

2004

UNIVERSITY OF CALIFORNIA - COOPERATIVE EXTENSION

**SAMPLE COSTS
TO ESTABLISH A MINT STAND AND PRODUCE**

PEPPERMINT OIL



IN THE INTERMOUNTAIN REGION

Daniel B. Marcum
Harry L. Carlson

UC Cooperative Extension Farm Advisor, Shasta-Lassen Counties, McArthur
UC Cooperative Extension Farm Advisor, Intermountain Research and
Extension Center, Tulelake

Karen M. Klonsky

UC Cooperative Extension Economist, Department of Agricultural and
Resource Economics, UC Davis

Pete Livingston

UC Cooperative Extension Staff Research Associate, Department of
Agricultural and Resource Economics, UC Davis

INTRODUCTION

Detailed costs of establishing a peppermint (*mentha piperita*) stand and production of peppermint for oil in the Intermountain Region are presented in this study. The hypothetical farm used in this report is 500 acres, 60 of which are planted to mint.

This study consists of Assumptions to Establish a Peppermint Stand and Produce Peppermint, nine tables, and is intended as a guide only. It can be used to make production decisions, determine potential returns, prepare budgets and evaluate production loans. Sample costs given for labor, materials, equipment and contract services are based on current figures. Some costs and practices detailed in this study may not be applicable to every situation. A blank, *Your Cost*, column is provided to enter your actual costs on Table 1 Costs Per Acre To Produce Peppermint, Table 2 Costs and Returns Per Acre to Establish A Peppermint Stand, Table 3 Costs Per Acre to Produce Peppermint Oil, and Table 4 Costs And Returns Per Acre to Produce Peppermint.

The hypothetical farm operation, production practices, overhead, and calculations are described under the assumptions. For additional information or an explanation of the calculations used in the study call the Department of Agricultural and Resource Economics, University of California, Davis, 530-752-2414.

STUDY CONTENTS

INTRODUCTION	2
ASSUMPTIONS.....	3
Industry Overview	3
Stand Establishment and Production Practices and Material Inputs	3
Cash Overhead Costs	6
Non-Cash Overhead Costs	7
REFERENCES	9
Table 1. COSTS PER ACRE TO ESTABLISH A PEPPERMINT STAND	10
Table 2. COSTS AND RETURNS PER ACRE TO ESTABLISH A PEPPERMINT STAND	11
Table 3. COSTS PER ACRE TO PRODUCE PEPPERMINT OIL	12
Table 4. COSTS AND RETURNS PER ACRE TO PRODUCE PEPPERMINT OIL	13
Table 5. MONTHLY CASH COST PER ACRE TO PRODUCE PEPPERMINT OIL.....	14
Table 6. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD.....	15
Table 7. HOURLY EQUIPMENT COSTS	16
Table 8. RANGING ANALYSIS	17
Table 9. COST AND RETURNS/BREAKEVEN ANALYSIS	18
Table 10. DETAILS BY OPERATION	19

Sample Cost of Production studies for many commodities are available and can be requested through the Department of Agricultural and Resource Economics, UC Davis, 530-752-4424. Current studies, those produced during the last five years, can be obtained from selected county UC Cooperative Extension offices or downloaded from the department website <http://coststudies.ucdavis.edu>.

The University of California, in accordance with applicable Federal and State law and University policy, does not discriminate on the basis of race, color, national origin, religion, sex, disability, age, medical condition (cancer-related), ancestry, marital status, citizenship, sexual orientation, or status as a Vietnam-era veteran or special disabled veteran.

Inquiries regarding the University's nondiscrimination policies may be directed to the Affirmative Action Director, University of California, Agriculture and Natural Resources, 1111 Franklin, 6th Floor, Oakland, CA 94607-5200 (510) 987-0096.

ASSUMPTIONS

The following are assumptions pertaining to sample costs of establishing a mint stand and producing mint for oil in the Intermountain Region. Practices described are not recommendations by the University of California, but represent production procedures and materials considered typical of a well managed mint stand in the Intermountain Region. Costs and practices detailed in this study may not be applicable to all situations. Establishment and cultural practices vary by grower and region; variations can be significant. These costs are on an annual, per acre basis. *The use of trade names in this report does not constitute an endorsement or recommendation by the University of California nor is any criticism implied by omission of other similar products.*

INDUSTRY OVERVIEW

Peppermint oil was produced experimentally in the Fall River Valley in 1991 and 1992. Commercial distillation in the Fall River Valley began in 1993 and in the Tulelake Basin in 1998. The 2002 peppermint acreage in Northeastern California is over 4,000 acres and distillation occurred at five facilities. Almost 700 acres of peppermint in the Tulelake Basin is harvested for use in tea. This cost study focuses on mint grown solely for oil.

Market Development. A market channel should be determined before a mint stand is planted and brought into production. Currently only three oil buyers purchase peppermint oil in Northeastern California. At times, there is no demand for oil. Annual contracts are commonly negotiated in the winter for the following season at a fixed number of pounds at a set price. Surplus oil is warehoused and sold on the spot market.

Risk. The major production risk is production of poor quality oil (for which there is little or no demand) by failure to control weeds or by stressing plants for water and/or nitrogen. Salsify (*Tragopogon porrifolius*), pigweed (*Amaranthus* sp.) and many other broadleaf weeds produce oils which greatly diminish the value of peppermint oil. Irrigation water and nitrogen should be adequate for maximum growth; plant stress causes early bloom and production of menthofuran which reduce oil quality for some markets.

While this study makes every effort to model a production system based on typical, real world practices, it cannot fully represent financial, agronomic and market risks which affect the profitability and economic viability of mint production. The risks associated with producing and marketing peppermint oil should not be overlooked.

STAND ESTABLISHMENT AND PRODUCTION PRACTICES AND MATERIAL INPUTS

Land. The farm in this study consists of 500 acres of land, which is typical in size for the Fall River Valley. Of that, a peppermint stand is established on 60 acres, other crops which can include alfalfa, grains, wild rice, garlic, Timothy hay, orchardgrass hay, and carrot seed, and 10 acres are occupied by roads, irrigation systems and farmstead. The soil contains enough organic matter to require the maximum label rate of Direx. Tulelake Basin farms are usually larger in size and do not grow as many different crops found in the Fall River Valley. Potatoes are grown in a Tulelake rotation system. The stand is farmed by the owner. Land in this study is valued at \$2,000 per acre. Because 490 of the 500 acres are planted, land costs \$2,041 per planted acre.

Stand. The current, predominant peppermint cultivar in California is Black Mitchum which accounts for approximately 95% of the acreage. Although Black Mitchum is susceptible to verticillium wilt, but to date mint-aggressive verticillium types have been excluded by county ordinances requiring the use of certified verticillium wilt-free planting stock. The life of the stand at the time of planting in this study is six years.

Labor. Hourly wages for workers are \$10.06, and \$6.75 per hour for skilled, and field workers respectively. Adding 45% for Workers Compensation, Social Security, Medicare insurance, and other possible benefits gives the labor rates shown of \$14.59 per hour for skilled labor, and \$9.87 per hour for field labor. Labor for operations involving machinery are 20% higher than the operation time given in Table 2 to account for the extra labor involved in equipment set up, moving, maintenance, work breaks, and repair. A manager's salary of \$32,500 per year is included in cash overhead costs. Returns above total costs are considered a return to management.

Irrigation System. The stand is irrigated using a wheel-line sprinkler irrigation system. Water is delivered to the stand from a well through an underground pipe and riser system. The system is in place before the stand is planted. Mint stands are most commonly grown under sprinkler irrigation, but can also be produced under border irrigation. The irrigation system is considered an improvement to the property and has a 25 year life. Therefore, it is included in the capital recovery cost sections of various tables and the Investments portion of Table 6.

Water cost will vary from grower to grower across the Intermountain Region depending on the particular irrigation district or various well characteristics, power costs and other irrigation factors. Water cost for irrigation represents water pumped from the farm's well. In this study water is valued at \$30 per acre-foot or \$2.50 per acre-inch which is the estimated cost of electricity for pumping groundwater to sprinkler irrigate mint in the Fall River Valley of Eastern Shasta County. Water costs in the Tulelake Basin are less due to the low cost of district water and lower power costs for pumping.

Successful water management and irrigation scheduling requires careful observation of water conditions of the soil and plant. Proper management of irrigation can provide for strong vegetative growth and influence insect and disease pests pressures.

Stand Preparation. This stand is established on ground that has been previously planted to field and row crops. The land is assumed to be well drained and class II soil.

Soil at the stand site is tested for nutrient levels to determine if fertilizers should added prior to planting. Following the discing the field is harrowed and the mint roots are purchased and custom planted in October for \$250 per acre.

Fertilization. Elemental sulfur is needed on nearly all mint stands in this region and is spread before final disking. Elemental sulfur provides sulfur for early growth the next spring. Nitrogen (N) fertilizers are usually surface or water applied in May and June to encourage maximum plant vigor and high oil production. Two applications of N are made to match nitrogen supply with crop demand. Two split applications of urea at 115 pounds of N each are made in May and June. Tissue sampling is used to monitor crop N status.

Irrigation. Water is applied to match local crop evapotranspiration demand during the growing season and post-harvest. Early season irrigation through May is adjusted by on-farm measurements of rainfall. Individual irrigation applications are about 2 acre-inches each week during the high crop water use months of June, July and August. Two post-harvest irrigations of 1.5 acre-inches each are essential to continue plant growth into the fall for winter survival and next year's spring vigor.

Weed Management. The most critical time for weed control occurs during the establishment year. Graxomone is applied in May before weed emergence. Basagran is used for broadleaf weed control after crop emergence. Hand weeding is used to control certain escaped weeds 20 days prior to harvest. A long enough interval of time is needed to let the weeds dry out for removal from the field.

After the mint stand is a year old the most effective weed control program begins as soon as the mint becomes dormant, in November or December. A combination of residual (Gramoxone Max, and Direx) herbicides is applied for broadleaf and grass control. Late winter weed control in January or February is usually a combination of Gramoxone Max, Direx, and Goal. Spring weed control, using Stinger, and hoeing, manages specialized weed problems.

Insect Management. In production years Lorsban is applied after harvest to control mint root borer and reduce it the following spring.

Mite Management. Regular weekly pest scouting begins as soon as mint emerges in the spring. Predator mites are released during all years when two-spotted mites are first observed. If predator mites are released in a timely manner pesticide treatments are rarely needed for control of two-spotted mites. Onager may be used as an alternative.

In established mint stands Omite is used to control two-spotted mite in the field. Omite is applied to 100% of the acreage.

Pesticide Recommendations. Not all treatments mentioned in this report will be needed every year. UC guidelines for weed control in peppermint can be found at <http://www.ipm.ucdavis.edu/PMG/selectnewpest.peppermint.html>. For specific pesticides choices and rates consult a licensed pest control advisor. Written recommendations made by pest control advisors are required for many pesticides. For information and pesticide use permits, contact the local county Agricultural Commissioner's office.

Establishment Cost. The establishment cost is the sum of cash costs for land preparation, planting, mint plants, production expenses, and cash overhead for growing peppermint through the first year minus any returns from the oil sold. The *Net Cash Cost Per Acre* in the first year shown in Table 2, represents the establishment cost per acre. For this study, the cost is \$176 per acre or \$10,560 for the 60 acres planted to peppermint. Establishment cost is amortized over the remaining 5 years that the mint stand is assumed to be in production. Establishment cost is used to determine the non-cash overhead, stand capital recovery expense for production years.

Harvest. Mint is cut and processed once during the year. A swather cuts the mint into windrows which is picked up by a forage chopper, blown into a wagon and hauled to a distillery. In this study, the grower pays to have the mint cut, picked up, hauled, and distilled for a \$3.25

per pound charge. A newly established mint stand is harvested in September and in August for older established mint fields.

For growers who own harvesting and distilling equipment, the equipment used for harvesting and processing operations should be added to the equipment and investment inventories on Table 6 and custom harvest charges should be replaced in Harvest costs in Tables 1-5, with grower performed harvest and hauling costs.

Assessment. The California Mint Growers Association (CMGA) in eastern Shasta and western Lassen counties is a voluntary grower organization which assesses members in the state to pay for activities of common interest including seminars. Though the CMGA assessment is voluntary all mint growers are currently members. The fee is \$0.06 per pound of oil of which \$0.02 goes to the Mint Industry Research Council, a national group that sponsors research nationally. California does not have a state mint marketing order.

Yields and Returns. Mint begins bearing an economic crop in the first year after fall planting. Typical annual yields for mint are measured pounds of oil produced per acre. In the establishment year 75 (60-80 pounds per acre) pounds of oil is produced from fall planted roots and from the second year on an average of 85 (80-110 pounds per acre) pounds per acre is harvested. An estimated price of a \$12 per pound of peppermint oil is used in this study to determine potential profits/losses.

Prices for oil have ranged from \$8 to \$15 per pound. Statistics for the major three counties in the contract region are shown in Table A.

Table A. Acreage, returns, and yield for peppermint oil in the Intermountain Region §

County	2001			2002			2003		
	Harvested Acres	Price (Lbs) [‡]	Oil Distilled (Lbs/Ac)	Harvested Acres	Price (Lbs) [‡]	Oil Distilled (Lbs/Ac)	Harvested Acres	Price (Lbs) [‡]	Oil Distilled (Lbs/Ac)
Lassen	793	\$3.79	32	919	\$6.03	40	990	\$2.89	40
Shasta	1,575	\$7.64	65	1,900	\$6.11	74	2,200	\$6.48	88
Siskiyou	536	\$2.19	23	786	\$7.14	35	885	\$3.04	39
Total	2,904	\$13.62[†]		3,605	\$19.28[†]		4,075	\$12.40[†]	

§ Data from County Crop Reports, 2001-2003. Published by California Agricultural Statistics Service.

‡ Price per pound of oil by county is weighted by percent of California total yield.

† Weighted average total price per pound of mint oil.

Returns, shown in Table 8 and 9, will vary and the yields and prices used in this cost study are estimates taking into consideration current situations.

CASH OVERHEAD COSTS

Cash Overhead. Cash overhead consists of various cash expenses paid out during the year that are assigned to the whole farm and not to a particular operation. These costs include property taxes, interest on operating capital, office expense, liability and property insurance, sanitation services, and repairs for buildings and irrigation equipment. Cash overhead costs are included as a per acre cost in Tables 1-5. Table 6 shows the cash overhead expenses in the Annual Business Overhead Costs section.

Property Taxes. Counties charge a base property tax rate of 1% on the assessed value of the property. In some counties special assessment districts exist and charge additional taxes on property including equipment, buildings, and improvements. For this study, county taxes are calculated as 1% of the average value of the property. Average value equals new cost plus salvage value divided by 2 on a per acre basis. Salvage value for investments will vary.

Interest On Operating Capital Interest on operating capital is based on cash operating costs and is calculated monthly until harvest at a nominal rate of 6.89% per year. A nominal interest rate is the going market cost of borrowed funds.

Insurance Insurance for farm investments varies depending on the assets included and the amount of coverage. Property insurance provides coverage for property loss and is charged at 0.713% of the average value of the assets over their useful life. Liability insurance covers accidents on the farm and costs \$895 for the entire farm or \$1.79 per acre.

Marketing Expense The cost of marketing peppermint oil is estimated at \$11 per acre or \$5,500 annually for the farm.

Office Expense Office and business expenses are estimated at \$11 per acre. These expenses include office supplies, telephones, bookkeeping, accounting, legal fees, road maintenance, etc.

Equipment Cash Costs. Equipment costs are composed of three parts; non-cash overhead, cash overhead, and operating costs. Both of the overhead factors have been discussed in previous sections. The operating costs consist of fuel, lubrication, and repairs.

Repair costs are based on purchase price, annual hours of use, total hours of life, and repair coefficients formulated by the ASAE. Fuel and lubrication costs are also determined by ASAE equations based on maximum PTO hp, and type of fuel used. The fuel and repair cost per acre for each operation in Table 1 and 3 is determined by multiplying the total hourly operating cost in Table 6 for each piece of equipment used for the cultural practice by the number of hours per acre for that operation. Tractor time is 10% higher than implement time (Operation Time) for a given operation to account for fueling, moving equipment, and setup time. Prices for on-farm delivery of diesel and gasoline are \$1.44 and \$1.88 per gallon, respectively.

NON-CASH OVERHEAD COSTS

Capital Recovery. Capital recovery cost is calculated for equipment and other farm investments. Although farm equipment used on mint farms might be purchased new or used, this study shows the current purchase price for new equipment. The new purchase price is adjusted to 50% to indicate a mix of new and used equipment. Annual ownership costs (Equipment and Investments) are shown in Tables 1-4, and 6. They represent the capital recovery cost for investments on an annual per acre basis.

Capital recovery cost is the annual depreciation and interest costs for a capital investment. It is the amount of money required each year to recover the difference between the purchase prices and salvage value (unrecovered capital). Put another way, it is equivalent to the annual payment on a loan for the investment with the down payment equal to the discounted salvage value. This is a more complex method of calculating ownership costs than straight-line depreciation and opportunity costs, but more accurately represents the annual costs of ownership because it takes

the time value of money into account (Boehlje and Eidman). The calculation for the annual capital recovery costs is as follows.

$$\left[\left(\frac{\text{Purchase Price} - \text{Salvage Value}}{\text{Price Value}} \right) \times \left(\frac{\text{Capital Recovery}}{\text{Factor}} \right) \right] + \left[\frac{\text{Salvage Value} \times \text{Interest Rate}}{\text{Value Rate}} \right]$$

Salvage Value. Salvage value is an estimate of the remaining value of an investment at the end of its life. For farm machinery (e.g., tractors and implements) the remaining value is a percentage of the new cost of the investment (Boehlje and Eidman). The life in years is estimated by dividing the wear-out life, as given by American Society of Agricultural Engineers (ASAE) by the annual use in hours. Salvage value is calculated as

$$\text{New Price} \times \% \text{ Remaining Value}$$

Salvage value for other investments including irrigation systems, buildings, and miscellaneous equipment is zero. The salvage value for land is equal to the purchase price because land does not depreciate from use. The purchase price and salvage value for certain equipment and investments are shown in Table 4.

Capital Recovery Factor. Capital recovery factor is the amortization factor or annual payment whose present value at compound interest is 1. It is the function of the interest rate and years of life of the equipment.

Interest Rate. The interest rate of 6.23% used to calculate capital recovery cost is the USDA-ERS's ten year average of California's agricultural sector long-run rate of return to production assets from current income. It is used to reflect the long-term realized rate of return to these specialized resources that can only be used effectively in the agricultural sector. In other words, the next best alternative use for these resources is in another agricultural enterprise.

Acknowledgment. Appreciation is expressed to those growers and other cooperators who provided support for this study.

REFERENCES

- American Society of Agricultural Engineers. 2002. *American Society of Agricultural Engineers Standards Yearbook*. Russell H. Hahn and Evelyn E. Rosentreter (ed.) St. Joseph, MO. 41st edition.
- Boehlje, Michael D., and Vernon R. Eidman. 1984. *Farm Management*. John Wiley and Sons. New York, New York
- California Department of Food and Agriculture. 2001, 2002, 2003. County Agricultural Commissioners' Data. <http://www.nass.usda.gov/ca/bul/agcom/indexcac.htm>. Internet accessed December, 2004.
- Marcum, Daniel B. 1993. *Mint Handbook*. Shasta-Lassen Cooperative Extension. McArthur.
- Marcum, Daniel B., Karen M. Klonsky, Pete Livingston. 1998. *Sample Costs to Establish a Mint Stand and Produce Peppermint Oil in the Intermountain Region*. University of California, Cooperative Extension. Department of Agricultural and Resource Economics. Davis, CA.

For information concerning the above or other University of California publications, contact UC DANR Communications Services at 1-800-994-8849, online at www.ucop.edu, or your local county UC Cooperative Extension office.

Table 2.

U.C. COOPERATIVE EXTENSION
 COSTS AND RETURNS PER ACRE TO ESTABLISH A PEPPERMINT STAND
 INTERMOUNTAIN REGION - 2004

Labor Rate: \$14.59/hr. machine labor
 \$9.79/hr. non-machine labor

Interest Rate: 6.89%
 Yield per Acre: 75 Lb

	Quantity/Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Peppermint Oil	75.00	Lb	13	<u>975</u>	
TOTAL GROSS RETURNS FOR ESTABLISHING A PEPPERMINT STAND				<u>975</u>	
OPERATING COSTS					
Custom:					
Soil Test	1.00	Acre	1.50	2	
Fertilizer Spreading	3.00	Acre	5.75	17	
Insect Scouting	1.00	Acre	7.50	8	
Fertilizer:					
Sulfur - Elemental	300.00	Lb	0.046	14	
46-0-0	230.00	Lb N	0.267	61	
Contract:					
Mint Roots & Plant	1.00	Acre	250.00	250	
Hand Weed	1.00	Acre	25.00	25	
Harvest & Distill Mint Oil	75.00	Lb	3.25	244	
Herbicide:					
Gramoxone Max	2.00	Pint	6.41	13	
Basagran	3.00	Pint	14.14	42	
Irrigation:					
Water	40.00	AcIn	2.50	100	
Beneficials:					
Predator Mites	1.00	Acre	10.00	10	
Assessment:					
California Mint Grower Assessment	75.00	Lb	0.06	5	
Labor (machine)	2.13	Hrs	14.59	31	
Labor (non-machine)	5.10	Hrs	9.79	50	
Fuel - Gas	1.84	Gal	1.88	3	
Fuel - Diesel	4.24	Gal	1.45	6	
Lube				1	
Machinery repair				5	
Interest on operating capital @ 6.89%				<u>26</u>	
TOTAL OPERATING COSTS/ACRE				<u>913</u>	
NET RETURNS ABOVE OPERATING COSTS				<u>62</u>	
CASH OVERHEAD COSTS:					
Liability Insurance				2	
Office Expense				11	
Manager's Salary				65	
Marketing Expenses				10	
Property Taxes				27	
Property Insurance				18	
Investment Repairs				<u>16</u>	
TOTAL CASH OVERHEAD COSTS/ACRE				<u>149</u>	
TOTAL CASH COSTS/ACRE				<u>1,062</u>	
NET CASH COST PER ACRE (ESTABLISHMENT COST)				<u>87</u>	
NON-CASH OVERHEAD COSTS (CAPITAL RECOVERY):					
Shop Building				9	
Shop Tools				2	
Irrigation System				26	
Pipe - Wheel Lines				35	
Fuel Tanks & Pumps				3	
Fuel Wagon				1	
Land				125	
Equipment				<u>52</u>	
TOTAL NON-CASH OVERHEAD COSTS/ACRE				<u>252</u>	
TOTAL COSTS/ACRE				<u>1,314</u>	
NET RETURNS ABOVE TOTAL COSTS				<u>-339</u>	

U.C. COOPERATIVE EXTENSION
Table 5. MONTHLY CASH COSTS PER ACRE TO PRODUCE PEPPERMINT OIL
 INTERMOUNTAIN REGION - 2004

Beginning DEC 03	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	TOTAL
Ending NOV 04	03	04	04	04	04	04	04	04	04	04	04	04	
Cultural:													
Apply Herbicide - Broadcast 2X	16		65										81
Insect Scouting - Mites & Worms				8									8
Irrigate					7	22	30	30	30				119
Weed Control - Stinger					30								30
Fertilize - Nitrogen (46-0-0) 2X						37	37						75
Insect Control - Predators						10							10
Mite Control - Omite						44							44
Weed Control - Hand Hoe								25					25
Insect Scouting - Mint Borer											8		8
Pickup Truck Use	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>19</u>
TOTAL CULTURAL COSTS	18	2	67	9	39	115	69	56	31	2	9	2	418
Harvest:													
Harvest & Distill Mint Oil									276				276
Mint Assessment											<u>5</u>		<u>5</u>
TOTAL HARVEST COSTS									276		5		281
Postharvest:													
Insect Control - Lorsban										35			35
Irrigate 2X										<u>12</u>			<u>12</u>
TOTAL POSTHARVEST COSTS *										47			47
Interest on Operating Capital @ 6.89%	0	0	0	1	1	1	2	2	4	0	0	0	11
TOTAL OPERATING COSTS/ACRE	18	2	67	10	39	117	71	58	311	49	14	2	757
CASH OVERHEAD:													
Liability Insurance		2											2
Office Expense	1	1	1	1	1	1	1	1	1	1	1	1	11
Manager's Salary	5	5	5	5	5	5	5	5	5	5	5	5	65
Marketing Expenses	1	1	1	1	1	1	1	1	1	1	1	1	10
Property Taxes					25								25
Property Insurance					17								17
Investment Repairs	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>16</u>
TOTAL CASH OVERHEAD COSTS	8	10	8	8	50	8	8	8	8	8	8	8	145
TOTAL CASH COSTS/ACRE	27	12	76	18	90	125	79	67	320	57	23	10	903

* Postharvest operation costs are discounted back to the time of harvest.

Table 6. U.C. COOPERATIVE EXTENSION
WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT, AND BUSINESS OVERHEAD COSTS
INTERMOUNTAIN REGION - 2004

ANNUAL EQUIPMENT COSTS

Yr	Description	Price	Yrs Life	Salvage Value	Capital Recovery	- Cash Overhead -		Total
						Insur- ance	Taxes	
FOR ESTABLISHMENT YEAR ONLY								
04	130 HP 2WD Tractor	89,314	12	22,330	9,482	377	558	10,417
04	62 HP 2WD Tractor	31,675	12	7,919	3,363	134	198	3,695
04	ATV - 4WD	6,540	7	2,481	888	30	45	963
04	Disc - Tandem 21'	21,359	13	2,618	2,309	81	120	2,510
04	Harrow - Spike 14'	841	13	103	91	3	5	99
04	PBM Sprayer - 100 Gallon	5,014	10	887	622	20	30	672
04	Pickup - 1/2 Ton	21,396	7	8,116	2,904	100	148	3,151
TOTAL		176,139		176,139	44,454	19,658	746	1,103
50% of New Cost *		88,069		22,227	9,829	373	551	10,753
FOR PRODUCTION YEARS ONLY								
04	ATV - 4WD	6,540	7	2,481	888	30	45	963
04	PBM Sprayer - 100 Gallon	5,014	10	887	622	20	30	672
04	Pickup - 1/2 Ton	21,396	7	8,116	2,904	100	148	3,151
TOTAL		32,950		11,484	4,414	150	223	4,786
50% of New Cost *		16,475		5,742	2,207	75	112	2,393

* Used to reflect a mix of new and used equipment.

ANNUAL INVESTMENT COSTS

Description	Price	Yrs Life	Salvage Value	Capital Recovery	----- Cash Overhead -----			Total
					Insur- ance	Taxes	Repairs	
INVESTMENT								
FOR ALL YEARS								
Fuel Tanks & Pumps	19,225	20	1,923	1,657	71	106	389	2,223
Fuel Wagon	4,033	10	403	524	15	22	82	643
Irrigation System	166,172	25	16,617	12,991	618	914	3,365	17,888
Land	1,000,000	40	1,000,000	62,300	6,760	10,000	0	79,060
Pipe - Wheel Lines	135,160	10	13,516	17,550	503	743	2,737	21,533
Peppermint Stand Establishment	5,220	5		1,247	18	26	0	1,291
Shop Building	49,725	20	4,973	4,285	185	273	1,007	5,750
Shop Tools	12,758	20	1,276	1,099	47	70	258	1,475

ANNUAL BUSINESS OVERHEAD COSTS

Description	Units/		Price/ Unit	Total Cost
	Farm	Unit		
Liability Insurance	500	Acre	1.74	870
Manager's Salary	500	Acre	65.00	32,500
Marketing Expenses	500	Acre	10.00	5,000
Office Expense	500	Acre	11.00	5,500

U.C. COOPERATIVE EXTENSION
Table 7. HOURLY EQUIPMENT COSTS
 INTERMOUNTAIN REGION - 2004

		----- COSTS PER HOUR -----							
Yr	Description	Actual	Capital	- Cash Overhead -			----- Operating -----		Total
		Hours		Recovery	Insur-	Taxes	Repairs	Fuel &	
		Used		ance			Lube	Oper.	Costs/Hr.
FOR ESTABLISHMENT YEAR ONLY									
04	130 HP 2WD Tractor	999.3	4.74	0.19	0.28	3.31	12.58	15.89	21.10
04	62 HP 2WD Tractor	999.8	1.68	0.07	0.10	1.17	5.08	6.25	8.10
04	ATV - 4WD	299.8	1.88	0.05	0.08	0.36	1.44	1.80	3.80
04	Disc - Tandem 21'	149.7	7.71	0.27	0.40	2.76	0.00	2.76	11.14
04	Harrow - Spike 14'	149.8	0.30	0.01	0.02	0.11	0.00	0.11	0.44
04	PBM Sprayer - 100 Gallon	149.8	2.08	0.07	0.10	1.11	0.00	1.11	3.36
04	Pickup - 1/2 Ton	400.0	4.60	0.12	0.18	1.32	4.32	5.64	10.55
FOR PRODUCTION YEARS ONLY									
04	ATV - 4WD	299.8	1.88	0.05	0.08	0.36	1.44	1.80	3.80
04	PBM Sprayer - 100 Gallon	149.8	2.08	0.07	0.10	1.11	0.00	1.11	3.36
04	Pickup - 1/2 Ton	400.0	4.60	0.12	0.18	1.32	4.32	5.64	10.55

U.C. COOPERATIVE EXTENSION
Table 8. RANGING ANALYSIS
 INTERMOUNTAIN REGION - 2004

COSTS PER ACRE AT VARYING YIELDS TO PRODUCE PEPPERMINT OIL							
COSTS PER ACRE AT VARYING YIELDS FOR PEPPERMINT OIL							
	YIELD (POUNDS/ACRE)						
	50	65	80	95	110	125	140
OPERATING COSTS/ACRE:							
Cultural Cost	418	418	418	418	418	418	418
Harvest Cost	166	215	265	314	364	414	463
Postharvest Cost	47	47	47	47	47	47	47
Interest on operating capital	10	10	11	11	11	11	12
TOTAL OPERATING COSTS/ACRE	641	691	740	790	840	890	940
TOTAL OPERATING COSTS/LB	12.81	10.62	9.26	8.32	7.64	7.12	6.72
CASH OVERHEAD COSTS/ACRE	145	145	145	145	145	145	145
TOTAL CASH COSTS/ACRE	786	836	886	936	985	1,035	1,085
TOTAL CASH COSTS/LB	15.72	12.86	11.07	9.85	8.96	8.28	7.75
NON-CASH OVERHEAD COSTS/ACRE	226	226	226	226	226	226	226
TOTAL COSTS/ACRE	1,012	1,062	1,112	1,162	1,212	1,262	1,312
TOTAL COSTS/LB	20.00	16.34	13.90	12.23	11.02	10.09	9.37

NET RETURNS PER ACRE ABOVE OPERATING COSTS FOR PEPPERMINT OIL							
PRICE (DOLLARS/LB)	YIELD (LBS OF OIL/ACRE)						
	50	65	80	95	110	125	140
Peppermint Oil							
9.00	-191	-106	-20	65	150	235	320
10.00	-141	-41	60	160	260	360	460
11.00	-91	24	140	255	370	485	600
12.00	-41	89	220	350	480	610	740
13.00	9	154	300	445	590	735	880
14.00	59	219	380	540	700	860	1,020
15.00	109	284	460	635	810	985	1,160

NET RETURNS PER ACRE ABOVE CASH COSTS FOR PEPPERMINT OIL							
PRICE (DOLLARS/LB)	YIELD (LBS OF OIL/ACRE)						
	50	65	80	95	110	125	140
Peppermint Oil							
9.00	-336	-251	-166	-81	5	90	175
10.00	-286	-186	-86	14	115	215	315
11.00	-236	-121	-6	109	225	340	455
12.00	-186	-56	74	204	335	465	595
13.00	-136	9	154	299	445	590	735
14.00	-86	74	234	394	555	715	875
15.00	-36	139	314	489	665	840	1,015

NET RETURNS PER ACRE ABOVE TOTAL COSTS FOR PEPPERMINT OIL							
PRICE (DOLLARS/LB)	YIELD (LBS OF OIL/ACRE)						
	50	65	80	95	110	125	140
Peppermint Oil							
9.00	-562	-477	-392	-307	-222	-137	-52
10.00	-512	-412	-312	-212	-112	-12	88
11.00	-462	-347	-232	-117	-2	113	228
12.00	-412	-282	-152	-22	108	238	368
13.00	-362	-217	-72	73	218	363	508
14.00	-312	-152	8	168	328	488	648
15.00	-262	-87	88	263	438	613	788

U.C. COOPERATIVE EXTENSION
Table 9. COSTS AND RETURNS / BREAKEVEN ANALYSIS
 INTERMOUNTAIN REGION - 2004

COSTS AND RETURNS - PER ACRE BASIS							
Crop	1. Gross Returns	2. Operating Costs	3. Net Returns Above Oper. Costs (1-2)	4. Cash Costs	5. Net Returns Above Cash Costs (1-4)	6. Total Costs	7. Net Returns Above Total Costs (1-6)
Peppermint Oil	1,105	757	348	902	203	1,129	-24

COSTS AND RETURNS - TOTAL ACREAGE							
Crop	1. Gross Returns	2. Operating Costs	3. Net Returns Above Oper. Costs (1-2)	4. Cash Costs	5. Net Returns Above Cash Costs (1-4)	6. Total Costs	7. Net Returns Above Total Costs (1-6)
Peppermint Oil	66,300	45,425	20,875	54,135	12,165	67,719	-1,419

BREAKEVEN PRICES PER YIELD UNIT					
CROP	Base Yield (Units/Acre)	Yield Units	Operating Costs	Cash Costs	Total Costs
Peppermint Oil	85.0	Lbs	8.91	10.61	13.28

BREAKEVEN YIELDS PER ACRE					
CROP	Yield Units	Base Price (\$/Unit)	Operating Costs	Cash Costs	Total Costs
Peppermint Oil	Lbs of Oil	13.00	58.2	69.4	86.8

UC COOPERATIVE EXTENSION
Table 10. OPERATIONS BY MONTH
 INTERMOUNTIAN REGION - 2004

Operation	Operation Month	Tractor/ Power Unit	Implement	Material	Broadcast Rate/acre	Material Unit
Cultural:						
Apply Herbicide - Broadcast 2X	December	ATV - 4WD	PBM Sprayer - 100 Gal	Gramoxone Max	1.00	Pint
				Direx	2.40	Pint
	March	ATV - 4WD	PBM Sprayer - 100 Gal	Gramoxone Max	1.00	Pint
				Direx	2.40	Pint
				Goal 2XL	3.00	Pint
				Insect Scouting	1.00	Acre
Insect Scouting - Mites & Worms	March	Custom				
Irrigate 16X	April	Labor		Water	2.00	AcIn
	May	Labor		Water	6.00	AcIn
	June	Labor		Water	8.00	AcIn
	July	Labor		Water	8.00	AcIn
	August	Labor		Water	8.00	AcIn
	Weed Control - Stinger	April	ATV - 4WD	PBM Sprayer - 100 Gal	Stinger	5.00
Fertilize - Nitrogen (46-0-0) 2X	May	Custom		46-0-0	115.00	Lb N
	June	Custom		46-0-0	115.00	Lb N
Insect Control - Predator Mites	May	Custom		Predator Mites	1,000	Acre
Mite Control - Omite	May	Custom		Omite 6E	2.00	Pint
Weed Control - Hand Hoe	July	Contract		Labor	1.00	Acre
Insect Scouting - Mint Root Borer	October	Custom		Insect Scouting	1.00	Acre
Harvest & Distill Mint Oil	August	Contract		Harvest & Distill	3.25	Lb of Oil
Peppermint Assessments	October			CA Mint Growers Assc	0.06	Lb of Oil
Postharvest - Insect Control - Lorsban	September	ATV - 4WD	PBM Sprayer - 100 Gal	Lorsban EC	4.00	Pint
Postharvest - Irrigate 2X	September	Labor		Water	3.00	AcIn
Pickup Truck Use	Annual	Pickup 1/2 Ton				
ATV	Annual	ATV				