



<p>Farm Business Management Reports</p>		<p>EB1975E</p>
	<p>2004 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 2004. 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.

Table of Contents

Introduction.....	1
Source of Information.....	2
Basic Assumptions.....	2
Summary of Results.....	3
Table 1. Estimated per Acre Costs for Preparing and Establishing a Hop Field under Drip Irrigation.....	3
Table 2. Estimated per Acre Costs and Returns from Producing Aroma (Willamette) Hops under Drip Irrigation	5
Table 3. Estimated per Acre Costs and Returns from Producing Alpha (Galena & Nugget) Hops under Drip Irrigation.....	6
Table 4. Estimated per Acre Costs and Returns from Producing Super Alpha Hops under Drip Irrigation.....	7
Table 5. Prices Needed to Cover Costs at Different Average Mature Yield Levels for Aroma (Willamette) Hops	8
Table 6. Prices Needed to Cover Costs at Different Average Mature Yield Levels for Alpha (Galena & Nugget) Hops	8
Table 7. Prices Needed to Cover Costs at Different Average Mature Yield Levels for Super Alpha Hops.....	8
The Hop Cost Workbook.....	9
Understanding and Using WSU Hop Enterprise Budgets	10
Table 8. Estimated per Acre Costs and Returns From Producing Super Alpha Hops under Drip Irrigation (Financial Budget–Example 1)	12
Table 9. Estimated per Acre Costs and Returns From Producing Super Alpha Hops under Drip Irrigation (Financial Budget–Example 2)	14

2004 ESTIMATED COST OF PRODUCING HOPS UNDER DRIP IRRIGATION IN THE YAKIMA VALLEY, WASHINGTON STATE

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Introduction

In 2003, Washington State harvested 39.95 million pounds of hops from 19,492 acres, accounting for 74% of the U.S. production. Hops, with a value of \$87.6 million, rank 13th in agricultural commodity value in the state. All hop acreage in Washington State is in the Yakima Valley. Washington hop acreage has declined by 11,588 acres (38%) since 1997. This reduction is a result of a worldwide oversupply of hops created by the introduction of higher yielding varieties of hops and technological advances that have improved the efficiency of downstream processing. These factors have resulted in extremely poor market conditions. Additional acreage reductions may be realized in the next few years as the international hop industry seeks equilibrium between supply and demand.²

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/Nugget), and super alpha. The specific objectives were to: (1) provide estimates of capital requirements, production costs, and returns representative of well-managed hop enterprises growing these various types of hops under drip irrigation; and (2) give producers a procedure and a tool for analyzing the profitability of their own enterprise.

Due to assumptions and methods of gathering the information used in this study, the data in this publication should be considered 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, the Excel and Quattro Pro spreadsheets containing the data and results for this study are available on disc and over the Internet and can be easily modified by producers to estimate their own costs and returns. The primary value of this report is to identify the type of inputs, 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 that their own costs are lower than those presented. 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 explained in the section “Understanding and Using WSU Hop Enterprise Budgets,” beginning on page 10 of this bulletin. This section also explains why producers who have sizable equity in their farm businesses can often “survive” at prices below those determined as break-even prices by WSU crop enterprise budgets, and why it is

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economically sound for some producers to continue to produce even though they are not covering their full cost of production.

Sources of Information

A committee of area producers identified the inputs, yields, and assumptions under which the budgets were developed. These producers were considered to represent well-managed hop farms. The quantities and types of materials (plants, fertilizers, herbicides, insecticides, etc.) used in the budgets 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. Building and machinery costs were based on what producers thought would be typical of an average-sized hop farm in the Yakima Valley.

Basic Assumptions

The following assumptions were made in developing the enterprise data:

1. The representative farm, calculated as the average size in the Yakima Valley, is 420 acres with 360 acres in established hops and 20 acres in first-year production. It takes 1.1 acres of land to establish 1 acre of hops. Thus, on this example farm approximately 40 acres of extra land are needed for roads, buildings, picking equipment, etc.
2. Bare land is valued at \$2,500 per acre.
3. Hop poles and trellis systems have a 21-year life.
4. Hop plants have a 7-year life. The limit on hop plant life is due primarily to the need to change varieties.
5. A drip irrigation system costs \$1,000 per acre to install with a 21-year life. Annual repair and maintenance costs are \$15 per acre.
6. The water charge is \$75 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>	Price Range (\$/Lb.)
Aroma (Willamette)	804.0 lbs.	1,340 lbs.	\$2.75–\$3.05
Alpha (Galena/Nugget)	1,125.6 lbs.	1,876 lbs.	\$.50–\$1.40
Super Alpha	2,196.0 lbs.	2,745 lbs.	\$.50–\$1.40

Mature production for aroma and alpha hops is the three-year (2001–03) average for the state of Washington.³ First-year production for aroma and alpha hops is 60% of mature year production. First-year production for super alpha hops is 80% of mature year production.

³ Ann George, Administrator, Washington Hop Commission.

8. Management is valued at \$150 per acre.
9. The prevailing interest rate is 7.5%.

Summary of Results

Given the assumption listed above, Table 1 presents the estimated per acre establishment costs for all hops grown under drip irrigation at a planting of 14' x 3.5'. Establishment costs include land preparation in the fall of the previous year and constructing the trellis system, installing the irrigation system, and planting the roots in March of the first year of production.

TABLE 1. ESTIMATED COSTS PER ACRE FOR PREPARING AND ESTABLISHING A HOP FIELD UNDER DRIP IRRIGATION.

		Comments and Notes
LAND PREPARATION:	\$	October–November of Previous Year
Disc	22.00	Custom hire 1.1 acres @ \$20/acre
Subsoil	22.00	Custom hire 1.1 acres @ \$20/acre
Plow	33.00	Custom hire 1.1 acres @ \$30/acre
Cultipack/Sprtooth (2X)	33.00	Custom hire 1.1 acres @ \$15/acre each time
Fumigate	100.00	
Overhead	15.75	7.5% of land prep cost excl. interest
Interest	16.93	7.5% of land prep cost including overhead
Total Land Preparation Cost	242.68	
ESTABLISHMENT:		March of Year 1
Materials and Labor:		
Field Poles	660.00	55 poles @ \$12.00/pole
Anchor Poles	180.00	10 poles @ \$18.00/pole
Anchor Holes	35.00	10 holes @ \$3.50/hole
Anchor Pin Material	65.00	10 holes @ \$6.50/hole
Wire and Staples	673.00	2,100 lbs. of wire @ 32 cents/lb. Staples @ \$1/acre
Hop Roots	600.00	4,000 roots @ 15 cents/root
Part-time Labor	540.00	60 hours @ \$9/hour
Full-time Labor	120.00	10 hours @ \$12/hour
Irrigation System	1000.00	Labor and materials
Overhead	49.50	7.5% of labor cost
Interest	171.61	7.5% of establishment cost x 7/12 (7 months)
Total Establishment Cost	4094.11	
Total Land Preparation and Establishment Costs	4336.79	

NOTE: All machinery costs, other than custom hired, are included in Year 1 production costs.

Table 2 presents the estimated first year and a mature year's cost of production per acre under the given assumptions. The costs are divided into two categories. The first category, variable costs, is associated with operating machinery, labor, and purchasing services and materials. Variable costs include fuel, oil, repairs, fertilizer, chemicals, custom work, overhead, and interest on operating capital. Labor, including that provided by the owner-operator, is also included as a variable cost.

The second category, fixed costs, includes those costs that are incurred whether or not hops are grown. Fixed costs include machinery and building annual replacement cost (a proxy for depreciation), interest and taxes on investment, insurance, land establishment, and management cost. Land cost is valued at 7.5% of the bare land value, which represents the minimum return the producer desires on the land investment. Since 1.1 acres of land are required per acre of hops planted, the 7.5% fixed land cost is based on the estimated value of 1.1 acres of bare land (\$2,750).

An opportunity cost of \$150 per acre for management is also listed as a fixed cost. 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 or loses management skills during the production year.

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, a 7.5% return is assumed.

Fixed costs also include the establishment costs amortized over 7- or 21-year periods, depending on the type of establishment cost, at 7.5% interest. These amortized establishment year costs must be recaptured during the production years if the enterprise is to be profitable. Since the trellis and irrigation system lasts 21 years, the cost of establishing the trellis and the irrigation system are amortized over 21 years. Hop plants have a 7-year life due primarily to variety changes. Thus, planting costs are amortized over a 7-year period. The mature years of production also include, as a fixed cost, an amortization of the loss that occurred in the first year of production. 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 short, in regard 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, less than a fair market return is being realized on these resources.

Tables 3 and 4 present a summary of the first-year and mature-year production costs for alpha (Galena/Nugget) and super alpha hops grown under drip irrigation at a planting of 14' x 3.5', respectively.

TABLE 2. ESTIMATED PER ACRE COSTS AND RETURNS FROM PRODUCING AROMA (WILLAMETTE) HOPS UNDER DRIP IRRIGATION.

	Year 1	Mature Years	Comments and Notes	
	\$	\$		
Estimated Production Level	804.00	1340.00		
Estimated Price (Lb.)	2.90	2.90		
TOTAL RETURNS	2331.60	3886.00		
Variable Costs:				
Leaf Feed	65.00	65.00		
Fertilizer	100.00	60.00		
Herbicide	60.00	60.00		
Insecticide and Fungicide	250.00	300.00		
Parts and Repairs	200.00	200.00		
Fuel and Oil	80.00	80.00		
Twine and Clips	120.00	120.00		
Plastic	17.49	29.15	\$4.35	per bale
Kiln Fuel	44.22	73.70	\$11.00	per bale
Water Charge	75.00	75.00		
Irrigation Material	15.00	15.00		
Line Cleaner	15.50	15.50		
Electricity	60.00	60.00		
Foreman	76.00	76.00		
Hop Dryer & Baler	28.14	46.90	\$7.00	per bale
Labor	1075.00	1010.00		
Overhead	171.10	171.47	7.5% of all above variable costs	
Interest	91.97	92.16	7.5% of all above variable costs x 6/12 (6 mos.)	
Total Variable Costs	2544.41	2549.88		
Fixed Costs:				
Machinery & Building Annual Replacement Cost	225.00	225.00	\$85,500 per year for a 380 acre hop ranch	
Interest on Mach. & Buildings	200.00	200.00	\$1,013,333 @ 7.5% divided by 380 acres	
Insurance Cost (all farm)	170.00	170.00		
Amortized Establishment				
Planting Cost (7 years)	140.47	140.47	Roots + 16 hours of \$9 labor (\$744.00) @ 7.5%	
Total Land Prep. & Estab.				
- Planting Cost (21 years)	345.01	345.01	\$4,336.79 - 744.00 = \$3,592.79 @ 7.5%	
First-Year Loss (6 years)		369.00	7.50% amortized interest rate	
Land & Property Taxes	82.50	82.50	\$75 per acre x 1.1 acres	
Land Cost	206.25	206.25	(\$2,500 per acre x 1.1 acres) x 7.5%	
Management Cost	150.00	150.00		
Total Fixed Costs	1519.23	1888.23		
TOTAL COSTS	4063.64	4438.11	Break-Even Price = \$3.265	
Yearly Loss or Gain	-1732.04	-552.11		

TABLE 3. ESTIMATED PER ACRE COSTS AND RETURNS FROM PRODUCING ALPHA (GALENA & NUGGET) HOPS UNDER DRIP IRRIGATION.

	Year 1 \$	Mature Years \$	Comments and Notes	
Estimated Production Level (Lbs.)	1126.00	1876.00		
Estimated Price (Lb.)	1.40	1.40		
TOTAL RETURNS	1575.84	2626.40		
Variable Costs:				
Leaf Feed	65.00	65.00		
Fertilizer	100.00	60.00		
Herbicide	60.00	60.00		
Insecticide and Fungicide	250.00	300.00		
Parts and Repairs	200.00	200.00		
Fuel and Oil	80.00	80.00		
Twine and Clips	120.00	120.00		
Burlap	18.29	30.49	\$3.25	per bale
Kiln Fuel	61.91	103.18	\$11.00	per bale
Water Charge	75.00	75.00		
Irrigation Material	15.00	15.00		
Line Cleaner	15.50	15.50		
Electricity	60.00	60.00		
Foreman	76.00	76.00		
Hop Dryer & Baler	39.40	65.66	\$7.00	per bale
Labor	1075.00	1010.00		
Overhead	173.33	175.19	7.5% of all above variable costs	
Interest	93.17	94.16	7.5% of all above variable costs x 6/12 (6 months)	
Total Variable Costs	2577.59	2605.17		
Fixed Costs:				
Machinery & Building Annual				
Replacement Cost	225.00	225.00	\$85,500 per year for a 380-acre hop ranch	
Interest on Mach & Buildings	200.00	200.00	\$1,013,333 @ 7.5% divided by 380 acres	
Insurance Cost (all farm insurance)	170.00	170.00		
Amortized Establishment Costs:				
Planting Cost (7 years)	140.47	140.47	Roots + 16 hours of \$9 labor (\$744.00) @ 7.5%	
Total Land Prep. & Estab. Cost				
- Planting Cost (21 years)	345.01	345.01	\$4,336.79 - 744.00 = \$3,592.79 @ 7.5%	
First-Year Loss (6 years)		537.08	7.50%	amortized interest rate
Land & Property Taxes	82.50	82.50	\$75 per acre x 1.1	
Land Cost	206.25	206.25	(\$2,500 per acre x 1.1 acres) x 7.5%	
Management Cost	150.00	150.00		
Total Fixed Costs	1519.23	2056.31		
TOTAL COSTS	4096.82	4661.49	Break-Even Price = \$2.362	
Yearly Loss or Gain	-2520.98	-2035.09		

TABLE 4. ESTIMATED PER ACRE COSTS AND RETURNS FROM PRODUCING SUPER ALPHA HOPS UNDER DRIP IRRIGATION.

	Year 1	Mature Years	Comments and Notes	
	\$	\$		
Estimated Production Level (Lbs.)	2196.00	2745.00		
Estimated Price (Lb.)	1.40	1.40		
TOTAL RETURNS	3074.40	3843.00		
Variable Costs:				
Leaf Feed	65.00	65.00		
Fertilizer	100.00	60.00		
Herbicide	60.00	60.00		
Insecticide and Fungicide	300.00	350.00		
Parts and Repairs	200.00	200.00		
Fuel and Oil	80.00	80.00		
Twine and Clips	125.00	125.00		
Burlap	35.69	44.61	\$3.25	per bale
Kiln Fuel	120.78	150.98	\$11.00	per bale
Water Charge	75.00	75.00		
Irrigation Material	15.00	15.00		
Line Cleaner	15.50	15.50		
Electricity	60.00	60.00		
Foreman	76.00	76.00		
Hop Dryer & Baler	76.86	96.08	\$7.00	per bale
Labor	1075.00	1010.00		
Overhead	185.99	186.24	7.5% of all above variable costs	
Interest	99.97	100.10	7.5% of all above variable costs x 6/12 (6 months)	
Total Variable Costs	2765.78	2769.50		
Fixed Costs:				
Machinery & Building Annual				
Replacement Cost	225.00	225.00	\$85,500 per year for a 380-acre hop ranch	
Interest on Mach. & Buildings	200.00	200.00	\$1,013,333 @ 7.5% divided by 380 acres	
Insurance Cost (all farm)	170.00	170.00		
Amortized Establishment Costs:				
Planting Cost (7 years)	140.47	140.47	Roots + 16 hours of \$9 labor (\$744.00) @ 7.5%	
Total Land Prep. & Estab. Cost				
- Planting Cost (21 years)	345.01	345.01	\$4,336.79 - 744.00 = \$3,592.79 @ 7.5%	
First-Year Loss (6 years)		257.91	7.50% amortized interest rate	
Land & Property Taxes	82.50	82.50	\$75 per acre x 1.1 acres	
Land Cost	206.25	206.25	(\$2,500 per acre x 1.1 acres) x 7.5%	
Management Cost	150.00	150.00		
Total Fixed Costs	1519.23	1777.14		
TOTAL COSTS	4285.01	4546.64	Break-Even Price = \$1.619	
Yearly Loss or Gain	-1210.61	-703.64		

Tables 5, 6, and 7 present break-even prices at different average annual yield levels during the mature years 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.

Table 5. Prices Needed to Cover Cost at Different Average Mature Yield Levels for Aroma (Willamette) Hops.¹

Yield Level:	1100 lbs.	1200 lbs.	1300 lbs.	1340 lbs. ²	1400 lbs.	1500 lbs.	1600 lbs.
	\$	\$	\$	\$	\$	\$	\$
Break-even Price/Lb.	3.95	3.63	3.36	3.265	3.13	2.93	2.755

¹ Production during first-year production is 60% mature year's production level.

² Base situation.

Table 6. Prices Needed to Cover Cost at Different Average Mature Yield Levels for Alpha (Galena & Nugget) Hops.¹

Yield Level:	1600 lbs.	1700 lbs.	1800 lbs.	1876 lbs. ²	1900 lbs.	2000 lbs.	2100 lbs.
	\$	\$	\$	\$	\$	\$	\$
Break-even Price/Lb.	2.75	2.595	2.46	2.36	2.33	2.22	2.12

¹ Production during first-year production is 60% mature year's production level.

² Base situation.

Table 7. Prices Needed to Cover Cost at Different Average Mature Yield Levels for Super Alpha Hops:¹

Yield Level:	2500 lbs.	2600 lbs.	2700 lbs.	2745 lbs. ²	3100 lbs.	3200 lbs.	3300 lbs.
	\$	\$	\$	\$	\$	\$	\$
Break-even Price/Lb.	1.765	1.70	1.655	1.62	1.59	1.54	1.49

¹ Production during first-year production is 80% mature year's production level.

² Base situation.

In reviewing these summary tables, the cost of producing different hop types in the mature years under drip irrigation, at a planting of 14' x 3.5', differs 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. At an assumed yield of 1,340 pounds per acre during the mature production years for aroma hops, the break-even price per pound for aroma hops is \$3.265 per pound. The break-even price for alpha hops, at an assumed yield of 1,876 pounds per acre, is \$2.36 per pound, and that for super alpha hops with an assumed mature yield of 2,745 pounds per acre is \$1.62 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 the break-

even price means 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.

The Hop Cost Workbook

The Hop_Cost workbook (both in Excel and Quattro Pro) that contains the spreadsheets presented in this bulletin can be downloaded from the WSU Farm Management web site. Go to http://farm-mgmt.wsu.edu/publication_lists.htm, click on “Irrigated Crops,” and the workbook link will be directly below the title of this extension bulletin. To download the Hop_Cost workbook, click on the link to the workbook file. When the workbook appears, save this workbook in a specified folder on your hard drive.

Once the Hop_Cost Excel workbook is downloaded, you can go to the folder in which you stored this file on your hard drive and use it. It is recommended, however, that you make the Hop_Cost workbook a “read-only” file by right-clicking on the Hop_Cost workbook file name, left-clicking on “Properties,” “General,” “Read-only,” and “OK.” Making the file a “read-only” file will preserve the workbook in its original form. If you want to save new data loaded into this workbook, simply save it under another file name.

The Hop_Cost workbook contains the spreadsheets for preparing and establishing a hop field and for the first and mature years of aroma, alpha, and super alpha hops, respectively. These spreadsheets have been illustrated in Tables 1 through 4 in the previous section. For each spreadsheet the blue cells are protected cells and the yellow cells are unprotected cells used for data entry and notations. In this original workbook up to four additional line items can be added to the land preparation, establishment, variable, and fixed cost sections. Any of the spreadsheets, however, can be easily unprotected and modified by the user by simply clicking on “Tools,” “Protection,” and “Unprotect Sheet.” Since the cost of land preparation and establishing the trellis and irrigation systems must be amortized over 21 years, and the planting costs must be amortized over seven years, an amortization calculator spreadsheet (shown below) has been developed to calculate the annual amortized value over a specified number of years at a specified interest rate.

AMORTIZATION CALCULATOR

Dollar amount to be amortized:	-\$744.00
Number of years:	7
Interest rate:	7.50%
Amortized amount per year:	\$140.47

If you have problems downloading or using the Hop_Cost workbook, contact Herb Hinman at email address hinman@wsu.edu or phone 509-335-2855.

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 recognized 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. In developing the budget shown in Table 4, page 7, the estimated costs and returns per acre for producing super alpha hops during the first and mature years of production, it was assumed that the representative hop farm includes 420 acres with 360 acres currently in hops with an additional 20 acres being added to the hop enterprise. It was also assumed for every acre of hops planted, one-tenth of an acre is used for roads, buildings, farmstead, etc. The mature hop yield for this budget was assumed to be 2,745 pounds.

This budget indicates the total cost per acre to produce an acre of super alpha hops to be \$4,547 and that to break even, the producer must clear \$1.62 per pound, net of marketing costs. Any price received above \$1.62 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, management, 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.

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.

Establishment costs are those costs incurred during the establishment of the enterprise. In the case of hops, establishment costs include the establishment of the trellis system (including land preparation), the irrigation system, and planting the hop roots.

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 financial costs (i.e., excluding opportunity 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 per acre hop budget figures (including establishment cost figures) for super alpha hops except for the overhead, 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 \$280,000 on which 8% interest is being paid over a remaining 15-year period. The producer currently has outstanding machinery loans of \$215,000 on which 6.5% interest is being paid. The producer also carries approximately \$320,000 in operating loans for an average of 6 months per year at 7.5% annual interest and estimates an annual overhead expense for the entire farm of approximately \$55,000 per year.

Table 8, a financial budget for the producer in the example above, is a modification of Table 4. In doing this modification 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 4 are displayed with an asterisk (*) in Table 8. Overhead, and machinery and building replacement costs were replaced with the actual cost experienced by the producer. Management cost was eliminated since the operator furnishes all management. All other modifications, with the exception of land cost, have to do with eliminating opportunity cost on equity capital and including only interest costs actually paid. In the case of land cost, although principal payments are not expenses, both the principal and interest payment on the land loan are included since principal payments are annual cash obligations that the enterprise must cover. In the case of machinery and buildings, the principal payments on the loans are covered by the "Machinery & Building Annual Replacement Cost" figure.

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 mature super alpha hops to be \$3,888 and that to break even the producer must clear \$1.415 per pound, net of marketing cost. Any returns above these costs are returns to the operator's management, equity capital, and risk. In the above example, at a price of \$1.40 per pound the producer is 1.5 cents per pound short of making any returns to management, equity capital, and risk, before income and social security taxes. However, the per pound cost of \$1.415 for the financial budget is 20.5 cents less than that for the economic budget which includes all opportunity cost.

**TABLE 8. ESTIMATED PER ACRE COSTS AND RETURNS FROM PRODUCING SUPER ALPHA HOPS UNDER DRIP IRRIGATION
(FINANCIAL BUDGET-EXAMPLE 1)**

	Year 1	Mature Years	Comments and Notes	
	\$	\$		
Estimated Production Level (Lbs.)	2196.00	2745.00		
Estimated Price (Lb.)	1.40	1.40		
TOTAL RECEIPTS	3074.40	3843.00		
Variable Costs:				
Leaf Feed	65.00	65.00		
Fertilizer	100.00	60.00		
Herbicide	60.00	60.00		
Insecticide and Fungicide	300.00	350.00		
Parts and Repairs	200.00	200.00		
Fuel and Oil	80.00	80.00		
Twine and Clips	125.00	125.00		
Burlap	35.69	44.61	\$3.25	per bale
Kiln Fuel	120.78	150.98	\$11.00	per bale
Water Charge	75.00	75.00		
Irrigation Material	15.00	15.00		
Line Cleaner	15.50	15.50		
Electricity	60.00	60.00		
Foreman	76.00	76.00		
Hop Dryer & Baler	76.86	96.08	\$7.00	per bale
Labor	1075.00	1010.00		
* Overhead	144.74	144.74	\$55,000 divided by 380 acres	
* Interest	31.58	31.58	(\$320,000 x 7.5% x 6/12) / 380 acres	
* Total Variable Costs	2656.15	2659.48		
Fixed Costs				
Machinery & Building Annual				
Replacement Cost	225.00	225.00	\$85,500 per year for a 380-acre hop ranch	
* Interest on Mach. & Buildings	36.78	36.78	(\$215,000 loan x 6.5%) / 380 acres	
Insurance Cost (all farm)	170.00	170.00		
Amortized Establishment Costs:				
Planting Cost (7 years)	140.47	140.47	Roots + 16 hours of \$9 labor (\$744.00) @ 7.5%	
Total Land Prep. & Estab. Cost				
- Planting Cost (21 years)	345.01	345.01	\$4,336.79 - 744.00 = \$3,592.79 @ 7.5%	
* First-Year Loss (6 years)		142.22	7.50% amortized interest rate	
Land & Property Taxes	82.50	82.50	\$75 per acre x 1.1 acres	
* Land Cost	86.06	86.06	P&I for (\$280,000 loan @ 8% for 15 years) / 380 acres	
* Management Cost				
* Total Fixed Costs	1085.82	1228.04		
* TOTAL COSTS	3741.97	3887.52	Break-Even Price = \$1.414/lb.	
* Yearly Loss or Gain	-667.57	-44.52		

As shown in the previous example of a financial budget, at \$1.40 per pound return on hops, the example producer still is not covering all financial costs. It may now be asked, “Is it economically rational for some producers that do not cover their financial costs to continue to produce?” The answer is “Yes” and it lies in the nature of the fixed costs associated with hop production. Once the trellis and irrigation systems for the hop enterprise are established, the producer has an investment that he/she must “use or lose” over the next 21 years. Thus, in making production decisions over the life of the trellis and irrigation systems, the amortized cost of the establishment cost can be ignored. The same can be said for the amortized cost of planting and the first-year loss when the producer has already experienced these costs and still has some years before the plantings must be replanted. Thus, as shown in Table 9, if the producer in the above example was to ignore the amortized cost of establishing the trellis and irrigation systems, the budget shows that at \$1.40 per pound, fixed costs of \$300 per acre are being covered that would not be if he/she had not produced. The financial break-even price in this situation is \$1.31 per pound. If this was carried further and the amortized cost of planting roots and the first-year loss were also ignored, which are also costs that are sunk into the business, the analysis would show that at a price of \$1.40 per pound, fixed costs of \$583 per acre are being covered and the financial break-even price is \$1.19 per pound.

Thus, producers who have sizable equity in their farm businesses can often “survive” at prices below those determined as break-even prices by “economic” crop enterprise budgets. It can also be seen why it is rational to continue to produce at prices below the financial cost of production as long as some of the fixed costs are being covered. However, it must still be realized that 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 9. ESTIMATED PER ACRE COSTS AND RETURNS FROM PRODUCING SUPER ALPHA HOPS UNDER DRIP IRRIGATION
(FINANCIAL BUDGET-EXAMPLE 2)**

	Year 1	Mature Years	Comments and Notes	
	\$	\$		
Estimated Production Level (Lbs.)	2196.00	2745.00		
Estimated Price (Lb.)	1.40	1.40		
TOTAL RETURNS	3074.40	3843.00		
Variable Costs:				
Leaf Feed	65.00	65.00		
Fertilizer	100.00	60.00		
Herbicide	60.00	60.00		
Insecticide and Fungicide	300.00	350.00		
Parts and Repairs	200.00	200.00		
Fuel and Oil	80.00	80.00		
Twine and Clips	125.00	125.00		
Burlap	35.69	44.61	\$3.25	per bale
Kiln Fuel	120.78	150.98	\$11.00	per bale
Water Charge	75.00	75.00		
Irrigation Material	15.00	15.00		
Line Cleaner	15.50	15.50		
Electricity	60.00	60.00		
Foreman	76.00	76.00		
Hop Dryer & Baler	76.86	96.08	\$7.00	per bale
Labor	1075.00	1010.00		
* Overhead	144.74	144.74	\$55,000 divided by 380 acres	
* Interest	31.58	31.58	(\$320,000 x 7.5% x 6/12) / 380 acres	
* Total Variable Costs	2656.15	2659.48		
Fixed Costs:				
Machinery & Building Annual Replacement Cost	225.00	225.00	\$85,500 per year for a 380-acre hop ranch	
* Interest on Mach. & Buildings	36.78	36.78	(\$215,000 loan x 6.5%) / 380 acres	
Insurance Cost (all farm)	170.00	170.00		
Amortized Establishment Costs:				
Planting Cost (7 years)	140.47	140.47	Roots + 16 hours of \$9 labor (\$744.00) @ 7.5%	
Total Land Prep. & Estab. Cost - Planting Cost (21 years)	345.01		Eliminate amortized trellis and irrigation system costs	
* First-Year Loss (6 years)		142.22	7.50% amortized interest rate	
Land & Property Taxes	82.50	82.50	\$75 per acre x 1.1 acres	
* Land Cost	86.06	86.06	P&I for (\$280,000 loan @ 8% for 15 years) / 380 acres	
* Management Cost				
* Total Fixed Costs	1085.82	883.03		
* TOTAL COSTS	3741.97	3542.51	Break-Even Price = \$1.31/lb.	
* Yearly Loss or Gain	-667.57	300.49		

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 a 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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