phosphate (11-52-0) are broadcast-applied and rotovated in before laying out and staking the planting.

In March, before constructing the trellis system, Fuji trees are planted in the double row configuration described on page 2. There are 316 trees along 630 feet of each double row. Trees are assumed to be well feathered and of good quality. Some high density growers in Washington prefer to grow their own trees to keep costs down and to ensure that they are feathered correctly. However, for this study, at $5.00 per nursery tree, the 1,422 trees per acre are estimated to cost $7,110. Pollenizer trees (71 per acre), at a cost of $4.50 per tree, are inter-planted among the Fujis.

An irrigation pump and mainline system appropriate for the new orchard is installed in March. After the trees have been planted, a mini-sprinkler irrigation system is established within the orchard as described under the Budget Assumptions.

An 8-foot wide, low maintenance grass cover strip is seeded down each drive middle. Herbicides are used to maintain the 2-foot wide double row along with 2.5 feet on each side of the double row in a weed free condition. Touch-up hand weeding is conducted in the summer.

In May, the trellis system is constructed. Appendix II details the design specifications, construction materials, and costs required for this particular system.

During this first year's growing season, frequent training visits through the orchard will be required. Close attention must be paid to the very vigorous Fuji variety. The main leaders are trained to grow at the 65-70 degree angle by tieing them to the trellis wires.

Using tapeners, secondary limbs are taped along the wires in a horizontal position to promote early flower bud formation on limbs and to help reduce excessive vegetative growth. Secondary shoots fill up the space between the wires, forming a uniform and shallow canopy. Figure 1 shows how mature trees are trained on a five-wire system.

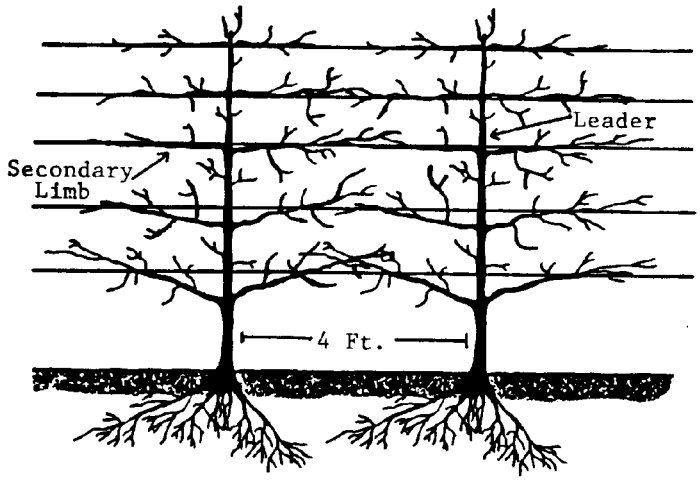

Figure 1: Side View, Trees Trained to a Five-Wire V-Trellis System.

Also in May, tree trunks are painted with white latex for sunscald protection. Pest management programs, started in year 1, are mainly for aphid and mildew control. Gopher control practices are also initiated in the first year, and will be continued throughout the orchard's life. Three hundred sixty-eight pounds of urea (46-0-0) are applied in years 1, 2, and 3 through the irrigation system for nitrogen needs.

Total cost for year 1 is $16,592 per acre. The cost of planting the trees combined with the cost of the trellis make up over 60% of this amount.

Second Year (Tables 4.2, 5.2)

It is assumed 15 trees need to be replaced during year 1. An early spring dormant oil spray of Chlorpyrifos and Superior Oil for aphid and mite control is applied. One beehive per acre is rented for pollination. Trees are expected to bear a light crop in the second year, generally about seven bins. The fruit load is balanced with hand thinning. Three cover sprays for codling moth and aphid management are also applied. Two mildew sprays are also applied. Three herbicide applications and four mowings are used to manage the orchard grass cover.

It is important in the second year to pay close attention to tree growth. While a light commercial crop is expected by the second year, emphasis in the orchard is on trees growing into their allotted space on the trellis. Tree training passes are made in April, May, and July. Secondary shoots are tied down and secured with plastic tape. Summer pruning is necessary to remove unwanted vigorous shoot growth.

Harvest for Fuji is based on color picking, so a minimum of two harvests is required. Four pickers plus one driver are hired for harvesting the block. Total cost per acre in year two is $3,680. Total expected revenue is $2,275.

Third Year (Tables 4.3, 5.3)

Starting in the third year, trees are pruned by hand during the dormant season. Tree training and chemical costs increase substantially in year 3 because the tree canopy is almost fully established by this time. An early spring dormant spray is again applied, but at higher application rates than in year 2.

Pruning is conducted with hand tools. Tree training occurs in May, July, and August. Two beehives per acre are rented for pollination because flowering is expected to increase. Three cover sprays and two mildew sprays are applied at higher application rates than in year 2.

Crop production is expected to be about 20 bins/acre by the third year. The crop is still hand thinned rather than chemically thinned because response to chemical thinners by young trees is unpredictable and erratic. Herbicides and mowing are used for weed and grass cover management.

Harvest is based on color picking with at least two passes through the orchard. Total cost per acre in year 3 is $4,468, whereas, revenue from production is expected to be $5,840. This is the first year where annual revenue from production exceeds annual production costs.

Fourth Year (Tables 4.4, 5.4)

By year 4, the tree canopy should be fully established and achieving a significant commercial crop, about 40 bins per acre. Dormant pruning will include containment and renewal cuts. Pruning is done with hand tools. Tree training consists mainly of limb spreading in May, July, and August.

Herbicides, pesticides, and other orchard operations are conducted as previously described but at higher rates. Fertilization through the irrigation system is reduced to 312 pounds of urea (46-0-0). By year 4, the crop can be chemically thinned with NAA and Sevin, although hand thinning is also used as a follow-up.

By year 4, a system of custom picking, hauling, and harvest supervision should be firmly established. Since revenues exceeded production costs in year 3, interest on net establishment costs begins

to decrease, thus decreasing total annual cost. Total cost per acre in year 4 is $5,235. Total expected revenue is $10,520.

Fifth Year (Tables 4.5, 5.5)

About 45 bins/acre are anticipated for the fifth year. Trees are fully established and pruning consists almost entirely of containment and renewal cuts made with hand tools. By this time, tree training is all but complete. A pass through the orchard is made in June when renewal branches are positioned to achieve maximum high quality fruit production. The crop is thinned with Sevin and NAA and follow-up hand thinning.

Orchard operations, such as pesticide applications, herbicides, mowing, and gopher control, are conducted as previously described. Fertilization through the irrigation system is lowered to 271 pounds of urea (46-0-0). Total cost for year 5 is $4,851 and total expected revenue is $10,665. The accumulated net cost by the end of year 5 is $5,525. Under the given assumptions, it is expected that the orchard will recover all of its establishment costs by end of the sixth year.

Services and Materials (Table 6)

In Tables 4.1 through 4.5, which show the schedule of operation and estimated cost per acre for each of the 5 years of orchard life presented, figures representing the cost of services and/or materials utilized by operation are shown in the respective columns. Table 6 presents by year, month, and operation the services and/or materials used in calculating these figures.

Machinery and Building Complement (Table 7)

Table 7 lists the type and number of machines used in producing apples under the double row V-trellis planting system plus, on a per-unit basis, their replacement value, years of life before trade-in, salvage value, hours of annual use, annual repair cost, fuel type (if applicable), and gallons of fuel used per hour. For the machine shed and shop, shop tools, and the irrigation system, the same information is provided except instead of specifying annual hours of use, the number of acres these assets provide for are specified.

Per-Hour and Per-Acre Machinery and Building Cost (Table 8)

Table 8 presents the estimated fixed and variable costs per hour of use for the machinery listed in Table 7. Costs for the machine shed and shop and for shop tools are calculated on a per-acre basis. The per-acre cost of the irrigation system and the trellis system are included in the first-year establishment costs.

Machinery fixed costs include depreciation and interest on investment, property taxes, and insurance -- costs that do not vary with machine use. Note that interest on investment represents a 9% opportunity cost to the enterprise. These are earnings foregone by investing money in the machinery complement rather than in the next

best alternative investment. This may also represent the interest paid on funds borrowed to finance machinery purchases. Machinery variable costs include machine repair, fuel, and lubrication costs -- costs that vary with machine use.

Input Prices (Table 9)

Table 9 lists the prices and charges used for custom work, rentals, labor, fuel, fertilizer, chemicals, tree stock, and other selected inputs used in deriving these budgets.

Concluding Note

Due to the procedures and assumptions used in this study, the results should be used advisedly. Growers and authors realize that the situation outlined is not characteristic of all orchard or farm operations. For example, economies were gained by adding this acreage to an existing farm operation. Accordingly, added costs can be anticipated when the planting represents a separate business enterprise. Furthermore, in planting a given acreage, the dimensions and topography of a given orchard site may reduce the actual number of acres of trellised and/or planted orchard. Windbreaks, buildings, roads, and service areas may require more than the 0.8 acre devoted to these in our 11-acre model. In addition, this study says very little about the economics of this system compared to other high density or conventional systems.

It is essential that when you use this publication as a guide to determine establishment and production costs, you use considerable judgment in generalizing cost estimates to situations different from those outlined. Carefully consider both the advantages and disadvantages for this system, some of which are outlined on pages 2 and 3. Moreover, this publication is not specifically intended as a guide to double row V-trellis construction or other planting and production practices. Rather, it provides an overview of current technology used in central Washington.

Appendix I

Detailed Cost and Production

Practice Information

TABLE 4.1: SCHEDULE OF OPERATIONS AND ESTIMATED COSTS PER ACRE* FOR ESTABLISHING A DOUBLE ROW V-TRELLIS HIGH DENSITY FUJI APPLE ORCHARD IN CENTRAL WASHINGTON - YEAR 1.

							VARIABLE COST						
OPERATION	TOOLING	MONTH	YEAR	MACH HOURS	LABOR HOURS	TOTAL FIXED COST	FUEL, LUBE, & REPAIRS	LABOR	SERVICE	MATER.	INTER.	TOTAL VARIABLE COST	TOTAL COST
						$	$	$	$	$	$	$	$
CLEAR LAND	CUSTOM HIRE	FALL	1992	.00	.00	.00	.00	.00	175.00	.00	14.44	189.44	189.44
RIP LAND	CUSTOM HIRE	FALL	1992	.00	.00	.00	.00	.00	180.00	.00	14.85	194.85	194.85
CLEAN UP & DISC	CUSTOM HIRE	FALL	1992	.00	.00	.00	.00	.00	165.00	.00	13.61	178.61	178.61
SOIL SAMPLE	CUSTOM HIRE	FALL	1992	.00	.00	.00	.00	.00	12.00	.00	.99	12.99	12.99
FUMIGATE	CUSTOM HIRE	FALL	1992	.00	.00	.00	.00	.00	565.00	.00	46.61	611.61	611.61
SEAL FUMIGANT	CUSTOM HIRE	FALL	1992	.00	.00	.00	.00	.00	45.00	.00	3.71	48.71	48.71
LAYOUT & STAKE	HAND LABOR (2 PERSONS)	FEB	1993	.00	4.00	.00	.00	36.20	.00	5.00	2.47	43.67	43.67
FERTILIZE	60HP-WT, RENTED FERT. SPREADER	FEB	1993	.55	.61	2.12	1.98	4.03	3.00	50.00	3.54	62.55	64.67
ROTOTILL	60HP-WT, 6' ROTOTILLER	FEB	1993	1.10	1.21	9.02	6.79	7.99	.00	.00	.89	15.66	24.68
RESTAKE	FULL TIME LABOR	FEB	1993	.00	1.50	.00	.00	17.25	.00	.00	1.04	18.29	18.29
HAUL TREES	60HP-WT, TRAILER	MAR	1993	.25	2.00	1.43	1.20	13.20	.00	.00	.76	15.16	16.59
PLANT TREES	RENTED 100HP-WT & PLANTER	MAR	1993	.00	16.02	.00	9.83	118.81	40.00	7110.00	382.13	7660.77	7660.77
PLANT POLLENIZERS	60HP-WT W/BACKFORK	MAR	1993	1.00	4.50	4.39	4.09	37.05	.00	319.50	18.93	379.58	383.97
INSTALL IRR SYS	60HP-WT, HAND LABOR	MAR	1993	1.00	20.00	3.86	3.60	151.60	.00	1425.00	82.96	1663.16	1667.02
COVER CROP PREP	60HP-WT, 6' ROTOTILLER	MAR	1993	2.20	2.41	18.04	13.58	15.91	.00	.00	1.55	31.04	49.07
SEED COVER CROP	60HP-WT, RENTED SEEDER	MAR	1993	1.00	1.10	3.86	3.60	7.26	10.00	15.00	1.88	37.74	41.60
PRUNING	HAND LABOR, 1 FULL TIME PERSON	MAR	1993	.00	7.00	.29	.00	80.50	.00	.00	4.23	84.73	85.01
MILDEW SPRAY(2X)	60HP-WT, BLAST SPRAYER	APR	1993	.88	1.10	12.62	9.22	7.26	.00	12.76	1.32	30.56	43.18
HERBICIDE	60HP-WT, 100 GAL SPRAYER	APR	1993	.35	.42	2.06	1.77	2.77	.00	35.08	1.78	41.40	43.46
TREE TRAINING	HAND LABOR, TAPNERS	SEA	1993	.00	41.00	6.72	.00	270.60	.00	24.00	13.26	307.86	314.58
IRRIGATION	HAND LABOR, WATER & ELECTRICITY	SEA	1993	.00	10.00	.00	30.00	66.00	.00	100.00	8.82	204.82	204.82
FERTIGATE	THROUGH IRRIGATION SYSTEM	SEA	1993	.00	1.00	.00	.00	6.60	.00	47.84	2.45	56.89	56.89
PAINT TREE TRUNKS	HAND LABOR (ALSO TRIM SUCKERS)	MAY	1993	.00	12.00	.00	.00	79.20	.00	30.00	4.10	113.29	113.29
INSTALL TRELLIS	CUSTOM INSTALLATION	MAY	1993	.00	.00	.00	.00	.00	908.00	1616.00	94.65	2618.65	2618.65
MILDEW SPRAY	60HP-WT, BLAST SPRAYER	MAY	1993	.44	.53	6.31	4.61	3.50	.00	1.97	.38	10.45	16.76
HERBICIDE	60HP-WT, 100 GAL SPRAYER	MAY	1993	.35	.42	2.06	1.77	2.77	.00	3.91	.32	8.77	10.83
HERBICIDE	60HP-WT, 100 GAL SPRAYER	JUN	1993	.35	.42	2.06	1.77	2.77	.00	3.91	.25	8.71	10.76
MOW COVER	60HP-WT, 8' ROTARY MOWER	JUL	1993	.33	.36	2.64	2.01	2.38	.00	.00	.10	4.49	7.13
HERBICIDE	60HP-WT, 100 GAL SPRAYER	JUL	1993	.35	.42	2.06	1.77	2.77	.00	3.91	.19	8.64	10.70
COVER SPRAY	60HP-WT, BLAST SPRAYER	JUL	1993	.44	.53	6.31	4.61	3.50	.00	1.14	.21	9.45	15.76
MOW COVER	60HP-WT, 8' ROTARY MOWER	AUG	1993	.33	.36	2.64	2.01	2.38	.00	.00	.07	4.45	7.09
HERBICIDE	60HP-WT, 100 GAL SPRAYER	AUG	1993	.35	.42	2.06	1.77	2.77	.00	3.91	.13	8.58	10.64
COVER SPRAY	60HP-WT, BLAST SPRAYER	AUG	1993	.44	.53	6.31	4.61	3.50	.00	1.14	.14	9.38	15.69
MOW COVER	60HP-WT, 8' ROTARY MOWER	OCT	1993	.33	.36	2.64	2.01	2.38	.00	.00	.00	4.39	7.03
GOPHER CONTROL	HAND LABOR AND BAIT BARS	ANN	1993	.00	2.50	.00	.00	16.50	.00	15.00	1.42	32.92	32.92
MISC USE PICKUP	MANAGER'S PICKUP	ANN	1993	8.33	.00	45.44	40.88	.00	.00	.00	1.84	42.72	88.16
MISC USE PICKUP	LABOR PICKUP	ANN	1993	4.00	.00	12.28	22.03	.00	.00	.00	.99	23.02	35.30
MISC USE ATV	4-WHEEL ATV	ANN	1993	8.00	.00	17.71	25.01	.00	.00	.00	1.13	26.14	43.85
MISC USE SHOP	MACHINE SHED & SHOP	ANN	1993	.00	.00	17.68	2.70	.00	.00	.00	.12	2.82	20.50
MISC USE TOOLS	SHOP TOOLS	ANN	1993	.00	.00	11.87	.20	.00	.00	.00	.01	.21	12.08
LAND COST**	6% INTEREST ON $2500/AC VALUE	ANN	1993	.00	.00	165.00	.00	.00	.00	.00	.00	.00	165.00
TAXES	LAND	ANN	1993	.00	.00	58.00	.00	.00	.00	.00	.00	.00	58.00
OVERHEAD	UTILITIES, LEGAL, ACCTNG, ETC.	ANN	1993	.00	.00	.00	.00	.00	1112.04	.00	.00	1112.04	1112.04
MANAGEMENT	MANAGEMENT CHARGE	ANN	1993	.00	.00	225.00	.00	.00	.00	.00	.00	.00	225.00
TOTAL PER ACRE				30.37	132.72	652.45	203.45	967.43	3215.04	10834.90	728.24	15939.21	16591.66

* 1.02 ACRES OF TRELLISED AREA, 0.976 ACRES OF ACTUAL PLANTED AREA.
** 1.1 ACRES OF LAND.

TABLE 5.1: ITEMIZED COST PER ACRE* FOR ESTABLISHING A DOUBLE ROW V-TRELLIS HIGH DENSITY FUJI APPLE ORCHARD IN CENTRAL WASHINGTON - YEAR 1.

	UNIT	PRICE OR COST/UNIT	QUANTITY	VALUE OR COST	YOUR FARM
VARIABLE COSTS		$		$	
CLEAR LAND	ACRE	175.00	1.00	175.00	
RIP LAND	ACRE	180.00	1.00	180.00	
CLEAN UP & DISC	ACRE	165.00	1.00	165.00	
SOIL SAMPLE	ACRE	12.00	1.00	12.00	
FUMIGANT	ACRE	565.00	1.00	565.00	
SEAL FUMIGANT	ACRE	45.00	1.00	45.00	
STAKING MATERIAL	ACRE	5.00	1.00	5.00	
MONO AMMONIUM PHOSPHATE	LB.	0.125	400.00	50.00	
RENTED FERT SPREADER	ACRE	3.00	1.00	3.00	
FUJI TREES	TREE	5.00	1422.00	7110.00	
RENTED 100 HP-WT PLANTER	DAY	120.00	.33	40.00	
MACHURIAN POLLENIZERS	TREE	4.50	47.00	211.50	
SNOWDRIFT POLLENIZERS	TREE	4.50	24.00	108.00	
PUMP & MAINLINE	ACRE	550.00	1.00	550.00	
IRR SYSTEM MATERIALS	ACRE	875.00	1.00	875.00	
COMPANION GRASS SEED	LB.	1.25	12.00	15.00	
RENTED SEEDER	ACRE	10.00	1.00	10.00	
TRELLIS MATERIALS	ACRE	1616.00	1.00	1616.00	
INSTALL TRELLIS	ACRE	908.00	1.00	908.00	
TREE TRAIN MATERIALS	ACRE	24.00	1.00	24.00	
TREE PAINT	GAL.	6.00	5.00	30.00	
PART TIME LABOR	HOUR	6.60	114.05	752.73	
FULL TIME LABOR	HOUR	11.50	18.67	214.71	
RALLY 40 W	OZ.	4.73	2.50	11.83	
BORON 20.5 WP	LB.	.75	1.25	.94	
BAYLETON	OZ.	3.12	.63	1.97	
GRAMOXONE	QRT.	8.50	2.30	19.55	
DIMETHOATE 2.67 EC	PINT	2.27	1.00	2.27	
SURFLAN	GAL.	67.75	.46	31.17	
GOPHER BAIT BARS	LB.	2.50	6.00	15.00	
LIQUID UREA (46-0-0)	LB.	.13	368.00	47.84	
IRRIGATION WATER	ACRE	50.00	1.00	50.00	
ELECTRICITY FOR PUMP	ACRE	50.00	1.00	50.00	
REPAIR IRRIGATION SYSTEM	ACRE	30.00	1.00	30.00	
TRACTOR REPAIR	ACRE	16.89	1.00	16.89	
TRACTOR FUEL/LUBE	ACRE	39.70	1.00	39.70	
MACHINERY REPAIRS	ACRE	80.93	1.00	80.93	
MACHINE FUEL/LUBE	ACRE	35.93	1.00	35.93	
INTEREST ON OP. CAP.	ACRE	728.24	1.00	728.24	
OVERHEAD (7½% OF V.C.)	ACRE	1112.04	1.00	1112.04	
TOTAL VARIABLE COST				15939.21	
FIXED COSTS		$		$	
TRACTOR DEPRECIATION	ACRE	22.08	1.00	22.08	
TRACTOR INTEREST	ACRE	22.11	1.00	22.11	
TRACTOR INSURANCE	ACRE	1.47	1.00	1.47	
TRACTOR TAXES	ACRE	4.42	1.00	4.42	
MACHINE DEPRECIATION**	ACRE	97.93	1.00	97.93	
MACHINE INTEREST**	ACRE	44.55	1.00	44.55	
MACHINE INSURANCE**	ACRE	2.97	1.00	2.97	
MACHINE TAXES**	ACRE	8.91	1.00	8.91	
LAND COST***	ACRE	165.00	1.00	165.00	
LAND TAXES	ACRE	58.00	1.00	58.00	
MANAGEMENT	ACRE	225.00	1.00	225.00	
TOTAL FIXED COST				652.45	
TOTAL COST				16591.66	

* 1.02 ACRES OF TRELLISED AREA, 0.976 ACRES OF ACTUAL PLANTED AREA.
** INCLUDES MACHINE SHED AND SHOP.
*** 6% RETURN ON VALUE OF 1.1 ACRES BARE LAND.

TABLE 4.2: SCHEDULE OF OPERATIONS AND ESTIMATED COSTS PER ACRE* FOR A DOUBLE ROW V-TRELLIS HIGH DENSITY FUJI APPLE ORCHARD IN CENTRAL WASHINGTON - YEAR 2.

							VARIABLE COST						
OPERATION	TOOLING	MONTH	YEAR	MACH HOURS	LABOR HOURS	TOTAL FIXED COST	FUEL, LUBE, & REPAIRS	LABOR	SERVICE	MATER.	INTER.	TOTAL VARIABLE COST	TOTAL COST
						$	$	$	$	$	$	$	$
DORMANT SPRAY	60HP-WT, BLAST SPRAYER	MAR	1994	.44	.53	6.31	4.61	3.50	.00	6.05	.74	14.90	21.21
REPLANT LOST TREES	60HP-WT, W/BACKFORK	MAR	1994	1.00	1.00	4.39	4.09	11.50	.00	75.00	4.76	95.35	99.74
TREE TRAIN	60HP-WT, TRAILER, HAND LABOR	APR	1994	.70	16.10	4.01	3.37	117.53	.00	.00	5.44	126.34	130.35
MILDEW SPRAY(2X)	60HP-WT, BLAST SPRAYER	APR	1994	.88	1.10	12.62	9.22	7.26	.00	19.00	1.60	37.08	49.70
RENT BEE HIVES	ONE HIVE PER ACRE	APR	1994	.00	.00	.00	.00	.00	25.00	.00	1.13	26.12	26.12
IRRIGATION	HAND LABOR, WATER & ELECTRICTY	SEA	1994	.00	10.00	.00	30.00	66.00	.00	100.00	8.82	204.82	204.82
FERTIGATE	THROUGH IRRIGATION SYSTEM	SEA	1994	.00	1.00	.00	.00	6.60	.00	47.84	2.45	56.89	56.89
MOW COVER	60HP-WT, 8' ROTARY MOWER	MAY	1994	.33	.36	2.64	2.01	2.38	.00	.00	.16	4.55	7.19
COVER SPRAY	60HP-WT, BLAST SPRAYER	MAY	1994	.44	.53	6.31	4.61	3.50	.00	2.28	.39	10.78	17.09
TREE TRAIN	60HP-WT, TRAILER, HAND LABOR	MAY	1994	.70	16.10	4.01	3.37	117.53	.00	.00	4.53	125.44	129.44
HERBICIDE	60HP-WT, 100 GAL SPRAYER	MAY	1994	.35	.42	2.06	1.77	2.77	.00	3.91	.32	8.77	10.83
MILDEW SPRAY	60HP-WT, BLAST SPRAYER	MAY	1994	.44	.53	6.31	4.61	3.50	.00	2.96	.42	11.49	17.80
HAND THINNING	HAND LABOR	JUN	1994	.00	12.00	.00	.00	79.20	.00	.00	2.38	81.58	81.58
COVER SPRAY	60HP-WT, BLAST SPRAYER	JUN	1994	.44	.53	6.31	4.61	3.50	.00	4.98	.39	13.48	19.79
MOW COVER	60HP-WT, 8' ROTARY MOWER	JUL	1994	.33	.36	2.64	2.01	2.38	.00	.00	.10	4.49	7.13
COVER SPRAY	60HP-WT, BLAST SPRAYER	JUL	1994	.44	.53	6.31	4.61	3.50	.00	3.41	.26	11.78	18.09
TREE TRAIN	60HP-WT, TRAILER, HAND LABOR	JUL	1994	.70	16.10	4.01	3.37	117.53	.00	.00	2.72	123.62	127.63
MOW COVER	60HP-WT, 8' ROTARY MOWER	AUG	1994	.33	.36	2.64	2.01	2.38	.00	.00	.07	4.45	7.09
HERBICIDE	60HP-WT, 100 GAL SPRAYER	AUG	1994	.35	.42	2.06	1.77	2.77	.00	3.91	.13	8.58	10.64
MOW COVER	60HP-WT, 8' ROTARY MOWER	OCT	1994	.33	.36	2.64	2.01	2.38	.00	.00	.00	4.39	7.03
HARVEST (7 BINS)	PICKERS, LADDERS, PICKING BAGS	OCT	1994	.00	.00	3.66	.22	.00	175.00	.00	.00	175.22	178.88
HARVEST	SUPERVISION	OCT	1994	.00	1.00	.00	.00	11.50	.00	.00	.00	11.50	11.50
HARVEST	CHECKER	OCT	1994	.00	1.00	.00	.00	6.60	.00	.00	.00	6.60	6.60
HARVEST	60HP-WT, BACKFORK	OCT	1994	1.40	3.50	6.15	5.73	23.10	.00	.00	.00	28.83	34.98
BIN HANDLING	60HP-WT, FORKLIFT	OCT	1994	2.10	2.50	19.30	14.27	28.75	.00	.00	.00	43.02	62.31
HAUL FRUIT	CUSTOM HAULING	OCT	1994	.00	.00	.00	.00	.00	17.50	.00	.00	17.50	17.50
HERBICIDE	60HP-WT, 100 GAL SPRAYER	OCT	1994	.35	.42	2.06	1.77	2.77	.00	31.17	.00	35.71	37.76
GOPHER CONTROL	HAND LABOR AND BAIT BARS	ANN	1994	.00	2.50	.00	.00	16.50	.00	15.00	1.42	32.92	32.92
MISC USE PICKUP	MANAGER'S PICKUP	ANN	1994	8.33	.00	45.44	40.88	.00	.00	.00	1.84	42.72	88.16
MISC USE PICKUP	LABOR'S PICKUP	ANN	1994	4.00	.00	12.28	22.03	.00	.00	.00	.99	23.02	35.30
MISC USE ATV	4 WHEEL ATV	ANN	1994	8.00	.00	17.71	25.01	.00	.00	.00	1.13	26.14	43.85
MISC USE SHOP	MACHINE SHED AND SHOP	ANN	1994	.00	.00	17.68	2.70	.00	.00	.00	.12	2.82	20.50
MISC USE TOOLS	SHOP TOOLS	ANN	1994	.00	.00	11.87	.20	.00	.00	.00	.01	.21	12.08
LAND COST**	6% INTEREST ON $2500/AC VALUE	ANN	1994	.00	.00	165.00	.00	.00	.00	.00	.00	.00	165.00
TAXES	LAND	ANN	1994	.00	.00	58.00	.00	.00	.00	.00	.00	.00	58.00
OVERHEAD***	UTILITIES, LEGAL, ACCTNG, ETC.	ANN	1994	.00	.00	.00	.00	.00	106.58	.00	.00	106.58	106.58
MANAGEMENT	MANAGEMENT CHARGE	ANN	1994	.00	.00	225.00	.00	.00	.00	.00	.00	.00	225.00
INTEREST	INTEREST ON ACCUM NET COST	ANN	1994	.00	.00	1493.25	.00	.00	.00	.00	.00	.00	1493.25
TOTAL PER ACRE				32.38	88.25	2152.65	200.88	644.91	324.08	315.50	42.30	1527.68	3680.33

* 1.02 ACRES OF TRELLISED AREA, 0.976 ACRES OF ACTUAL PLANTED AREA.
** 1.1 ACRES OF LAND.
*** OVERHEAD INCLUDES $1.50 PER ACRE FOR TRELLIS REPAIR.

TABLE 5.2: ITEMIZED COST PER ACRE* FOR A DOUBLE ROW V-TRELLIS HIGH DENSITY FUJI APPLE ORCHARD IN CENTRAL WASHINGTON - YEAR 2.

	UNIT	PRICE OR COST/UNIT	QUANTITY	VALUE OR COST	YOUR FARM
VARIABLE COSTS		$		$	
PART TIME LABOR	HOUR	6.60	77.85	513.81	
FULL TIME LABOR	HOUR	11.50	11.40	131.10	
FUJI TREES	TREE	5.00	15.00	75.00	
SUPERIOR OIL	GAL.	2.60	.60	1.56	
CHLORPYRIFOS	PINT	5.98	.75	4.49	
RALLY 40 W	OZ.	4.73	3.72	17.60	
BORON 20.5 WP	LB.	.75	1.88	1.41	
BAYLETON	OZ.	3.12	.95	2.96	
GRAMOXONE	QRT.	8.50	.92	7.82	
GUTHION	LB.	5.70	1.20	6.84	
PENNCAP M	PINT	2.70	1.00	2.70	
DIMETHOATE 2.67 EC	PINT	2.27	.50	1.14	
SURFLAN	GAL.	67.75	.46	31.17	
GOPHER BAIT BAR	LB.	2.50	6.00	15.00	
LIQUID UREA (46-0-0-)	LB.	.13	368.00	47.84	
RENT BEE HIVES	ACRE	25.00	1.00	25.00	
IRRIGATION WATER	ACRE	50.00	1.00	50.00	
ELECTRICITY FOR PUMP	ACRE	50.00	1.00	50.00	
REPAIR IRRIGATION SYSTEM	ACRE	30.00	1.00	30.00	
HARVEST PICKING	BIN	25.00	7.00	175.00	
HAUL FRUIT	BIN	2.50	7.00	17.50	
TRACTOR REPAIR	ACRE	17.23	1.00	17.23	
TRACTOR FUEL/LUBE	ACRE	30.49	1.00	30.49	
MACHINERY REPAIRS	ACRE	87.24	1.00	87.24	
MACHINE FUEL/LUBE	ACRE	35.93	1.00	35.93	
INTEREST ON OP. CAP.	ACRE	42.30	1.00	42.30	
OVERHEAD (7½% OF V.C.)	ACRE	106.58	1.00	106.58	
TOTAL VARIABLE COST				1527.68	
FIXED COSTS		$		$	
TRACTOR DEPRECIATION	ACRE	22.53	1.00	22.53	
TRACTOR INTEREST	ACRE	22.57	1.00	22.57	
TRACTOR INSURANCE	ACRE	1.50	1.00	1.50	
TRACTOR TAXES	ACRE	4.51	1.00	4.51	
MACHINE DEPRECIATION**	ACRE	100.28	1.00	100.28	
MACHINE INTEREST**	ACRE	47.37	1.00	47.37	
MACHINE INSURANCE**	ACRE	3.16	1.00	3.16	
MACHINE TAXES**	ACRE	9.47	1.00	9.47	
LAND COST***	ACRE	165.00	1.00	165.00	
LAND TAXES	ACRE	58.00	1.00	58.00	
MANAGEMENT	ACRE	225.00	1.00	225.00	
INT ON ACCUM NET COST	ACRE	1493.25	1.00	1493.25	
TOTAL FIXED COST				2152.65	
TOTAL COST				3680.33	

* 1.02 ACRES OF TRELLISED AREA, 0.976 ACRES OF ACTUAL PLANTED AREA.
** INCLUDES MACHINE SHED AND SHOP.
*** 6% RETURN ON VALUE OF 1.1 ACRES BARE LAND.

TABLE 4.3: SCHEDULE OF OPERATIONS AND ESTIMATED COSTS PER ACRE* FOR A DOUBLE ROW V-TRELLIS HIGH DENSITY FUJI APPLE ORCHARD IN CENTRAL WASHINGTON - YEAR 3.

							VARIABLE COST						
OPERATION	TOOLING	MONTH	YEAR	MACH HOURS	LABOR HOURS	TOTAL FIXED COST	FUEL, LUBE, & REPAIRS	LABOR	SERVICE	MATER.	INTER.	TOTAL VARIABLE COST	TOTAL COST
						$	$	$	$	$	$	$	$
PRUNE	HAND LABOR, PRUNING SHEARS	FEB	1995	.00	21.00	.86	.00	153.30	.00	.00	9.20	162.50	163.36
MOW COVER	60HP-WT, 8' ROTARY MOWER	MAR	1995	.33	.36	2.64	2.01	2.38	.00	.00	.23	4.62	7.26
DORMANT SPRAY	60HP-WT, BLAST SPRAYER	MAR	1995	.44	.53	6.31	4.61	3.50	.00	9.10	.90	18.11	24.42
MILDEW SPRAY (2X)	60HP-WT, BLAST SPRAYER	APR	1995	.88	1.10	12.62	9.22	7.26	.00	13.70	1.36	31.54	44.16
RENT BEE HIVES	TWO HIVES PER ACRE	APR	1995	.00	.00	.00	.00	.00	50.00	.00	2.25	52.25	52.25
IRRIGATION	HAND LABOR, WATER & ELECTRICITY	SEA	1995	.00	10.00	.00	30.00	66.00	.00	100.00	8.82	204.82	204.82
FERTIGATE	THROUGH IRRIGATION SYSTEM	SEA	1995	.00	1.00	.00	.00	6.60	.00	47.84	2.45	56.89	56.89
MOW COVER	60HP-WT, 8' ROTARY MOWER	MAY	1995	.33	.36	2.64	2.01	2.38	.00	.00	.16	4.55	7.19
COVER SPRAY	60HP-WT, BLAST SPRAYER	MAY	1995	.44	.53	6.31	4.61	3.50	.00	4.56	.48	13.14	19.45
TREE TRAIN	60HP-WT, TRAILER, HAND LABOR	MAY	1995	.50	17.15	2.86	2.41	125.20	.00	.00	4.79	132.39	135.25
HERBICIDE	60HP-WT, 100 GAL SPRAYER	MAY	1995	.35	.42	2.06	1.77	2.77	.00	14.00	.70	19.24	21.29
MILDEW SPRAY	60HP-WT, BLAST SPRAYER	MAY	1995	.44	.53	6.31	4.61	3.50	.00	3.90	.45	12.46	18.77
HAND THINNING	HAND LABOR	JUN	1995	.00	20.00	.00	.00	132.00	.00	.00	3.96	135.96	135.96
COVER SPRAY	60HP-WT, BLAST SPRAYER	JUN	1995	.44	.53	6.31	4.61	3.50	.00	8.61	.50	17.22	23.53
MOW COVER	60HP-WT, 8' ROTARY MOWER	JUL	1995	.33	.36	2.64	2.01	2.38	.00	.00	.10	4.49	7.13
COVER SPRAY	60HP-WT, BLAST SPRAYER	JUL	1995	.44	.53	6.31	4.61	3.50	.00	6.26	.32	14.70	20.00
TREE TRAIN	60HP-WT, TRAILER, HAND LABOR	JUL	1995	.50	17.15	2.86	2.41	125.20	.00	.00	2.87	130.47	133.34
MOW COVER	60HP-WT, 8' ROTARY MOWER	AUG	1995	.33	.36	2.64	2.01	2.38	.00	.00	.07	4.45	7.09
TREE TRAIN	60HP-WT, TRAILER, HAND LABOR	AUG	1995	.50	17.15	2.86	2.41	125.20	.00	.00	1.91	129.52	132.38
HERBICIDE	60HP-WT, 100 GAL SPRAYER	AUG	1995	.35	.42	2.06	1.77	2.77	.00	14.00	.28	18.82	20.88
MOW COVER	60HP-WT, 8' ROTARY MOWER	OCT	1995	.33	.36	2.64	2.01	2.38	.00	.00	.00	4.39	7.03
HARVEST (20 BINS)	PICKERS, LADDERS, PICKING BAGS	OCT	1995	.00	.00	10.46	.63	.00	500.00	.00	.00	500.62	511.08
HARVEST	SUPERVISION	OCT	1995	.00	2.85	.00	.00	32.77	.00	.00	.00	32.77	32.77
HARVEST	CHECKER	OCT	1995	.00	2.85	.00	.00	18.81	.00	.00	.00	18.81	18.81
HARVEST	60HP-WT, BACKFORK	OCT	1995	4.00	4.40	17.56	16.37	29.04	.00	.00	.00	45.41	62.98
BIN HANDLING	60HP-WT, BIN TRAILER	OCT	1995	2.00	2.20	11.45	9.63	14.52	.00	.00	.00	24.15	35.61
LOADING FRUIT	60HP-WT, FORKLIFT	OCT	1995	.80	.88	7.35	5.43	10.12	.00	.00	.00	15.55	22.91
HAUL FRUIT	CUSTOM HAULING	OCT	1995	.00	.00	.00	.00	.00	50.00	.00	.00	50.00	50.00
HERBICIDE	60HP-WT, 100 GAL SPRAYER	OCT	1995	.35	.42	2.06	1.77	2.77	.00	31.17	.00	35.71	37.76
GOPHER CONTROL	HAND LABOR AND BAIT BARS	ANN	1995	.00	2.50	.00	.00	16.50	.00	15.00	1.42	32.92	32.92
MISC USE PICKUP	MANAGER'S PICKUP	ANN	1995	8.33	.00	45.44	40.88	.00	.00	.00	1.84	42.72	88.16
MISC USE PICKUP	LABOR'S PICKUP	ANN	1995	4.00	.00	12.28	22.03	.00	.00	.00	.99	23.02	35.30
MISC USE ATV	4 WHEEL ATV	ANN	1995	8.00	.00	17.71	25.01	.00	.00	.00	1.13	26.14	43.85
MISC USE SHOP	MACHINE SHED AND SHOP	ANN	1995	.00	.00	17.68	2.70	.00	.00	.00	.12	2.82	20.50
MISC USE TOOLS	SHOP TOOLS	ANN	1995	.00	.00	11.87	.20	.00	.00	.00	.01	.21	12.08
LAND COST**	6% INTEREST ON $2500/AC VALUE	ANN	1995	.00	.00	165.00	.00	.00	.00	.00	.00	.00	165.00
TAXES	LAND	ANN	1995	.00	.00	58.00	.00	.00	.00	.00	.00	.00	58.00
OVERHEAD***	UTILITIES, LEGAL, ACCTNG, ETC.	ANN	1995	.00	.00	.00	.00	.00	151.75	.00	.00	151.75	151.75
MANAGEMENT	MANAGEMENT CHARGE	ANN	1995	.00	.00	225.00	.00	.00	.00	.00	.00	.00	225.00
INTEREST	INTEREST ON ACCUM NET COST	ANN	1995	.00	.00	1619.73	.00	.00	.00	.00	.00	.00	1619.73
TOTAL PER ACRE				34.41	125.94	2292.52	207.76	900.21	751.75	268.14	47.30	2175.16	4467.68

* 1.02 ACRES OF TRELLISED AREA, 0.976 ACRES OF ACTUAL PLANTED AREA.
** 1.1 ACRES OF LAND.
*** OVERHEAD INCLUDES $1.50 PER ACRE FOR TRELLIS REPAIR.

TABLE 5.3: ITEMIZED COST PER ACRE* FOR A DOUBLE ROW V-TRELLIS HIGH DENSITY FUJI APPLE ORCHARD IN CENTRAL WASHINGTON - YEAR 3.

	UNIT	PRICE OR COST/UNIT	QUANTITY	VALUE OR COST	YOUR FARM
VARIABLE COSTS		$		$	
PART TIME LABOR	HOUR	6.60	111.86	738.28	
FULL TIME LABOR	HOUR	11.50	14.08	161.92	
SUPERIOR OIL	GAL.	2.60	1.20	3.12	
CHLORPYRIFOS	PINT	5.98	1.00	5.98	
RALLY 40 W	OZ.	4.73	2.50	11.83	
BORON 20.5 WP	LB.	.75	2.50	1.88	
BAYLETON	OZ.	3.12	1.25	3.90	
ROUND-UP	QRT.	14.00	2.00	28.00	
GUTHION	LB.	5.70	2.40	13.68	
PENNCAP M	PINT	2.70	1.50	4.05	
DIMETHOATE 2.67 EC	PINT	2.27	.75	1.70	
SURFLAN	GAL.	67.75	.46	31.17	
GOPHER BAIT BARS	LB.	2.50	6.00	15.00	
LIQUID UREA (46-0-0)	LB.	.13	368.00	47.84	
RENT BEE HIVES	ACRE	25.00	2.00	50.00	
IRRIGATION WATER	ACRE	50.00	1.00	50.00	
ELECTRICITY FOR PUMP	ACRE	50.00	1.00	50.00	
REPAIR IRRIGATION SYSTEM	ACRE	30.00	1.00	30.00	
HARVEST PICKING	BIN	25.00	20.00	500.00	
HAUL FRUIT	BIN	2.50	20.00	50.00	
TRACTOR REPAIR	ACRE	20.13	1.00	20.13	
TRACTOR FUEL/LUBE	ACRE	35.62	1.00	35.62	
MACHINERY REPAIRS	ACRE	86.08	1.00	86.08	
MACHINE FUEL/LUBE	ACRE	35.93	1.00	35.93	
INTEREST ON OP. CAP.	ACRE	47.30	1.00	47.30	
OVERHEAD (7½% OF V.C.)	ACRE	151.75	1.00	151.75	
TOTAL VARIABLE COST				2175.16	
FIXED COSTS		$		$	
TRACTOR DEPRECIATION	ACRE	26.33	1.00	26.33	
TRACTOR INTEREST	ACRE	26.37	1.00	26.37	
TRACTOR INSURANCE	ACRE	1.76	1.00	1.76	
TRACTOR TAXES	ACRE	5.27	1.00	5.27	
MACHINE DEPRECIATION**	ACRE	104.24	1.00	104.24	
MACHINE INTEREST**	ACRE	48.02	1.00	48.02	
MACHINE INSURANCE**	ACRE	3.20	1.00	3.20	
MACHINE TAXES**	ACRE	9.60	1.00	9.60	
LAND COST***	ACRE	165.00	1.00	165.00	
LAND TAXES	ACRE	58.00	1.00	58.00	
MANAGEMENT	ACRE	225.00	1.00	225.00	
INT ON ACCUM NET COST	ACRE	1619.73	1.00	1619.73	
TOTAL FIXED COST				2292.52	
TOTAL COST				4467.68	

* 1.02 ACRES OF TRELLISED AREA, 0.976 ACRES OF ACTUAL PLANTED AREA.
** INCLUDES MACHINE SHED AND SHOP.
*** 6% RETURN ON VALUE OF 1.1 ACRES BARE LAND.

TABLE 4.4: SCHEDULE OF OPERATIONS AND ESTIMATED COSTS PER ACRE* FOR A DOUBLE ROW V-TRELLIS HIGH DENSITY FUJI APPLE ORCHARD IN CENTRAL WASHINGTON - YEAR 4.

							VARIABLE COST						
OPERATION	TOOLING	MONTH	YEAR	MACH HOURS	LABOR HOURS	TOTAL FIXED COST	FUEL, LUBE, & REPAIRS	LABOR	SERVICE	MATER.	INTER.	TOTAL VARIABLE COST	TOTAL COST
						$	$	$	$	$	$	$	$
PRUNE	HAND LABOR, PRUNING SHEARS	FEB	1996	.00	35.00	1.44	.00	255.50	.00	.00	15.33	270.83	272.27
MOW COVER	60HP-WT, 8' ROTARY MOWER	MAR	1996	.33	.36	2.64	2.01	2.38	.00	.00	.23	4.62	7.26
DORMANT SPRAY	60HP-WT, BLAST SPRAYER	MAR	1996	.44	.53	6.31	4.61	3.50	.00	14.82	1.20	24.13	30.44
MILDEW SPRAY(2X)	60HP-WT, BLAST SPRAYER	APR	1996	.88	1.10	12.62	9.22	7.26	.00	20.47	1.66	38.61	51.23
RENT BEE HIVES	TWO HIVES PER ACRE	APR	1996	.00	.00	.00	.00	.00	50.00	.00	2.25	52.25	52.25
IRRIGATION	HAND LABOR, WATER & ELECTRICITY	SEA	1996	.00	10.00	.00	30.00	66.00	.00	100.00	8.82	204.82	204.82
FERTIGATE	THROUGH IRRIGATION SYSTEM	SEA	1996	.00	1.00	.00	.00	6.60	.00	40.56	2.12	49.28	49.28
MOW COVER	60HP-WT, 8' ROTARY MOWER	MAY	1996	.33	.36	2.64	2.01	2.38	.00	.00	.16	4.55	7.19
COVER SPRAY	60HP-WT, BLAST SPRAYER	MAY	1996	.44	.53	6.31	4.61	3.50	.00	8.55	.62	17.28	23.59
TREE TRAIN	60HP-WT, TRAILER, HAND LABOR	MAY	1996	.50	8.05	2.86	2.41	58.77	.00	.00	2.29	63.47	66.33
HERBICIDE	60HP-WT, 100 GAL SPRAYER	MAY	1996	.35	.42	2.06	1.77	2.77	.00	14.00	.70	19.24	21.29
MILDEW SPRAY	60HP-WT, BLAST SPRAYER	MAY	1996	.44	.53	6.31	4.61	3.50	.00	5.87	.52	14.50	20.81
CHEMICAL THIN	60HP-WT, BLAST SPRAYER	MAY	1996	.44	.53	6.31	4.61	3.50	.00	65.70	2.77	76.58	82.89
HAND THINNING	HAND LABOR	JUN	1996	.00	33.33	.00	.00	220.00	.00	.00	6.60	226.60	226.60
COVER SPRAY	60HP-WT, BLAST SPRAYER	JUN	1996	.44	.53	6.31	4.61	3.50	.00	12.60	.62	21.33	27.64
MOW COVER	60HP-WT, 8' ROTARY MOWER	JUL	1996	.33	.36	2.64	2.01	2.38	.00	.00	.10	4.49	7.13
COVER SPRAY	60HP-WT, BLAST SPRAYER	JUL	1996	.44	.53	6.31	4.61	3.50	.00	10.25	.41	18.77	25.08
TREE TRAIN	60HP-WT, TRAILER, HAND LABOR	JUL	1996	.50	8.05	2.86	2.41	58.77	.00	.00	1.38	62.55	65.41
MOW COVER	60HP-WT, 8' ROTARY MOWER	AUG	1996	.33	.36	2.64	2.01	2.38	.00	.00	.07	4.45	7.09
TREE TRAIN	60HP-WT, TRAILER, HAND LABOR	AUG	1996	.50	8.05	2.86	2.41	58.77	.00	.00	.92	62.09	64.95
HERBICIDE	60HP-WT, 100 GAL SPRAYER	AUG	1996	.35	.42	2.06	1.77	2.77	.00	14.00	.28	18.82	20.88
MOW COVER	60HP-WT, 8' ROTARY MOWER	OCT	1996	.33	.36	2.64	2.01	2.38	.00	.00	.00	4.39	7.03
HARVEST (40 BINS)	PICKERS, LADDERS, PICKING BAGS	OCT	1996	.00	.00	20.91	1.25	.00	1000.00	.00	.00	1001.25	1022.16
HARVEST	SUPERVISION	OCT	1996	.00	5.71	.00	.00	65.67	.00	.00	.00	65.67	65.67
HARVEST	CHECKER	OCT	1996	.00	5.71	.00	.00	37.69	.00	.00	.00	37.69	37.69
HARVEST	60HP-WT, BACKFORK	OCT	1996	8.00	8.80	35.12	32.75	58.08	.00	.00	.00	90.83	125.95
BIN HANDLING	60HP-WT, BIN TRAILER	OCT	1996	4.00	4.40	22.90	19.27	29.04	.00	.00	.00	48.31	71.21
LOADING FRUIT	60HP-WT, FORKLIFT	OCT	1996	1.60	1.76	14.70	10.87	20.24	.00	.00	.00	31.11	45.81
HAUL FRUIT	CUSTOM HAULING	OCT	1996	.00	.00	.00	.00	.00	100.00	.00	.00	100.00	100.00
HERBICIDE	60HP-WT, 100 GAL SPRAYER	OCT	1996	.35	.42	2.06	1.77	2.77	.00	31.17	.00	35.71	37.76
GOPHER CONTROL	HAND LABOR AND BAIT BARS	ANN	1996	.00	2.50	.00	.00	16.50	.00	15.00	1.42	32.92	32.92
MISC USE PICKUP	MANAGER'S PICKUP	ANN	1996	8.33	.00	45.44	40.88	.00	.00	.00	1.84	42.72	88.16
MISC USE PICKUP	LABOR'S PICKUP	ANN	1996	4.00	.00	12.28	22.03	.00	.00	.00	.99	23.02	35.30
MISC USE ATV	4 WHEEL ATV	ANN	1996	8.00	.00	17.71	25.01	.00	.00	.00	1.13	26.14	43.85
MISC USE SHOP	MACHINE SHED AND SHOP	ANN	1996	.00	.00	17.68	2.70	.00	.00	.00	.12	2.82	20.50
MISC USE TOOLS	SHOP TOOLS	ANN	1996	.00	.00	11.87	.20	.00	.00	.00	.01	.21	12.08
LAND COST**	6% INTEREST ON $2500/AC VALUE	ANN	1996	.00	.00	165.00	.00	.00	.00	.00	.00	.00	165.00
TAXES	LAND	ANN	1996	.00	.00	58.00	.00	.00	.00	.00	.00	.00	58.00
OVERHEAD***	UTILITIES, LEGAL, ACCTNG, ETC.	ANN	1996	.00	.00	.00	.00	.00	210.15	.00	.00	210.15	210.15
MANAGEMENT	MANAGEMENT CHARGE	ANN	1996	.00	.00	225.00	.00	.00	.00	.00	.00	.00	225.00
INTEREST	INTEREST ON ACCUM NET COST	ANN	1996	.00	.00	1496.22	.00	.00	.00	.00	.00	.00	1496.22
TOTAL PER ACRE				41.65	139.70	2222.72	244.44	1000.07	1360.15	352.98	54.57	3012.21	5234.93

* 1.02 ACRES OF TRELLISED AREA, 0.976 ACRES OF ACTUAL PLANTED AREA.
** 1.1 ACRES OF LAND.
*** OVERHEAD INCLUDES $1.50 PER ACRE FOR TRELLIS REPAIR.

TABLE 5.4: ITEMIZED COST PER ACRE* FOR A DOUBLE ROW V-TRELLIS HIGH DENSITY FUJI APPLE ORCHARD IN CENTRAL WASHINGTON - YEAR 4.

	UNIT	PRICE OR COST/UNIT	QUANTITY	VALUE OR COST	YOUR FARM
VARIABLE COSTS		$		$	
PART TIME LABOR	HOUR	6.60	123.78	816.97	
FULL TIME LABOR	HOUR	11.50	15.92	183.10	
SUPERIOR OIL	GAL.	2.60	2.25	5.85	
CHLORPYRIFOS	PINT	5.98	1.50	8.97	
RALLY 40 W	OZ.	4.73	3.74	17.69	
BORON 20.5 WP	LB.	.75	3.70	2.78	
NAA (200G)	GAL.	37.00	1.70	62.90	
SEVIN	LB.	2.80	1.00	2.80	
BAYLETON	OZ.	3.12	1.88	5.87	
ROUND-UP	QRT.	14.00	2.00	28.00	
GUTHION	LB.	5.70	4.50	25.65	
PENNCAP M	PINT	2.70	1.50	4.05	
DIMETHOATE 2.67 EC	PINT	2.27	.75	1.70	
SURFLAN	GAL.	67.75	.46	31.17	
GOPHER BAIT BARS	LB.	2.50	6.00	15.00	
LIQUID UREA (46-0-0)	LB.	.13	312.00	40.56	
RENT BEE HIVES	ACRE	25.00	2.00	50.00	
IRRIGATION WATER	ACRE	50.00	1.00	50.00	
ELECTRICITY FOR PUMP	ACRE	50.00	1.00	50.00	
REPAIR IRRIGATION SYSTEM	ACRE	30.00	1.00	30.00	
HARVEST PICKING	BIN	25.00	40.00	1000.00	
HAUL FRUIT	BIN	2.50	40.00	100.00	
TRACTOR REPAIR	ACRE	30.49	1.00	30.49	
TRACTOR FUEL/LUBE	ACRE	53.94	1.00	53.94	
MACHINERY REPAIRS	ACRE	94.09	1.00	94.09	
MACHINE FUEL/LUBE	ACRE	35.93	1.00	35.93	
INTEREST ON OP. CAP.	ACRE	54.57	1.00	54.57	
OVERHEAD (7½% OF V.C.)	ACRE	210.15	1.00	210.15	
TOTAL VARIABLE COST				3012.21	
FIXED COSTS		$		$	
TRACTOR DEPRECIATION	ACRE	39.87	1.00	39.87	
TRACTOR INTEREST	ACRE	39.93	1.00	39.93	
TRACTOR INSURANCE	ACRE	2.66	1.00	2.66	
TRACTOR TAXES	ACRE	7.99	1.00	7.99	
MACHINE DEPRECIATION**	ACRE	118.93	1.00	118.93	
MACHINE INTEREST**	ACRE	54.57	1.00	54.57	
MACHINE INSURANCE**	ACRE	3.64	1.00	3.64	
MACHINE TAXES**	ACRE	10.91	1.00	10.91	
LAND COST***	ACRE	165.00	1.00	165.00	
LAND TAXES	ACRE	58.00	1.00	58.00	
MANAGEMENT	ACRE	225.00	1.00	225.00	
INT ON ACCUM NET COST	ACRE	1496.22	1.00	1496.22	
TOTAL FIXED COST				2222.72	
TOTAL COST				5234.93	

* 1.02 ACRES OF TRELLISED AREA, 0.976 ACRES OF ACTUAL PLANTED AREA.
** INCLUDES MACHINE SHED AND SHOP.
*** 6% RETURN ON VALUE OF 1.1 ACRES BARE LAND.

TABLE 4.5: SCHEDULE OF OPERATIONS AND ESTIMATED COSTS PER ACRE* FOR A DOUBLE ROW V-TRELLIS HIGH DENSITY FUJI APPLE ORCHARD IN CENTRAL WASHINGTON - YEAR 5.

							VARIABLE COST						
OPERATION	TOOLING	MONTH	YEAR	MACH HOURS	LABOR HOURS	TOTAL FIXED COST	FUEL, LUBE, & REPAIRS	LABOR	SERVICE	MATER.	INTER.	TOTAL VARIABLE COST	TOTAL COST
						$	$	$	$	$	$	$	$
PRUNE	HAND LABOR, PRUNING SHEARS	FEB	1997	.00	35.00	1.44	.00	255.50	.00	.00	15.33	270.83	272.27
MOW COVER	60HP-WT, 8' ROTARY MOWER	MAR	1997	.33	.36	2.64	2.01	2.38	.00	.00	.23	4.62	7.26
DORMANT SPRAY	60HP-WT, BLAST SPRAYER	MAR	1997	.44	.53	6.31	4.61	3.50	.00	19.76	1.46	29.33	35.64
MILDEW SPRAY(2X)	60HP-WT, BLAST SPRAYER	APR	1997	.88	1.10	12.62	9.22	7.26	.00	27.40	1.97	45.86	58.48
RENT BEE HIVES	TWO HIVES PER ACRE	APR	1997	.00	.00	.00	.00	.00	50.00	.00	2.25	52.25	52.25
IRRIGATION	HAND LABOR, WATER & ELECTRICITY	SEA	1997	.00	10.00	.00	30.00	66.00	.00	100.00	8.82	204.82	204.82
FERTIGATE	THROUGH IRRIGATION SYSTEM	SEA	1997	.00	1.00	.00	.00	6.60	.00	35.23	1.88	43.71	43.71
MOW COVER	60HP-WT, 8' ROTARY MOWER	MAY	1997	.33	.36	2.64	2.01	2.38	.00	.00	.16	4.55	7.19
COVER SPRAY	60HP-WT, BLAST SPRAYER	MAY	1997	.44	.53	6.31	4.61	3.50	.00	11.40	.73	20.24	26.55
HERBICIDE	60HP-WT, 100 GAL SPRAYER	MAY	1997	.35	.42	2.06	1.77	2.77	.00	14.00	.70	19.24	21.29
MILDEW SPRAY	60HP-WT, BLAST SPRAYER	MAY	1997	.44	.53	6.31	4.61	3.50	.00	7.80	.60	16.51	22.82
CHEMICAL THIN	60HP-WT, BLAST SPRAYER	MAY	1997	.44	.53	6.31	4.61	3.50	.00	65.70	2.77	76.58	82.89
HAND THINNING	HAND LABOR	JUN	1997	.00	37.50	.00	.00	247.50	.00	.00	7.43	254.93	254.93
COVER SPRAY	60HP-WT, BLAST SPRAYER	JUN	1997	.44	.53	6.31	4.61	3.50	.00	16.80	.75	25.66	31.97
TREE TRAIN	60HP-WT, TRAILER, HAND LABOR	JUN	1997	.50	6.02	2.86	2.41	43.95	.00	.00	1.39	47.75	50.61
MOW COVER	60HP-WT, 8' ROTARY MOWER	JUL	1997	.33	.36	2.64	2.01	2.38	.00	.00	.10	4.49	7.13
COVER SPRAY	60HP-WT, BLAST SPRAYER	JUL	1997	.44	.53	6.31	4.61	3.50	.00	13.67	.49	22.27	28.58
MOW COVER	60HP-WT, 8' ROTARY MOWER	AUG	1997	.33	.36	2.64	2.01	2.38	.00	.00	.07	4.45	7.09
HERBICIDE	60HP-WT, 100 GAL SPRAYER	AUG	1997	.35	.42	2.06	1.77	2.77	.00	14.00	.28	18.82	20.88
MOW COVER	60HP-WT, 8' ROTARY MOWER	OCT	1997	.33	.36	2.64	2.01	2.38	.00	.00	.00	4.39	7.03
HARVEST (45 BINS)	PICKERS, LADDERS, PICKING BAGS	OCT	1997	.00	.00	23.53	1.41	.00	1125.00	.00	.00	1126.41	1149.94
HARVEST	SUPERVISION	OCT	1997	.00	6.43	.00	.00	73.94	.00	.00	.00	73.94	73.94
HARVEST	CHECKER	OCT	1997	.00	6.43	.00	.00	42.44	.00	.00	.00	42.44	42.44
HARVEST	60HP-WT, BACKFORK	OCT	1997	9.00	9.90	39.51	36.84	65.34	.00	.00	.00	102.18	141.69
BIN HANDLING	60HP-WT, BIN TRAILER	OCT	1997	4.50	4.95	25.77	21.68	32.67	.00	.00	.00	54.35	80.11
LOADING FRUIT	60HP-WT, FORKLIFT	OCT	1997	1.80	1.98	16.54	12.23	22.77	.00	.00	.00	35.00	51.54
HAUL FRUIT	CUSTOM HAULING	OCT	1997	.00	.00	.00	.00	.00	112.50	.00	.00	112.50	112.50
HERBICIDE	60HP-WT, 100 GAL SPRAYER	OCT	1997	.35	.42	2.06	1.77	2.77	.00	31.17	.00	35.71	37.76
GOPHER CONTROL	HAND LABOR AND BAIT BARS	ANN	1997	.00	2.50	.00	.00	16.50	.00	15.00	1.42	32.92	32.92
MISC USE PICKUP	MANAGER'S PICKUP	ANN	1997	8.33	.00	45.44	40.88	.00	.00	.00	1.84	42.72	88.16
MISC USE PICKUP	LABOR'S PICKUP	ANN	1997	4.00	.00	12.28	22.03	.00	.00	.00	.99	23.02	35.30
MISC USE ATV	4 WHEEL ATV	ANN	1997	8.00	.00	17.71	25.01	.00	.00	.00	1.13	26.14	43.85
MISC USE SHOP	MACHINE SHED AND SHOP	ANN	1997	.00	.00	17.68	2.70	.00	.00	.00	.12	2.82	20.50
MISC USE TOOLS	SHOP TOOLS	ANN	1997	.00	.00	11.87	.20	.00	.00	.00	.01	.21	12.08
LAND COST**	6% INTEREST ON $2500/AC VALUE	ANN	1997	.00	.00	165.00	.00	.00	.00	.00	.00	.00	165.00
TAXES	LAND	ANN	1997	.00	.00	58.00	.00	.00	.00	.00	.00	.00	58.00
OVERHEAD***	UTILITIES, LEGAL, ACCTNG, ETC.	ANN	1997	.00	.00	.00	.00	.00	216.12	.00	.00	216.12	216.12
MANAGEMENT	MANAGEMENT CHARGE	ANN	1997	.00	.00	225.00	.00	.00	.00	.00	.00	.00	225.00
INTEREST	INTEREST ON ACCUM NET COST	ANN	1997	.00	.00	1020.56	.00	.00	.00	.00	.00	.00	1020.56
TOTAL PER ACRE				41.35	129.03	1753.04	247.64	921.65	1503.62	371.93	52.91	3097.75	4850.79

* 1.02 ACRES OF TRELLISED AREA, 0.976 ACRES OF ACTUAL PLANTED AREA.
** 1.1 ACRES OF LAND.
*** OVERHEAD INCLUDES $1.50 PER ACRE FOR TRELLIS REPAIR.

TABLE 5.5: ITEMIZED COST PER ACRE* FOR A DOUBLE ROW V-TRELLIS HIGH DENSITY FUJI APPLE ORCHARD IN CENTRAL WASHINGTON - YEAR 5.

	UNIT	PRICE OR COST/UNIT	QUANTITY	VALUE OR COST	YOUR FARM
VARIABLE COSTS		$		$	
PART TIME LABOR	HOUR	6.60	114.78	757.55	
FULL TIME LABOR	HOUR	11.50	14.27	164.10	
SUPERIOR OIL	GAL.	2.60	3.00	7.80	
CHLORPYRIFOS	PINT	5.98	2.00	11.96	
RALLY 40 W	OZ.	4.73	5.00	23.65	
BORON 20.5 WP	LB.	.75	5.00	3.75	
NAA (200G)	GAL.	37.00	1.70	62.90	
SEVIN	LB.	2.80	1.00	2.80	
BAYLETON	OZ.	3.12	2.50	7.80	
ROUND-UP	QRT.	14.00	2.00	28.00	
GUTHION	LB.	5.70	6.00	34.20	
PENNCAP M	PINT	2.70	2.00	5.40	
DIMETHOATE 2.67 EC	PINT	2.27	1.00	2.27	
SURFLAN	GAL.	67.75	.46	31.17	
GOPHER BAIT BARS	LB.	2.50	6.00	15.00	
LIQUID UREA (46-0-0)	LB.	.13	271.00	35.23	
RENT BEE HIVES	ACRE	25.00	2.00	50.00	
IRRIGATION WATER	ACRE	50.00	1.00	50.00	
ELECTRICITY FOR PUMP	ACRE	50.00	1.00	50.00	
REPAIR IRRIGATION SYSTEM	ACRE	30.00	1.00	30.00	
HARVEST PICKING	BIN	25.00	45.00	1125.00	
HAUL FRUIT	BIN	2.50	45.00	112.50	
TRACTOR REPAIR	ACRE	31.49	1.00	31.49	
TRACTOR FUEL/LUBE	ACRE	55.71	1.00	55.71	
MACHINERY REPAIRS	ACRE	94.52	1.00	94.52	
MACHINE FUEL/LUBE	ACRE	35.93	1.00	35.93	
INTEREST ON OP. CAP.	ACRE	52.91	1.00	52.91	
OVERHEAD (7½% OF V.C.)	ACRE	216.12	1.00	216.12	
TOTAL VARIABLE COST				3097.75	
FIXED COSTS		$		$	
TRACTOR DEPRECIATION	ACRE	41.18	1.00	41.18	
TRACTOR INTEREST	ACRE	41.24	1.00	41.24	
TRACTOR INSURANCE	ACRE	2.75	1.00	2.75	
TRACTOR TAXES	ACRE	8.25	1.00	8.25	
MACHINE DEPRECIATION**	ACRE	121.01	1.00	121.01	
MACHINE INTEREST**	ACRE	55.31	1.00	55.31	
MACHINE INSURANCE**	ACRE	3.69	1.00	3.69	
MACHINE TAXES**	ACRE	11.06	1.00	11.06	
LAND COST***	ACRE	165.00	1.00	165.00	
LAND TAXES	ACRE	58.00	1.00	58.00	
MANAGEMENT	ACRE	225.00	1.00	225.00	
INT ON ACCUM NET COST	ACRE	1020.56	1.00	1020.56	
TOTAL FIXED COST				1753.04	
TOTAL COST				4850.79	

* 1.02 ACRES OF TRELLISED AREA, 0.976 ACRES OF ACTUAL PLANTED AREA.
** INCLUDES MACHINE SHED AND SHOP.
*** 6% RETURN ON VALUE OF 1.1 ACRES BARE LAND.

TABLE 6: SERVICES AND MATERIALS USED BY OPERATION.

OPERATION	MONTH	YEAR	SERVICE AND/OR MATERIAL
Year 1			
Clear Land	Fall	1992	Custom hire @ $175.00/Acre
Rip Land	Fall	1992	Custom hire @ $180.00/Acre
Cleanup & Disk	Fall	1992	Custom hire @ $165.00/Acre
Soil Sample	Fall	1992	Custom hire @ $ 12.00/Acre
Fumigate	Fall	1992	Custom hire @ $565.00/Acre
Seal Fumigant	Fall	1992	Custom hire @ $ 45.00/Acre
Layout & Stake	Feb.	1993	Staking material @ $5.00/Acre
Fertilize	Feb.	1993	Rent fertilizer spreader @ $3.00/Acre 400 lbs. Mono Ammonium Phosphate (11-52-0) @ $0.125/Lb. = $50.00
Plant Trees	Mar.	1993	Rented 100 HP-WT with planter @ $120.00/day for .333 days each acre = $40.00 1422 Fuji Trees @ $5.00/tree = $7,110.00
Plant Pollenizers	Mar.	1993	47 Manchurian and 24 Snowdrift pollenizer trees @ $4.50/Tree = $319.50
Install Irrigation	Mar.	1993	Pumps and mainlines $ 550.00 System materials $ 875.00 $1,425.00/Acre
Seed Cover Crop	Mar.	1993	Rented grass seeder @ $10.00/Acre 12 lbs. of Companion seed @ $1.25/Lb. = $15.00
Mildew Spray (2X)	Apr.	1993	1.25 ounces Rally 40W at $4.73/Oz. = $ 5.91 0.625 lbs. (10 Oz.) Boron 20 WP @ $0.75/Lb. = $ 0.47 $ 6.38 x Two Passes = $12.76/Acre

TABLE 6: SERVICES AND MATERIALS USED BY OPERATION (Continued).

OPERATION	MONTH	YEAR	SERVICE AND/OR MATERIAL
Herbicide	Apr.	1993	0.46 qt. of Gramoxone @ $8.50/Qt. = $ 3.91 0.46 gal. of Surflan @ $67.75/Gal.= $31.17 $35.08/Acre
Tree Training	Sea.	1993	Tree training materials @ $24.00/Acre
Irrigation	Sea.	1993	Water charge $ 50.00 Electricity charge $ 50.00 $100.00/Acre
Fertigate	Sea.	1993	368 lbs. Liquid Urea (46-0-0) @ $0.13/Lb.= $47.84
Paint Tree Trunk	May	1993	5 gals. of paint at $6.00/Gal. = $30.00
Install Trellis	May	1993	Custom installation: $908/Acre for labor and $1,616/Acre for materials (see Appendix II)
Mildew Spray	May	1993	0.63 ounce of Bayleton @ $3.12/Oz. = $1.97
Herbicide	May	1993	0.46 quart of Gramoxone @ $8.50/Qt. = $3.91
Herbicide	June	1993	0.46 quart of Gramoxone @ $8.50/Qt. = $3.91
Herbicide	July	1993	0.46 quart of Gramoxone @ $8.50/Qt. = $3.91
Cover Spray	July	1993	0.5 pint Dimethoate 2.67 EC @ $2.27/Pt. = $1.14
Herbicide	Aug.	1993	0.46 quart of Gramoxone @ $8.50/Qt. = $3.91
Cover Spray	Aug.	1993	0.5 pint Dimethoate 2.67 EC @ $2.27/Pt. = $1.14
Gopher Control	Ann.	1993	6 lbs. Pocket Gopher Bait Bars @ $2.50/Lb. = $15.00

TABLE 6: SERVICES AND MATERIALS USED BY OPERATION (Continued).

OPERATION	MONTH	YEAR	SERVICE AND/OR MATERIAL
Overhead	Ann.	1993	7.5% of variable cost ($14,827.17) = $1,112.04
Year 2			
Dormant Spray	Mar.	1994	0.6 gal. of Superior Oil @ $2.60/Gal. = $1.56 0.75 pint Chlorpyrifos 4EC @ $5.98/Pt. = $4.49 $6.05/Acre
Replant Lost Trees	Mar.	1994	15 Fuji Trees @ $5.00/Tree = $75.00
Mildew Spray (2X)	Apr.	1994	1.86 ounces Rally 40W @ $4.73/Oz. = $ 8.80 0.9375 lb. (15 Oz.) Boron 20.5 WP @ $0.75/Lb. = $ 0.70 $ 9.50 x Two Passes = $19.00/Acre
Rent Bee Hives	Apr.	1994	One hive @ $25.00/Hive = $25.00
Irrigation	Sea.	1994	Water charge $ 50.00 Electricity charge $ 50.00 $100.00/Acre
Fertigate	Sea.	1994	368 lbs. Liquid Urea (46-0-0) @ $0.13/Lb.= $47.84
Cover Spray	May	1994	0.4 lb. Guthion 35W @ $5.70/Lb. = $2.28
Herbicide	May	1994	0.46 quart Gramoxone @ $8.50/Qt. = $3.91
Mildew Spray	May	1994	0.95 ounce Bayleton @ $3.12/Oz. = $2.96
Cover Spray	June	1994	0.4 lb. Guthion 35W @ $5.70/Lb. = $2.28 1.0 pint Penncap M @ $2.70/Pt. = $2.70 $4.98/Acre

TABLE 6: SERVICES AND MATERIALS USED BY OPERATION (Continued).

OPERATION	MONTH	YEAR	SERVICE AND/OR MATERIAL
Cover Spray	July	1994	0.4 lb. Guthion 35W @ $5.70/Lb. = $2.28 0.5 pint Dimethoate 2.67 EC @ $2.27/Pt. = $1.13 $3.41/Acre
Herbicide	Aug.	1994	0.46 quart of Gramoxone @ $8.50/Qt. = $3.91
Harvest	Oct.	1994	7 bins @ $25.00/Bin to pick piece rate = $175.00
Haul Fruit	Oct.	1994	7 bins custom hauled @ $2.50/Bin = $17.50
Herbicide	Oct.	1994	0.46 gal. Surflan @ $67.75/Gal. = $31.17
Gopher Control	Ann.	1994	6 lbs. Pocket Gopher Bait Bars @ $2.50/Lb. = $15.00
Overhead	Ann.	1994	7.5% of variable cost ($1,421.10) = $106.58
Year 3			
Dormant Spray	Mar.	1995	1.2 gal. of Superior Oil @ $2.50/Gal. = $3.12 1.0 pint Chlorpyrifos 4EC @ $5.98/Pt. = $5.98 $9.10
Mildew Spray (2X)	Apr.	1995	1.25 ounces Rally 40W @ $4.73/Oz. = $ 5.91 1.25 lbs. Boron 20.5 WP @ $0.75/lb. = $ 0.94 $ 6.85 x Two Passes = $13.70/Acre
Rent Bee Hives	Apr.	1995	2 Hives @ $25.00/Hive = $50.00
Irrigation	Sea.	1995	Water charge $ 50.00 Electricity charge $ 50.00 $100.00/Acre

TABLE 6: SERVICES AND MATERIALS USED BY OPERATION (Continued).

OPERATION	MONTH	YEAR	SERVICE AND/OR MATERIAL
Fertigate	Sea.	1995	368 lbs. Liquid Urea (46-0-0) @ $0.13/Lb. = $47.84
Cover Spray	May	1995	0.8 lb. Guthion 35W @ $5.70/Lb. = $4.56
Herbicide	May	1995	1.0 quart Roundup @ $14.00/Qt. = $14.00
Mildew Spray	May	1995	1.25 ounces Bayleton @ $3.12/Oz. = $3.90
Cover Spray	June	1995	0.8 lb. Guthion 35W @ $5.70/Lb. = $4.56 1.5 pints Penncap M @ $2.70/Pt. = $4.05 $8.61/Acre
Cover Spray	July	1995	0.8 lb. Guthion 35W @ $5.70/Lb. = $4.56 0.75 pint Dimethoate 2.67 EC @ 2.27/Pt. = $1.70 $6.26/Acre
Herbicide	Aug.	1995	1.0 quart Roundup @ $14.00/Qt. = $14.00
Harvest	Oct.	1995	20 bins @ $25.00/Bin to pick piece rate = $500.00
Haul Fruit	Oct.	1995	20 bins custom hauled @ $2.50/Bin = $50.00
Herbicide	Oct.	1995	0.46 gal. Surflan @ $67.75/Gal. = $31.17
Gopher Control	Ann.	1995	6 lbs. Pocket Gopher Bait Bars @ $2.50/Lb. = $15.00
Overhead	Ann.	1995	7.5% of variable cost ($2,023.41) = $151.75

TABLE 6: SERVICES AND MATERIALS USED BY OPERATION (Continued).

OPERATION	MONTH	YEAR	SERVICE AND/OR MATERIAL
Year 4			
Dormant Spray	Mar.	1996	2.25 gals. of Superior Oil @ $2.60/Gal. = $ 5.85 1.50 pints Chlorpyrifos 4EC @ $5.98/Pint = $ 8.97 $14.82/Acre
Mildew Spray (2X)	Apr.	1996	1.87 ounces Rally 40W @ $4.73/Oz. = $ 8.84 1.85 lbs. Boron 20.5 WP @ $0.75/Lb. = $ 1.39 $10.23 x Two Passes = $20.47/Acre
Rent Bee Hives	Apr.	1996	2 hives @ $25.00/Hive = $50.00
Irrigation	Sea.	1996	Water charge $ 50.00 Electricity charge $ 50.00 $100.00/Acre
Fertigate	Sea.	1996	312 lbs. Liquid Urea (46-0-0) @ $0.13/Lb. = $40.56
Cover Spray	May	1996	1.5 lbs. Guthion 35W @ $5.70/Lb. = $8.55
Herbicide	May	1996	1.0 quart Roundup @ $14.00/Qt. = $14.00
Mildew Spray	May	1996	1.88 ounces Bayleton @ $3.12/Oz. = $5.87
Chemical Thin	May	1996	1.7 gal. NAA (200G) @ $37.00/Gal. = $62.90 1.0 lb. Sevin @ $2.80/Lb. = $ 2.80 $65.70/Acre
Cover Spray	June	1996	1.5 lbs. Guthion 35W @ $5.70/Lb. = $ 8.55 1.5 pints Penncap M @ $2.70/Pt. = $ 4.05/Pt. $12.60/Acre

TABLE 6: SERVICES AND MATERIALS USED BY OPERATION (Continued).

OPERATION	MONTH	YEAR	SERVICE AND/OR MATERIAL
Cover Spray	July	1996	1.5 lbs. Guthion 35W @ $5.70/Lb. = $ 8.55 0.75 pint Dimethoate 2.67 EC @ $2.27/Pt. = $ 1.70 $10.25/Acre
Herbicide	Aug.	1996	1.0 quart Roundup @ $14.00/Qt. = $14.00
Harvest	Oct.	1996	40 bins @ $25.00/Bin to pick piece rate = $1,000.00
Haul Fruit	Oct.	1996	40 bins custom hauled @ $2.50/Bin = $100.00
Herbicide	Oct.	1996	0.46 gal. Surflan @ $67.75/Gal. = $31.17
Gopher Control	Ann.	1996	6 lbs. Pocket Gopher Bait Bars @ $2.50/Lb. = $15.00
Overhead	Ann.	1996	7.5% of variable cost ($2,802.06) = $210.15
Year 5			
Dormant Spray	Mar.	1997	3.0 gal. of Superior Oil @ $2.60/Gal. = $7.80 2.0 pints Chlorpyrifos 4EC @ $5.98/Pt. = $11.96 $19.76/Acre
Mildew Spray (2X)	Apr.	1997	2.50 ounces Rally 40W @ $4.73/Oz. = $11.83 2.50 lbs. Boron 20.5 WP @ $0.75/Lb. = $ 1.87 $13.70 x Two Passes = $27.40/Acre
Rent Bee Hives	Apr.	1997	2 hives @ $25.00/Hive = $50.00
Irrigation	Sea.	1997	Water charge $ 50.00 Electricity charge $ 50.00 $100.00/Acre
Fertigate	Sea.	1997	271 lbs. Liquid Urea (46-0-0) @ $0.13/Lb. = $35.23

TABLE 6: SERVICES AND MATERIALS USED BY OPERATION (Continued).

OPERATION	MONTH	YEAR	MATERIAL AND/OR SERVICE
Cover spray	May	1997	2.0 lbs. Guthion 35W @ $5.70/Lb. = $11.40
Herbicide	May	1997	1.0 quart Roundup @ $14.00/Qt. = $14.00
Mildew Spray	May	1997	2.50 ounces Bayleton @ $3.12/Oz. = $7.80
Chemical Thin	May	1997	1.7 gal. NAA (200G) @ $37.00/Gal. = $62.90 1.0 lb. Sevin @ $2.80/Lb. = $ 2.80 $65.70/Acre
Cover Spray	June	1997	2.0 lbs. Guthion 35W @ $5.70/lb. = $11.40 2.0 pints Penncap M @ $2.70/Pt. = $ 5.40 $16.80/Acre
Cover Spray	July	1997	2.0 lbs. Guthion 35W @ $5.70/Lb. = $11.40 1.0 pint Dimethoate 2.67 EC @ $2.27/Pt. = $ 2.27 $13.67/Acre
Herbicide	Aug.	1997	1.0 quart Roundup @ $14.00/Qt. = $14.00
Harvest	Oct.	1997	45 bins @ $25.00/Bin to pick piece rate = $1,125.00
Haul Fruit	Oct.	1997	45 bins custom hauled @ $2.50/Bin = $112.50
Herbicide	Oct.	1997	0.46 gal. Surflan @ $67.75/Gal. = $31.17
Gopher Control	Ann.	1997	6 lbs. Pocket Gopher Bait Bars @ $2.50/Lb. = $15.00
Overhead	Ann.	1997	7.5% of variable cost ($2,881.63) = $216.12

Table 7: Machinery and Building Complement.

Description	Replacement Value	Years of Life	Salvage Value	Annual Hours of Use	Annual Repair	Fuel Type	Gal. Per Hour
	$		$		$		
60 HP-Wheel Tractor	19,000	15	3,700	600	780	Diesel	2.5
Manager's Pickup	17,000	4	3,500	833	2,000	Gas	2.0
Labor Pickup	3,500	3	500	400	1,200	Gas	2.0
4-Wheel All Terrain Vehicle	3,300	4	660	400	1,000	Gas	0.5
6' Rototiller	4,000	10	800	150	332		
8' Rotary Mower	3,800	10	760	150	320		
Blast Sprayer	13,000	10	500	200	1,304		
100-Gallon Sprayer	2,200	10	440	200	220		
Trailer	3,500	10	700	350	300		
Bin Trailer	3,500	10	700	350	300		
Backfork	150	10	30	150	20		
Forklift	5,000	10	1,000	150	425		
Ladder	125	10	0	80	2.5		
Pruning Shears	8	5	0	50	0		
Picking Bags	27	5	0	50	0		
Training Tapners	21	3	0	50	0		
				Acreage Covered			
Machine Shed & Shop	20,000	40	0	100	0		
Shop Tools	8,000	10	0	100	0		
Irrigation System	1,425	20	0	1	30		

TABLE 8: PER-HOUR AND PER-ACRE MACHINERY AND BUILDING COST.

MACHINERY	PURCHASE PRICE	YEARS TO TRADE	ANNUAL HOURS	DEPREC-IATION	INTER-EST	INSUR-ANCE	TAXES	HOUSING	TOTAL FIXED COST	REPAIR	FUEL AND LUBE	TOTAL VARIABLE COST	TOTAL COST
	$			COST PER HOUR									
60 HP-WT	19,000.00	15	600	1.70	1.70	.11	.34	.00	3.86	1.30	2.30	3.60	7.46
MANAGER'S PICKUP	17,000.00	4	833	4.05	1.11	.07	.22	.00	5.45	2.40	2.51	4.91	10.36
LABOR PICKUP	3,500.00	3	400	2.50	.45	.03	.09	.00	3.07	3.00	2.51	5.51	8.58
4 WHEEL ATV	3,300.00	4	400	1.65	.45	.03	.09	.00	2.21	2.50	.63	3.13	5.34
6' ROTOTILLER	4,000.00	10	150	2.13	1.44	.10	.29	.00	3.96	2.21	.00	2.21	6.17
8' ROTARY MOWER	3,800.00	10	150	2.03	1.37	.09	.27	.00	3.76	2.13	.00	2.13	5.89
BLAST SPRAYER	13,000.00	10	200	6.25	3.04	.20	.61	.00	10.10	6.52	.00	6.52	16.62
100 GALLON SPRAYER	2,200.00	10	200	.88	.59	.04	.12	.00	1.63	1.10	.00	1.10	2.73
TRAILER	3,500.00	10	350	.80	.54	.04	.11	.00	1.48	.86	.00	.86	2.34
BIN TRAILER	3,500.00	10	350	.80	.54	.04	.11	.00	1.48	.86	.00	.86	2.34
BACKFORK	150.00	10	150	.08	.05	.00	.01	.00	.15	.13	.00	.13	.28
FORK LIFT	5,000.00	10	150	2.67	1.80	.12	.36	.00	4.95	2.83	.00	2.83	7.78
LADDER	125.00	10	80	.16	.07	.00	.01	.00	.25	.03	.00	.03	.28
PRUNING SHEARS	8.00	5	50	.03	.01	.00	.00	.00	.04	.00	.00	.00	.04
PICKING BAGS	27.00	5	50	.11	.02	.00	.00	.00	.14	.00	.00	.00	.14
TRAINING TAPNERS	21.00	3	50	.14	.02	.00	.00	.00	.16	.00	.00	.00	.16
			ACRES COVERED	COSTS PER ACRE									
MACHINE SHED & SHOP	20,000.00	40	100	4.00	10.80	.72	2.16	.00	17.68	2.70	.00	2.70	20.38
SHOP TOOLS	8,000.00	10	100	6.40	4.32	.29	.86	.00	11.87	.20	.00	.20	12.07

NOTE: COST OF IRRIGATION SYSTEM AND THE TRELLIS SYSTEM ARE PART OF THE ESTABLISHMENT COSTS.

TABLE 9: 1992 INPUT PRICES.

ITEM NAME	UNIT	PRICE
Custom Clearing	Acre	$ 175.00
Custom Ripping	Acre	180.00
Custom Clean Up and Disk	Acre	165.00
Custom Fumigate	Acre	565.00
Custom Seal Fumigant	Acre	45.00
Custom Trellis System	Acre	1,616.00
Custom Trellis Installation	Acre	908.00
Custom Piece Picking	Bin	25.00
Custom Hauling	Bin	2.50
Soil Sample	Acre	12.00
Rent 100 HP Wheel Tractor W/Planter	Day	120.00
Rent Fertilizer Drop Spreader	Acre	3.00
Rent Grass Seeder	Acre	10.00
Rent Bee Hives	Hive	25.00
Irrigation Pump and Mainlines	Acre	550.00
Irrigation System Materials	Acre	875.00
Irrigation Charge	Acre	50.00
Electricity Charge	Acre	50.00
Layout and Stake Material	Acre	5.00
Tree Training Materials	Acre	24.00
Fuji Trees	Tree	5.00
Pollenizer Trees	Tree	4.50
Companion Grass Seed	Pound	1.25
Tree Paint	Gallon	6.00
Mono Ammonium Phosphate (11-52-0)	Pound	0.125
Urea (46-0-0)	Pound	0.13
Rally 40W	Ounce	4.73
Boron 20.5 WP	Pound	0.75
Gramoxone	Quart	8.50
Surflan	Gallon	67.75
Dimethoate 2.67 EC	Pint	2.27
Superior Oil	Gallon	2.60
Chlorpyrifos 4EC	Pint	5.98
Nutraphos K	Pound	1.30
Guthion	Pound	4.85
Roundup	Quart	14.00
Bayleton	Ounce	3.90
Penncap M	Pint	2.70
NAA (200G)	Gallon	37.00
Sevin	Pound	2.80
Pocket Gopher Bait Bars	Pound	2.50

TABLE 9: 1992 INPUT PRICES (Continued).

ITEM NAME	UNIT	PRICE
Part Time Labor	Hour	6.60
Full Time Labor	Hour	11.50
Interest Rate	Dollar	0.09
Gasoline	Gallon	1.09
Diesel	Gallon	0.80

Appendix II

Itemized Cost and Description of the

Double Row V-Trellis System

Orchard and Design Specifications

Once constructed, the trellis system will comprise an area of 10.2 acres. The 45 planted rows in the system span 675 feet (45 rows x 15 feet per row) along one side of the block. Each row of the system is 660 feet long and, as represented in Figure 2, contains 13 T-bar steel pole supports oriented in a 'V' shape, which are spaced 45 feet apart down the row. Each T-bar pole is 18 feet long and buried 2 feet into the ground. At the end of each row, two 5 foot long, 18 inch wide, and 3/4 inch thick steel anchor plates are buried, attached by cable to two wooden 18 foot anchor poles. The anchor poles are also 'V' shaped, buried 2 feet into the ground, and angled at about 70 to 75 degrees from horizontal to increase trellis strength. The anchor poles are pressure treated with wood preserving chemicals. Chromated copper arsenate (CCA), dissolved with water, is forced into the wood under high pressure. The CCA treatment combines chemically with the wood, resulting in protection from the effects of humidity, rain, and ground water. The distance between the anchors and the anchor poles account for 15 feet on each end of the row. Therefore, there are 630 feet in each row available for planting between the two sets of anchor poles. There are 316 Fuji trees planted in each row, which means that there will be about 22 trees between each T-bar 'V' pole.

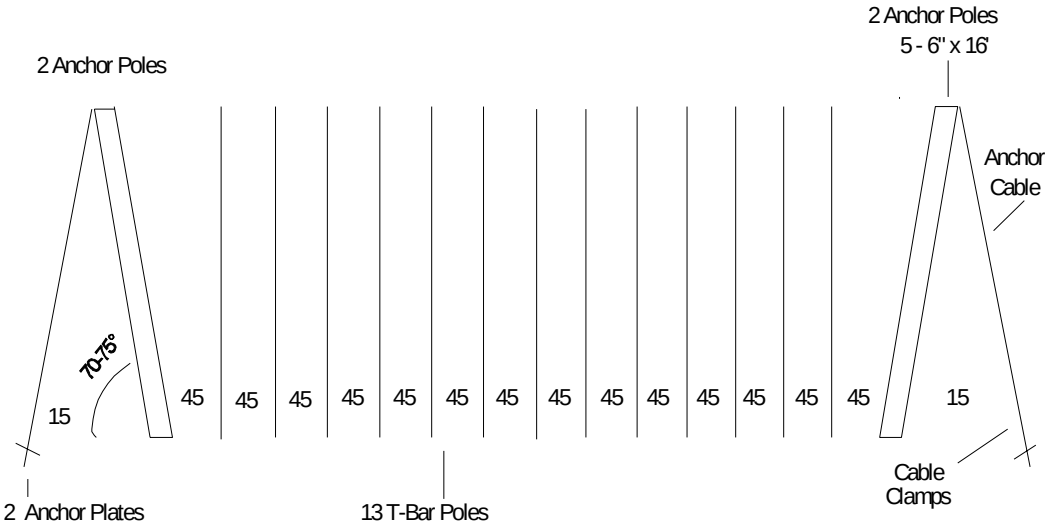

Figure 2: Double Row V-Trellis System Design, Side View

Figure 3 provides a sketch as seen from the end of a row, looking down a drive middle. It shows how each T-bar pole is buried at a 65 to 70 degree angle and welded together over the drive middles. To comprise the trellis, five 12.5 gauge (0.10-inch diameter) training wires are strung down the length of each row, attached to the interior T-bar poles. Alternate methods of attaching wire are also shown in Figure 3. The first wire is set 48 inches off the ground, with each subsequent wire set every 24 inches up the poles.

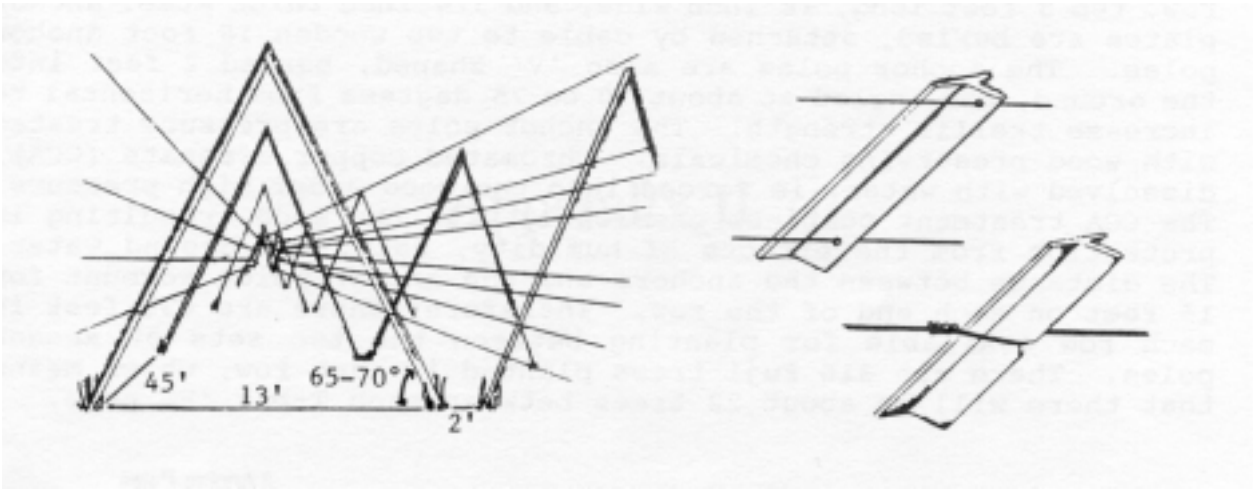

Figure 3: Double Row V-Trellis System Design, Front View

Not pictured, is the construction of the outside rows, where additional T-bar poles are needed for extra trellis support. Thirteen T-bars are welded horizontally in the 'V's of each outside row, changing each 'V' into an upside down 'A'.

Detailed Material and Labor Costs

Material Costs:

Number Required	Description	Unit	Price	Cost
186	Anchor Poles	Each	14.55	2,706.30
1,196	Interior T-Bar Poles	Each	5.80	6,936.80
0.8162	Anchor Cable 5000'	Roll	395.00	322.38
86	12.5 Gauge Wire 4200'	Roll	41.95	3,607.80
3,892	Wire Splices	Box of 100	0.15	583.76
1	3" Staples	Box of 1250	56.50	56.50
2	2" Staples	Box of 2500	36.40	72.80
180	Cable Clamps, 5/16"	Each	0.34	61.20
5,259	Wire Tie 101 Clips	Each	0.025	131.48
180	Anchors	Each	8.00	1,440.00
1	Miscellaneous (1.5% of Materials)		238.79	238.79
			Total Materials:	16,157.81

Labor Costs: (at $7.00 per hour.)

Operation	Number in Crew	Labor Hours	Labor Cost
Supply Handling	2	16.00	112.00
Load/Mark Interior Poles	2	43.82	306.76
Lay Interior Poles	3	164.33	1,150.33
Stand Interior Poles	2	131.47	920.27
Weld Interior Poles	1	52.59	368.11
Dig Post Holes	2	12.40	86.80
Lay Out Anchor Poles	2	12.40	86.80
Assemble Anchor Poles	2	24.80	173.60
Stand Anchor Poles	3	37.20	260.40
Dig Anchor Poles	2	12.00	84.00
Set Anchors	3	18.00	126.00
Cover Anchors	2	12.00	84.00
Tie Cables	2	36.00	252.00
Lay Wire	4	223.20	1,562.40
Stretch Wire and tie	2	55.80	390.60
Tie wire to posts	1	5.73	40.09
Construct corners	3	12.00	84.00
		Total Labor:	6,088.16

Other Costs:

Operation	Cost per Acre	Cost Total
Management	200.00	2,000.00
Design	5.00	50.00
Tools	9.28	92.82
Trail Cost	25.00	250.00
Equipment	60.00	600.00
	Total Other:	2,992.82
	TOTAL COST:	25,238.79
	Per Acre:	2,523.88

Other Notes

1. Retail prices are as of May 10, 1992.

2. Prices do not include sales tax.

3. Prices may or may not include freight.

4. Wooden poles are 5-6" x 18', 0.4cca or 0.6cca blunt. They should be ordered 6 months to 1 year in advance.

5. Some other materials may be used if design loads are carefully considered. An alternate plate/rod/concrete system could replace the buried anchor plates, for example.

6. Anchors and end assemblies are the most important part of the system. Don't go cheap!

7. Other specialty tools or items that will or may be needed:

Hammers	Wire Dog	Nicopress Crimper
Bolt Cutter	Come-Along	Post Injector
Backhoe	Orchard 'Ape'	Chain Saw
Post Auger	Portable Welder	Chalk Line
Orchard Trailer	Wire Winder	Spray Paint
Circular Saw	Abrasive Blades	Socket & Ratchet

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1. Buckner, Lindsey. "Apple and Pear Variety Production Trends," Proceedings - Washington State Horticultural Association 86th Annual Meeting, 1990, pp. 36-46.

2. Barritt, Bruce, et.al. Economic Analysis of a Granny Smith Apple Orchard System Trial, XB1024, College of Agriculture and Home Economics, Washington State University, Pullman.

3. Barritt, Bruce H., Intensive Orchard Management, Good Fruit Grower, Yakima, WA, 1992.