


<p>Farm Business Management Reports</p>		<p>EB1134</p>
	<p>1999 Estimated Cost of Producing Hops Under Drip Irrigation in the Yakima Valley Washington State</p>	
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### NOTE

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

- ! Capital, labor, land, and management resources
- ! Type and size of machinery complement
- ! Cultural practices
- ! Size of farm and enterprise
- ! Crop yields
- ! Input and commodity prices

Costs can also be calculated differently depending on the intended use of the cost estimate. The information in this publication serves as a general guide for a modern and well-managed Yakima Valley hop farm as of 1999. To avoid drawing unwarranted conclusions for any particular operation, closely examine the assumptions used. If they are not appropriate for your situation, adjust the costs and/or returns as appropriate.

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# 1999 ESTIMATED COST OF PRODUCING HOPS UNDER DRIP IRRIGATION IN THE YAKIMA VALLEY, WASHINGTON STATE

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## **Introduction**

In 1998, Washington State harvested 44.8 million pounds of hops on 26,573 acres accounting for 75.2% of the U.S. production. Hops ranked 13th in agricultural commodity value in the state with a value of \$87.6 million. All hop acreage in Washington State is in the Yakima Valley. However, hop acreage for harvest is expected to decline by 3,500 acres in 1999 as a result of extremely poor market conditions.<sup>2</sup>

The general objective of this study was to develop enterprise budgets for three different types of hops grown under drip irrigation at a planting of 14' x 3.5'. The three types of hops are aroma (Willamette), alpha (Galena), and super alpha. The specific objectives were to: (1) identify production practices representative of well-managed hop enterprises growing these various types of hops under drip irrigation; (2) provide estimates of capital requirements, production costs, and returns; and (3) give producers a procedure for analyzing the profitability of their hop enterprise.

Due to assumptions and sources of information used in this study, you should consider the data in this publication to be representative of what knowledgeable hop growers in the area anticipate. Many different factors may alter the costs reported in this publication when compared with a particular individual's operation. Therefore, use the blanks provided on the right-hand side of various budget tables to estimate your own costs and returns. The primary value of this report is to identify the type of practices, yields, and costs considered to be typical of well-managed hop enterprises. As such, it should be helpful in estimating the physical and financial requirements of hop plantings.

Producers reviewing these budgets most likely will state their own costs are lower than those presented. Furthermore, others outside the industry may question the cost estimates and "break-even" prices stating, "Since some WSU budgets show producers are operating at a loss, how do they stay in business?" To adequately address these concerns and questions, one must understand the difference between "economic" and "financial" budgets and how an economic budget can be used to develop a financial budget. WSU enterprise budgets are economic budgets. Most farmers and lenders concern themselves mainly with financial budgets.

The difference between "economic" and "financial" budgets and how an economic budget can be used to develop a financial budget is fully explained in Appendix II of this bulletin. It also explains why producers who have sizable equity in their farm business can often "survive" at prices below those determined as break-even prices by WSU crop enterprise budgets.

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<sup>2</sup>Sean McGree, Hop Growers of America, Inc.

## Sources of Information

A committee of area producers identified the field operations, machinery, building and irrigation complement, and the assumptions under which the budgets were developed. These producers were considered to be representative of well-managed hop farms. The quantities and types of materials (plants, fertilizers, herbicides, insecticides, etc.) used in the budget were based on widely used practices. Local farm suppliers were contacted to obtain price information on materials and other services commonly used by hop farmers. Machinery costs were based on current replacement prices and rates of annual use considered to be typical.

## Basic Assumptions

The following assumptions were made in developing the enterprise data:

1. The representative ranch is 550 acres with 480 acres in established hops and 20 acres of additional hop land being established. It takes 1.1 acres of land to establish 1 acre of hops. The extra land is needed for roads, buildings, picking equipment, etc.
2. Bare land is valued at \$3,000 per acre.
3. Hop poles and trellis systems have a 21-year life.
4. Hop plants have a 7-year life. The length of hop plant life is due primarily to variety changes.
5. A drip irrigation system costs \$1,000 per acre to install with a 21-year life. Annual repair and maintenance costs are \$50 per acre.
6. The water charge is \$50 per acre.
7. The three types of hops covered in this study have the following projected yields and price ranges:

	First-Year <u>Production</u>	Mature Year <u>Production</u>	<u>Price Range</u>
Aroma (Willamette)	862 lbs.	1,436 lbs.	\$2.00-\$2.50
Alpha (Galena)	1,142 lbs.	1,904 lbs.	\$1.20-\$1.80
Super Alpha	2,400 lbs.	3,000 lbs.	\$1.00-\$1.50

Mature production for aroma and alpha hops is the five-year (1994-98) average for the state of Washington.<sup>3</sup> First-year production for aroma and alpha hops is 60% of mature year production. For super alpha hops, a five-year average does not exist. Thus, the production estimates are those of the producer committee.

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<sup>3</sup>Sean McGree, Hop Growers of America, Inc.



8. Management is valued at \$150 per acre.
9. The prevailing interest rate is 9%.

### **Summary of Results**

Table 1.1 presents a summary of the establishment costs, the first-year and mature year production costs for aroma hops grown under drip irrigation at a planting of 14' x 3.5'. Production year costs include the establishment period costs amortized over 7- or 21-year periods, depending on the type of establishment cost, at 9% interest. These amortized establishment year costs must be recaptured during the production years if the enterprise is to be profitable. As shown in the detailed tables listed in Appendix I (discussed later), the establishment period includes constructing the trellis system, installing the irrigation system, and planting the roots. Since the trellis and irrigation system last 21 years, the cost of establishing the trellis and the irrigation system are amortized over 21 years. Hop plants have a seven-year life due primarily to variety changes. Thus, planting costs are amortized over a seven-year period. Furthermore, since production in the first-year occurs only 6 months after establishment costs are complete, interest on the amortized planting cost is charged for only 6 months as a first-year production cost.

The mature years of production include an amortization of the loss occurred in the first year of production due to a yield that is less than that during the mature years. This income loss during the first year must be recaptured during the remaining six years of mature production if the enterprise is to be profitable.

In Table 1.1, all interest costs or the part of a cost that represents interest is so noted. Interest costs represent required returns on investments. This may take the form of actual interest payments on loans to finance the investment or may represent an opportunity cost (a return not received by not investing in an alternative investment), or a combination of the two. In all cases, except land, a 9% return is assumed. In the case of the land investment, a 6% return is assumed, since land appreciation is expected to occur.

Tables 1.1, 1.2, and 1.3 present a summary of the establishment cost and the first-year and mature year production costs for aroma, alpha, and super alpha hops grown under drip irrigation at plantings of 14' x 3.5', respectively.

Tables 2.1, 2.2, and 2.3 present the prices at different average annual yield levels during the mature years necessary to cover all costs over the 7-year production period for aroma, alpha, and super alpha hops, respectively. In calculating these break-even prices, it was assumed that production during the first year was 60% of the mature years for aroma and alpha hops, and 80% of the mature years for super alpha hops.

In reviewing these summary tables, you can see the cost of producing different hop types in the mature years under drip irrigation, at a planting of 14' x 3.5', differ in variable costs mainly

because of harvesting costs related to different production levels for the different hop types. Fixed costs differ among the three hop types mainly because of amortized first-year loss differences and because of differences in management cost. At an assumed yield of 1,436 pounds per acre during the mature production years for aroma hops, the break-even price per pound for aroma hops is \$2.66 per pound. The break-even price for alpha hops, at an assumed yield of 1,904 pounds per acre, is \$2.08 per pound and that for super alpha hops with an assumed mature yield of 3,000 pounds per acre is \$1.35 per pound. Only if the break-even price is received, will the owner-operator recover all out-of-pocket expenses, plus realize the designated return to equity capital invested in land, trellis, irrigation, equipment, and operating capital, and receive the designated return to management. Failure to receive this break-even price means that the owner-operator will not realize a return on capital contributions and management equal to what could be earned in an alternative use. Realizing a price above the break-even level means that, in addition to covering all cash, management, and opportunity costs, the operator will get a return on the risk assumed in producing hops.

Table 1.1: Summary of Establishment and Production Costs Per Acre for Aroma Hops Produced Under Drip Irrigation.

	Estab. Period (6 Mos.)	Year 1 (6 Mos.)	Mature Years (12 Mos.)
	\$	\$	\$
Variable Costs:			
Land Preparation	75.90		
Trellis & Installation	1,613.00		
Irrigation System & Installation	1,000.00		
Roots	600.00		
Herbicide			45.00
Fertilizer		130.00	75.00
Twine & Clips		120.00	120.00
Custom Twining		70.00	70.00
Trellis Material		26.67	40.00
Irrigation Material		33.33	50.00
Leaf Foliar		20.00	20.00
Insecticide & Fungicide		182.16	263.23
Burlap		15.08	25.13
Kiln Fuel		34.48	57.44
Water Charge		50.00	50.00
Line Cleaner		20.00	20.00
Electricity		5.17	8.62
Crop, Picker & Trellis Insurance		45.80	53.00
Foreman		76.00	76.00
Labor	566.86	854.29	826.76
Hop Dryer & Baler		20.47	34.11
Fuel, Lube, and Repair	110.00	122.51	145.25
Overhead (Utilities, Legal, Acct., etc.)	299.90	141.40	153.05
Interest	<u>32.98</u>	<u>59.57</u>	<u>61.09</u>
Total Variable Costs	4,298.64	2,026.93	2,193.68

Table 1.1: Continued

	Estab. Period (6 Mos.)	Year 1 (6 Mos.)	Mature Years (12 Mos.)
	\$	\$	\$
Fixed Costs:			
Depr., Ins., & Taxes on Mach. & Build.	81.03	190.79	223.80
Interest on Mach. & Build.	72.45	184.40	216.85
Amortized Estab. Costs			
Planting Costs (7 years)			
- Principal (\$ 785.01 <sup>1</sup> )		85.27	116.62
- Interest		35.33 <sup>4</sup>	39.31
Irrigation Costs (21 years)			
- Principal (\$1,083.06 <sup>2</sup> )		19.07	53.20
- Interest		81.23 <sup>4</sup>	63.35
Trellis Costs (21 years)			
- Principal (\$2,584.05 <sup>3</sup> )		45.53	126.93
- Interest		193.80 <sup>4</sup>	151.16
Amortized First-Year Loss <sup>5</sup>			
- Principal			223.45
- Interest			75.42
Land Taxes		70.00	70.00
Land Costs <sup>6</sup>		198.00	198.00
Management		<u>150.00</u>	<u>150.00</u>
Total Fixed Costs	153.48	1,253.42	1,708.09
<b>TOTAL COSTS</b>	<b>4,452.12</b>	<b>3,280.35</b>	<b>3,901.77</b>

<sup>1</sup> Planting costs, plus \$54.77 of overhead cost; see Table 3 in Appendix I.

<sup>2</sup> Irrigation installation costs, plus \$75.56 of overhead cost; see Table 3 in Appendix I.

<sup>3</sup> All other establishment costs; see Table 3 in Appendix I.

<sup>4</sup> Interest charged for only 5/6 of year in the first year of production: see footnote on Table 6.1 in Appendix I.

<sup>5</sup> First-year loss of \$1,134.75 amortized over 6 years at 9% interest.

(Loss calculation: \$3,280.35 - {862 x \$2.25} = \$1,340.75)

<sup>6</sup> 6% of the value of bare land (1.1 acres).

Table 1.2: Summary of Establishment and Production Costs Per Acre for Alpha Hops Produced Under Drip Irrigation.

	Estab. Period (6 Mos.)	Year 1 (6 Mos.)	Mature Years (12 Mos.)
	\$	\$	\$
Variable Costs:			
Land Preparation	75.90		
Trellis & Installation	1,613.00		
Irrigation System & Installation	1,000.00		
Roots	600.00		
Herbicide			45.00
Fertilizer		130.00	75.00
Twine & Clips		120.00	120.00
Custom Twining		70.00	70.00
Trellis Material		26.67	40.00
Irrigation Material		33.33	50.00
Leaf Foliar		20.00	20.00
Insecticide & Fungicide		193.53	333.12
Burlap		19.98	33.32
Kiln Fuel		45.68	76.16
Water Charge		50.00	50.00
Line Cleaner		20.00	20.00
Electricity		6.85	11.42
Crop, Picker & Trellis Insurance		45.80	53.00
Foreman		76.00	76.00
Labor	566.86	854.77	832.95
Hop Dryer & Baler		27.13	45.22
Fuel, Lube, and Repair	110.00	122.69	148.16
Overhead (Utilities, Legal, Acct., etc.)	299.90	144.19	162.19
Interest	<u>32.98</u>	<u>60.10</u>	<u>63.19</u>
Total Variable Costs	4,298.64	2,066.72	2,324.73

Table 1.2: Continued

	Estab. Period (6 Mos.)	Year 1 (6 Mos.)	Mature Years (12 Mos.)
	\$	\$	\$
Fixed Costs:			
Depr., Ins., & Taxes on Mach. & Build.	81.03	191.56	226.90
Interest on Mach. & Build.	72.45	184.73	219.07
Amortized Estab. Costs			
Planting Costs (7 years)			
- Principal (\$ 785.01 <sup>1</sup> )		85.27	116.62
- Interest		35.33 <sup>4</sup>	39.31
Irrigation Costs (21 years)			
- Principal (\$1,083.06 <sup>2</sup> )		19.07	53.20
- Interest		81.23 <sup>4</sup>	63.35
Trellis Costs (21 years)			
- Principal (\$2,584.05 <sup>3</sup> )		45.53	126.93
- Interest		193.80 <sup>4</sup>	151.16
Amortized First-Year Loss <sup>5</sup>			
- Principal			268.04
- Interest			90.47
Land Taxes		70.00	70.00
Land Costs <sup>6</sup>		198.00	198.00
Management		<u>150.00</u>	<u>150.00</u>
Total Fixed Costs	153.48	1,254.52	1,773.05
<b>TOTAL COSTS</b>	<b>4,452.12</b>	<b>3,321.24</b>	<b>4,097.78</b>

<sup>1</sup> Planting costs, plus \$54.77 of overhead cost; see Table 3 in Appendix I.

<sup>2</sup> Irrigation installation costs, plus \$75.56 of overhead cost; see Table 3 in Appendix I.

<sup>3</sup> All other establishment costs; see Table 3 in Appendix I.

<sup>4</sup> Interest charged for only 5/6 of a year in the first year of production: see footnote on Table 6.2 in Appendix I.

<sup>5</sup> First-year loss of \$1,608.24 amortized over 6 years at 9% interest.

(Loss calculation: \$3,321.24 - {1,142 x \$1.50} = \$1,608.24)

<sup>6</sup> 6% of the value of bare land (1.1 acres).

Table 1.3: Summary of Establishment and Production Costs Per Acre for Super Alpha Hops Produced Under Drip Irrigation.

	Estab. Period (6 Mos.)	Year 1 (6 Mos.)	Mature Years (12 Mos.)
	\$	\$	\$
Variable Costs:			
Land Preparation	75.90		
Trellis & Installation	1,613.00		
Irrigation System & Installation	1,000.00		
Roots	600.00		
Herbicide			45.00
Fertilizer		130.00	75.00
Twine & Clips		120.00	120.00
Custom Twining		70.00	70.00
Trellis Material		26.67	40.00
Irrigation Material		33.33	50.00
Leaf Foliar		20.00	20.00
Insecticide & Fungicide		211.96	333.11
Burlap		42.00	52.50
Kiln Fuel		96.00	120.00
Water Charge		50.00	50.00
Line Cleaner		20.00	20.00
Electricity		14.40	18.00
Crop, Picker & Trellis Insurance		49.40	53.00
Foreman		76.00	76.00
Labor	566.86	913.19	885.76
Hop Dryer & Baler		57.00	71.25
Fuel, Lube, and Repair	110.00	135.42	160.79
Overhead (Utilities, Legal, Acct., etc.)	299.90	159.55	174.36
Interest	<u>32.98</u>	<u>61.89</u>	<u>64.40</u>
Total Variable Costs	4,298.64	2,286.81	2,499.17

Table 1.3 Continued

	Estab. Period (6 Mos.)	Year 1 (6 Mos.)	Mature Years (12 Mos.)
	\$	\$	\$
Fixed Costs:			
Depr., Ins., & Taxes on Mach. & Build.	81.03	225.47	260.33
Interest on Mach. & Build.	72.45	219.96	254.12
Amortized Estab. Costs			
Planting Costs (7 years)			
- Principal (\$ 785.01 <sup>1</sup> )		85.27	116.62
- Interest		35.33 <sup>4</sup>	39.31
Irrigation Costs (21 years)			
- Principal (\$1,083.06 <sup>2</sup> )		19.07	53.20
- Interest		81.23 <sup>4</sup>	63.35
Trellis Costs (21 years)			
- Principal (\$2,584.05 <sup>3</sup> )		45.53	126.93
- Interest		193.80 <sup>4</sup>	151.16
Amortized First-Year Loss <sup>5</sup>			
- Principal			101.75
- Interest			34.34
Land Taxes		70.00	70.00
Land Costs <sup>6</sup>		198.00	198.00
Management		<u>150.00</u>	<u>150.00</u>
Total Fixed Costs	153.48	1,323.66	1,619.11
<b>TOTAL COSTS</b>	<b>4,452.12</b>	<b>3,610.47</b>	<b>4,118.28</b>

<sup>1</sup> Planting costs, plus \$54.77 of overhead cost; see Table 3 in Appendix I.

<sup>2</sup> Irrigation installation costs, plus \$75.56 of overhead cost; see Table 3 in Appendix I.

<sup>3</sup> All other establishment costs; see Table 3 in Appendix I.

<sup>4</sup> Interest charged for only 5/6 of a year in the first year of production: see footnote on Table 6.3 in Appendix I.

<sup>5</sup> First-year loss of \$610.47 amortized over 6 years at 9% interest.

(Loss calculation: \$3,610.47 - {2,400 x \$1.25} = \$610.47)

<sup>6</sup> 6% of the value of bare land (1.1 acres).



Table 2.1: Prices needed to cover cost for different average annual mature yield levels for aroma hops grown under drip irrigation.<sup>1</sup>

Yield Level:	1300 lbs.	1400 lbs.	1436 lbs. <sup>2</sup>	1500 lbs.	1600 lbs.	1700 lbs.	1800 lbs
	\$	\$	\$	\$	\$	\$	\$
Break-even Price/Lb.	2.93	2.73	2.66	2.55	2.40	2.26	2.14

<sup>1</sup> Production during first-year production is 60% mature year's production level.

<sup>2</sup> Base situation.

Table 2.2: Prices needed to cover cost for different average annual mature yield levels for alpha hops grown under drip irrigation.<sup>1</sup>

Yield Level:	1700 lbs.	1800 lbs.	1904 lbs. <sup>2</sup>	2000 lbs.	2100 lbs.	2200 lbs.	2300 lbs
	\$	\$	\$	\$	\$	\$	\$
Break-even Price/Lb.	2.31	2.19	2.08	1.98	1.89	1.81	1.74

<sup>1</sup> Production during first-year production is 60% mature year's production level.

<sup>2</sup> Base situation.

Table 2.3: Prices needed to cover cost for different average annual mature yield levels for super alpha hops grown under drip irrigation.<sup>1</sup>

Yield Level:	2700 lbs.	2800 lbs.	2900 lbs.	3000 lbs. <sup>2</sup>	3100 lbs.	3200 lbs.	3300 lbs
	\$	\$	\$	\$	\$	\$	\$
Break-even Price/Lb.	1.49	1.44	1.40	1.35	1.31	1.28	1.24

<sup>1</sup> Production during first-year production is 80% mature year's production level.

<sup>2</sup> Base situation.

## Discussion of Detailed Budgets

The detailed budgets developed from this study for hops grown under drip irrigation at a planting of 14' X 3.5' are presented in Appendix I. As with the summary tables presented on the previous pages, tables in Appendix I that present the same type of information for the different types of hops are numbered similarly, differentiated only by a sub-number. For instance, Tables 6.1, 6.2, and 6.3 present the same information for each of the hop types studied.

### Schedule of Operations and Estimated Costs Per Acre

Table 3 outlines the schedule of establishment operations by month, the type of machinery used, the hours of machine and labor use per acre, and total cost for the establishment period. The establishment period is approximately 6 months, from October through March, when the trellis system and the irrigation system are installed and hop roots planted. The trellis system has an expected 21-year life, the irrigation system has an expected 21-year life, and the hop roots have an expected 7-year life.

Tables 6.1, 6.2, and 6.3 outline the schedule of field operations by month, the type of machinery used, the hours of machine use and labor use per acre, and the total cost per acre for the first year of production for aroma, alpha, and super alpha hops, respectively. Tables 9.1, 9.2, and 9.3 do the same for the years of mature production.

For each of these tables, costs are divided into two categories: fixed and variable. Fixed costs include machinery, building, land, establishment, and management.

During the establishment period (Table 3), fixed costs were limited to the machine costs required during this period. All other fixed costs were allocated to first-year production costs. Variable costs are associated with operating machinery, hiring labor, and purchasing services and materials. Total cost is the sum of fixed and variable costs.

Machinery and building fixed costs include depreciation, interest on the investment, property taxes, and insurance. These costs are incurred whether or not a crop is grown and do not vary with the size of the enterprise, given the ownership of a specific machinery and building complement. Machinery fixed costs for a specific field operation are determined by multiplying the machine hours per acre times the per-hour fixed cost. The per-hour fixed costs, shown in Table 14, are determined by dividing the total annual fixed cost by the annual hours of machinery use over all enterprises for the representative farm. Building and shop tool costs are calculated on a per-acre basis.

Land fixed cost is valued at 6% of the bare land value. Since 1.1 acres of land are required per acre of hops planted, the 6% fixed land cost is based on the estimated value of 1.1 acres of bare land which is \$3,300. A return of 6% on the value of land is deemed a fair return by most producers, since land value appreciation is not included in this figure.

As mentioned in the "Summary of Results" section beginning on page 3, establishment costs are included for each production year. These costs represent establishment year costs amortized over their respective lives at 9% interest that must be recaptured during production years. An

amortization of the net loss occurred in the first year of production is also included in years of mature production.

An opportunity cost of \$150 per acre for management is also listed in production year tables. This is representative of what the producer committee felt was a fair return to their management. Management is regarded as a fixed rather than a variable cost because one either uses management skills or loses them during the production year.

Variable costs vary with the number of acres farmed or with the enterprise. These costs include fuel, oil, repairs, fertilizer, chemicals, custom work, labor, overhead (utilities, legal and accounting fees, etc.), and interest (9%) on operating capital. Roots, trellis, and irrigation materials that are installed during the establishment period were also included as variable costs.

Four pickup trucks are included in the cost estimates: one for the manager, one for the foreman, and two for the hired labor. No labor hours are assigned to the use of these pickups. In the manager's and foreman's case, labor costs for using this pickup are part of the management and supervisory costs. For the pickups used by the hired labor, labor cost for using the pickups is included in the other labor figures, i.e., irrigation labor costs, etc.

#### Materials and Services Used by Operation

Tables 3, 6, and 9 list the "Schedule of Operations and Estimated Cost Per Acre...", for the establishment period and production years. The "Service" and "Materials" columns of these tables list dollar amounts spent on services and materials used with individual operations. Tables 4, 7, and 10 list, by operation, the specific services and/or materials used, the quantities used, and the prices paid for the establishment period and the production years analyzed in this study.

#### Itemized Costs Per Acre

Tables 5, 8, and 11 provide itemized lists of the costs detailed in Tables 3, 6, and 9, respectively. Most items are self-explanatory. "Tractor Interest" and "Machinery Interest" represent the opportunity cost (returns foregone by investing in machinery rather than in alternative investments) or interest paid to finance this equipment. Total interest cost on these capital purchases is calculated on the average value of the machinery over the respective years of use. The 9% interest charge made against this "average" value is the total interest cost.

#### Returns Per Acre Over Total Costs

Table 12 presents returns per acre over total cost for the mature production years at different prices and yields. Returns per acre over total costs represent the compensation you receive for producing hops after covering all costs of production including cash costs, depreciation, operator labor and management, and opportunity costs for investments in equipment and land. Failure to receive a positive return means you will not realize a return on your management, labor, and capital contributions equivalent to what you could earn from an alternative use. The solid line in Table 12, dividing the negative figures from the positive figures, gives an indication of break-even combinations.

## Machinery and Building Complement

Table 13 lists the type of machines used in producing hops, 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. The same information is provided for the buildings, shop tools and equipment, and the irrigation system, except the number of acres these assets support, are specified instead of annual hours of use.

## Hourly and Per-Acre Machinery and Building Cost

Table 14 presents the estimated fixed and variable costs per hour of use for the machinery listed in Table 13. Costs are calculated on a per-acre basis for buildings, shop tools, and containment tanks. The per-acre cost of the irrigation system and the trellis system are included in establishment costs that are included in the production budgets as costs being amortized over a 21-year period.

Machinery and building fixed costs include depreciation and interest on investment, property taxes, and insurance--costs that do not vary with the crop grown or the number of acres produced. Current replacement costs are used for all machinery and buildings. While this assumption may result in an overstatement of production costs, it is an indication of the enterprise's ability to generate earnings needed to replace depreciable assets. Continuing increases in prices paid for machinery and buildings mean that depreciation claimed on assets purchased before price advances understates the amount of capital currently required to replace assets. When an enterprise is evaluated to determine its long-run viability, it is important to consider its ability to replace depreciable assets. Interest on investment represents a 9% opportunity cost to the enterprise. These are earnings foregone by investing money in machinery and buildings rather than the next best alternative. This may also represent the interest paid on funds borrowed to finance machinery or building purchases.

Machinery and building variable costs include repair, fuel, and lubrication--costs that vary with the crop grown and the number of acres of crop produced.

## Input Prices

Prices used for fuel, fertilizer, chemicals, roots, custom services, and other inputs are listed in Table 15.

## **Concluding Note**

To use these budgets, you should fully comprehend the procedures and assumptions used in this study and interpret the results accordingly. The author and producers who developed this data recognize these budgets do not represent any one particular operation. They should be used as a general guide to help derive budgets for individual operations. Appendix II discusses how one can better understand and use WSU enterprise budgets. Moreover, this publication does not recommend production practices. Rather, it presents current technology used to produce hops in the Yakima Valley.

# Appendix I

Itemized Establishment

and

Production Costs

TABLE 3: SCHEDULE OF OPERATIONS AND ESTIMATED COSTS PER ACRE FOR ESTABLISHING A HOP FIELD UNDER DRIP IRRIGATION IN THE YAKIMA VALLEY OF WASHINGTON STATE, 1999.

OPERATION	TOOLING	MTH	YEAR	MACH HOURS	LABOR HOURS	TOTAL FIXED COST	VARIABLE COST					TOTAL VARIABLE COST	TOTAL COST
							FUEL, LUBE, & REPAIRS	LABOR	SERVICE	MATER.	INTER.		
						\$	\$	\$	\$	\$	\$	\$	
DISC	CUSTOM HIRE	OCT	1998	.00	.00	.00	.00	.00	13.20	.00	.59	13.79	13.79
SUBSOIL	CUSTOM HIRE	OCT	1998	.00	.00	.00	.00	.00	22.00	.00	.99	22.99	22.99
PLOW	CUSTOM HIRED	OCT	1998	.00	.00	.00	.00	.00	18.70	.00	.84	19.54	19.54
CULTPK/SPRTH(2X)	CUSTOM HIRED	OCT	1998	.00	.00	.00	.00	.00	22.00	.00	.99	22.99	22.99
MARKING	60HP-WT, T-BAR & DITCHER PARTS	OCT	1998	.44	.48	2.90	2.23	4.36	.00	.00	.30	6.88	9.78
MARKING	HAND LABOR	OCT	1998	.00	.48	.00	.00	3.78	.00	.00	.17	3.95	3.95
AUGER HOLES	60HP-WT, AUGER	MAR	1999	1.00	1.10	25.53	5.94	9.90	.00	.00	.12	15.96	41.50
SPREAD&SET POLES	TRUCK	MAR	1999	.90	1.00	1.37	2.63	9.00	.00	840.00	6.39	858.01	859.39
SPREAD&SET POLES	HAND LABOR	MAR	1999	.00	9.00	.00	.00	70.20	.00	.00	.53	70.73	70.73
SET ANCHOR PINS	CUSTOM HIRED	MAR	1999	.00	.00	.00	.00	.00	35.00	65.00	.75	100.75	100.75
SPREAD WIRE	60HP-WT, WIRE ROLLER	MAR	1999	.90	1.00	5.65	4.72	9.00	.00	672.00	5.14	690.86	696.51
SPREAD WIRE	HAND LABOR	MAR	1999	.00	1.00	.00	.00	7.80	.00	.00	.06	7.86	7.86
RAISE WIRE	TRACTOR/LOADER	MAR	1999	7.00	7.70	37.70	27.61	69.30	.00	1.00	.73	98.64	136.34
RAISE WIRE	60HP-WT, SLED	MAR	1999	7.00	7.70	43.91	35.77	69.30	.00	.00	.79	105.86	149.77
RAISE WIRE	60HP-WT, BLOCK & TACKLE	MAR	1999	7.00	7.70	36.42	31.11	69.30	.00	.00	.75	101.16	137.58
RAISE WIRE	HAND LABOR	MAR	1999	.00	15.40	.00	.00	120.12	.00	.00	.90	121.02	121.02
PLANTING	HAND LABOR	MAR	1999	.00	16.00	.00	.00	124.80	.00	600.00	5.44	730.24	730.24
INSTALL IRR. SYS	DRIP IRRIG., CUSTOM HIRED	MAR	1999	.00	.00	.00	.00	.00	.00	1000.00	7.50	1007.50	1007.50
OVERHEAD	UTILITIES, LEGAL, ACCTNG, ETC.	ANN	1999	.00	.00	.00	.00	.00	299.90	.00	.00	299.90	299.90
TOTAL PER ACRE				24.24	68.56	153.48	110.00	566.86	410.80	3178.00	32.98	4298.64	4452.12

Table 4: Materials and Services Used Per Acre by Operation for Establishing a Hop Field Under Drip Irrigation, in the Yakima Valley of Washington State, 1999.

Operation	Month	Material and/or Service
Disc	October	Custom hire 1.1 acres @ \$12.00/acre
Subsoil	October	Custom hire 1.1 acres @ \$20.00/acre
Plow	October	Custom hire 1.1 acres @ \$17.00/acre
Cultipack/ Springtooth (2X)	October	Custom hire 1.1 acres @ \$10.00/acre, each time
Spread & Set Poles	March	55 field poles @ \$12.00/pole 10 anchor poles @ \$18.00/pole
Set Anchor Pins	March	Custom hire 10 anchor holes @ \$3.50/hole Anchor pin material @ \$6.50/hole
Spread Wire	March	2,100 lbs. of wire @ \$.32/lb.
Raise Wire	March	Staples @ \$1.00/acre
Planting	March	4,000 roots @ \$.15/root
Install Irrigation System	March	Labor and materials @ \$1000/acre
Overhead	Annual	7.5% of variable cost

TABLE 5: ITEMIZED COST PER ACRE FOR ESTABLISHING A HOP FIELD UNDER DRIP IRRIGATION IN THE YAKIMA VALLEY OF WASHINGTON STATE, 1999.

	UNIT	PRICE OR COST/UNIT	QUANTITY	VALUE OR COST	YOUR FARM
-----					
VARIABLE COSTS		\$		\$	
CUSTOM DISC	ACRE	12.00	1.10	13.20	_____
CUSTOM SUBSOIL	ACRE	20.00	1.10	22.00	_____
CUSTOM PLOW	ACRE	17.00	1.10	18.70	_____
CUSTOM CULPK/SPTH	ACRE	10.00	2.20	22.00	_____
SET ANCHOR PINS	HOLE	3.50	10.00	35.00	_____
FIELD POLES	POLE	12.00	55.00	660.00	_____
ANCHOR POLES	POLE	18.00	10.00	180.00	_____
ANCHOR PIN MATERIAL	HOLE	6.50	10.00	65.00	_____
ROOTS	PLT.	.15	4000.00	600.00	_____
WIRE	LB.	.32	2100.00	672.00	_____
STAPLES	ACRE	1.00	1.00	1.00	_____
IRRIGATION SYSTEM	ACRE	1000.00	1.00	1000.00	_____
TRACTOR REPAIR	ACRE	43.18	1.00	43.18	_____
TRACTOR FUEL/LUBE	ACRE	57.04	1.00	57.04	_____
MACHINERY REPAIRS	ACRE	8.42	1.00	8.42	_____
MACHINE FUEL/LUBE	ACRE	1.37	1.00	1.37	_____
LABOR (TRAC/MACH)	HOUR	9.00	26.68	240.16	_____
HAND LABOR	HOUR	7.80	41.88	326.70	_____
OVERHEAD	ACRE	299.90	1.00	299.90	_____
INTEREST ON OP. CAP.	ACRE	32.98	1.00	32.98	_____
				-----	
TOTAL VARIABLE COST				4298.64	_____
FIXED COSTS		\$		\$	
TRACTOR DEPRECIATION	ACRE	47.12	1.00	47.12	_____
TRACTOR INTEREST	ACRE	59.68	1.00	59.68	_____
TRACTOR INSURANCE	ACRE	3.98	1.00	3.98	_____
TRACTOR TAXES	ACRE	11.94	1.00	11.94	_____
MACHINE DEPRECIATION	ACRE	14.59	1.00	14.59	_____
MACHINE INTEREST	ACRE	12.77	1.00	12.77	_____
MACHINE INSURANCE	ACRE	.85	1.00	.85	_____
MACHINE TAXES	ACRE	2.55	1.00	2.55	_____
				-----	
TOTAL FIXED COST				153.48	_____
TOTAL COST				4452.12	_____
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TABLE 6.1: SCHEDULE OF OPERATIONS AND ESTIMATED COSTS PER ACRE AROMA HOPS DURING THE FIRST YEAR OF PRODUCTION UNDER DRIP IRRIGATION IN THE YAKIMA VALLEY OF WASHINGTON STATE, 1999.

OPERATION	TOOLING	MTH	YEAR	MACH HOURS	LABOR HOURS	VARIABLE COST						TOTAL VARIABLE COST	TOTAL COST
						TOTAL FIXED COST	FUEL, LUBE, & REPAIRS	LABOR	SERVICE	MATER.	INTER.		
						\$	\$	\$	\$	\$	\$		
CULTIVATE	100HP-WT, 12' CULTIVATOR	MAR	1999	.40	.44	5.41	2.54	3.96	.00	.00	.34	6.85	12.25
FERTILIZE	CUSTOM HIRED	MAR	1999	.00	.00	.00	.00	.00	5.00	50.00	2.89	57.89	57.89
LAYOUT DRIP TUBE	60HP-WT, WIRE/TUBE ROLLER	MAR	1999	1.00	2.20	6.27	5.24	18.48	.00	.00	1.25	24.97	31.24
ADJUST DRIP TUBE	HAND LABOR	MAR	1999	.00	1.00	.00	.00	7.80	.00	.00	.41	8.21	8.21
IRRIGATE & FERT.	DRIP IRRIGATION	SEA	1999	.00	5.50	.00	.00	49.50	50.00	95.00	8.75	203.25	203.25
IRRIG. MAINTEN.	HAND LABOR	SEA	1999	.00	3.00	.00	.00	23.40	.00	33.33	2.55	59.28	59.28
INSURANCE	CROP, PICKER AND TRELLIS	SEA	1999	.00	.00	.00	.00	.00	45.80	.00	2.06	47.86	47.86
TRELLIS REPAIR	60HP-WT, SLED	APR	1999	.67	.74	4.20	3.42	6.63	.00	26.67	1.65	38.38	42.58**
TRELLIS REPAIR	TRUCK	APR	1999	.67	.74	1.02	1.96	6.63	.00	.00	.39	8.97	10.00**
TRELLIS REPAIR	HAND LABOR	APR	1999	.00	4.70	.00	.00	36.66	.00	.00	1.65	38.31	38.31**
TWINE	60HP-WT, SLED	APR	1999	1.00	.00	6.27	5.11	.00	.00	.00	.23	5.34	11.61
TWINE	TRUCK	APR	1999	1.00	.00	1.53	2.92	.00	.00	.00	.13	3.05	4.58
TWINE	CUSTOM HIRED	APR	1999	.00	.00	.00	.00	.00	70.00	120.00	8.55	198.55	198.55
RETWINE	HAND LABOR	MAY	1999	.00	1.00	.00	.00	7.80	.00	.00	.29	8.09	8.09
TRAIN & WEED	HAND LABOR	MAY	1999	.00	9.00	.00	.00	70.20	.00	.00	2.63	72.83	72.83
CULTIVATE	100HP-WT, 12' CULTIVATOR	MAY	1999	.40	.44	5.41	2.54	3.96	.00	.00	.24	6.75	12.16
TRAIN & WEED	HAND LABOR	MAY	1999	.00	9.00	.00	.00	70.20	.00	.00	2.63	72.83	72.83
SPRAY	60HP-WT, BLAST SPRAYER	MAY	1999	.50	.60	3.58	2.61	5.40	.00	18.20	.98	27.19	30.77
TRAIN & WEED	HAND LABOR	JUN	1999	.00	6.00	.00	.00	46.80	.00	.00	1.40	48.20	48.20
SPRAY	60HP-WT, BLAST SPRAYER	JUN	1999	.50	.60	3.58	2.61	5.40	.00	37.14	1.35	46.50	50.08
TRAIN & WEED	HAND LABOR	JUN	1999	.00	6.00	.00	.00	46.80	.00	.00	1.40	48.20	48.20
CULTIVATE	100HP-WT, 12' CULTIVATOR	JUN	1999	.40	.44	5.41	2.54	3.96	.00	.00	.20	6.70	12.11
SPRAY	60HP-WT, BLAST SPRAYER	JUL	1999	.50	.60	3.58	2.61	5.40	.00	73.41	1.83	83.24	86.82
MISC. FIELD WORK	HAND LABOR	SEA	1999	.00	10.00	.00	.00	78.00	.00	.00	3.51	81.51	81.51
SPRAY	60HP-WT, BLAST SPRAYER	AUG	1999	.50	.60	3.58	2.61	5.40	.00	73.41	1.22	82.63	86.21
CUT VINES	TOP CUTTER	SEP	1999	1.00	1.10	6.15	6.77	13.20	.00	.00	.15	20.12	26.27
CUT VINES	60HP-WT, BOTTOM CUTTER	SEP	1999	1.00	1.10	5.97	5.16	13.20	.00	.00	.14	18.50	24.46
CUT VINES	HAND LABOR (3)	SEP	1999	.00	3.30	.00	.00	25.74	.00	.00	.19	25.93	25.93
HAUL VINES	TRUCKS	SEP	1999	5.00	5.50	7.64	14.59	49.50	.00	.00	.48	64.57	72.21
PICK HOPS	DAUEHAUER DOUBLE RECLENER	SEP	1999	1.00	.00	238.37	21.43	.00	.00	5.17	.20	26.80	265.17
PICK HOPS	OPERATOR/MECHANIC & HELPER	SEP	1999	.00	2.40	.00	.00	36.00	.00	.00	.27	36.27	36.27
PICK HOPS	HAND LABOR (8)	SEP	1999	.00	8.80	.00	.00	68.64	.00	.00	.51	69.15	69.15
TEND KILN	HAND LABOR (2)	SEP	1999	.00	1.85	.00	.00	14.43	.00	.00	.11	14.54	14.54
DRY HOPS	HOP DRYER	SEP	1999	.00	.00	.00	.00	.00	6.46	34.48	.31	41.25	41.25
BALE HOPS	HOP BALERS	SEP	1999	.00	.00	.00	.00	.00	14.01	15.08	.22	29.31	29.31
MOVE&LOAD BALES	HYSTER LOADER	SEP	1999	.14	.15	3.07	.50	1.39	.00	.00	.01	1.90	4.97
SPR. VINE WASTE	TRACTOR/BACKHOE/LOADER	SEP	1999	.40	.44	4.09	2.23	3.96	.00	.00	.05	6.24	10.33
SPR. VINE WASTE	SREADER TRUCKS	SEP	1999	.80	.88	5.94	5.98	7.92	.00	.00	.10	14.00	19.94
PULL DRIP TUBES	HAND LABOR	OCT	1999	.00	2.00	.00	.00	15.60	.00	.00	.00	15.60	15.60
ROLLUP DRIP TUBE	60HP-WT, WIRE/TUBE ROLLER	OCT	1999	1.00	2.20	6.27	5.24	18.48	.00	.00	.00	23.72	30.00
BALE STORAGE	STORAGE SHED	ANN	1999	.00	.00	3.16	.00	.00	.00	.00	.00	.00	3.16
MISC USE	TRACTOR/LOADER	ANN	1999	.40	.44	2.15	1.58	3.96	.00	.00	.25	5.79	7.94
MISC USE	TRACTOR/BACKHOE/LOADER	ANN	1999	.80	.88	8.18	4.46	7.92	.00	.00	.56	12.94	21.12

TABLE 6.1: CONTINUED

OPERATION	TOOLING	MTH	YEAR	MACH HOURS	LABOR HOURS	VARIABLE COST						TOTAL VARIABLE COST	TOTAL COST							
						TOTAL FIXED COST	FUEL, LUBE, & REPAIRS	LABOR	SERVICE	MATER.	INTER.									
													\$	\$	\$	\$	\$	\$	\$	\$
MISC USE	SPREADER TRUCKS	ANN	1999	.40	.44	2.97	2.99	3.96	.00	.00	.31	7.26	10.23							
SKILLED LABOR	FULL TIME MECHANIC	ANN	1999	.00	5.00	.00	.00	68.00	.00	.00	3.06	71.06	71.06							
MISC USE	SERVICE TRUCK	ANN	1999	.25	.00	1.76	1.70	.00	.00	.00	.08	1.78	3.54							
SUPERVISION	FULL TIME FOREMAN	ANN	1999	.00	5.00	.00	.00	76.00	.00	.00	3.42	79.42	79.42							
MISC USE	FOREMAN'S PICKUP	ANN	1999	.60	.00	4.28	3.66	.00	.00	.00	.16	3.82	8.10							
MISC USE	MANAGER'S PICKUP	ANN	1999	1.00	.00	9.99	4.76	.00	.00	.00	.21	4.97	14.96							
MISC USE	LABOR'S PICKUP (2)	ANN	1999	1.00	.00	2.68	4.76	.00	.00	.00	.21	4.97	7.66							
MISC USE	MACHINE SHOP AND SHED	ANN	1999	.00	.00	4.52	.00	.00	.00	.00	.00	.00	4.52							
MISC USE	SHOP TOOLS	ANN	1999	.00	.00	4.95	.00	.00	.00	.00	.00	.00	4.95							
MISC USE	CONTAINMENT TANKS	ANN	1999	.00	.00	3.21	.00	.00	.00	.00	.00	.00	3.21							
OVERHEAD	UTILITIES, LEGAL, ACCTNG, ETC.	ANN	1999	.00	.00	.00	.00	.00	141.40	.00	.00	141.40	141.40							
ESTABLISHMT COST	7YR AMORT OF HOP PLANT COST	ANN	1999	.00	.00	120.60*	.00	.00	.00	.00	.00	.00	120.60							
ESTABLISHMT COST	21YR AMORT OF IRRIGATION COST	ANN	1999	.00	.00	100.30**	.00	.00	.00	.00	.00	.00	100.30							
ESTABLISHMT COST	21YR AMORT OF TRELLIS COST	ANN	1999	.00	.00	239.33**	.00	.00	.00	.00	.00	.00	239.33							
TAXES	LAND	ANN	1999	.00	.00	70.00	.00	.00	.00	.00	.00	.00	70.00							
LAND COST	6% RETURN ON BARE LAND VALUE	ANN	1999	.00	.00	198.00	.00	.00	.00	.00	.00	.00	198.00							
MANAGEMENT	\$150 PER ACRE	ANN	1999	.00	.00	150.00	.00	.00	.00	.00	.00	.00	150.00							
TOTAL PER ACRE				22.33	104.07	1253.42	122.51	930.29	332.68	581.88	59.57	2026.93	3280.35							

\*INTEREST CHARGED FOR ONLY A HALF-YEAR IN THE FIRST YEAR OF PRODUCTION.

\*\*IT IS ASSUMED THAT A TRELLIS AND IRRIGATION SYSTEM WILL PRODUCE THREE CROPS OF HOPS EACH WITH A SEVEN-YEAR LIFE. THEREFORE, TRELLIS REPAIR FOR BABY HOPS IS 2/3 OF YEARLY TRELLIS REPAIR COST, FOR IN THE FIRST YEAR OF ACTUAL USE THERE SHOULD BE NO TRELLIS REPAIR COSTS. FOR IRRIGATION MAINTENANCE, LABOR REMAINS THE SAME FOR BABY HOPS; HOWEVER, IRRIGATION MATERIAL REPAIR COST IS 2/3 OF YEARLY IRRIGATION MATERIAL REPAIR COST, FOR IN THE FIRST YEAR OF ACTUAL USE THERE SHOULD BE LITTLE OR NO MATERIALS NEEDED. FURTHERMORE, INTEREST FOR THE TRELLIS AND IRRIGATION AMORTIZED ESTABLISHMENT COSTS ARE REDUCED TO 5/6 OF THE INTEREST COST FOR OTHER YEARS, FOR IN THE FIRST YEAR OF USE FOR THE TRELLIS AND IRRIGATION SYSTEM, INTEREST SHOULD BE CHARGED FOR ONLY 1/2 YEAR.

Table 7.1: Materials and Services Used Per Acre by Operation for Producing Aroma Hops During the First Year of Production Under Drip Irrigation in the Yakima Valley of Washington State, 1999.

Operation	Month	Material and/or Service
Fertilize	March	Custom hire @ \$5.00/acre Fertilizer @ \$50.00/acre
Irrigate & Fertigate	Season	Water charge @ \$50.00/acre Fertilizer @ \$75.00/acre Line cleaner @ \$20.00/acre
Irrigation Maintenance	Season	Irrigation materials @ \$33.33/acre
Insurance	Season	Crop Insurance @ \$10.80/acre Picker Insurance @ \$20.00/acre Trellis Insurance @ \$15.00/acre
Trellis Repair	April	Trellis material @ \$26.67
Twine	April	Custom hire @ \$70.00/acre Twine & clips @ \$120.00/acre
Spray Fertilizer Powdery mildew spray	May	Leaf foliar @ \$10.00/acre 2 ounces of Rally @ \$4.10/ounce
Spray Fertilizer Aphid spray Powdery mildew spray	June	Leaf foliar @ \$10.00/acre 4 ounces of Provado @ \$3.71/ounce 3 ounces of Rally @ \$4.10/ounce
Spray Mite spray Mite spray Powdery mildew spray	July	0.75 gal. of crop oil @ \$2.25/gal. 12 ounces of Agrimek @ \$4.61/ounce 4 ounces of Rally @ \$4.10/ounce
Spray Mite spray Mite spray Powdery mildew spray	August	0.75 gal. of crop oil @ \$2.25/gal. 12 ounces of Agrimek @ \$4.61/ounce 4 ounces of Rally @ \$4.10/ounce
Pick Hops	Sept.	Electricity for 4.31 bales @ \$1.20/bale
Dry Hops	Sept.	Custom hire 4.31 bales @ \$1.50/bale Kiln fuel for 4.31 bales @ \$8.00/bale
Bale Hops	Sept.	Custom hire 4.31 bales @ \$3.25/bale Burlap for 4.31 bales @ \$3.50/bale
Overhead	Annual	7.5% of variable cost

TABLE 8.1: ITEMIZED COST PER ACRE FOR PRODUCING AROMA HOPS DURING THE FIRST YEAR OF PRODUCTION UNDER DRIP IRRIGATION IN THE YAKIMA VALLEY OF WASHINGTON STATE, 1999.

	UNIT	PRICE OR COST/UNIT	QUANTITY	VALUE OR COST	YOUR FARM
-----					
VARIABLE COSTS		\$		\$	
CUSTOM FERTILIZATION	ACRE	5.00	1.00	5.00	_____
MARCH FERTILIZER	ACRE	50.00	1.00	50.00	_____
CUSTOM TWINING	ACRE	70.00	1.00	70.00	_____
TWINE & CLIPS	ACRE	120.00	1.00	120.00	_____
TRELLIS MATERIAL	ACRE	26.67	1.00	26.67	_____
IRRIGATION MATERIAL	ACRE	33.33	1.00	33.33	_____
LEAF FOLIAR	ACRE	10.00	2.00	20.00	_____
RALLY	OZ.	4.10	13.00	53.30	_____
PROVADO	OZ.	3.71	4.00	14.84	_____
AGRIMEK	OZ.	4.61	24.00	110.64	_____
CROP OIL	GAL.	2.25	1.50	3.38	_____
WATER CHARGE	ACRE	50.00	1.00	50.00	_____
FERTIGATION MATERIAL	ACRE	75.00	1.00	75.00	_____
LINE CLEANER	ACRE	20.00	1.00	20.00	_____
ELECTRICITY	BALE	1.20	4.31	5.17	_____
BURLAP	BALE	3.50	4.31	15.08	_____
KILN FUEL	BALE	8.00	4.31	34.48	_____
CROP INSURANCE	ACRE	10.80	1.00	10.80	_____
PICKER INSURANCE	ACRE	20.00	1.00	20.00	_____
TRELLIS INSURANCE	ACRE	15.00	1.00	15.00	_____
HAND LABOR	HOUR	7.80	67.85	529.24	_____
LABOR (TRAC/MACH)	HOUR	9.00	21.63	194.65	_____
OPERATOR/MECHANIC	HOUR	18.00	1.20	21.60	_____
OPERATOR HELPER	HOUR	12.00	1.20	14.40	_____
CUTTING OPERATORS	HOUR	12.00	2.20	26.40	_____
FOREMAN	HOUR	15.20	5.00	76.00	_____
MECHANIC	HOUR	13.60	5.00	68.00	_____
HOP DRYER	BALE	1.50	4.31	6.46	_____
HOP BALERS	BALE	3.25	4.31	14.01	_____
TRACTOR REPAIR	ACRE	16.41	1.00	16.41	_____
TRACTOR FUEL/LUBE	ACRE	22.56	1.00	22.56	_____
MACHINERY REPAIRS*	ACRE	51.93	1.00	51.93	_____
MACHINE FUEL/LUBE	ACRE	31.61	1.00	31.61	_____
INTEREST ON OP. CAP.	ACRE	59.57	1.00	59.57	_____
OVERHEAD	ACRE	141.40	1.00	141.40	_____
				-----	
TOTAL VARIABLE COST				2026.93	_____
FIXED COSTS		\$		\$	
TRACTOR DEPRECIATION	ACRE	18.89	1.00	18.89	_____
TRACTOR INTEREST	ACRE	23.91	1.00	23.91	_____
TRACTOR INSURANCE	ACRE	1.59	1.00	1.59	_____
TRACTOR TAXES	ACRE	4.78	1.00	4.78	_____
MACHINE DEPRECIATION*	ACRE	122.73	1.00	122.73	_____
MACHINE INTEREST*	ACRE	160.49	1.00	160.49	_____
MACHINE INSURANCE*	ACRE	10.70	1.00	10.70	_____
MACHINE TAXES*	ACRE	32.10	1.00	32.10	_____
AMORT. PLANT COST	ACRE	120.60	1.00	120.60	_____
AMORT. TRELLIS COST	ACRE	239.33	1.00	239.33	_____
AMORT. IRRIG. COST	ACRE	100.30	1.00	100.30	_____
LAND COSTS	ACRE	198.00	1.00	198.00	_____
LAND TAXES	ACRE	70.00	1.00	70.00	_____
MANAGEMENT	ACRE	150.00	1.00	150.00	_____
				-----	
TOTAL FIXED COST				1253.42	_____
				-----	
TOTAL COST				3280.35	_____
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\*INCLUDES BUILDINGS, SHOP TOOLS, AND CONTAINMENT TANKS.

TABLE 9.1: SCHEDULE OF OPERATIONS AND ESTIMATED COSTS PER ACRE FOR PRODUCING AROMA HOPS DURING THE MATURE YEARS OF PRODUCTION UNDER DRIP IRRIGATION IN THE YAKIMA VALLEY OF WASHINGTON STATE, 1999.

OPERATION	TOOLING	MTH	YEAR	MACH HOURS	LABOR HOURS	VARIABLE COST						TOTAL VARIABLE COST	TOTAL COST
						TOTAL FIXED COST	FUEL, LUBE, & REPAIRS	LABOR	SERVICE	MATER.	INTER.		
						\$	\$	\$	\$	\$	\$		
CULTIVATE	100HP-WT, 12' CULTIVATOR	MAR	1999	.40	.44	5.41	2.54	3.96	.00	.00	.34	6.85	12.25
LAYOUT DRIP TUBE	60HP-WT, WIRE/TUBE ROLLER	MAR	1999	1.00	2.20	6.27	5.24	18.48	.00	.00	1.25	24.97	31.24
ADJUST DRIP TUBE	HAND LABOR	MAR	1999	.00	1.00	.00	.00	7.80	.00	.00	.41	8.21	8.21
IRRIGATE & FERT.	DRIP IRRIGATION	SEA	1999	.00	5.50	.00	.00	49.50	50.00	95.00	8.75	203.25	203.25
IRRIG. MAINTEN.	HAND LABOR	SEA	1999	.00	3.00	.00	.00	23.40	.00	50.00	3.30	76.70	76.70
INSURANCE	CROP, PICKER AND TRELLIS INS.	SEA	1999	.00	.00	.00	.00	.00	53.00	.00	2.39	55.39	55.39
TRELLIS REPAIR	60HP-WT, SLED	APR	1999	1.00	1.10	6.27	5.11	9.90	.00	40.00	2.48	57.49	63.76
TRELLIS REPAIR	TRUCK	APR	1999	1.00	1.10	1.53	2.92	9.90	.00	.00	.58	13.39	14.92
TRELLIS REPAIR	HAND LABOR	APR	1999	.00	7.00	.00	.00	54.60	.00	.00	2.46	57.06	57.06
PRUNE VINES	60HP-WT, MECHANICAL PRUNER	APR	1999	.50	.55	5.74	4.22	4.95	.00	.00	.41	9.58	15.33
TWINE	60HP-WT, SLED	APR	1999	1.00	.00	6.27	5.11	.00	.00	.00	.23	5.34	11.61
TWINE	TRUCK	APR	1999	1.00	.00	1.53	2.92	.00	.00	.00	.13	3.05	4.58
TWINE	CUSTOM HIRED	APR	1999	.00	.00	.00	.00	.00	70.00	120.00	8.55	198.55	198.55
RETWINE	HAND LABOR	MAY	1999	.00	1.00	.00	.00	7.80	.00	.00	.29	8.09	8.09
TRAIN	HAND LABOR	MAY	1999	.00	6.00	.00	.00	46.80	.00	.00	1.76	48.55	48.55
CULTIVATE	100HP-WT, 12' CULTIVATOR	MAY	1999	.40	.44	5.41	2.54	3.96	.00	.00	.24	6.75	12.16
TRAIN	HAND LABOR	MAY	1999	.00	5.00	.00	.00	39.00	.00	.00	1.46	40.46	40.46
SPRAY	60HP-WT, BLAST SPRAYER	MAY	1999	.50	.60	3.58	2.61	5.40	.00	26.40	1.29	35.70	39.27
PUT UP HEADS	HAND LABOR	MAY	1999	.00	4.00	.00	.00	31.20	.00	.00	1.17	32.37	32.37
APPLY HERBICIDE	60HP-WT, REAR SPRAYER	MAY	1999	.33	.37	2.45	2.15	3.30	.00	22.50	1.05	29.00	31.45
SPRAY	60HP-WT, BLAST SPRAYER	JUN	1999	.50	.60	3.58	2.61	5.40	.00	45.34	1.60	54.95	58.52
CULTIVATE	100HP-WT, 12' CULTIVATOR	JUN	1999	.40	.44	5.41	2.54	3.96	.00	.00	.20	6.70	12.11
SPRAY	60HP-WT, BLAST SPRAYER	JUN	1999	.50	.60	3.58	2.61	5.40	.00	20.50	.86	29.36	32.94
MISC. FIELD WORK	HAND LABOR	SEA	1999	.00	10.00	.00	.00	78.00	.00	.00	3.51	81.51	81.51
SPRAY	60HP-WT, BLAST SPRAYER	JUL	1999	.50	.60	3.58	2.61	5.40	.00	104.71	2.54	115.25	118.83
APPLY HERBICIDE	60HP-WT, REAR SPRAYER	JUL	1999	.33	.37	2.45	2.15	3.30	.00	22.50	.63	28.58	31.03
SPRAY	60HP-WT, BLAST SPRAYER	AUG	1999	.50	.60	3.58	2.61	5.40	.00	86.27	1.41	95.69	99.27
CUT VINES	TOP CUTTER	SEP	1999	1.18	1.30	7.26	7.99	15.60	.00	.00	.18	23.76	31.02
CUT VINES	60HP-WT, BOTTOM CUTTER	SEP	1999	1.18	1.30	7.04	6.09	15.60	.00	.00	.16	21.85	28.89
CUT VINES	EXTRA HAND LABOR (3)	SEP	1999	.00	3.90	.00	.00	30.42	.00	.00	.23	30.65	30.65
HAUL VINES	TRUCKS	SEP	1999	5.90	6.49	9.01	17.22	58.41	.00	.00	.57	76.19	85.20
PICK HOPS	DAUEHAUER DOUBLE RECLEANER	SEP	1999	1.18	.00	281.28	25.29	.00	.00	8.62	.25	34.16	315.43
PICK HOPS	OPERATOR/MECHANIC & HELPER	SEP	1999	.00	2.84	.00	.00	42.60	.00	.00	.32	42.92	42.92
PICK HOPS	HAND LABOR (8)	SEP	1999	.00	10.40	.00	.00	81.12	.00	.00	.61	81.73	81.73
TEND KILN	HAND LABOR (2)	SEP	1999	.00	3.08	.00	.00	24.02	.00	.00	.18	24.20	24.20
DRY HOPS	HOP DRYER	SEP	1999	.00	.00	.00	.00	.00	10.77	57.44	.51	68.72	68.72
BALE HOPS	HOP BALERS	SEP	1999	.00	.00	.00	.00	.00	23.34	25.13	.36	48.83	48.83
MOVE&LOAD BALES	HYSTER LOADER	SEP	1999	.24	.26	5.26	.86	2.38	.00	.00	.02	3.26	8.52
SPR. VINE WASTE	TRACTOR/BACKHOE/LOADER	SEP	1999	.40	.44	4.09	2.23	3.96	.00	.00	.05	6.24	10.33
SPR. VINE WASTE	SPREADER TRUCKS	SEP	1999	.80	.88	5.94	5.98	7.92	.00	.00	.10	14.00	19.94
PULL DRIP TUBES	HAND LABOR	OCT	1999	.00	2.00	.00	.00	15.60	.00	.00	.00	15.60	15.60

TABLE 9.1: CONTINUED

OPERATION	TOOLING	MTH	YEAR	MACH HOURS	LABOR HOURS	VARIABLE COST					TOTAL VARIABLE COST	TOTAL COST	
						TOTAL FIXED COST	FUEL, LUBE, & REPAIRS	LABOR	SERVICE	MATER. INTER.			
						\$	\$	\$	\$	\$	\$	\$	
ROLLUP DRIP TUBE	60HP-WT, WIRE/TUBE ROLLER	OCT	1999	1.00	2.20	6.27	5.24	18.48	.00	.00	.00	23.72	30.00
BALE STORAGE	STORAGE SHED	ANN	1999	.00	.00	3.16	.00	.00	.00	.00	.00	.00	3.16
MISC USE	TRACTOR/LOADER	ANN	1999	.40	.44	2.15	1.58	3.96	.00	.00	.25	5.79	7.94
MISC USE	TRACTOR/BACKHOE/LOADER	ANN	1999	.80	.88	8.18	4.46	7.92	.00	.00	.56	12.94	21.12
MISC USE	SPREADER TRUCKS	ANN	1999	.40	.44	2.97	2.99	3.96	.00	.00	.31	7.26	10.23
SKILLED LABOR	FULL TIME MECHANIC	ANN	1999	.00	5.00	.00	.00	68.00	.00	.00	3.06	71.06	71.06
MISC USE	SERVICE TRUCK	ANN	1999	.25	.00	1.76	1.70	.00	.00	.00	.08	1.78	3.54
SUPERVISION	FULL TIME FOREMAN	ANN	1999	.00	5.00	.00	.00	76.00	.00	.00	3.42	79.42	79.42
MISC USE	FOREMAN'S PICKUP	ANN	1999	.60	.00	4.28	3.66	.00	.00	.00	.16	3.82	8.10
MISC USE	MANAGER'S PICKUP	ANN	1999	1.00	.00	9.99	4.76	.00	.00	.00	.21	4.97	14.96
MISC USE	LABOR'S PICKUP (2)	ANN	1999	1.00	.00	2.68	4.76	.00	.00	.00	.21	4.97	7.66
MISC USE	MACHINE SHOP AND SHED	ANN	1999	.00	.00	4.52	.00	.00	.00	.00	.00	.00	4.52
MISC USE	SHOP TOOLS	ANN	1999	.00	.00	4.95	.00	.00	.00	.00	.00	.00	4.95
MISC USE	CONTAINMENT TANKS	ANN	1999	.00	.00	3.21	.00	.00	.00	.00	.00	.00	3.21
OVERHEAD	UTILITIES, LEGAL, ACCTNG, ETC.	ANN	1999	.00	.00	.00	.00	.00	153.05	.00	.00	153.05	153.05
ESTABLISHMT COST	6YR AMORT OF FIRST YEAR LOSS*	ANN	1999	.00	.00	298.87	.00	.00	.00	.00	.00	.00	298.87
ESTABLISHMT COST	7YR AMORT OF HOP PLANT COST	ANN	1999	.00	.00	155.93	.00	.00	.00	.00	.00	.00	155.93
ESTABLISHMT COST	21YR AMORT OF IRRIGATION COST	ANN	1999	.00	.00	116.55	.00	.00	.00	.00	.00	.00	116.55
ESTABLISHMT COST	21YR AMORT OF TRELIS COST	ANN	1999	.00	.00	278.09	.00	.00	.00	.00	.00	.00	278.09
TAXES	LAND	ANN	1999	.00	.00	70.00	.00	.00	.00	.00	.00	.00	70.00
LAND COST	6% RETURN ON BARE LAND VALUE	ANN	1999	.00	.00	198.00	.00	.00	.00	.00	.00	.00	198.00
MANAGEMENT	\$150 PER ACRE	ANN	1999	.00	.00	150.00	.00	.00	.00	.00	.00	.00	150.00
TOTAL PER ACRE				26.20	99.36	1708.09	145.25	902.76	360.16	724.42	61.09	2193.68	3901.77

\*FIRST-YEAR NET LOSS CALCULATIONS: \$3,280.35 - (862 LBS. x \$2.25) = \$1,340.75

Table 10.1: Materials and Services Used Per Acre by Operation for Producing Aroma Hops During the Mature Years of Production Under Drip Irrigation in the Yakima Valley of Washington State, 1999.

Operation	Month	Material and/or Service
Irrigate & Fertigate	Season	Water charge @ \$50.00/acre Fertilizer @ \$75.00/acre Line cleaner @ \$20.00/acre
Irrigation Maintenance	Season	Irrigation repair materials @ \$50.00/acre
Insurance	Season	Crop insurance @ \$18.00/acre Picker insurance @ \$20.00/acre Trellis insurance @ \$15.00/acre
Trellis Repair	April	Trellis materials @ \$40.00/acre
Twine	April	Custom hire @ \$70.00/acre Twine & clips @ \$120.00/acre
Spray Fertilizer Powdery mildew spray	May	Leaf foliar @ \$10.00/acre 4 ounces of Rally @ \$4.10/ounce
Apply Herbicide	May	Herbicide @ \$22.50/acre
Spray Fertilizer Aphid spray Powdery mildew spray	June	Leaf foliar @ \$10.00/acre 4 ounces of Provado @ \$3.71/ounce 5 ounces of Rally @ \$4.10/ounce
Spray Powdery mildew spray	June	5 ounces of Rally @ \$4.10/ounce
Spray Mite spray Mite spray Powdery mildew spray	July	1 gallon of crop oil @ \$2.25/gal. 16 ounces of Agrimek @ \$4.61/ounce 7 ounces of Rally @ \$4.10/ounce
Apply Herbicide	July	Herbicide @ \$22.50/acre
Spray Mite spray Mite spray Powdery mildew spray	August	1 gallon of crop oil @ \$2.25/gal. 12 ounces of Agrimek @ \$4.61/ounce 7 ounces of Rally @ \$4.10/ounce
Pick Hops	Sept.	Electricity for 7.18 bales @ \$1.20/bale
Dry Hops	Sept.	Custom hire 7.18 bales @ \$1.50/bale Kiln fuel for 7.18 bales @ \$8.00/bale
Bale Hops	Sept.	Custom hire 7.18 bales @ \$3.25/bale Burlap for 7.18 bales @ \$3.50/bale
Overhead	Annual	7.5% of variable cost

TABLE 11.1: ITEMIZED COST PER ACRE FOR PRODUCING AROMA HOPS DURING THE MATURE YEARS OF PRODUCTION UNDER DRIP IRRIGATION IN THE YAKIMA VALLEY OF WASHINGTON STATE, 1999.

		PRICE OR		VALUE OR	YOUR
	UNIT	COST/UNIT	QUANTITY	COST	FARM
-----					
VARIABLE COSTS		\$		\$	
CUSTOM TWINING	ACRE	70.00	1.00	70.00	_____
TWINE & CLIPS	ACRE	120.00	1.00	120.00	_____
TRELLIS MATERIAL	ACRE	40.00	1.00	40.00	_____
IRRIGATION MATERIAL	ACRE	50.00	1.00	50.00	_____
HERBICIDE	ACRE	22.50	2.00	45.00	_____
LEAF FOLIAR	ACRE	10.00	2.00	20.00	_____
RALLY	OZ.	4.10	28.00	114.80	_____
PROVADO	OZ.	3.71	4.00	14.84	_____
AGRIMEK	OZ.	4.61	28.00	129.08	_____
CROP OIL	GAL.	2.25	2.00	4.50	_____
WATER CHARGE	ACRE	50.00	1.00	50.00	_____
FERTIGATION MATERIAL	ACRE	75.00	1.00	75.00	_____
LINE CLEANER	ACRE	20.00	1.00	20.00	_____
ELECTRICITY	BALE	1.20	7.18	8.62	_____
BURLAP	BALE	3.50	7.18	25.13	_____
KILN FUEL	BALE	8.00	7.18	57.44	_____
CROP INSURANCE	ACRE	18.00	1.00	18.00	_____
PICKER INSURANCE	ACRE	20.00	1.00	20.00	_____
TRELLIS INSURANCE	ACRE	15.00	1.00	15.00	_____
HAND LABOR	HOUR	7.80	58.58	456.92	_____
LABOR (TRAC/MACH)	HOUR	9.00	25.34	228.04	_____
OPERATOR/MECHANIC	HOUR	18.00	1.42	25.56	_____
OPERATOR HELPER	HOUR	12.00	1.42	17.04	_____
CUTTING OPERATORS	HOUR	12.00	2.60	31.20	_____
FOREMAN	HOUR	15.20	5.00	76.00	_____
MECHANIC	HOUR	13.60	5.00	68.00	_____
HOP DRYER	BALE	1.50	7.18	10.77	_____
HOP BALERS	BALE	3.25	7.18	23.34	_____
TRACTOR REPAIR	ACRE	20.76	1.00	20.76	_____
TRACTOR FUEL/LUBE	ACRE	27.87	1.00	27.87	_____
MACHINERY REPAIRS*	ACRE	62.24	1.00	62.24	_____
MACHINE FUEL/LUBE	ACRE	34.39	1.00	34.39	_____
INTEREST ON OP. CAP.	ACRE	61.09	1.00	61.09	_____
OVERHEAD	ACRE	153.05	1.00	153.05	_____
-----					
TOTAL VARIABLE COST				2193.68	_____
-----					
FIXED COSTS		\$		\$	
TRACTOR DEPRECIATION	ACRE	23.07	1.00	23.07	_____
TRACTOR INTEREST	ACRE	29.55	1.00	29.55	_____
TRACTOR INSURANCE	ACRE	1.97	1.00	1.97	_____
TRACTOR TAXES	ACRE	5.91	1.00	5.91	_____
MACHINE DEPRECIATION*	ACRE	142.90	1.00	142.90	_____
MACHINE INTEREST*	ACRE	187.30	1.00	187.30	_____
MACHINE INSURANCE*	ACRE	12.49	1.00	12.49	_____
MACHINE TAXES*	ACRE	37.46	1.00	37.46	_____
AMORT. 1ST YEAR LOSS	ACRE	298.87	1.00	298.87	_____
AMORT. PLANT COST	ACRE	155.93	1.00	155.93	_____
AMORT. IRRIG. COST	ACRE	116.55	1.00	116.55	_____
AMORT. TRELLIS COST	ACRE	278.09	1.00	278.09	_____
LAND COSTS	ACRE	198.00	1.00	198.00	_____
LAND TAXES	ACRE	70.00	1.00	70.00	_____
MANAGEMENT	ACRE	150.00	1.00	150.00	_____
-----					
TOTAL FIXED COST				1708.09	_____
-----					
TOTAL COST				3901.77	_____
-----					

\*INCLUDES BUILDINGS, SHOP TOOLS, AND CONTAINMENT TANKS.



Table 12.1: Annual Returns Per Acre Over Total Costs at Different Price and Yield Levels for Aroma Hops Grown Under Drip Irrigation in the Yakima Valley of Washington State, 1999.<sup>1</sup>

Price Per Lb.	Yield Level						
	1,300 Lbs.	1,400 Lbs.	1,436 Lbs. <sup>2</sup>	1,500 Lbs.	1,600 Lbs.	1,700 Lbs.	1,800 Lbs.
\$	\$	\$	\$	\$	\$	\$	\$
2.00	-1371	-1156	-1078	-940	-725	-510	-194
2.10	-1223	-997	-915	-770	-543	-317	-90
2.20	-1076	-838	-752	-600	-362	-124	114
2.25 <sup>2</sup>	-1002	-759	-671	-515	-271	-28	216
2.30	-929	-679	-590	-430	-180	69	318
2.40	-781	-521	-427	-259	1	261	522
2.50	-634	-362	-264	-89	182	454	726

<sup>1</sup> First-year production is assumed to be 60% mature year's production.

<sup>2</sup> Base situation.

TABLE 6.2: SCHEDULE OF OPERATIONS AND ESTIMATED COSTS PER ACRE FOR PRODUCING ALPHA HOPS DURING THE FIRST YEAR OF PRODUCTION UNDER DRIP IRRIGATION IN THE YAKIMA VALLEY OF WASHINGTON STATE, 1999.

OPERATION	TOOLING	MTH YEAR	MACH HOURS	LABOR HOURS	TOTAL FIXED COST	VARIABLE COST					TOTAL VARIABLE COST	TOTAL COST
						FUEL, LUBE, & REPAIRS	LABOR	SERVICE MATER.	INTER.			
						\$	\$	\$	\$	\$	\$	\$
CULTIVATE	100HP-WT, 12' CULTIVATOR	MAR 1999	.40	.44	5.41	2.54	3.96	.00	.00	.34	6.85	12.25
FERTILIZE	CUSTOM HIRED	MAR 1999	.00	.00	.00	.00	.00	5.00	50.00	2.89	57.89	57.89
LAYOUT DRIP TUBE	60HP-WT, WIRE/TUBE ROLLER	MAR 1999	1.00	2.20	6.27	5.24	18.48	.00	.00	1.25	24.97	31.24
ADJUST DRIP TUBE	HAND LABOR	MAR 1999	.00	1.00	.00	.00	7.80	.00	.00	.41	8.21	8.21
IRRIGATE & FERT.	DRIP IRRIGATION	SEA 1999	.00	5.50	.00	.00	49.50	50.00	95.00	8.75	203.25	203.25
IRRIG. MAINTEN.	HAND LABOR	SEA 1999	.00	3.00	.00	.00	23.40	.00	33.33	2.55	59.28	59.28**
INSURANCE	CROP, PICKER AND TRELIS	SEA 1999	.00	.00	.00	.00	.00	45.80	.00	2.06	47.86	47.86
TRELIS REPAIR	60HP-WT, SLED	APR 1999	.67	.74	4.20	3.42	6.63	.00	26.67	1.65	38.38	42.58**
TRELIS REPAIR	TRUCK	APR 1999	.67	.74	1.02	1.96	6.63	.00	.00	.39	8.97	10.00**
TRELIS REPAIR	HAND LABOR	APR 1999	.00	4.70	.00	.00	36.66	.00	.00	1.65	38.31	38.31**
TWINE	60HP-WT, SLED	APR 1999	1.00	.00	6.27	5.11	.00	.00	.00	.23	5.34	11.61
TWINE	TRUCK	APR 1999	1.00	.00	1.53	2.92	.00	.00	.00	.13	3.05	4.58
TWINE	CUSTOM HIRED	APR 1999	.00	.00	.00	.00	.00	70.00	120.00	8.55	198.55	198.55
RETWINE	HAND LABOR	MAY 1999	.00	1.00	.00	.00	7.80	.00	.00	.29	8.09	8.09
TRAIN & WEED	HAND LABOR	MAY 1999	.00	9.00	.00	.00	70.20	.00	.00	2.63	72.83	72.83
CULTIVATE	100HP-WT, 12' CULTIVATOR	MAY 1999	.40	.44	5.41	2.54	3.96	.00	.00	.24	6.75	12.16
TRAIN & WEED	HAND LABOR	MAY 1999	.00	9.00	.00	.00	70.20	.00	.00	2.63	72.83	72.83
SPRAY	60HP-WT, BLAST SPRAYER	MAY 1999	.50	.60	3.58	2.61	5.40	.00	18.20	.98	27.19	30.77
TRAIN & WEED	HAND LABOR	JUN 1999	.00	6.00	.00	.00	46.80	.00	.00	1.40	48.20	48.20
SPRAY	60HP-WT, BLAST SPRAYER	JUN 1999	.50	.60	3.58	2.61	5.40	.00	48.52	1.70	58.22	61.79
TRAIN & WEED	HAND LABOR	JUN 1999	.00	6.00	.00	.00	46.80	.00	.00	1.40	48.20	48.20
CULTIVATE	100HP-WT, 12' CULTIVATOR	JUN 1999	.40	.44	5.41	2.54	3.96	.00	.00	.20	6.70	12.11
SPRAY	60HP-WT, BLAST SPRAYER	JUL 1999	.50	.60	3.58	2.61	5.40	.00	73.41	1.83	83.24	86.82
MISC. FIELD WORK	HAND LABOR	SEA 1999	.00	10.00	.00	.00	78.00	.00	.00	3.51	81.51	81.51
SPRAY	60HP-WT, BLAST SPRAYER	AUG 1999	.50	.60	3.58	2.61	5.40	.00	73.41	1.22	82.63	86.21
CUT VINES	TOP CUTTER	SEP 1999	1.00	1.10	6.15	6.77	13.20	.00	.00	.15	20.12	26.27
CUT VINES	60HP-WT, BOTTOM CUTTER	SEP 1999	1.00	1.10	5.97	5.16	13.20	.00	.00	.14	18.50	24.46
CUT VINES	EXTRA HAND LABOR (3)	SEP 1999	.00	3.30	.00	.00	25.74	.00	.00	.19	25.93	25.93
HAUL VINES	TRUCKS	SEP 1999	5.00	5.50	7.64	14.59	49.50	.00	.00	.48	64.57	72.21
PICK HOPS	DAUEHAUER DOUBLE RECLENER	SEP 1999	1.00	.00	238.37	21.43	.00	.00	6.85	.21	28.49	266.86
PICK HOPS	OPERATOR/MECHANIC & HELPER	SEP 1999	.00	2.40	.00	.00	36.00	.00	.00	.27	36.27	36.27
PICK HOPS	HAND LABOR (8)	SEP 1999	.00	8.80	.00	.00	68.64	.00	.00	.51	69.15	69.15
TEND KILN	HAND LABOR (2)	SEP 1999	.00	1.85	.00	.00	14.43	.00	.00	.11	14.54	14.54
DRY HOPS	HOP DRYER	SEP 1999	.00	.00	.00	.00	.00	8.56	45.68	.41	54.65	54.65
BALE HOPS	HOP BALERS	SEP 1999	.00	.00	.00	.00	.00	18.56	19.98	.29	38.83	38.83
MOVE&LOAD BALES	HYSTER LOADER	SEP 1999	.19	.21	4.17	.68	1.88	.00	.00	.02	2.58	6.74
SPR. VINE WASTE	TRACTOR/BACKHOE/LOADER	SEP 1999	.40	.44	4.09	2.23	3.96	.00	.00	.05	6.24	10.33
SPR. VINE WASTE	SPREADER TRUCKS	SEP 1999	.80	.88	5.94	5.98	7.92	.00	.00	.10	14.00	19.94
PULL DRIP TUBES	PULL DRIP TUBES FROM HOP PLTS.	OCT 1999	.00	2.00	.00	.00	15.60	.00	.00	.00	15.60	15.60
ROLLUP DRIP TUBE	60HP-WT, WIRE/TUBE ROLLER	OCT 1999	1.00	2.20	6.27	5.24	18.48	.00	.00	.00	23.72	30.00
BALE STORAGE	STORAGE SHED	ANN 1999	.00	.00	3.16	.00	.00	.00	.00	.00	.00	3.16

TABLE 6.2: CONTINUED

OPERATION	TOOLING	MTH YEAR	MACH HOURS	LABOR HOURS	TOTAL FIXED COST	VARIABLE COST					TOTAL VARIABLE COST	TOTAL COST
						FUEL, LUBE, & REPAIRS	LABOR	SERVICE	MATER.	INTER.		
						\$	\$	\$	\$	\$		
MISC USE	TRACTOR/LOADER	ANN 1999	.40	.44	2.15	1.58	3.96	.00	.00	.25	5.79	7.94
MISC USE	TRACTOR/BACKHOE/LOADER	ANN 1999	.80	.88	8.18	4.46	7.92	.00	.00	.56	12.94	21.12
MISC USE	SPREADER TRUCKS	ANN 1999	.40	.44	2.97	2.99	3.96	.00	.00	.31	7.26	10.23
SKILLED LABOR	FULL TIME MECHANIC	ANN 1999	.00	5.00	.00	.00	68.00	.00	.00	3.06	71.06	71.06
MISC USE	SERVICE TRUCK	ANN 1999	.25	.00	1.76	1.70	.00	.00	.00	.08	1.78	3.54
SUPERVISION	FULL TIME FOREMAN	ANN 1999	.00	5.00	.00	.00	76.00	.00	.00	3.42	79.42	79.42
MISC USE	FOREMAN'S PICKUP	ANN 1999	.60	.00	4.28	3.66	.00	.00	.00	.16	3.82	8.10
MISC USE	MANAGER'S PICKUP	ANN 1999	1.00	.00	9.99	4.76	.00	.00	.00	.21	4.97	14.96
MISC USE	LABOR'S PICKUP (2)	ANN 1999	1.00	.00	2.68	4.76	.00	.00	.00	.21	4.97	7.66
MISC USE	MACHINE SHOP AND SHED	ANN 1999	.00	.00	4.52	.00	.00	.00	.00	.00	.00	4.52
MISC USE	SHOP TOOLS	ANN 1999	.00	.00	4.95	.00	.00	.00	.00	.00	.00	4.95
MISC USE	CONTAINMENT TANKS	ANN 1999	.00	.00	3.21	.00	.00	.00	.00	.00	.00	3.21
OVERHEAD	UTILITIES, LEGAL, ACCTNG, ETC.	ANN 1999	.00	.00	.00	.00	.00	144.19	.00	.00	144.19	144.19
ESTABLISHMT COST	7YR AMORT OF HOP PLANT COST	ANN 1999	.00	.00	120.60*	.00	.00	.00	.00	.00	.00	120.60
ESTABLISHMT COST	21YR AMORT OF IRRIGATION COST	ANN 1999	.00	.00	100.30**	.00	.00	.00	.00	.00	.00	100.30
ESTABLISHMT COST	21YR AMORT OF TRELIS COST	ANN 1999	.00	.00	239.33**	.00	.00	.00	.00	.00	.00	239.33
TAXES	LAND	ANN 1999	.00	.00	70.00	.00	.00	.00	.00	.00	.00	70.00
LAND COST	6% RETURN ON BARE LAND VALUE	ANN 1999	.00	.00	198.00	.00	.00	.00	.00	.00	.00	198.00
MANAGEMENT	\$150 PER ACRE	ANN 1999	.00	.00	150.00	.00	.00	.00	.00	.00	.00	150.00
TOTAL PER ACRE			22.38	104.13	1254.52	122.68	930.78	342.11	611.05	60.10	2066.72	3321.24

\*INTEREST CHARGED FOR ONLY A HALF-YEAR IN THE FIRST YEAR OF PRODUCTION.

\*\*IT IS ASSUMED THAT A TRELIS AND IRRIGATION SYSTEM WILL PRODUCE THREE CROPS OF HOPS EACH WITH A SEVEN-YEAR LIFE. THEREFORE, TRELIS REPAIR FOR BABY HOPS IS 2/3 OF YEARLY TRELIS REPAIR COST, FOR IN THE FIRST YEAR OF ACTUAL USE THERE SHOULD BE NO TRELIS REPAIR COSTS. FOR IRRIGATION MAINTENANCE, LABOR REMAINS THE SAME FOR BABY HOPS; HOWEVER, IRRIGATION MATERIAL REPAIR COST IS 2/3 OF YEARLY IRRIGATION MATERIAL REPAIR COST, FOR IN THE FIRST YEAR OF ACTUAL USE THERE SHOULD BE LITTLE OR NO MATERIALS NEEDED. FURTHERMORE, INTEREST FOR THE TRELIS AND IRRIGATION AMORTIZED ESTABLISHMENT COSTS ARE REDUCED TO 5/6 OF THE INTEREST COST FOR OTHER YEARS, FOR IN THE FIRST YEAR OF USE FOR THE TRELIS AND IRRIGATION SYSTEM, INTEREST SHOULD BE CHARGED FOR ONLY 1/2 YEAR.

Table 7.2: Materials and Services Used Per Acre by Operation for Producing Alpha Hops During the First Year of Production Under Drip Irrigation in the Yakima Valley of Washington State, 1999.

Operation	Month	Material and/or Service
Fertilize	March	Custom hire @ \$5.00/acre Fertilizer @ \$50.00/acre
Irrigate & Fertigate	Season	Water charge @ \$50.00/acre Fertilizer @ \$75.00/acre Line cleaner @ \$20.00/acre
Irrigation Maintenance	Season	Irrigation repair materials @ \$33.33/acre
Insurance	Season	Crop insurance @ \$10.80/acre Picker insurance @ \$20.00/acre Trellis insurance @ \$15.00/acre
Trellis Repair	April	Trellis materials @ \$26.67/acre
Twine	April	Custom hire @ \$70.00/acre Twine & clips @ \$120.00/acre
Spray Fertilizer Powdery mildew spray	May	Leaf foliar @ \$10.00/acre 2 ounces of Rally @ \$4.10/ounce
Spray Fertilizer Aphid spray Powdery mildew spray Downy mildew spray	June	Leaf foliar @ \$10.00/acre 4 ounces of Provado @ \$3.71/ounce 3 ounces of Rally @ \$4.10/ounce 1.25 lbs. of Alliette @ \$9.10/lb.
Spray Mite spray Mite spray Powdery mildew spray	July	0.75 gal. of crop oil @ \$2.25/gal. 12 ounces of Agrimek @ \$4.61/ounce 4 ounces of Rally @ \$4.10/ounce
Spray Mite spray Mite spray Powdery mildew spray	August	0.75 gal. of crop oil @ \$2.25/gal. 12 ounces of Agrimek @ \$4.61/ounce 4 ounces of Rally @ \$4.10/ounce
Pick Hops \$1.20/bale	Sept.	Electricity for 5.71 bales @
Dry Hops	Sept.	Custom hire 5.71 bales @ \$1.50/bale Kiln fuel for 5.71 bales @ \$8.00/bale
Bale Hops	Sept.	Custom hire 5.71 bales @ \$3.25/bale Burlap for 5.71 bales @ \$3.50/bale
Overhead	Annual	7.5% of variable cost

TABLE 8.2: ITEMIZED COST PER ACRE FOR PRODUCING ALPHA HOPS DURING THE FIRST YEAR OF PRODUCTION UNDER DRIP IRRIGATION, IN THE YAKIMA VALLEY OF WASHINGTON STATE, 1999.

		PRICE OR	QUANTITY	VALUE OR	YOUR
		UNIT COST/UNIT		COST	FARM
-----					
VARIABLE COSTS		\$		\$	
CUSTOM FERTILIZATION	ACRE	5.00	1.00	5.00	_____
MARCH FERTILIZER	ACRE	50.00	1.00	50.00	_____
CUSTOM TWINING	ACRE	70.00	1.00	70.00	_____
TWINE & CLIPS	ACRE	120.00	1.00	120.00	_____
TRELLIS MATERIAL	ACRE	26.67	1.00	26.67	_____
IRRIGATION MATERIAL	ACRE	33.33	1.00	33.33	_____
LEAF FOLIAR	ACRE	10.00	2.00	20.00	_____
RALLY	OZ.	4.10	13.00	53.30	_____
PROVADO	OZ.	3.71	4.00	14.84	_____
ALLIETTE	LB.	9.10	1.25	11.37	_____
AGRIMEK	OZ.	4.61	24.00	110.64	_____
CROP OIL	GAL.	2.25	1.50	3.38	_____
WATER CHARGE	ACRE	50.00	1.00	50.00	_____
FERTIGATION MATERIAL	ACRE	75.00	1.00	75.00	_____
LINE CLEANER	ACRE	20.00	1.00	20.00	_____
ELECTRICITY	BALE	1.20	5.71	6.85	_____
BURLAP	BALE	3.50	5.71	19.98	_____
KILN FUEL	BALE	8.00	5.71	45.68	_____
CROP INSURANCE	ACRE	10.80	1.00	10.80	_____
PICKER INSURANCE	ACRE	20.00	1.00	20.00	_____
TRELLIS INSURANCE	ACRE	15.00	1.00	15.00	_____
HAND LABOR	HOUR	7.80	67.85	529.22	_____
LABOR (TRAC/MACH)	HOUR	9.00	21.68	195.15	_____
OPERATOR/MECHANIC	HOUR	18.00	1.20	21.60	_____
OPERATOR HELPER	HOUR	12.00	1.20	14.40	_____
CUTTING OPERATORS	HOUR	12.00	2.20	26.40	_____
FOREMAN	HOUR	15.20	5.00	76.00	_____
MECHANIC	HOUR	13.60	5.00	68.00	_____
HOP DRYER	BALE	1.50	5.71	8.56	_____
HOP BALERS	BALE	3.25	5.71	18.56	_____
TRACTOR REPAIR	ACRE	16.41	1.00	16.41	_____
TRACTOR FUEL/LUBE	ACRE	22.56	1.00	22.56	_____
MACHINERY REPAIRS*	ACRE	52.01	1.00	52.01	_____
MACHINE FUEL/LUBE	ACRE	31.71	1.00	31.71	_____
INTEREST ON OP. CAP.	ACRE	60.10	1.00	60.10	_____
OVERHEAD	ACRE	144.19	1.00	144.19	_____
TOTAL VARIABLE COST				2066.72	_____
-----					
FIXED COSTS		\$		\$	
TRACTOR DEPRECIATION	ACRE	18.89	1.00	18.89	_____
TRACTOR INTEREST	ACRE	23.91	1.00	23.91	_____
TRACTOR INSURANCE	ACRE	1.59	1.00	1.59	_____
TRACTOR TAXES	ACRE	4.78	1.00	4.78	_____
MACHINE DEPRECIATION*	ACRE	123.42	1.00	123.42	_____
MACHINE INTEREST*	ACRE	160.82	1.00	160.82	_____
MACHINE INSURANCE*	ACRE	10.72	1.00	10.72	_____
MACHINE TAXES*	ACRE	32.16	1.00	32.16	_____
AMORT. PLANT COST	ACRE	120.60	1.00	120.60	_____
AMORT. IRRIG. COST	ACRE	100.30	1.00	100.30	_____
AMORT. TRELLIS COST	ACRE	239.33	1.00	239.33	_____
LAND COSTS	ACRE	198.00	1.00	198.00	_____
LAND TAXES	ACRE	70.00	1.00	70.00	_____
MANAGEMENT	ACRE	150.00	1.00	150.00	_____
TOTAL FIXED COST				1254.52	_____
TOTAL COST				3321.24	_____
-----					

\*INCLUDES BUILDINGS, SHOP TOOLS, AND CONTAINMENT TANKS.

TABLE 9.2: SCHEDULE OF OPERATIONS AND ESTIMATED COSTS PER ACRE FOR PRODUCING ALPHA HOPS DURING THE MATURE YEARS OF PRODUCTION UNDER DRIP IRRIGATION IN THE YAKIMA VALLEY OF WASHINGTON STATE, 1999.

OPERATION	TOOLING	MTH	YEAR	MACH HOURS	LABOR HOURS	VARIABLE COST						TOTAL VARIABLE COST	TOTAL COST
						TOTAL FIXED COST	FUEL, LUBE, & REPAIRS	LABOR	SERVICE MATER.	INTER.			
						\$	\$	\$	\$	\$	\$	\$	
CULTIVATE	100HP-WT, 12' CULTIVATOR	MAR	1999	.40	.44	5.41	2.54	3.96	.00	.00	.34	6.85	12.25
LAYOUT DRIP TUBE	60HP-WT, WIRE/TUBE ROLLER	MAR	1999	1.00	2.20	6.27	5.24	18.48	.00	.00	1.25	24.97	31.24
ADJUST DRIP TUBE	HAND LABOR	MAR	1999	.00	1.00	.00	.00	7.80	.00	.00	.41	8.21	8.21
IRRIGATE & FERT.	DRIP IRRIGATION	SEA	1999	.00	5.50	.00	.00	49.50	50.00	95.00	8.75	203.25	203.25
IRRIG. MAINTEN.	HAND LABOR	SEA	1999	.00	3.00	.00	.00	23.40	.00	50.00	3.30	76.70	76.70
INSURANCE	CROP, PICKER AND TRELLIS	SEA	1999	.00	.00	.00	.00	.00	53.00	.00	2.39	55.39	55.39
TRELLIS REPAIR	60HP-WT, SLED	APR	1999	1.00	1.10	6.27	5.11	9.90	.00	40.00	2.48	57.49	63.76
TRELLIS REPAIR	TRUCK	APR	1999	1.00	1.10	1.53	2.92	9.90	.00	.00	.58	13.39	14.92
TRELLIS REPAIR	HAND LABOR	APR	1999	.00	7.00	.00	.00	54.60	.00	.00	2.46	57.06	57.06
PRUNE VINES	60HP-WT, MECHANICAL PRUNER	APR	1999	.50	.55	5.74	4.22	4.95	.00	.00	.41	9.58	15.33
TWINE	60HP-WT, SLED	APR	1999	1.00	.00	6.27	5.11	.00	.00	.00	.23	5.34	11.61
TWINE	TRUCK	APR	1999	1.00	.00	1.53	2.92	.00	.00	.00	.13	3.05	4.58
TWINE	CUSTOM HIRED	APR	1999	.00	.00	.00	.00	.00	70.00	120.00	8.55	198.55	198.55
RETWINE	HAND LABOR	MAY	1999	.00	1.00	.00	.00	7.80	.00	.00	.29	8.09	8.09
TRAIN	HAND LABOR	MAY	1999	.00	6.00	.00	.00	46.80	.00	.00	1.76	48.55	48.55
CULTIVATE	100HP-WT, 12' CULTIVATOR	MAY	1999	.40	.44	5.41	2.54	3.96	.00	.00	.24	6.75	12.16
TRAIN	HAND LABOR	MAY	1999	.00	5.00	.00	.00	39.00	.00	.00	1.46	40.46	40.46
SPRAY	60HP-WT, BLAST SPRAYER	MAY	1999	.50	.60	3.58	2.61	5.40	.00	26.40	1.29	35.70	39.27
PUT UP HEADS	HAND LABOR	MAY	1999	.00	4.00	.00	.00	31.20	.00	.00	1.17	32.37	32.37
APPLY HERBICIDE	60HP-WT, REAR SPRAYER	MAY	1999	.33	.37	2.45	2.15	3.30	.00	22.50	1.05	29.00	31.45
SPRAY	60HP-WT, BLAST SPRAYER	JUN	1999	.50	.60	3.58	2.61	5.40	.00	68.90	2.28	78.38	81.96
CULTIVATE	100HP-WT, 12' CULTIVATOR	JUN	1999	.40	.44	5.41	2.54	3.96	.00	.00	.20	6.70	12.11
SPRAY	60HP-WT, BLAST SPRAYER	JUN	1999	.50	.60	3.58	2.61	5.40	.00	20.50	.86	29.36	32.94
MISC. FIELD WORK	HAND LABOR	SEA	1999	.00	10.00	.00	.00	78.00	.00	.00	3.51	81.51	81.51
SPRAY	60HP-WT, BLAST SPRAYER	JUL	1999	.50	.60	3.58	2.61	5.40	.00	104.71	2.54	115.25	118.83
APPLY HERBICIDE	60HP-WT, REAR SPRAYER	JUL	1999	.33	.37	2.45	2.15	3.30	.00	22.50	.63	28.58	31.03
SPRAY	60HP-WT, BLAST SPRAYER	JUL	1999	.50	.60	3.58	2.61	5.40	.00	28.70	.83	37.53	41.11
SPRAY	60HP-WT, BLAST SPRAYER	AUG	1999	.50	.60	3.58	2.61	5.40	.00	104.71	1.69	114.41	117.98
CUT VINES	TOP CUTTER	SEP	1999	1.18	1.30	7.26	7.99	15.60	.00	.00	.18	23.76	31.02
CUT VINES	60HP-WT, BOTTOM CUTTER	SEP	1999	1.18	1.30	7.04	6.09	15.60	.00	.00	.16	21.85	28.89
CUT VINES	EXTRA HAND LABOR (3)	SEP	1999	.00	3.90	.00	.00	30.42	.00	.00	.23	30.65	30.65
HAUL VINES	TRUCKS	SEP	1999	5.90	6.49	9.01	17.22	58.41	.00	.00	.57	76.19	85.20
PICK HOPS	DAUEHAUER DOUBLE RECLENER	SEP	1999	1.18	.00	281.28	25.29	.00	.00	11.42	.28	36.99	318.26
PICK HOPS	OPERATOR/MECHANIC & HELPER	SEP	1999	.00	2.84	.00	.00	42.60	.00	.00	.32	42.92	42.92
PICK HOPS	HAND LABOR (8)	SEP	1999	.00	10.40	.00	.00	81.12	.00	.00	.61	81.73	81.73
TEND KILN	HAND LABOR (2)	SEP	1999	.00	3.08	.00	.00	24.02	.00	.00	.18	24.20	24.20
DRY HOPS	HOP DRYER	SEP	1999	.00	.00	.00	.00	.00	14.28	76.16	.68	91.12	91.12
BALE HOPS	HOP BALERS	SEP	1999	.00	.00	.00	.00	.00	30.94	33.32	.48	64.74	64.74
MOVE&LOAD BALES	HYSTER LOADER	SEP	1999	.32	.35	7.02	1.14	3.17	.00	.00	.03	4.34	11.36

TABLE 9.2: CONTINUED

OPERATION	TOOLING	MTH	YEAR	MACH HOURS	LABOR HOURS	TOTAL FIXED COST	VARIABLE COST					TOTAL VARIABLE COST	TOTAL COST
							FUEL, LUBE, & REPAIRS	LABOR	SERVICE MATER.	INTER.	TOTAL COST		
						\$	\$	\$	\$	\$	\$	\$	
SPR. VINE WASTE	TRACTOR/BACKHOE/LOADER	SEP	1999	.40	.44	4.09	2.23	3.96	.00	.00	.05	6.24	10.33
SPR. VINE WASTE	SPREADER TRUCKS	SEP	1999	.80	.88	5.94	5.98	7.92	.00	.00	.10	14.00	19.94
PULL DRIP TUBES	PULL DRIP TUBES FROM HOP PLTS.	OCT	1999	.00	2.00	.00	.00	15.60	.00	.00	.00	15.60	15.60
ROLLUP DRIP TUBE	60HP-WT, WIRE/TUBE ROLLER	OCT	1999	1.00	2.20	6.27	5.24	18.48	.00	.00	.00	23.72	30.00
BALE STORAGE	STORAGE SHED	ANN	1999	.00	.00	3.16	.00	.00	.00	.00	.00	.00	3.16
MISC USE	TRACTOR/LOADER	ANN	1999	.40	.44	2.15	1.58	3.96	.00	.00	.25	5.79	7.94
MISC USE	TRACTOR/BACKHOE/LOADER	ANN	1999	.80	.88	8.18	4.46	7.92	.00	.00	.56	12.94	21.12
MISC USE	SPREADER TRUCKS	ANN	1999	.40	.44	2.97	2.99	3.96	.00	.00	.31	7.26	10.23
SKILLED LABOR	FULL TIME MECHANIC	ANN	1999	.00	5.00	.00	.00	68.00	.00	.00	3.06	71.06	71.06
MISC USE	SERVICE TRUCK	ANN	1999	.25	.00	1.76	1.70	.00	.00	.00	.08	1.78	3.54
SUPERVISION	FULL TIME FOREMAN	ANN	1999	.00	5.00	.00	.00	76.00	.00	.00	3.42	79.42	79.42
MISC USE	FOREMAN'S PICKUP	ANN	1999	.60	.00	4.28	3.66	.00	.00	.00	.16	3.82	8.10
MISC USE	MANAGER'S PICKUP	ANN	1999	1.00	.00	9.99	4.76	.00	.00	.00	.21	4.97	14.96
MISC USE	LABOR'S PICKUP (2)	ANN	1999	1.00	.00	2.68	4.76	.00	.00	.00	.21	4.97	7.66
MISC USE	MACHINE SHOP AND SHED	ANN	1999	.00	.00	4.52	.00	.00	.00	.00	.00	.00	4.52
MISC USE	SHOP TOOLS	ANN	1999	.00	.00	4.95	.00	.00	.00	.00	.00	.00	4.95
MISC USE	CONTAINMENT TANKS	ANN	1999	.00	.00	3.21	.00	.00	.00	.00	.00	.00	3.21
OVERHEAD	UTILITIES, LEGAL, ACCTNG, ETC.	ANN	1999	.00	.00	.00	.00	.00	162.19	.00	.00	162.19	162.19
ESTABLISHMT COST	6YR AMORT OF FIRST YEAR LOSS*	ANN	1999	.00	.00	358.51	.00	.00	.00	.00	.00	.00	358.51
ESTABLISHMT COST	7YR AMORT OF HOP PLANT COST	ANN	1999	.00	.00	155.93	.00	.00	.00	.00	.00	.00	155.93
ESTABLISHMT COST	21YR AMORT OF IRRIGATION COST	ANN	1999	.00	.00	116.55	.00	.00	.00	.00	.00	.00	116.55
ESTABLISHMT COST	21YR AMORT OF TRELIS COST	ANN	1999	.00	.00	278.09	.00	.00	.00	.00	.00	.00	278.09
TAXES	LAND	ANN	1999	.00	.00	70.00	.00	.00	.00	.00	.00	.00	70.00
LAND COST	6% RETURN ON BARE LAND VALUE	ANN	1999	.00	.00	198.00	.00	.00	.00	.00	.00	.00	198.00
MANAGEMENT	\$150 PER ACRE	ANN	1999	.00	.00	150.00	.00	.00	.00	.00	.00	.00	150.00
TOTAL PER ACRE				26.78	100.05	1773.05	148.16	908.96	380.41	824.01	63.19	2324.73	4097.78

\*FIRST-YEAR NET LOSS CALCULATION: \$3,321.24 - (1,142 X 1.50) = \$1,608.24

Table 10.2: Materials and Services Used Per Acre by Operation for Producing Alpha Hops During the Mature Years of Production Under Drip Irrigation in the Yakima Valley of Washington State, 1999.

Operation	Month	Material and/or Service
Irrigate & Fertigate	Season	Water charge @ \$50.00/acre Fertilizer @ \$75.00/acre Line cleaner @ \$20.00/acre
Irrigation Maintenance	Season	Irrigation repair materials @ \$50.00/acre
Insurance	Season	Crop insurance @ \$18.00/acre Picker insurance @ \$20.00/acre Trellis insurance @ \$15.00/acre
Trellis Repair	April	Trellis materials @ \$40.00/acre
Twine	April	Custom hire @ \$70.00/acre Twine & clips @ \$120.00/acre
Spray Fertilizer Powdery mildew spray	May	Leaf foliar @ \$10.00/acre 4 ounces of Rally @ \$4.10/ounce
Apply Herbicide	May	Herbicide @ \$22.50/acre
Spray Fertilizer Aphid spray Powdery mildew spray Downy mildew spray	June	Leaf foliar @ \$10.00/acre 4 ounces of Provado @ \$3.71/ounce 5 ounces of Rally @ \$4.10/ounce 2.5 lbs. of Alliette @ \$9.10/lb.
Spray Powdery mildew spray	June	5 ounces of Rally @ \$4.10/ounce
Spray Mite spray Mite spray Powdery mildew spray	July	1 gallon of crop oil @ \$2.25/gal. 16 ounces of Agrimek @ \$4.61/ounce 7 ounces of Rally @ \$4.10/ounce
Apply Herbicide	July	Herbicide @ \$22.50/acre
Spray Powdery mildew spray	July	7 ounces of Rally @ \$4.10/ounce
Spray Mite spray Mite spray Powdery mildew spray	August	1 gallon of crop oil @ \$2.25/gal. 16 ounces of Agrimek @ \$4.61/ounce 7 ounces of Rally @ \$4.10/ounce
Pick Hops	Sept.	Electricity for 9.52 bales @ \$1.20/bale
Dry Hops	Sept.	Custom hire 9.52 bales @ \$1.50/bale Kiln fuel for 9.52 bales @ \$8.00/bale
Bale Hops	Sept.	Custom hire 9.52 bales @ \$3.25/bale Burlap for 9.52 bales @ \$3.50/bale
Overhead	Annual	7.5% of variable cost



TABLE 11.2: ITEMIZED COST PER ACRE FOR PRODUCING ALPHA HOPS DURING THE MATURE YEARS OF PRODUCTION UNDER DRIP IRRIGATION IN THE YAKIMA VALLEY OF WASHINGTON STATE, 1999.

		PRICE OR		VALUE OR	YOUR
		UNIT COST/UNIT	QUANTITY	COST	FARM
-----					
VARIABLE COSTS		\$		\$	
CUSTOM TWINING	ACRE	70.00	1.00	70.00	_____
TWINE & CLIPS	ACRE	120.00	1.00	120.00	_____
TRELLIS MATERIAL	ACRE	40.00	1.00	40.00	_____
IRRIGATION MATERIAL	ACRE	50.00	1.00	50.00	_____
HERBICIDE	ACRE	22.50	2.00	45.00	_____
LEAF FOLIAR	ACRE	10.00	2.00	20.00	_____
RALLY	OZ.	4.10	35.00	143.50	_____
PROVADO	OZ.	3.71	4.00	14.84	_____
ALLIETTE	LB.	9.10	2.50	22.75	_____
AGRIMEK	OZ.	4.61	32.00	147.52	_____
CROP OIL	GAL.	2.25	2.00	4.50	_____
WATER CHARGE	ACRE	50.00	1.00	50.00	_____
FERTIGATION MATERIAL	ACRE	75.00	1.00	75.00	_____
LINE CLEANER	ACRE	20.00	1.00	20.00	_____
ELECTRICITY	BALE	1.20	9.52	11.42	_____
BURLAP	BALE	3.50	9.52	33.32	_____
KILN FUEL	BALE	8.00	9.52	76.16	_____
CROP INSURANCE	ACRE	1.00	18.00	18.00	_____
PICKER INSURANCE	ACRE	1.00	20.00	20.00	_____
TRELLIS INSURANCE	ACRE	1.00	15.00	15.00	_____
HAND LABOR	HOUR	7.80	58.58	456.92	_____
LABOR (TRAC/MACH)	HOUR	9.00	26.03	234.23	_____
OPERATOR/MECHANIC	HOUR	18.00	1.42	25.56	_____
OPERATOR HELPER	HOUR	12.00	1.42	17.04	_____
CUTTING OPERATORS	HOUR	12.00	2.60	31.20	_____
FOREMAN	HOUR	15.20	5.00	76.00	_____
MECHANIC	HOUR	13.60	5.00	68.00	_____
HOP DRYER	BALE	1.50	9.52	14.28	_____
HOP BALERS	BALE	3.25	9.52	30.94	_____
TRACTOR REPAIR	ACRE	21.76	1.00	21.76	_____
TRACTOR FUEL/LUBE	ACRE	29.10	1.00	29.10	_____
MACHINERY REPAIRS*	ACRE	62.75	1.00	62.75	_____
MACHINE FUEL/LUBE	ACRE	34.55	1.00	34.55	_____
INTEREST ON OP. CAP.	ACRE	63.19	1.00	63.19	_____
OVERHEAD	ACRE	162.19	1.00	162.19	_____
				-----	
TOTAL VARIABLE COST				2324.73	_____
FIXED COSTS		\$		\$	
TRACTOR DEPRECIATION	ACRE	24.03	1.00	24.03	_____
TRACTOR INTEREST	ACRE	30.84	1.00	30.84	_____
TRACTOR INSURANCE	ACRE	2.06	1.00	2.06	_____
TRACTOR TAXES	ACRE	6.17	1.00	6.17	_____
MACHINE DEPRECIATION*	ACRE	144.44	1.00	144.44	_____
MACHINE INTEREST*	ACRE	188.23	1.00	188.23	_____
MACHINE INSURANCE*	ACRE	12.55	1.00	12.55	_____
MACHINE TAXES*	ACRE	37.65	1.00	37.65	_____
AMORT. 1ST YEAR LOSS	ACRE	358.51	1.00	358.51	_____
AMORT. PLANT COST	ACRE	155.93	1.00	155.93	_____
AMORT. IRRIG. COST	ACRE	116.55	1.00	116.55	_____
AMORT. TRELLIS COST	ACRE	278.09	1.00	278.09	_____
LAND COSTS	ACRE	198.00	1.00	198.00	_____
LAND TAXES	ACRE	70.00	1.00	70.00	_____
MANAGEMENT	ACRE	150.00	1.00	150.00	_____
				-----	
TOTAL FIXED COST				1773.05	_____
				-----	
TOTAL COST				4097.78	_____
-----					

\*INCLUDES BUILDINGS, SHOP TOOLS, AND CONTAINMENT TANKS.

Table 12.2: Annual Returns Per Acre Over Total Costs at Different Price and Yield Levels for Alpha Hops Grown Under Drip Irrigation  
In the Yakima Valley, Washington State, 1999.<sup>1</sup>

Price Per Lb.	Yield Level						
	1,700 Lbs.	1,800 Lbs.	1,904 Lbs. <sup>2</sup>	2,000 Lbs.	2,100 Lbs.	2,200 Lbs.	2,300 Lbs.
\$	\$	\$	\$	\$	\$	\$	\$
1.20	-2143	-2019	-1889	-1770	-1645	-1520	-1396
1.30	-1951	-1815	-1673	-1543	-1407	-1271	-1135
1.40	-1758	-1611	-1457	-1316	-1169	-1022	-874
1.50 <sup>2</sup>	-1565	-1406	-1242	-1089	-931	-772	-613
1.60	-1372	-1202	-1026	-863	-693	-523	-353
1.70	-1180	-998	-810	-636	-455	-273	-92
1.80	-987	-794	-594	-409	-216	-24	169

<sup>1</sup> First-year production is assumed to be 60% mature year's production.

<sup>2</sup> Base situation.

TABLE 6.3: SCHEDULE OF OPERATIONS AND ESTIMATED COSTS PER ACRE FOR PRODUCING SUPER ALPHA HOPS DURING THE FIRST YEAR OF PRODUCTION UNDER DRIP IRRIGATION IN THE YAKIMA VALLEY OF WASHINGTON STATE, 1999.

OPERATION	TOOLING	MTH	YEAR	MACH HOURS	LABOR HOURS	VARIABLE COST						TOTAL VARIABLE COST	TOTAL COST
						TOTAL FIXED COST	FUEL, LUBE, & REPAIRS	LABOR	SERVICE	MATER.	INTER.		
						\$	\$	\$	\$	\$	\$		
CULTIVATE	100HP-WT, 12' CULTIVATOR	MAR	1999	.40	.44	5.41	2.54	3.96	.00	.00	.34	6.85	12.25
FERTILIZE	CUSTOM HIRED	MAR	1999	.00	.00	.00	.00	.00	5.00	50.00	2.89	57.89	57.89
LAYOUT DRIP TUBE	60HP-WT, WIRE/TUBE ROLLER	MAR	1999	1.00	2.20	6.27	5.24	18.48	.00	.00	1.25	24.97	31.24
ADJUST DRIP TUBE	HAND LABOR	MAR	1999	.00	1.00	.00	.00	7.80	.00	.00	.41	8.21	8.21
IRRIGATE & FERT.	DRIP IRRIGATION	SEA	1999	.00	5.50	.00	.00	49.50	50.00	95.00	8.75	203.25	203.25
IRRIG. MAINTEN.	HAND LABOR	SEA	1999	.00	3.00	.00	.00	23.40	.00	33.33	2.55	59.28	59.28**
INSURANCE	CROP, PICKER AND TRELLIS	SEA	1999	.00	.00	.00	.00	.00	49.40	.00	2.22	51.62	51.62
TRELLIS REPAIR	60HP-WT, SLED	APR	1999	.67	.74	4.20	3.42	6.63	.00	26.67	1.65	38.38	42.58**
TRELLIS REPAIR	TRUCK	APR	1999	.67	.74	1.02	1.96	6.63	.00	.00	.39	8.97	10.00**
TRELLIS REPAIR	HAND LABOR	APR	1999	.00	4.70	.00	.00	36.66	.00	.00	1.65	38.31	38.31**
TWINE	60HP-WT, SLED	APR	1999	1.00	.00	6.27	5.11	.00	.00	.00	.23	5.34	11.61
TWINE	TRUCK	APR	1999	1.00	.00	1.53	2.92	.00	.00	.00	.13	3.05	4.58
TWINE	CUSTOM HIRED	APR	1999	.00	.00	.00	.00	.00	70.00	120.00	8.55	198.55	198.55
RETWINE	HAND LABOR	MAY	1999	.00	1.00	.00	.00	7.80	.00	.00	.29	8.09	8.09
TRAIN & WEED	HAND LABOR	MAY	1999	.00	9.00	.00	.00	70.20	.00	.00	2.63	72.83	72.83
CULTIVATE	100HP-WT, 12' CULTIVATOR	MAY	1999	.40	.44	5.41	2.54	3.96	.00	.00	.24	6.75	12.16
TRAIN & WEED	HAND LABOR	MAY	1999	.00	9.00	.00	.00	70.20	.00	.00	2.63	72.83	72.83
SPRAY	60HP-WT, BLAST SPRAYER	MAY	1999	.50	.60	3.58	2.61	5.40	.00	18.20	.98	27.19	30.77
TRAIN & WEED	HAND LABOR	JUN	1999	.00	6.00	.00	.00	46.80	.00	.00	1.40	48.20	48.20
SPRAY	60HP-WT, BLAST SPRAYER	JUN	1999	.50	.60	3.58	2.61	5.40	.00	48.52	1.70	58.22	61.79
TRAIN & WEED	HAND LABOR	JUN	1999	.00	6.00	.00	.00	46.80	.00	.00	1.40	48.20	48.20
CULTIVATE	100HP-WT, 12' CULTIVATOR	JUN	1999	.40	.44	5.41	2.54	3.96	.00	.00	.20	6.70	12.11
SPRAY	60HP-WT, BLAST SPRAYER	JUL	1999	.50	.60	3.58	2.61	5.40	.00	73.41	1.83	83.24	86.82
MISC. FIELD WORK	HAND LABOR	SEA	1999	.00	10.00	.00	.00	78.00	.00	.00	3.51	81.51	81.51
SPRAY	60HP-WT, BLAST SPRAYER	AUG	1999	.50	.60	3.58	2.61	5.40	.00	91.85	1.50	101.35	104.93
CUT VINES	TOP CUTTER	SEP	1999	1.25	1.38	7.69	8.46	16.50	.00	.00	.19	25.15	32.84
CUT VINES	60HP-WT, BOTTOM CUTTER	SEP	1999	1.25	1.38	7.46	6.45	16.50	.00	.00	.17	23.12	30.58
CUT VINES	EXTRA HAND LABOR (3)	SEP	1999	.00	4.13	.00	.00	32.17	.00	.00	.24	32.42	32.42
HAUL VINES	TRUCKS	SEP	1999	6.25	6.88	9.54	18.24	61.88	.00	.00	.60	80.71	90.26
PICK HOPS	DAUEHAUER DOUBLE RECLENER	SEP	1999	1.25	.00	297.96	26.79	.00	.00	14.40	.31	41.49	339.46
PICK HOPS	OPERATOR/MECHANIC & HELPER	SEP	1999	.00	3.00	.00	.00	45.00	.00	.00	.34	45.34	45.34
PICK HOPS	HAND LABOR (8)	SEP	1999	.00	11.00	.00	.00	85.80	.00	.00	.64	86.44	86.44
TEND KILN	HAND LABOR (2)	SEP	1999	.00	2.46	.00	.00	19.19	.00	.00	.14	19.33	19.33
DRY HOPS	HOP DRYER	SEP	1999	.00	.00	.00	.00	.00	18.00	96.00	.86	114.85	114.85
BALE HOPS	HOP BALERS	SEP	1999	.00	.00	.00	.00	.00	39.00	42.00	.61	81.61	81.61
MOVE&LOAD BALES	HYSTER LOADER	SEP	1999	.40	.44	8.77	1.43	3.96	.00	.00	.04	5.43	14.20
SPR. VINE WASTE	TRACTOR/BACKHOE/LOADER	SEP	1999	.40	.44	4.09	2.23	3.96	.00	.00	.05	6.24	10.33
SPR. VINE WASTE	SPREADER TRUCKS	SEP	1999	.80	.88	5.94	5.98	7.92	.00	.00	.10	14.00	19.94
PULL DRIP TUBES	HAND LABOR	OCT	1999	.00	2.00	.00	.00	15.60	.00	.00	.00	15.60	15.60
ROLLUP DRIP TUBE	60HP-WT, WIRE/TUBE ROLLER G	OCT	1999	1.00	2.20	6.27	5.24	18.48	.00	.00	.00	23.72	30.00

TABLE 6.3: CONTINUED

OPERATION	TOOLING	MTH YEAR	MACH HOURS	LABOR HOURS	TOTAL FIXED COST	VARIABLE COST					TOTAL VARIABLE COST	TOTAL COST
						FUEL, LUBE, & REPAIRS	LABOR	SERVICE	MATER.	INTER.		
						\$	\$	\$	\$	\$	\$	\$
BALE STORAGE	STORAGE SHED	ANN 1999	.00	.00	3.16	.00	.00	.00	.00	.00	.00	3.16
MISC USE	TRACTOR/LOADER	ANN 1999	.40	.44	2.15	1.58	3.96	.00	.00	.25	5.79	7.94
MISC USE	TRACTOR/BACKHOE/LOADER	ANN 1999	.80	.88	8.18	4.46	7.92	.00	.00	.56	12.94	21.12
MISC USE	SPREADER TRUCKS	ANN 1999	.40	.44	2.97	2.99	3.96	.00	.00	.31	7.26	10.23
SKILLED LABOR	FULL TIME MECHANIC	ANN 1999	.00	5.00	.00	.00	68.00	.00	.00	3.06	71.06	71.06
MISC USE	SERVICE TRUCK	ANN 1999	.25	.00	1.76	1.70	.00	.00	.00	.08	1.78	3.54
SUPERVISION	FULL TIME FOREMAN	ANN 1999	.00	5.00	.00	.00	76.00	.00	.00	3.42	79.42	79.42
MISC USE	FOREMAN'S PICKUP	ANN 1999	.60	.00	4.28	3.66	.00	.00	.00	.16	3.82	8.10
MISC USE	MANAGER'S PICKUP	ANN 1999	1.00	.00	9.99	4.76	.00	.00	.00	.21	4.97	14.96
MISC USE	LABOR'S PICKUP (2)	ANN 1999	1.00	.00	2.68	4.76	.00	.00	.00	.21	4.97	7.66
MISC USE	MACHINE SHOP AND SHED	ANN 1999	.00	.00	4.52	.00	.00	.00	.00	.00	.00	4.52
MISC USE	SHOP TOOLS	ANN 1999	.00	.00	4.95	.00	.00	.00	.00	.00	.00	4.95
MISC USE	CONTAINMENT TANKS	ANN 1999	.00	.00	3.21	.00	.00	.00	.00	.00	.00	3.21
OVERHEAD	UTILITIES, LEGAL, ACCTNG, ETC.	ANN 1999	.00	.00	.00	.00	.00	159.55	.00	.00	159.55	159.55
ESTABLISHMT COST	7YR AMORT OF HOP PLANT COST	ANN 1999	.00	.00	120.60*	.00	.00	.00	.00	.00	.00	120.60
ESTABLISHMT COST	21YR AMORT OF IRRIGATION COST	ANN 1999	.00	.00	100.30**	.00	.00	.00	.00	.00	.00	100.30
ESTABLISHMT COST	21YR AMORT OF TRELLIS COST	ANN 1999	.00	.00	239.33**	.00	.00	.00	.00	.00	.00	239.33
TAXES	LAND	ANN 1999	.00	.00	70.00	.00	.00	.00	.00	.00	.00	70.00
LAND COST	6% RETURN ON BARE LAND VALUE	ANN 1999	.00	.00	198.00	.00	.00	.00	.00	.00	.00	198.00
MANAGEMENT	\$150 PER ACRE	ANN 1999	.00	.00	150.00	.00	.00	.00	.00	.00	.00	150.00
TOTAL PER ACRE			24.59	110.54	1323.66	135.42	989.18	390.95	709.37	61.89	2286.81	3610.47

\*INTEREST CHARGED FOR ONLY A HALF-YEAR IN THE FIRST YEAR OF PRODUCTION.

\*\*IT IS ASSUMED THAT A TRELLIS AND IRRIGATION SYSTEM WILL PRODUCE THREE CROPS OF HOPS EACH WITH A SEVEN-YEAR LIFE. THEREFORE, TRELLIS REPAIR FOR BABY HOPS IS 2/3 OF YEARLY TRELLIS REPAIR COST, FOR IN THE FIRST YEAR OF ACTUAL USE THERE SHOULD BE NO TRELLIS REPAIR COSTS. FOR IRRIGATION MAINTENANCE, LABOR REMAINS THE SAME FOR BABY HOPS; HOWEVER, IRRIGATION MATERIAL REPAIR COST IS 2/3 OF YEARLY IRRIGATION MATERIAL REPAIR COST, FOR IN THE FIRST YEAR OF ACTUAL USE THERE SHOULD BE LITTLE OR NO MATERIALS NEEDED. FURTHERMORE, INTEREST FOR THE TRELLIS AND IRRIGATION AMORTIZED ESTABLISHMENT COSTS ARE REDUCED TO 5/6 OF THE INTEREST COST FOR OTHER YEARS, FOR IN THE FIRST YEAR OF USE FOR THE TRELLIS AND IRRIGATION SYSTEM, INTEREST SHOULD BE CHARGED FOR ONLY 1/2 YEAR.

Table 7.3: Materials and Services Used Per Acre by Operation for Producing Super Alpha Hops During the First Year of Production Under Drip Irrigation in the Yakima Valley of Washington State, 1999.

Operation	Month	Material and/or Service
Fertilize	March	Custom hire @ \$5.00/acre Fertilizer @ \$50.00/acre
Irrigate & Fertigate	Season	Water charge @ \$50.00/acre Fertilizer @ \$75.00/acre Line cleaner @ \$20.00/acre
Irrigation Maintenance	Season	Irrigation repair materials @ \$33.33/acre
Insurance	Season	Crop insurance \$14.40/acre Picker insurance \$20.00/acre Trellis insurance \$15.00/acre
Trellis Repair	April	Trellis material @ \$26.67/acre
Twine	April	Custom hire @ \$70.00/acre Twine & clips @ \$120.00/acre
Spray Fertilizer Powdery mildew spray	May	Leaf foliar @ \$10.00/acre 2 ounces of Rally @ \$4.10/ounce
Spray Fertilizer Aphid spray Powdery mildew spray Downy mildew spray	June	Leaf foliar @ \$10.00/acre 4 ounces of Provado @ \$3.71/ounce 3 ounces of Rally @ \$4.10/ounce 1.25 lbs. of Alliette @ \$9.10/lb.
Spray Mite spray Mite spray Powdery mildew spray	July	0.75 gal. of crop oil @ \$2.25/gal. 12 ounces of Agrimek @ \$4.61/ounce 4 ounces of Rally @ \$4.10/ounce
Spray Mite spray Mite spray Powdery mildew spray	August	0.75 gal. of crop oil @ \$2.25/gal. 16 ounces of Agrimek @ \$4.61/ounce 4 ounces of Rally @ \$4.10/ounce
Pick Hops	Sept.	Electricity for 12.0 bales @ \$1.20/bale
Dry Hops	Sept.	Custom hire 12.0 bales @ \$1.50/bale Kiln fuel for 12.0 bales @ \$8.00/bale
Bale Hops	Sept.	Custom hire 12.0 bales @ \$3.25/bale Burlap for 12.0 bales @ \$3.50/bale
Overhead	Annual	7.5% of variable cost

TABLE 8.3: ITEMIZED COST PER ACRE FOR PRODUCING SUPER ALPHA HOPS DURING THE FIRST YEAR OF PRODUCTION UNDER DRIP IRRIGATION IN THE YAKIMA VALLEY OF WASHINGTON STATE, 1999.

		PRICE OR		VALUE OR	YOUR
	UNIT	COST/UNIT	QUANTITY	COST	FARM
-----					
VARIABLE COSTS		\$		\$	
CUSTOM FERTILIZATION	ACRE	5.00	1.00	5.00	_____
MARCH FERTILIZER	ACRE	50.00	1.00	50.00	_____
CUSTOM TWINING	ACRE	70.00	1.00	70.00	_____
TWINE & CLIPS	ACRE	120.00	1.00	120.00	_____
TRELLIS MATERIAL	ACRE	26.67	1.00	26.67	_____
IRRIGATION MATERIAL	ACRE	33.33	1.00	33.33	_____
LEAF FOLIAR	ACRE	10.00	2.00	20.00	_____
RALLY	OZ.	4.10	13.00	53.30	_____
PROVADO	OZ.	3.71	4.00	14.84	_____
ALLIETTE	LB.	9.10	1.25	11.37	_____
AGRIMEK	OZ.	4.61	28.00	129.08	_____
CROP OIL	GAL.	2.25	1.50	3.38	_____
WATER CHARGE	ACRE	50.00	1.00	50.00	_____
FERTIGATION MATERIAL	ACRE	75.00	1.00	75.00	_____
LINE CLEANER	ACRE	20.00	1.00	20.00	_____
ELECTRICITY	BALE	1.20	12.00	14.40	_____
BURLAP	BALE	3.50	12.00	42.00	_____
KILN FUEL	BALE	8.00	12.00	96.00	_____
CROP INSURANCE	ACRE	14.40	1.00	14.40	_____
PICKER INSURANCE	ACRE	20.00	1.00	20.00	_____
TRELLIS INSURANCE	ACRE	15.00	1.00	15.00	_____
HAND LABOR	HOUR	7.80	71.48	557.54	_____
LABOR (TRAC/MACH)	HOUR	9.00	23.29	209.60	_____
OPERATOR/MECHANIC	HOUR	18.00	1.50	27.00	_____
OPERATOR HELPER	HOUR	12.00	1.50	18.00	_____
CUTTING OPERATORS	HOUR	12.00	2.75	33.00	_____
FOREMAN	HOUR	15.20	5.00	76.00	_____
MECHANIC	HOUR	13.60	5.00	68.00	_____
HOP DRYER	BALE	1.50	12.00	18.00	_____
HOP BALERS	BALE	3.25	12.00	39.00	_____
TRACTOR REPAIR	ACRE	16.91	1.00	16.91	_____
TRACTOR FUEL/LUBE	ACRE	23.17	1.00	23.17	_____
MACHINERY REPAIRS*	ACRE	60.32	1.00	60.32	_____
MACHINE FUEL/LUBE	ACRE	35.02	1.00	35.02	_____
INTEREST ON OP. CAP.	ACRE	61.89	1.00	61.89	_____
OVERHEAD	ACRE	159.55	1.00	159.55	_____
				-----	
TOTAL VARIABLE COST				2286.81	_____
FIXED COSTS		\$		\$	
TRACTOR DEPRECIATION	ACRE	19.37	1.00	19.37	_____
TRACTOR INTEREST	ACRE	24.55	1.00	24.55	_____
TRACTOR INSURANCE	ACRE	1.64	1.00	1.64	_____
TRACTOR TAXES	ACRE	4.91	1.00	4.91	_____
MACHINE DEPRECIATION	ACRE	147.44	1.00	147.44	_____
MACHINE INTEREST*	ACRE	195.41	1.00	195.41	_____
MACHINE INSURANCE*	ACRE	13.03	1.00	13.03	_____
MACHINE TAXES*	ACRE	39.08	1.00	39.08	_____
AMORT. PLANT COST	ACRE	120.60	1.00	120.60	_____
AMORT. IRRIG. COST	ACRE	100.30	1.00	100.30	_____
AMORT. TRELLIS COST	ACRE	239.33	1.00	239.33	_____
LAND COSTS	ACRE	198.00	1.00	198.00	_____
LAND TAXES	ACRE	70.00	1.00	70.00	_____
MANAGEMENT	ACRE	150.00	1.00	150.00	_____
				-----	
TOTAL FIXED COST				1323.66	_____
				-----	
TOTAL COST				3610.47	_____
-----					

\*INCLUDES BUILDINGS, SHOP TOOLS, AND CONTAINMENT TANKS.

TABLE 9.3: SCHEDULE OF OPERATIONS AND ESTIMATED COSTS PER ACRE FOR PRODUCING SUPER ALPHA HOPS DURING THE MATURE YEARS OF PRODUCTION UNDER DRIP IRRIGATION IN THE YAKIMA VALLEY OF WASHINGTON STATE, 1999.

OPERATION	TOOLING	MTH	YEAR	MACH HOURS	LABOR HOURS	VARIABLE COST						TOTAL VARIABLE COST	TOTAL COST
						TOTAL FIXED COST	FUEL, LUBE, & REPAIRS	LABOR	SERVICE	MATER.	INTER.		
						\$	\$	\$	\$	\$	\$		
CULTIVATE	100HP-WT, 12' CULTIVATOR	MAR	1999	.40	.44	5.41	2.54	3.96	.00	.00	.34	6.85	12.25
LAYOUT DRIP TUBE	60HP-WT, WIRE/TUBE ROLLER	MAR	1999	1.00	2.20	6.27	5.24	18.48	.00	.00	1.25	24.97	31.24
ADJUST DRIP TUBE	HAND LABOR	MAR	1999	.00	1.00	.00	.00	7.80	.00	.00	.41	8.21	8.21
IRRIGATE & FERT.	DRIP IRRIGATION	SEA	1999	.00	5.50	.00	.00	49.50	50.00	95.00	8.75	203.25	203.25
IRRIG. MAINTEN.	HAND LABOR	SEA	1999	.00	3.00	.00	.00	23.40	.00	50.00	3.30	76.70	76.70
INSURANCE	CROP, PICKER AND TRELLIS	SEA	1999	.00	.00	.00	.00	.00	53.00	.00	2.39	55.39	55.39
TRELLIS REPAIR	60HP-WT, SLED	APR	1999	1.00	1.10	6.27	5.11	9.90	.00	40.00	2.48	57.49	63.76
TRELLIS REPAIR	TRUCK	APR	1999	1.00	1.10	1.53	2.92	9.90	.00	.00	.58	13.39	14.92
TRELLIS REPAIR	HAND LABOR	APR	1999	.00	7.00	.00	.00	54.60	.00	.00	2.46	57.06	57.06
PRUNE VINES	60HP-WT, MECHANICAL PRUNER	APR	1999	.50	.55	5.74	4.22	4.95	.00	.00	.41	9.58	15.33
TWINE	TRUCK	APR	1999	1.00	.00	1.53	2.92	.00	.00	.00	.13	3.05	4.58
TWINE	60HP-WT, SLED	APR	1999	1.00	.00	6.27	5.11	.00	.00	.00	.23	5.34	11.61
TWINE	CUSTOM HIRED	APR	1999	.00	.00	.00	.00	.00	70.00	120.00	8.55	198.55	198.55
RETWINE	HAND LABOR	MAY	1999	.00	1.00	.00	.00	7.80	.00	.00	.29	8.09	8.09
TRAIN	HAND LABOR	MAY	1999	.00	6.00	.00	.00	46.80	.00	.00	1.76	48.55	48.55
CULTIVATE	100HP-WT, 12' CULTIVATOR	MAY	1999	.40	.44	5.41	2.54	3.96	.00	.00	.24	6.75	12.16
TRAIN	HAND LABOR	MAY	1999	.00	5.00	.00	.00	39.00	.00	.00	1.46	40.46	40.46
SPRAY	60HP-WT, BLAST SPRAYER	MAY	1999	.50	.60	3.58	2.61	5.40	.00	26.40	1.29	35.70	39.27
PUT UP HEADS	HAND LABOR	MAY	1999	.00	4.00	.00	.00	31.20	.00	.00	1.17	32.37	32.37
APPLY HERBICIDE	60HP-WT, REAR SPRAYER	MAY	1999	.33	.37	2.45	2.15	3.30	.00	22.50	1.05	29.00	31.45
SPRAY	60HP-WT, BLAST SPRAYER	JUN	1999	.50	.60	3.58	2.61	5.40	.00	68.09	2.28	78.38	81.96
CULTIVATE	100HP-WT, 12' CULTIVATOR	JUN	1999	.40	.44	5.41	2.54	3.96	.00	.00	.20	6.70	12.11
SPRAY	60HP-WT, BLAST SPRAYER	JUN	1999	.50	.60	3.58	2.61	5.40	.00	20.50	.86	29.36	32.94
MISC. FIELD WORK	HAND LABOR	SEA	1999	.00	10.00	.00	.00	78.00	.00	.00	3.51	81.51	81.51
SPRAY	60HP-WT, BLAST SPRAYER	JUL	1999	.50	.60	3.58	2.61	5.40	.00	104.71	2.54	115.25	118.83
APPLY HERBICIDE	60HP-WT, REAR SPRAYER	JUL	1999	.33	.37	2.45	2.15	3.30	.00	22.50	.63	28.58	31.03
SPRAY	60HP-WT, BLAST SPRAYER	JUL	1999	.50	.60	3.58	2.61	5.40	.00	28.70	.83	37.53	41.11
SPRAY	60HP-WT, BLAST SPRAYER	AUG	1999	.50	.60	3.58	2.61	5.40	.00	104.71	1.69	114.41	117.98
CUT VINES	TOP CUTTER	SEP	1999	1.43	1.57	8.80	9.68	18.84	.00	.00	.21	28.73	37.53
CUT VINES	60HP-WT, BOTTOM CUTTER	SEP	1999	1.43	1.57	8.53	7.38	18.84	.00	.00	.20	26.41	34.95
CUT VINES	EXTRA HAND LABOR (3)	SEP	1999	.00	4.72	.00	.00	36.82	.00	.00	.28	37.09	37.09
HAUL VINES	TRUCKS	SEP	1999	7.15	7.87	10.92	20.86	70.83	.00	.00	.69	92.38	103.30
PICK HOPS	DAUEHAUER DOUBLE RECLENER	SEP	1999	1.43	.00	340.87	30.64	.00	.00	18.00	.36	49.01	389.88
PICK HOPS	OPERATOR/MECHANIC & HELPER	SEP	1999	.00	3.43	.00	.00	51.48	.00	.00	.39	51.87	51.87
PICK HOPS	HAND LABOR (8)	SEP	1999	.00	12.56	.00	.00	97.97	.00	.00	.73	98.70	98.70
TEND KILN	HAND LABOR (2)	SEP	1999	.00	3.08	.00	.00	24.02	.00	.00	.18	24.20	24.20
DRY HOPS	HOP DRYER	SEP	1999	.00	.00	.00	.00	.00	22.50	120.00	1.07	143.57	143.57
BALE HOPS	HOP BALERS	SEP	1999	.00	.00	.00	.00	.00	48.75	52.50	.76	102.01	102.01
MOVE&LOAD BALES	HYSTER LOADER	SEP	1999	.50	.55	10.96	1.78	4.95	.00	.00	.05	6.79	17.75

TABLE 9.3: CONTINUED

OPERATION	TOOLING	MTH YEAR	MACH HOURS	LABOR HOURS	TOTAL FIXED COST	VARIABLE COST					TOTAL VARIABLE COST	TOTAL COST
						FUEL, LUBE, & REPAIRS	LABOR	SERVICE	MATER.	INTER.		
						\$	\$	\$	\$	\$	\$	\$
SPR. VINE WASTE	TRACTOR/BACKHOE/LOADER	SEP 1999	.40	.44	4.09	2.23	3.96	.00	.00	.05	6.24	10.33
SPR. VINE WASTE	SPREADER TRUCKS	SEP 1999	.80	.88	5.94	5.98	7.92	.00	.00	.10	14.00	19.94
PULL DRIP TUBES	HAND LABOR	OCT 1999	.00	2.00	.00	.00	15.60	.00	.00	.00	15.60	15.60
ROLLUP DRIP TUBE	60HP-WT, WIRE/TUBE ROLLER	OCT 1999	1.00	2.20	6.27	5.24	18.48	.00	.00	.00	23.72	30.00
BALE STORAGE	STORAGE SHED	ANN 1999	.00	.00	3.16	.00	.00	.00	.00	.00	.00	3.16
MISC USE	TRACTOR/LOADER	ANN 1999	.40	.44	2.15	1.58	3.96	.00	.00	.25	5.79	7.94
MISC USE	TRACTOR/BACKHOE/LOADER	ANN 1999	.80	.88	8.18	4.46	7.92	.00	.00	.56	12.94	21.12
MISC USE	SPREADER TRUCKS	ANN 1999	.40	.44	2.97	2.99	3.96	.00	.00	.31	7.26	10.23
SKILLED LABOR	FULL TIME MECHANIC	ANN 1999	.00	5.00	.00	.00	68.00	.00	.00	3.06	71.06	71.06
MISC USE	SERVICE TRUCK	ANN 1999	.25	.00	1.76	1.70	.00	.00	.00	.08	1.78	3.54
SUPERVISION	FULL TIME FOREMAN	ANN 1999	.00	5.00	.00	.00	76.00	.00	.00	3.42	79.42	79.42
MISC USE	FOREMAN'S PICKUP	ANN 1999	.60	.00	4.28	3.66	.00	.00	.00	.16	3.82	8.10
MISC USE	MANAGER'S PICKUP	ANN 1999	1.00	.00	9.99	4.76	.00	.00	.00	.21	4.97	14.96
MISC USE	LABOR'S PICKUP (2)	ANN 1999	1.00	.00	2.68	4.76	.00	.00	.00	.21	4.97	7.66
MISC USE	MACHINE SHOP AND SHED	ANN 1999	.00	.00	4.52	.00	.00	.00	.00	.00	.00	4.52
MISC USE	SHOP TOOLS	ANN 1999	.00	.00	4.95	.00	.00	.00	.00	.00	.00	4.95
MISC USE	CONTAINMENT TANKS	ANN 1999	.00	.00	3.21	.00	.00	.00	.00	.00	.00	3.21
OVERHEAD	UTILITIES, LEGAL, ACCTNG, ETC.	ANN 1999	.00	.00	.00	.00	.00	174.36	.00	.00	174.36	174.36
ESTABLISHMT COST	6YR AMORT OF FIRST YEAR LOSS*	ANN 1999	.00	.00	136.09	.00	.00	.00	.00	.00	.00	136.09
ESTABLISHMT COST	7YR AMORT OF HOP PLANT COST	ANN 1999	.00	.00	155.93	.00	.00	.00	.00	.00	.00	155.93
ESTABLISHMT COST	21YR AMORT OF IRRIGATION COST	ANN 1999	.00	.00	116.55	.00	.00	.00	.00	.00	.00	116.55
ESTABLISHMT COST	21YR AMORT OF TRELIS COST	ANN 1999	.00	.00	278.09	.00	.00	.00	.00	.00	.00	278.09
TAXES	LAND	ANN 1999	.00	.00	70.00	.00	.00	.00	.00	.00	.00	70.00
LAND COST	6% RETURN ON BARE LAND VALUE	ANN 1999	.00	.00	198.00	.00	.00	.00	.00	.00	.00	198.00
MANAGEMENT	\$150 PER ACRE	ANN 1999	.00	.00	150.00	.00	.00	.00	.00	.00	.00	150.00
TOTAL PER ACRE			28.96	105.73	1619.11	160.78	961.77	418.61	893.61	64.40	2499.17	4118.28

\*FIRST-YEAR NET LOSS CALCULATIONS: \$3,610.47 - (2,400 X \$1.25) = \$610.47



Table 10.3: Materials and Services Used Per Acre by Operation for Producing Super Alpha Hops During the Mature Years of Production Under Drip Irrigation in the Yakima Valley of Washington State, 1999.

Operation	Month	Material and/or Service
Irrigate & Fertigate	Season	Water charge @ \$50.00/acre Fertilizer @ \$75.00/acre Line cleaner @ \$20.00/acre
Irrigation Maintenance	Season	Irrigation repair materials @ \$50.00/acre
Insurance	Season	Crop insurance @ \$18.00/acre Picker insurance @ \$20.00/acre Trellis insurance @ \$15.00/acre
Trellis Repair	April	Trellis material @ \$40.00/acre
Twine	April	Custom hire @ \$70.00/acre Twine & clips @ \$120.00/acre
Spray Fertilizer Powdery mildew spray	May	Leaf foliar @ \$10.00/acre 4 ounces of Rally @ \$4.10/ounce
Apply Herbicide	May	Herbicide @ \$22.50/acre
Spray Fertilizer Aphid spray Powdery mildew spray Downy mildew spray	June	Leaf foliar @ \$10.00/acre 4 ounces of Provado @ \$3.71/ounce 5 ounces of Rally @ \$4.10/ounce 2.5 lbs. of Alliette @ \$9.10/pound
Spray Powdery mildew spray	June	5 ounces of Rally @ \$4.10/ounce
Spray Mite spray Mite spray Powdery mildew spray	July	1 gallon of crop oil @ \$2.25/gal. 16 ounces of Agrimek @ \$4.61/ounce 7 ounces of Rally @ \$4.10/ounce
Apply Herbicide	July	Herbicide @ \$22.50/acre
Spray Powdery mildew spray	July	7 ounces of Rally @ \$4.10/ounce
Spray Mite spray Mite spray Powdery mildew spray	August	1 gallon of crop oil @ \$2.25/gal. 16 ounces of Agrimek @ \$4.61/ounce 7 ounces of Rally @ \$4.10/ounce
Pick Hops	Sept.	Electricity for 15.0 bales @ \$1.20/bale
Dry Hops	Sept.	Custom hire 15.0 bales @ \$1.50/bale Kiln fuel for 15.0 bales @ \$8.00/bale
Bale Hops	Sept.	Custom hire 15.0 bales @ \$3.25/bale Burlap for 15.0 bales @ \$3.50/bale
Overhead	Annual	7.5% of variable cost

TABLE 11.3: ITEMIZED COST PER ACRE FOR PRODUCING SUPER ALPHA HOPS  
DURING THE MATURE YEARS OF PRODUCTION UNDER DRIP  
IRRIGATION IN THE YAKIMA VALLEY OF WASHINGTON STATE, 1999.

		PRICE OR		VALUE OR	YOUR
	UNIT	COST/UNIT	QUANTITY	COST	FARM
-----					
VARIABLE COSTS		\$		\$	
CUSTOM TWINING	ACRE	70.00	1.00	70.00	_____
TWINE & CLIPS	ACRE	120.00	1.00	120.00	_____
TRELLIS MATERIAL	ACRE	40.00	1.00	40.00	_____
IRRIGATION MATERIAL	ACRE	50.00	1.00	50.00	_____
HERBICIDE	ACRE	22.50	2.00	45.00	_____
LEAF FOLIAR	ACRE	10.00	2.00	20.00	_____
RALLY	OZ.	4.10	35.00	143.50	_____
PROVADO	OZ.	3.71	4.00	14.84	_____
ALLIETTE	LB.	9.10	2.50	22.75	_____
AGRIMEK	OZ.	4.61	32.00	147.52	_____
CROP OIL	GAL.	2.25	2.00	4.50	_____
WATER CHARGE	ACRE	50.00	1.00	50.00	_____
FERTIGATION MATERIAL	ACRE	75.00	1.00	75.00	_____
LINE CLEANER	ACRE	20.00	1.00	20.00	_____
ELECTRICITY	BALE	1.20	15.00	18.00	_____
BURLAP	BALE	3.50	15.00	52.50	_____
KILN FUEL	BALE	8.00	15.00	120.00	_____
CROP INSURANCE	ACRE	18.00	1.00	18.00	_____
PICKER INSURANCE	ACRE	20.00	1.00	20.00	_____
TRELLIS INSURANCE	ACRE	15.00	1.00	15.00	_____
HAND LABOR	HOUR	7.80	61.56	480.17	_____
LABOR (TRAC/MACH)	ACRE	9.00	27.60	248.44	_____
OPERATOR/MECHANIC	HOUR	18.00	1.72	30.89	_____
OPERATOR HELPER	HOUR	12.00	1.72	20.59	_____
CUTTING OPERATORS	HOUR	12.00	3.14	37.68	_____
FOREMAN	HOUR	15.20	5.00	76.00	_____
MECHANIC	HOUR	13.60	5.00	68.00	_____
HOP DRYER	BALE	1.50	15.00	22.50	_____
HOP BALERS	BALE	3.25	15.00	48.75	_____
TRACTOR REPAIR	ACRE	22.26	1.00	22.26	_____
TRACTOR FUEL/LUBE	ACRE	29.71	1.00	29.71	_____
MACHINERY REPAIRS*	ACRE	71.02	1.00	71.02	_____
MACHINE FUEL/LUBE	ACRE	37.80	1.00	37.80	_____
INTEREST ON OP. CAP.	ACRE	64.40	1.00	64.40	_____
OVERHEAD	ACRE	174.36	1.00	174.36	_____
-----					
TOTAL VARIABLE COST				2499.17	_____
-----					
FIXED COSTS		\$		\$	
TRACTOR DEPRECIATION	ACRE	24.51	1.00	24.51	_____
TRACTOR INTEREST	ACRE	31.49	1.00	31.49	_____
TRACTOR INSURANCE	ACRE	2.10	1.00	2.10	_____
TRACTOR TAXES	ACRE	6.30	1.00	6.30	_____
MACHINE DEPRECIATION*	ACRE	168.05	1.00	168.05	_____
MACHINE INTEREST*	ACRE	222.63	1.00	222.63	_____
MACHINE INSURANCE*	ACRE	14.84	1.00	14.84	_____
MACHINE TAXES*	ACRE	44.53	1.00	44.53	_____
AMORT. 1ST YEAR LOSS	ACRE	136.09	1.00	136.09	_____
AMORT. PLANT COST	ACRE	155.93	1.00	155.93	_____
AMORT. IRRIG. COST	ACRE	116.55	1.00	116.55	_____
AMORT. TRELLIS COST	ACRE	278.09	1.00	278.09	_____
LAND COSTS	ACRE	198.00	1.00	198.00	_____
LAND TAXES	ACRE	70.00	1.00	70.00	_____
MANAGEMENT	ACRE	150.00	1.00	150.00	_____
-----					
TOTAL FIXED COST				1619.11	_____
-----					
TOTAL COST				4118.28	_____
-----					

\*INCLUDES BUILDINGS, SHOP TOOLS, AND CONTAINMENT TANKS.

Table 12.3: Annual Returns Per Acre Over Total Costs at Different Price and Yield Levels for Super Alpha Hops Grown Under Drip Irrigation in the Yakima Valley of Washington State, 1999.<sup>1</sup>

Price Per Lb. Lbs.	Yield Level						
	2,700 Lbs.	2,800 Lbs.	2,900 Lbs.	3,000 Lbs. <sup>2</sup>	3,100 Lbs.	3,200 Lbs.	3,300
\$	\$	\$	\$	\$	\$	\$	\$
1.00	-1570	-1464	-1358	-1252	-1146	-1040	-934
1.10	-1252	-1134	-1016	-898	-781	-663	-545
1.20	-934	-804	-674	-545	-416	-286	-156
1.25 <sup>2</sup>	-774	-639	-504	-368	-233	-97	38
1.30	-615	-474	-333	-191	51	91	232
1.40	-297	-144	9	162	315	468	613
1.50	21	186	351	516	666	817	967

<sup>1</sup> First-year production is assumed to be 80% mature year's production.

<sup>2</sup> Base situation.

Table 13: Machinery and Building Complement for a 500-Acre Hop Ranch Producing Hops in the Yakima Valley of Washington State.

Description	Replacement Value	Years of Life	Salvage Value	Annual Hours of Use	Annual Repair	Fuel Type	Gal. Per Hour
	\$		\$		\$		
100 HP-Wheel Tractor	40,000	20	6,000	500	1,000	Diesel	4.0
60 HP-4WD Wheel Tractor	24,000	20	4,800	500	1,000	Diesel	2.5
Tractor/Loader (Used)	10,000	20	1,000	200	300	Diesel	2.5
Tractor/Loader/Backhoe	50,000	15	5,000	500	1000	Diesel	4.0
Hyster Loader	12,000	7	2,400	100	150	Gas	1.5
Top Cutter	40,000	20	4,000	700	2000	Diesel	4.0
Bottom Cutter	5,000	20	0	700	500		
Auger W/3 Bits	1,900	20	0	10	15		
Sled	3000	20	0	300	200		
T-Bar w/Shanks	1,500	10	300	160	100		
12' Cultivator	4,000	15	700	100	45		
Blast Sprayer	12,000	15	2,000	750	575		
Rear Sprayer	5,000	20	0	250	500		
Mechanical Pruner	5,000	10	0	125	500		
Wire/Tube Roller	2,500	20	0	250	200		
Picking Equipment <sup>1</sup>	1,800,000	30	180,000	700	15,000		
Manager's Pickup	25,000	5	10,000	500	1,000	Gas	2.0
Foreman's Pickup (Used)	10,000	5	3,000	300	1,000	Gas	2.0
Labor's Pickup (Used)	3,000	5	700	250	500	Gas	2.0
Service Truck (Used)	6,000	8	500	150	400	Gas	3.0
Spreader Truck (Used)	15,000	10	3,000	300	1,000	Gas	3.0
Trucks (Used)	5,000	10	500	500	700	Gas	1.1
				<u>Acreage Covered</u>			
Machine Shop & Shed	25,000	30	0	500	0		
Shop Tools and Equipment	20,000	15	0	500	0		
Storage Shed	17,500	30	0	500	0		
Containment Tanks	15,000	20	0	500	0		
Irrigation System	1,000	15	0	1	50		

<sup>1</sup>The picking equipment includes a Dauenhauer double recleaner picking machine, a kiln with 7 dryers, baler, and protective buildings.

TABLE 14: HOURLY AND PER ACRE MACHINERY AND BUILDING COSTS

MACHINERY	PURCHASE PRICE	YEARS TO TRADE	ANNUAL HOURS	DEPREC-IATION	INTER-EST	INSUR-ANCE	TAXES	TOTAL FIXED COST	REPAIR	FUEL AND LUBE	TOTAL VARIABLE COST	TOTAL COST	
	\$							COST PER HOUR					
100HP-WT	40,000.00	20	500	3.40	4.14	.28	.83	8.64	2.00	3.91	5.91	14.55	
60HP-4WD-WT	24,000.00	20	500	1.92	2.59	.17	.52	5.20	2.00	2.44	4.44	9.64	
TRACTOR/LOADER	10,000.00	20	200	2.25	2.48	.17	.50	5.39	1.50	2.44	3.94	9.33	
TRAC/LOADER/BACKHOE	50,000.00	15	500	6.00	4.95	.33	.99	12.27	2.00	3.91	5.91	18.18	
HYSTER LOADER	12,000.00	7	100	13.71	6.48	.43	1.30	21.92	1.50	2.07	3.57	25.49	
TOP CUTTER	40,000.00	20	700	2.57	2.83	.19	.57	6.15	2.86	3.91	6.77	12.92	
BOTTOM CUTTER	5,000.00	20	700	.36	.32	.02	.06	.76	.71	.00	.71	1.48	
AUGER W/3 BITS	1,900.00	20	10	9.50	8.55	.57	1.71	20.33	1.50	.00	1.50	21.83	
SLED	3,000.00	20	300	.50	.45	.03	.09	1.07	.67	.00	.67	1.74	
T-BAR W/SHANKS	1,500.00	10	160	.75	.51	.03	.10	1.39	.63	.00	.63	2.02	
12' CULTIVATOR	4,000.00	15	100	2.20	2.12	.14	.42	4.88	.45	.00	.45	5.33	
BLAST SPRAYER	12,000.00	15	750	.89	.84	.06	.17	1.95	.77	.00	.77	2.72	
REAR SPRAYER	5,000.00	20	250	1.00	.90	.06	.18	2.14	2.00	.00	2.00	4.14	
MECHANICAL PRUNER	5,000.00	10	125	4.00	1.80	.12	.36	6.28	4.00	.00	4.00	10.28	
WIRE/TUBE ROLLER	2,500.00	20	250	.50	.45	.03	.09	1.07	.80	.00	.80	1.87	
PICKING EQUIPMT	1,800,000.00	30	700	77.14	127.29	8.49	25.46	238.37	21.43	.00	21.43	259.80	
MANAGER'S PICKUP	25,000.00	5	500	6.00	3.15	.21	.63	9.99	2.00	2.76	4.76	14.75	
FOREMAN'S PICKUP	10,000.00	5	300	4.67	1.95	.13	.39	7.14	3.33	2.76	6.09	13.23	

Table 15: Input Prices

Description	Unit	Price
Services:		\$
Custom Disc	Acre	12.00
Custom Subsoil	Acre	20.00
Custom Plow	Acre	17.00
Custom Cultipack/Springtooth	Acre	10.00
Custom Setting of Anchor Pins	Hole	3.50
Custom Twining	Acre	70.00
Custom Fertilizing	Acre	5.00
Water Charge	Acre	50.00
Labor:		
Hand Labor	Hour	7.80
Machine Operator	Hour	9.00
Irrigator	Hour	9.00
Cutter Drivers	Hour	12.00
Mechanic	Hour	13.60
Foreman	Hour	15.20
Picker Operator	Hour	18.00
Picker Operator Helper	Hour	10.00
Hop Dryers	Bale	1.50
Hop Balers	Bale	3.25
Materials:		
Field Poles (treated)	Pole	10.50
Anchor Poles (treated)	Pole	15.00
Anchor Pin Material	Hole	6.50
Wire	Pound	.32
Staples	Acre	1.00
Electricity	Bale	1.20
Roots	Root	.15
Burlap	Bale	3.50
Twine and Clips	Acre	120.00
Kiln Fuel	Bale	8.00
March Fertilizer	Acre	50.00
Fertigation Material	Acre	100.00
Line Cleaner	Acre	35.00
Rally	Ounce	4.10
Provado	Ounce	3.71
Alliette	Ounce	0.71
Agrimek	Ounce	4.61
Crop Oil	Gallon	2.25
Gasoline	Gallon	1.20
Diesel	Gallon	.85
Other:		
Land Taxes	Acre	70.00

# Appendix II

Understanding and Using

WSU

Hop Enterprise Budgets

## **Understanding and Using WSU Hop Enterprise Budgets**

The purpose of these hop budgets is to estimate the costs and returns of producing hops for research and policy purposes and to provide producers and their credit providers with a tool to use in determining the financial requirements of the enterprise.

These budgets were assembled by a group of progressive producers in the area working with a WSU extension economist. It is fully realized by those involved in this process that the resulting enterprise budgets do not represent any one particular farm and must be modified by individual producers to fit their situation. However, the resulting budgets are reasonable estimates for the area.

Producers reviewing these budgets most likely will state their own costs are lower than those presented. Furthermore, others outside the industry may question the cost estimates and “break-even” prices stating, “Since some WSU budgets show producers are operating at a loss, how do they stay in business?” To adequately address these concerns and questions, one must understand the difference between “economic” and “financial” budgets and how an economic budget can be used to develop a financial budget.

WSU enterprise budgets are economic budgets. The budget shown in Table 16, the itemized cost per acre for producing alpha (Galena) hops during the mature years of production, is the same budget shown in Table 11.2, page 35, of this bulletin. In developing this budget, it was assumed that the representative hop farm includes 550 acres with 480 acres currently in hops with an additional 20 acres being added to the hop enterprise. It is also assumed for every acre of hops planted, one-tenth of an acre is used for roads, buildings, farmstead, etc. The hop yield for this budget is assumed to be 1,904 lbs.

This budget indicates the total cost per acre to produce an acre of alpha hops to be \$4,098 and that to break even the producer must clear \$2.15 per pound, net of marketing costs. Any price received above \$2.15 per pound is a return to the producer for risk incurred in producing the crop.

While individual producers may differ relative to the type and amount of inputs and the yield, the main sources of confusion are establishment costs and the cost of owned capital, labor, and land. To fully understand these hop budgets, one must understand the concepts of opportunity cost and amortized establishment cost.

Opportunity cost is the revenue lost by not investing in the next best similar risk alternative. For instance, if a producer invests \$50,000 of equity capital in equipment, the producer gives up the alternative of investing this money in the stock market or paying off a current loan. Thus, if the producer is to realize an “economic” profit, the equipment investment must realize a return greater than that associated with the next best alternative. If the next best alternative happens to be paying off a current loan with 9% annual interest, economic profits are not realized until a net return greater than \$4,500 is realized by the equipment investment. Thus, the hop enterprise budgets reflect an interest cost on both owned and borrowed capital.



**TABLE 16: WSU ECONOMIC ENTERPRISE BUDGET**

ITEMIZED COST PER ACRE FOR PRODUCING ALPHA HOPS DURING  
THE MATURE YEARS OF PRODUCTION UNDER DRIP IRRIGATION  
IN THE YAKIMA VALLEY OF WASHINGTON STATE, 1999.

		PRICE OR		VALUE OR	YOUR
	UNIT	COST/UNIT	QUANTITY	COST	FARM
-----					
VARIABLE COSTS		\$		\$	
CUSTOM TWINING	ACRE	70.00	1.00	70.00	_____
TWINE & CLIPS	ACRE	120.00	1.00	120.00	_____
TRELLIS MATERIAL	ACRE	40.00	1.00	40.00	_____
IRRIGATION MATERIAL	ACRE	50.00	1.00	50.00	_____
HERBICIDE	ACRE	22.50	2.00	45.00	_____
LEAF FOLIAR	ACRE	10.00	2.00	20.00	_____
RALLY	OZ.	4.10	35.00	143.50	_____
PROVADO	OZ.	3.71	4.00	14.84	_____
ALLIETTE	LB.	9.10	2.50	22.75	_____
AGRIMEK	OZ.	4.61	32.00	147.52	_____
CROP OIL	GAL.	2.25	2.00	4.50	_____
WATER CHARGE	ACRE	50.00	1.00	50.00	_____
FERTIGATION MATERIAL	ACRE	75.00	1.00	75.00	_____
LINE CLEANER	ACRE	20.00	1.00	20.00	_____
ELECTRICITY	BALE	1.20	9.52	11.42	_____
BURLAP	BALE	3.50	9.52	33.32	_____
KILN FUEL	BALE	8.00	9.52	76.16	_____
CROP INSURANCE	ACRE	1.00	18.00	18.00	_____
PICKER INSURANCE	ACRE	1.00	20.00	20.00	_____
TRELLIS INSURANCE	ACRE	1.00	15.00	15.00	_____
HAND LABOR	HOUR	7.80	58.58	456.92	_____
LABOR (TRAC/MACH)	HOUR	9.00	26.03	234.23	_____
OPERATOR/MECHANIC	HOUR	18.00	1.42	25.56	_____
OPERATOR HELPER	HOUR	12.00	1.42	17.04	_____
CUTTING OPERATORS	HOUR	12.00	2.60	31.20	_____
FOREMAN	HOUR	15.20	5.00	76.00	_____
MECHANIC	HOUR	13.60	5.00	68.00	_____
HOP DRYER	BALE	1.50	9.52	14.28	_____
HOP BALERS	BALE	3.25	9.52	30.94	_____
TRACTOR REPAIR	ACRE	21.76	1.00	21.76	_____
TRACTOR FUEL/LUBE	ACRE	29.10	1.00	29.10	_____
MACHINERY REPAIRS*	ACRE	62.75	1.00	62.75	_____
MACHINE FUEL/LUBE	ACRE	34.55	1.00	34.55	_____
INTEREST ON OP. CAP.	ACRE	63.19	1.00	63.19	_____
OVERHEAD	ACRE	162.19	1.00	162.19	_____
				-----	
TOTAL VARIABLE COST				2324.73	_____
-----					
FIXED COSTS		\$		\$	
TRACTOR DEPRECIATION	ACRE	24.03	1.00	24.03	_____
TRACTOR INTEREST	ACRE	30.84	1.00	30.84	_____
TRACTOR INSURANCE	ACRE	2.06	1.00	2.06	_____
TRACTOR TAXES	ACRE	6.17	1.00	6.17	_____
MACHINE DEPRECIATION*	ACRE	144.44	1.00	144.44	_____
MACHINE INTEREST*	ACRE	188.23	1.00	188.23	_____
MACHINE INSURANCE*	ACRE	12.55	1.00	12.55	_____
MACHINE TAXES*	ACRE	37.65	1.00	37.65	_____
AMORT. 1ST YEAR LOSS	ACRE	358.51	1.00	358.51	_____
AMORT. PLANT COST	ACRE	155.93	1.00	155.93	_____
AMORT. IRRIG. COST	ACRE	116.55	1.00	116.55	_____
AMORT. TRELLIS COST	ACRE	278.09	1.00	278.09	_____
LAND COSTS	ACRE	198.00	1.00	198.00	_____
LAND TAXES	ACRE	70.00	1.00	70.00	_____
MANAGEMENT	ACRE	150.00	1.00	150.00	_____
				-----	
TOTAL FIXED COST				1773.05	_____
				-----	
TOTAL COST				4097.78	_____
-----					

\*INCLUDES BUILDINGS, SHOP TOOLS, AND CONTAINMENT TANKS.

BREAK-EVEN PRICE CALCULATED AS \$4,097.78/1,904 LBS. = \$2.15/LB.

The same is true for operator labor and management, and owned land. In calculating labor and management costs, operator labor and management are valued at their opportunity cost of being hired out to a neighboring farmer, or the dollar amount it would cost to hire someone else to do the labor and management being furnished by the producer. For land owned, the opportunity cost included in the hop budgets is the return the producer would like to receive from his or her land investment over and above any appreciation in land values that may occur.

Establishment costs are those incurred during the establishment of the enterprise. In the case of hops, establishment costs include the establishment of the trellis system, the irrigation system, and planting the hop roots. During the life of these investments, 21 years for the trellis and irrigation system and 7 years for the hop roots, these establishment costs plus a return equal to the expected return from the next best alternative (opportunity cost) need to be recovered. Thus, in the case of the irrigation system that cost \$1,086 to establish, assuming a 9% opportunity cost, \$116.55 per year is needed to pay this investment off over 21 years. In short, in regards to opportunity and amortized establishment cost, it is assumed the owner of capital assets and unpaid labor and management want a market return for these resources. If full economic costs are not covered, a less than market return is being realized on these resources.

Since most producers have equity in their farm business and provide labor and management associated with running their operation, in order to determine a given producer's costs excluding opportunity costs (i.e., financial costs), adjustments must be made to the "economic" hop budgets presented in this bulletin. Let us assume, for example, a producer in the Yakima Valley agrees with all the hop budget figures (including establishment cost figures) for alpha hops except interest, management, machinery and land costs. This owner-operator owns all land and equipment and furnishes all management on the farm. Being a full-time manager, the amount of actual unpaid labor the producer contributes to the operation is minimal. This person has outstanding real estate loans of \$825,000 and outstanding machinery loans of \$450,000 on which 9% interest is being paid. The producer also carries approximately \$600,000 in operating loans for an average of 6 months per year at 10% annual interest and estimates an annual expense of approximately \$100,000 for tractor and machinery replacement. Wanting only one budget to estimate per acre financial cost, average yearly production is dropped from 1,904 pounds per acre to 1,795 pounds (8.975 bales) to account for the lesser production in the baby hop years.

Table 17, a financial budget for the producer in the example above, is a modification of Table 16. In doing this modification, other than decreasing average production to take into account baby year production, all opportunity costs on equity capital and unpaid operator labor and management are eliminated. The specific modifications made to the "economic" budget shown in Table 16 are displayed in bold in Table 17. All items calculated on a per bale basis (electricity, burlap, kiln fuel, etc.) were modified by the decrease in average production due to including the baby year in the average. All depreciation costs were replaced with annual replacement cost per acre. Management cost was eliminated since the operator furnishes all management. All other modifications, with the exception of overhead, have to do with eliminating all opportunity cost on equity capital and including only interest costs actually paid.

Thus, the establishment costs shown in Table 17 are the actual cost of establishment for the trellis, irrigation system, and plants allocated over their years of life on a per acre basis. Interest on operating capital is that actually paid on a per acre basis as is the interest on the machine loans and the real estate loans. Overhead is calculated, as calculated in the economic budget, as being 7.5% of all variable cost.

The resulting budget is the financial cost of producing hops on a per acre basis for the producer in the given example. This budget indicates the total financial cost per acre to produce an acre of alpha hops to be \$3,152 and that to break even the producer must clear \$1.76 per pound, net of marketing cost. Any returns above these costs are returns to the operator's management, equity capital and risk-essentially taxable income.

Thus, it can be seen why producers who have sizable equity in their farm business can often "survive" at prices below those determined as break-even prices by WSU crop enterprise budgets. However, it must still be realized if the enterprise does not return full cost of production (financial and opportunity), the owner-operator is not earning a return on labor, management, and capital contributions equivalent to those that could be generated by the producer's labor, management, and capital contributions if they had been invested in the next best similar risk alternative.

**TABLE 17: EXAMPLE FINANCIAL ENTERPRISE BUDGET**

ITEMIZED COST PER ACRE FOR PRODUCING ALPHA HOPS DURING  
THE MATURE YEARS OF PRODUCTION UNDER DRIP IRRIGATION  
IN THE YAKIMA VALLEY OF WASHINGTON STATE, 1999.

		PRICE OR		VALUE OR	YOUR
	UNIT	COST/UNIT	QUANTITY	COST	FARM
-----					
VARIABLE COSTS		\$		\$	
CUSTOM TWINING	ACRE	70.00	1.00	70.00	_____
TWINE & CLIPS	ACRE	120.00	1.00	120.00	_____
TRELLIS MATERIAL	ACRE	40.00	1.00	40.00	_____
IRRIGATION MATERIAL	ACRE	50.00	1.00	50.00	_____
HERBICIDE	ACRE	22.50	2.00	45.00	_____
LEAF FOLIAR	ACRE	10.00	2.00	20.00	_____
RALLY	OZ.	4.10	35.00	143.50	_____
PROVADO	OZ.	3.71	4.00	14.84	_____
ALLIETTE	LB.	9.10	2.50	22.75	_____
AGRIMEK	OZ.	4.61	32.00	147.52	_____
CROP OIL	GAL.	2.25	2.00	4.50	_____
WATER CHARGE	ACRE	50.00	1.00	50.00	_____
FERTIGATION MATERIAL	ACRE	75.00	1.00	75.00	_____
LINE CLEANER	ACRE	20.00	1.00	20.00	_____
<b>ELECTRICITY</b>	<b>BALE</b>	<b>1.20</b>	<b>8.98</b>	<b>10.77</b>	_____
<b>BURLAP</b>	<b>BALE</b>	<b>3.50</b>	<b>8.98</b>	<b>31.41</b>	_____
<b>KILN FUEL</b>	<b>BALE</b>	<b>8.00</b>	<b>8.98</b>	<b>71.80</b>	_____
CROP INSURANCE	ACRE	1.00	18.00	18.00	_____
PICKER INSURANCE	ACRE	1.00	20.00	20.00	_____
TRELLIS INSURANCE	ACRE	1.00	15.00	15.00	_____
HAND LABOR	HOURL	7.80	58.58	456.92	_____
LABOR (TRAC/MACH)	HOURL	9.00	26.03	234.23	_____
OPERATOR/MECHANIC	HOURL	18.00	1.42	25.56	_____
OPERATOR HELPER	HOURL	12.00	1.42	17.04	_____
CUTTING OPERATORS	HOURL	12.00	2.60	31.20	_____
FOREMAN	HOURL	15.20	5.00	76.00	_____
MECHANIC	HOURL	13.60	5.00	68.00	_____
<b>HOP DRYER</b>	<b>BALE</b>	<b>1.50</b>	<b>8.98</b>	<b>13.46</b>	_____
<b>HOP BALERS</b>	<b>BALE</b>	<b>3.25</b>	<b>8.98</b>	<b>29.17</b>	_____
TRACTOR REPAIR	ACRE	21.76	1.00	21.76	_____
TRACTOR FUEL/LUBE	ACRE	29.10	1.00	29.10	_____
MACHINERY REPAIRS*	ACRE	62.75	1.00	62.75	_____
MACHINE FUEL/LUBE	ACRE	34.55	1.00	34.55	_____
<b>INTEREST ON OP. CAP.</b>	<b>ACRE</b>	<b>60.00</b>	<b>1.00</b>	<b>60.00</b>	_____
<b>OVERHEAD</b>	<b>ACRE</b>	<b>161.24</b>	<b>1.00</b>	<b>161.24</b>	_____
				-----	
<b>TOTAL VARIABLE COST</b>				<b>2311.08</b>	_____
FIXED COSTS		\$		\$	
<b>TRAC &amp; MACH REPLMT*</b>	<b>ACRE</b>	<b>200.00</b>	<b>1.00</b>	<b>200.00</b>	_____
TRAC & MACH INSUR*	ACRE	14.61	1.00	14.61	_____
TRAC & MACH TAXES*	ACRE	43.82	1.00	43.82	_____
<b>PLANT ESTAB COST-7YR</b>	<b>ACRE</b>	<b>111.31</b>	<b>1.00</b>	<b>111.31</b>	_____
<b>IRRIG ESTAB COST-21YR</b>	<b>ACRE</b>	<b>51.19</b>	<b>1.00</b>	<b>51.19</b>	_____
<b>TRELL ESTAB COST-21YR</b>	<b>ACRE</b>	<b>122.14</b>	<b>1.00</b>	<b>122.14</b>	_____
<b>INTEREST ON MACH LOAN</b>	<b>ACRE</b>	<b>81.00</b>	<b>1.00</b>	<b>81.00</b>	_____
<b>INTEREST ON R.E. LOAN</b>	<b>ACRE</b>	<b>148.50</b>	<b>1.00</b>	<b>148.50</b>	_____
LAND TAXES	ACRE	70.00	1.00	70.00	_____
				-----	
<b>TOTAL FIXED COST</b>				<b>842.57</b>	_____
				-----	
<b>TOTAL COST</b>				<b>3153.65</b>	_____
-----					

\*INCLUDES BUILDINGS, SHOP TOOLS AND CONTAINMENT TANKS.

BREAK-EVEN PRICE CALCULATED AS \$3,153.65/1,795 LBS. = \$1.76/LB.

Use pesticides with care. Apply them only to plants, animals, or sites listed on the label. When mixing and applying pesticides, follow all label precautions to protect yourself and others around you. It is violation of law to disregard label directions . If pesticides are spilled on skin or clothing, remove clothing and wash skin thoroughly. Store pesticides in their original containers and keep them out of the reach of children, pets, and livestock.

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