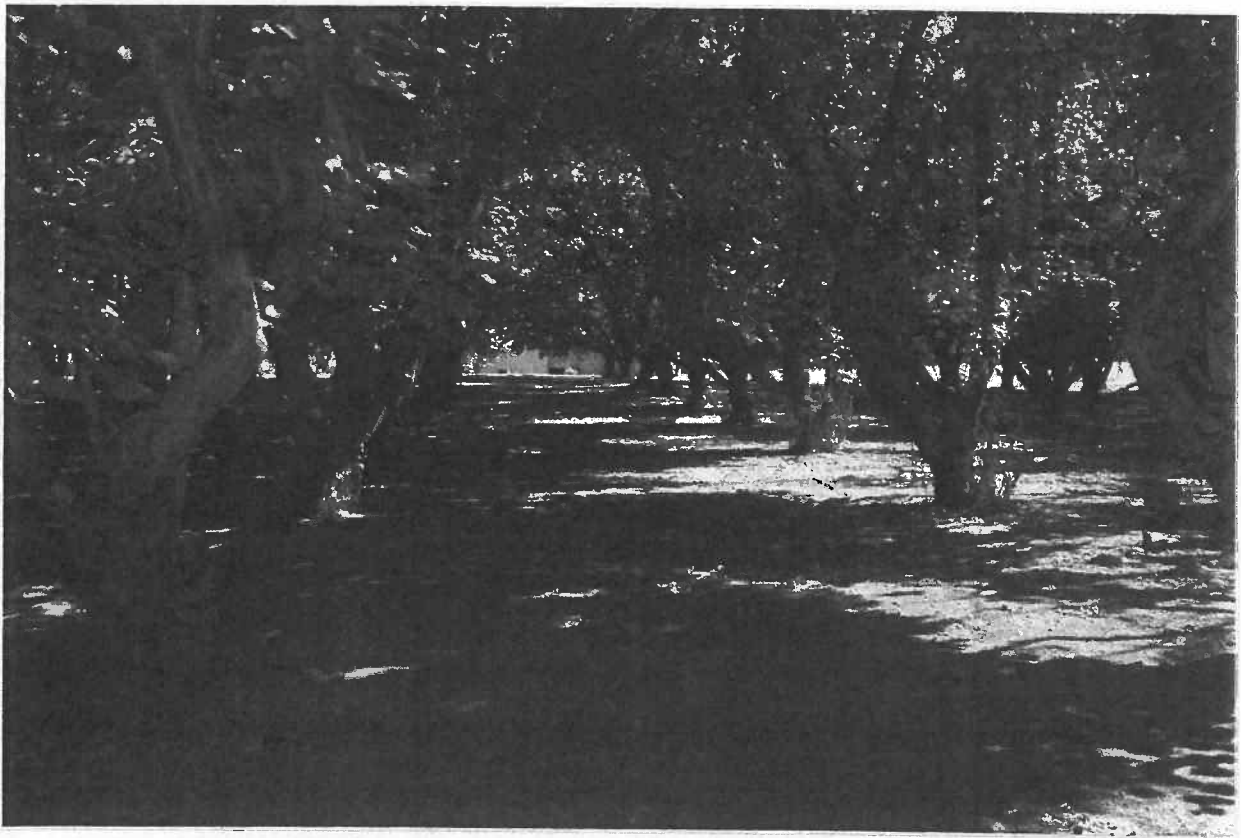


AEB 0043
November 2013

Orchard Economics:

The Costs and Returns of Establishing and Producing Hazelnuts in the Willamette Valley

Matthew Miller, Clark F. Seavert, and Jeff L. Olsen



CONTENTS

Introduction.....	2
Assumptions	2
Table 1. Machinery Cost Assumptions	4
Table 2. Machinery Cost Calculations.....	4
Table 3. Estimated Cost of Each Operation with Power Unit	5
Table 4. Input Assumptions for Variable, Harvest, and Fixed Costs.....	6
Results of Establishing an Eastern Filbert Blight Resistant Standard-Density Hazelnut Orchard	8
Cash Flow Analysis	8
Economic Costs and Returns	8
Table 5. Cash Flow Analysis for Establishing a Hazelnut Orchard in the Willamette Valley, 20ft x 20ft Spacing	9
Table 6. Economic Costs and Returns of Establishing a Hazelnut Orchard in the Willamette Valley, 20ft x 20ft Spacing.....	10
Figure 1. Cash Costs to Establish a Hazelnut Orchard for the First 12 Years of Establishment	11
Figure 2. Economic Costs (All Costs Including Return on Owners' Investment) to Establish a Hazelnut Orchard for the First 12 Years of Establishment	11
Double-Density Planting: Economic Costs and Returns and Cash Flow Analyses.....	12
Table 7. Cash Flow Analysis for Establishing a Double-Density Hazelnut Orchard in the Willamette Valley, 10ft x 20ft spacing.....	13
Table 8. Economic Costs and Returns of Establishing a Double-Density Hazelnut Orchard in the Willamette Valley, 10ft x 20ft spacing.....	14
Table 9. Comparing Cumulative Total Cash Costs and Returns Between the Standard and Double-Density Hazelnut Orchard through the 12th Year.....	15
Figure 3. Hazelnut Orchard Establishment: Cash Cost Comparison, Standard vs. Double- Density.....	15
Eastern Filbert Blight Management Costs	16
Table 10. Calibrating Reduced Fungicide Rates for Younger, Smaller Trees.....	16
Table 11. Cost for Scouting and Pruning Eastern Filbert Blight Infections in Standard-Density Hazelnut Orchard.....	16
Table 12. Average Costs of Four Common Eastern Filbert Blight Spray	16
Conclusions.....	17
Appendix A. Enterprise Budgets	18
Table 13. Hazelnut orchard establishment, year 1, \$/acre economic costs and returns.....	18
Table 14. Hazelnut orchard establishment, year 2, \$/acre economic costs and returns.....	19
Table 15. Hazelnut orchard establishment, year 3, \$/acre economic costs and returns.....	20
Table 16. Hazelnut orchard establishment, year 4, \$/acre economic costs and returns.....	21
Table 17. Hazelnut orchard establishment, year 5, \$/acre economic costs and returns.....	22
Table 18. Hazelnut orchard establishment, year 6, \$/acre economic costs and returns.....	23
Table 19. Hazelnut orchard establishment, year 7, \$/acre economic costs and returns.....	24
Table 20. Hazelnut orchard establishment, year 8, \$/acre economic costs and returns.....	25
Table 21. Hazelnut orchard establishment, year 9, \$/acre economic costs and returns.....	26
Table 22. Hazelnut orchard establishment, year 10, \$/acre economic costs and returns.....	27
Table 23. Hazelnut orchard establishment, year 11, \$/acre economic costs and returns.....	28
Table 24. Hazelnut orchard establishment, full production years, \$/acre economic costs and returns	29

ORCHARD ECONOMICS: THE COSTS AND RETURNS OF ESTABLISHING AND PRODUCING HAZELNUTS IN THE WILLAMETTE VALLEY

Mathew Miller, Clark F. Seavert and Jeff L. Olson¹

INTRODUCTION

Oregon's Willamette Valley is the home of the United State hazelnut industry. Growers produce around 35,000 acres of hazelnuts. In the mid-1980s, Eastern Filbert Blight (EFB), the fungal disease *Anisogramma anomala*, was discovered in the northeast corner of the hazelnut-producing region. Since that time, the industry has been battling to manage the effects of the disease. The blight has slowly spread south and now is present throughout the hazelnut-producing area. The current recommended management program integrates scouting, fungicide sprays, pruning out of infected tissue, and the use of more resistant varieties. The OSU Hazelnut

Breeding program began releasing EFB-immune varieties in 2005.

As the Oregon hazelnut industry prepares to rejuvenate itself through the planting of improved varieties, this cost of establishment and production study provides growers with a tool for economic management and decision-making. The study is a product of cooperative input from selected growers, field representatives, researchers, and farm suppliers. The study provides average costs and returns to a 20-acre block of hazelnuts. Growers are encouraged to substitute their own costs to get an accurate accounting of their costs.

ASSUMPTIONS

In this study, the authors made assumptions that provided a basis for the analysis. These assumptions include:

1. Typical acreage for a hazelnut orchard in the Willamette Valley is 100 acres, and this study assumes 20 new acres planted.
2. Plant 108 trees per acre with a 20' x 20' spacing.
3. All labor is hired at a rate of \$14.00 per hour, which includes worker's compensation, unemployment insurance, and other labor overhead expenses. All labor is treated as a cash variable expense.

¹Matthew Miller, Faculty Research Assistant and Clark F. Seavert, Professor, Department of Applied Economics, and Jeff L. Olsen, Extension Horticulturist, Yamhill, Polk and Marion Counties, all of Oregon State University. The assistance provided by hazelnut producers, field representatives, farm suppliers, and researchers in developing this budget is greatly appreciated

4. The machinery and equipment used in the budget reflect the typical machinery complement of a hazelnut orchard in the Willamette Valley. A detailed breakdown of machinery values is shown in Table 1. Table 2 provides estimated machinery costs from the American Society of Agricultural Engineers. The 75-horsepower 4-wheel-drive tractor is used mainly for spraying and flailing operations. The 50-horsepower 2-wheel drive tractor is used mainly at harvest to move and load totes for delivery to processors. Table 3 lists the estimated cost of each operation with the power unit. Gasoline and diesel costs per gallon are \$3.30 and \$3.50, respectively.
5. The interest rate on operating funds is 8.5 percent and treated as a cash expense. One-half of the cash expenses are borrowed for a 6-month period.
6. Machinery and land are owned by the operator and assessed 8.5 and 8 percent rates of interest as opportunity costs. Land is valued at \$5,000 per acre.
7. Previous year's establishment costs are funded by the operator at a charge of 10 percent interest and also are considered opportunity costs.
8. Hazelnut price is \$1.00 per pound or \$2,000 per ton.
9. The full production yield is 2,800 marketable pounds per acre. Commercial yields begin in the third year and full production is reached in year 12.
10. Harvest time is 15 acres per day with the entire harvest operation covering the planting 1.5 times to ensure maximum yield.
11. The fertilizer program includes the urea form of nitrogen applied at an annual rate that varies with the age and size of tree.
12. A foliar boron spray is applied every year starting in the third year, at a rate described in Table 11. A potassium application is applied at the rate of 7 pounds per tree every 7 years.
13. Nutrient analysis: A soil test is conducted every 5 years beginning in Year 1 at \$25 each, followed by a lime application estimated to be 2 tons per acre. A foliar analysis every third year beginning in Year 4 is performed at \$45 each.
14. Insecticide sprays are adjusted to the age and size of the tree being sprayed described in Table 11. The integrated pest management program includes 1.5 sprays for filbertworm starting in the third year, and a spray yearly through the fourth year followed by once every fourth year for aphids and/or leafrollers. The cost of filbertworm trapping is included.
15. Fall copper applications for common filbert blight are made for the first 3 years. The time needed to spray the 20 acres is 10 hours. The costs of making spray applications for EFB control are listed in Table 4.
16. Herbicides used for strip maintenance are applied to one-third of each acre, assuming one-third of the orchard is in vegetation-free strips between trees.
17. One soil-residual material and one contact spray are used each year. The boom sprayer is used for both grass and sucker control. There are four sucker sprays yearly beginning Year 2, and beginning Year 3, five yearly orchard floor flailings, with a 10-foot flail mower making two passes in opposite directions, covering 6 acres per hour.
18. The other input assumptions for variable, fixed, and harvest operation costs are listed in Table 5.
19. Price inflation for the time period of this study is ignored.
20. Federal and state income tax consequences also are ignored for this study.

Machine	Size	Market Value	Hours or Miles of Annual Use	Expected Life (yrs)	Salvage Value
Tractor	4 wheel Dr 75hp, new	\$ 35,000	238	10	\$ 10,338
Tractor and Loader	2 wheel Dr 50hp, older	12,000	193	10	3,545
Air-Blast Spray	500 gallon unit, PTO	18,000	62	20	938
Flail Chopper	10' Unit	5,000	73	10	884
Weed Sprayer w/Boom		1,000	92	15	96
Fertilizer Spreader	1,000 pound	1,500	6	15	144
Pruning Power Lift		25,500	120	15	2,611
Filbert Harvester w/Cart		60,000	71	10	9,903
Sweeper		40,000	95	10	7,545
Brush Rake		900	24	20	47
Pickup	3/4 Ton 4X4	25,000	12,000	10	9,454
Leveling Blade		1,000	32	7	255
5th Wheel Trailer	20'	6,000	N/A	20	313
Shop/Shed	40' x 80'	25,000	N/A	35	0

Machine	Size	--- Variable Costs ---		--- Fixed Costs ---		Total Cost
		Fuel & Lube	Repairs & Maint.	Depr. & Interest	Insurance	
----- Costs per Hour -----						
Tractor	4 wheel Dr 75hp, new	\$ 24.15	\$ 0.25	\$ 18.48	\$ 0.86	\$ 43.74
Tractor and Loader	2 wheel Dr 50hp, older	20.13	0.16	7.82	0.36	28.47
Air-Blast Spray	500 gallon unit, PTO	0.00	7.87	26.80	0.92	35.58
Flail Chopper	10' Unit	0.00	1.60	9.09	0.24	10.93
Weed Sprayer w/Boom		0.00	0.45	1.17	0.04	1.65
Fertilizer Spreader	1,000 pound	0.00	0.46	26.42	0.81	27.70
Pruning Power Lift		8.05	7.26	22.67	1.05	39.03
Filbert Harvester w/Cart		0.00	7.31	112.87	2.97	123.15
Sweeper		12.08	7.77	55.33	2.25	77.42
Brush Rake		0.00	0.11	3.42	0.12	3.65
----- Costs per Mile -----						
Pickup	3/4 Ton 4X4	\$ 0.29	\$ 0.05	\$ 0.25	\$ 0.08	\$ 0.67
----- Costs per Acre -----						
Leveling Blade		\$ 0.00	\$ 0.03	\$ 1.60	\$ 0.00	\$ 1.63
5th Wheel Trailer	20'	0.00	1.40	5.55	0.00	6.95
Shop/Shed	40' x 80'	0.00	6.92	17.14	0.00	24.06

Table 3. Estimated cost of each operation with power-unit.

Operation	Tractor	Miles per Hr	Acres per Hr	Labor Cost per Acre	-- Machine Costs --		Total Cost per Acre
					Variable Cost per Acre	Fixed Cost per Acre	
Filbert Harvester w/Cart	4WD 75hp	1.25	2.12	\$ 6.60	\$ 14.95	\$ 63.72	\$ 85.26
Sweeper	Self-Propelled	1.63	1.58	8.88	12.59	36.53	58.01
Brush Rake	2WD 50hp	2.00	4.12	0.29	4.95	2.84	8.08
Air-Blast Spray	4WD 75hp	3.00	3.64	3.85	8.87	12.94	25.66
Flail Chopper	4WD 75hp	4.00	4.12	3.40	6.31	6.96	16.66
Weed Sprayer w/Boom	2WD 50hp	6.00	5.46	0.22	3.80	1.72	5.74
Fertilizer Spreader	2WD 50hp	8.00	16.49	0.07	1.26	2.15	3.48

Table 4. Input assumptions for variable, harvest and fixed costs.

	<u>Year 1</u>	<u>Year 2</u>	<u>Year 3</u>	<u>Year 4</u>	<u>Year 5</u>	<u>Year 6</u>
Price per Pound	\$ 1.00	\$ 1.00	\$ 1.00	\$ 1.00	\$ 1.00	\$ 1.00
Pounds per Acre	0	0	75	285	440	600
Labor Cost per Hour	\$ 14.00	\$ 14.00	\$ 14.00	\$ 14.00	\$ 14.00	\$ 14.00
Production Pruning Labor Hours	0.00	2.50	2.50	0.00	0.00	0.00
Maintenance Pruning Labor Hours	0.00	0.00	0.00	0.00	0.00	0.00
Hand Fertilizing Labor Hours	0.00	0.50	0.50	0.60	0.00	0.00
Fertilizer - Urea	\$ 0.00	\$ 13.79	\$ 20.68	\$ 27.57	\$ 34.47	\$ 41.36
Fertilizer - Potash	37.73	37.73	37.73	37.73	37.73	37.73
Fertilizer - Lime	59.20	59.20	59.20	59.20	59.20	59.20
Fertilizer - Boron	0.00	0.00	0.71	1.41	2.82	4.23
Fungicide - Fall Copper Spray	3.35	6.70	13.41	0.00	0.00	0.00
Herbicide Strip Sprays	8.38	8.38	8.38	8.38	8.38	8.38
Sucker Control	0.00	11.39	11.39	11.39	11.39	11.39
Filbertworm Spray	0.00	0.00	0.94	1.89	3.77	5.66
Aphid/Leafroller & Leaf-tier Spray	0.42	0.85	1.69	3.38	0.00	0.00
Rodent Materials	7.00	7.00	7.00	7.00	7.00	7.00
IPM Traps	0.00	0.00	2.57	2.57	2.57	2.57
IPM Scouting Labor Hours	0.00	0.00	1.00	1.00	1.00	1.00
Nutrient Analysis	1.25	0.00	0.00	2.25	0.00	1.25
Drying Costs per Pound	0.02	0.02	0.02	0.02	0.02	0.02
Herbicide Strip Spray (number of apps.)	1.00	1.00	1.00	1.00	1.00	1.00
Sucker Control (number of apps.)	0.00	4.00	4.00	4.00	4.00	4.00
Boron Spray (number of apps.)	0.00	0.00	0.00	0.50	0.50	0.50
Filbertworm Spray (number of apps.)	0.00	0.00	0.00	1.50	1.50	1.50
Flailing Orchard (number of apps.)	0.00	0.00	5.00	5.00	5.00	5.00
Aphid/Leafroller Spray (number of apps.)	1.00	1.00	1.00	1.00	0.00	0.00
	----- Fixed Input Costs -----					
Property Taxes	5.00	5.00	5.00	5.00	5.00	5.00
Property Insurance	30.00	30.00	30.00	30.00	30.00	30.00
Land Values	5,000	5,000	5,000	5,000	5,000	5,000
Tree Cost	6.50	6.50	6.50	6.50	6.50	6.50
Gasoline Price	3.30	3.30	3.30	3.30	3.30	3.30
Diesel Fuel Price	3.50	3.50	3.50	3.50	3.50	3.50
Operating Interest Rate	8.50%	8.50%	8.50%	8.50%	8.50%	8.50%
Machinery Interest Rate	8.50%	8.50%	8.50%	8.50%	8.50%	8.50%
Land Interest Rate	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%
Establishment Interest Rate	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%
Overhead Charge	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%
% of Operating Capital Borrowed	50.00%	50.00%	50.00%	50.00%	50.00%	50.00%
Months to Borrow Operating Capital	6.0	6.0	6.0	6.0	6.0	6.0
Planted Trees	108	10	0	0	0	0

Table 4. Input assumptions for variable, harvest and fixed costs, (cont').

	<u>Year 7</u>	<u>Year 8</u>	<u>Year 9</u>	<u>Year 10</u>	<u>Year 11</u>	<u>Full Prod</u>	
Price per Pound	\$ 1.00	\$ 1.00	\$ 1.00	\$ 1.00	\$ 1.00	\$ 1.00	
Pounds per Acre	1,100	1,200	1,600	2,000	2,300	2,800	
Labor Cost per Hour	\$ 14.00	\$ 14.00	\$ 14.00	\$ 14.00	\$ 14.00	\$ 14.00	
Production Pruning Labor Hours	0.00	0.00	0.00	0.00	0.00	1.20	
Maintenance Pruning Labor Hours	1.50	1.50	1.50	1.50	1.50	1.50	
Hand Fertilizing Labor Hours	0.00	0.00	0.00	0.00	0.00	0.00	
Fertilizer - Urea	\$ 48.25	\$ 55.14	\$ 62.04	\$ 68.93	\$ 75.82	\$ 82.72	
Fertilizer - Potash	37.73	66.02	66.02	66.02	66.02	37.73	
Fertilizer - Lime	59.20	59.20	59.20	59.20	59.20	59.20	
Fertilizer - Boron	5.64	7.05	7.05	7.05	7.05	7.05	
Fungicide - Fall Copper Spray	0.00	0.00	0.00	0.00	0.00	0.00	
Herbicide Strip Sprays	8.38	8.38	8.38	8.38	8.38	8.38	
Sucker Control	11.39	11.39	11.39	11.39	11.39	11.39	
Filbertworm Spray	7.55	9.44	9.44	9.44	9.44	9.44	
Aphid/Leafroller & Leaf-tier Spray	0.00	16.92	0.00	0.00	0.00	4.23	
Rodent Materials	7.00	7.00	7.00	7.00	7.00	7.00	
IPM Traps	2.57	2.57	2.57	2.57	2.57	2.57	
IPM Scouting Labor Hours	1.00	1.00	1.00	1.00	1.00	1.00	
Nutrient Analysis	2.25	0.00	0.00	2.25	1.25	1.15	
Drying Costs per Pound	0.02	0.02	0.02	0.02	0.02	0.02	
Herbicide Strip Spray (number of apps.)	1.00	1.00	1.00	1.00	1.00	1.00	
Sucker Control (number of apps.)	4.00	4.00	4.00	4.00	4.00	4.00	
Boron Spray (number of apps.)	0.50	0.50	0.50	0.50	0.50	0.50	
Filbertworm Spray (number of apps.)	1.50	1.50	1.50	1.50	1.50	1.50	
Flailing Orchard (number of apps.)	3.00	3.00	3.00	3.00	3.00	3.00	
Aphid/Leafroller Spray (number of apps.)	0.00	1.00	0.00	0.00	0.00	0.25	
				----- Fixed Input Costs -----			
Property Taxes	5.00	5.00	5.00	5.00	5.00	5.00	
Property Insurance	30.00	30.00	30.00	30.00	30.00	30.00	
Land Values	5,000	5,000	5,000	5,000	5,000	5,000	
Tree Cost	6.50	6.50	6.50	6.50	6.50	6.50	
Gasoline Price	3.30	3.30	3.30	3.30	3.30	3.00	
Diesel Fuel Price	3.50	3.50	3.50	3.50	3.50	3.50	
Operating Interest Rate	8.50%	8.50%	8.50%	8.50%	8.50%	8.50%	
Machinery Interest Rate	8.50%	8.50%	8.50%	8.50%	8.50%	8.50%	
Land Interest Rate	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	
Establishment Interest Rate	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	
Overhead Charge	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	
% of Operating Capital Borrowed	50.00%	50.00%	50.00%	50.00%	50.00%	50.00%	
Months to Borrow Operating Capital	6.0	6.0	6.0	6.0	6.0	6.0	
Planted Trees	0	0	0	0	0	0	

RESULTS OF ESTABLISHING AN EASTERN FILBERT BLIGHT RESISTANT STANDARD-DENSITY HAZELNUT ORCHARD

Cash Flow Analysis

Table 5 contains a cash flow analysis for establishing the hazelnut planting. The income, variable costs, and cash fixed costs are shown for each of the 12 establishment years. Production begins in year 3 with 75 pounds of hazelnuts per acre and increases to 2,800 pounds at full production. Total variable costs are \$1,354 in the first year with an additional \$54 of cash fixed costs for a total cash cost of \$1,408 per acre.

A positive sustainable cash flow begins in year 5 with gross income exceeding total cash costs by \$30 per acre. In year 9 the orchard returns a sufficient amount of gross income to pay all previous years' costs of establishment with \$189 per acre over and above prior costs.

Figure 1 shows the major cost components in relation to total cash costs. Machine costs, including fuel, oil, and repairs, are 27 percent of the cash costs. Fertilizer and chemicals are the second largest cost item with 19 percent of the total cash costs. Labor represents 17 percent of the total cash costs to establish this orchard. Tree cost is 11 percent of the total cash costs, and remaining cost items encompass 26 percent of the total cash costs.

Economic Costs and Returns

Table 6 details the economic costs and returns for the establishment of a 20-acre planting with 108 trees per acre. The gross income and variable costs remain the same as in Table 5, but fixed machine costs, shop, depreciation and interest, land interest

costs, and interest for previous establishment year's costs are included as well. Again, gross income exceeds variable costs beginning in Year 5. Gross income does not exceed total costs until year 12, when all previous year's establishment costs are amortized for 25 years at a ten percent interest rate, resulting in a cost of \$1,320 per acre. Then \$66 per acre can be expected over and above economic costs as show in Table 6.

Figure 2 shows the cost components in relation to total economic costs. When all economic costs are included, the interest cost, as assumed in this study, is the largest cost item with 38 percent of the total costs for the first 12 years of establishment. Machine costs (fuel, oil, repairs, depreciation, and interest charges) are the second largest cost item at 21 percent of the total costs. Land charges are 20 percent of the total costs, and hired labor, fertilizer, and chemicals are 5 percent of the total costs. The remaining cost items are only 11 percent of the total economic costs.

While growers often focus on reducing tree costs, fertilizers, chemicals, and operator labor, more emphasis should be placed on redirecting money to obtain earlier yields. As long as the additional revenues are greater than the additional costs, this will reduce interest costs. Increasing tree density in orchards is just one production technique that might accomplish those goals. The next section discusses the economic costs and returns of such an orchard.

Table 5. Cash flow analysis for establishing a standard-density hazelnut orchard in the Willamette Valley, 20ft x 20ft spacing.

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Full Prod
Income:												
Yield (Lbs per Acre)	0	0	75	285	440	600	1,100	1,200	1,600	2,000	2,300	2,800
Price (\$ per Lb)	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>
Gross Income(\$ per Acre)	0.00	0.00	75.00	285.00	440.00	600.00	1,100.00	1,200.00	1,600.00	2,000.00	2,300.00	2,800.00
Variable Costs:												
Field Preparation	9.22	0.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trees	702.00	65.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sawdust Mulch	3.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paint Trees	20.00	20.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fertilizer	96.93	13.79	20.68	27.57	34.47	100.56	48.25	121.17	62.04	68.93	135.02	179.65
Chemicals	12.15	27.32	34.87	26.45	26.36	29.66	32.95	53.17	36.25	36.25	36.25	40.48
IPM Scouting	0.00	0.00	0.00	2.57	2.57	2.57	2.57	2.57	2.57	2.57	2.57	2.57
Nutrient Analysis	0.00	0.00	0.00	2.25	0.00	1.25	2.25	0.00	0.00	2.25	1.25	1.15
Rodent Materials	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
Hired Labor	228.55	109.03	106.76	83.60	71.35	71.42	85.63	89.55	85.63	85.63	85.63	103.46
Harvest.Wash & Dry Nuts	0.00	0.00	1.69	6.41	9.90	13.50	24.75	27.00	36.00	45.00	51.75	63.00
Shop	6.92	6.92	6.92	6.92	6.92	6.92	6.92	6.92	6.92	6.92	6.92	6.92
Machine Costs	142.84	82.32	177.47	173.55	164.67	165.93	153.32	163.45	153.32	153.32	187.07	175.16
Misc. & Overhead	97.98	26.55	28.43	26.90	25.86	31.90	29.09	37.67	31.18	32.63	78.72	46.35
Operating Interest	<u>26.15</u>	<u>7.05</u>	<u>7.55</u>	<u>7.15</u>	<u>6.87</u>	<u>8.47</u>	<u>7.73</u>	<u>10.00</u>	<u>8.28</u>	<u>8.67</u>	<u>20.90</u>	<u>12.31</u>
Total Variable Costs	1,353.53	365.53	391.36	370.36	355.96	439.18	400.45	518.49	429.17	449.15	613.08	638.05
Gross Income minus VC	-1,353.53	-365.53	-316.36	-85.36	84.04	160.82	699.55	681.51	1,170.83	1,550.85	1,686.92	2,161.95
Cash Fixed Costs:												
Insurance	49.09	49.09	49.09	49.09	49.09	49.09	49.09	49.09	49.09	49.09	49.09	50.35
Property Taxes	<u>5.00</u>	<u>5.00</u>	<u>5.00</u>	<u>5.00</u>	<u>5.00</u>	<u>5.00</u>	<u>5.00</u>	<u>5.00</u>	<u>5.00</u>	<u>5.00</u>	<u>5.00</u>	<u>5.00</u>
Total Cash Fixed Cost	54.09	54.09	54.09	54.09	54.09	54.09	54.09	54.09	54.09	54.09	54.09	54.09
Total Cash Cost	1,407.62	419.62	445.45	424.45	410.05	493.27	454.54	572.58	483.26	503.24	667.16	692.13
Annual Cash Flow	-1,407.62	-419.62	-370.45	-139.45	29.95	106.73	645.46	627.42	1,116.74	1,496.76	1,632.84	2,107.87
Cumulative Cash Flow	-1,407.62	-1,827.24	-2,197.69	-2,337.14	-2,307.18	-2,200.45	-1,554.99	-927.57	189.17	1,685.92	3,318.76	5,426.62

Table 6. Economic costs and returns of establishing a standard-density hazelnut orchard in the Willamette Valley, 20ft x 20ft spacing.

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Full Prod
Income:												
Yield (Lbs per Acre)	0.00	0.00	75	285	440	600	1,100	1,200	1,600	2,000	2,300	2,800
Price (\$ per Lb)	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>
Gross Income(\$ per Acre)	0.00	0.00	75.00	285.00	440.00	600.00	1,100.00	1,200.00	1,600.00	2,000.00	2,300.00	2,800.00
Variable Costs:												
Field Preparation	9.22	0.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trees	702.00	65.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sawdust Mulch	3.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paint Trees	20.00	20.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fertilizer	96.93	13.79	20.68	27.57	34.47	100.56	48.25	121.17	62.04	68.93	135.02	179.65
Chemicals	12.15	27.32	34.87	26.45	26.36	29.66	32.95	53.17	36.25	36.25	36.25	40.48
IPM Scouting	0.00	0.00	0.00	2.57	2.57	2.57	2.57	2.57	2.57	2.57	2.57	2.57
Nutrient Analysis	0.00	0.00	0.00	2.25	0.00	1.25	2.25	0.00	0.00	2.25	1.25	1.15
Rodent Materials	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
Hired Labor	228.55	109.03	106.76	83.60	71.35	71.42	85.63	89.55	85.63	85.63	85.63	103.46
Harvest: Wash & Dry Nuts	0.00	0.00	1.69	6.41	9.90	13.50	24.75	27.00	36.00	45.00	51.75	63.00
Shop	6.92	6.92	6.92	6.92	6.92	6.92	6.92	6.92	6.92	6.92	6.92	6.92
Machine Costs	142.84	82.32	177.47	173.55	164.67	165.93	153.32	163.45	153.32	153.32	187.07	175.16
Misc. & Overhead	97.98	26.55	28.43	26.90	25.86	31.90	29.09	37.67	31.18	32.63	78.72	46.35
Operating Interest	<u>26.15</u>	<u>7.05</u>	<u>7.55</u>	<u>7.15</u>	<u>6.87</u>	<u>8.47</u>	<u>7.73</u>	<u>10.00</u>	<u>8.28</u>	<u>8.67</u>	<u>20.90</u>	<u>12.31</u>
Total Variable Costs	1,353.53	365.53	391.36	370.36	355.96	439.18	400.45	518.49	429.17	449.15	613.08	638.05
Gross Income minus VC	-1,353.53	-365.53	-316.36	-85.36	84.04	160.82	699.55	681.51	1,170.83	1,550.85	1,686.92	2,161.95
Fixed Costs:												
Insurance	49.09	49.09	49.09	49.09	49.09	49.09	49.09	49.09	49.09	49.09	49.09	50.35
Property Taxes	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Machine Costs	275.55	275.55	275.55	275.55	275.55	275.55	275.55	275.55	275.55	275.55	275.55	302.76
Shop	17.14	17.14	17.14	17.14	17.14	17.14	17.14	17.14	17.14	17.14	17.14	17.14
Land Interest Cost	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00
Interest on Estab. Costs	<u>0.00</u>	<u>210.16</u>	<u>342.40</u>	<u>490.46</u>	<u>622.72</u>	<u>751.26</u>	<u>884.99</u>	<u>978.21</u>	<u>1,082.56</u>	<u>1,148.41</u>	<u>1,182.84</u>	<u>1,320.51</u>
Total Fixed Cost	746.78	956.94	1,089.19	1,237.24	1,369.50	1,498.05	1,631.77	1,724.99	1,829.34	1,895.19	1,929.63	2,095.76
Total Cost	2,100.32	1,322.47	1,480.54	1,607.60	1,725.46	1,937.23	2,032.22	2,243.48	2,258.51	2,344.35	2,542.70	2,733.81
Net Projected Returns	-2,100.32	-1,322.47	-1,405.54	-1,322.60	-1,285.46	-1,337.23	-932.22	-1,043.48	-658.51	-344.35	-242.70	66.19
Cumulative Returns	-2,100.32	-3,422.78	-4,828.33	-6,150.93	-7,436.39	-8,773.62	-9,705.84	-10,749.32	-11,407.83	-11,752.18	-11,994.88	-11,928.69

Figure 1. Cash costs to establish a standard-density hazelnut orchard for the first 12 years of establishment.

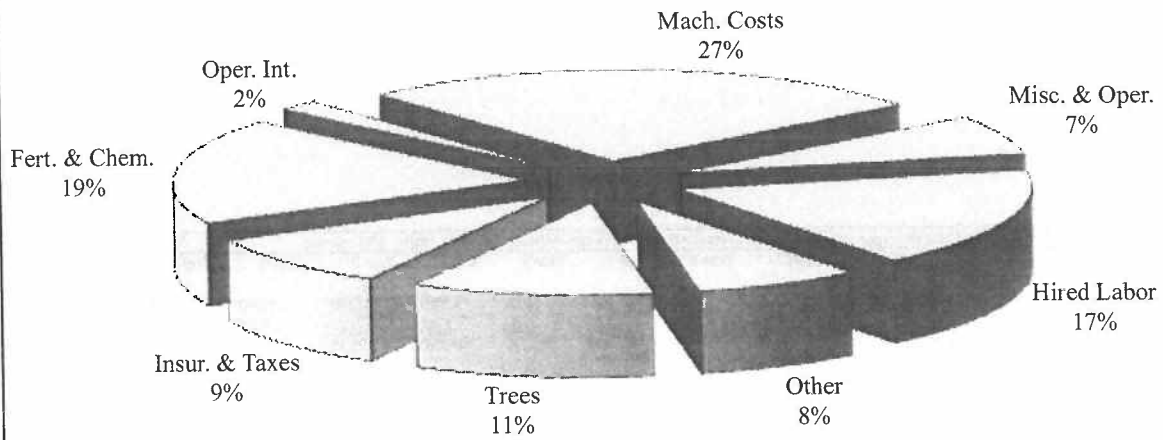
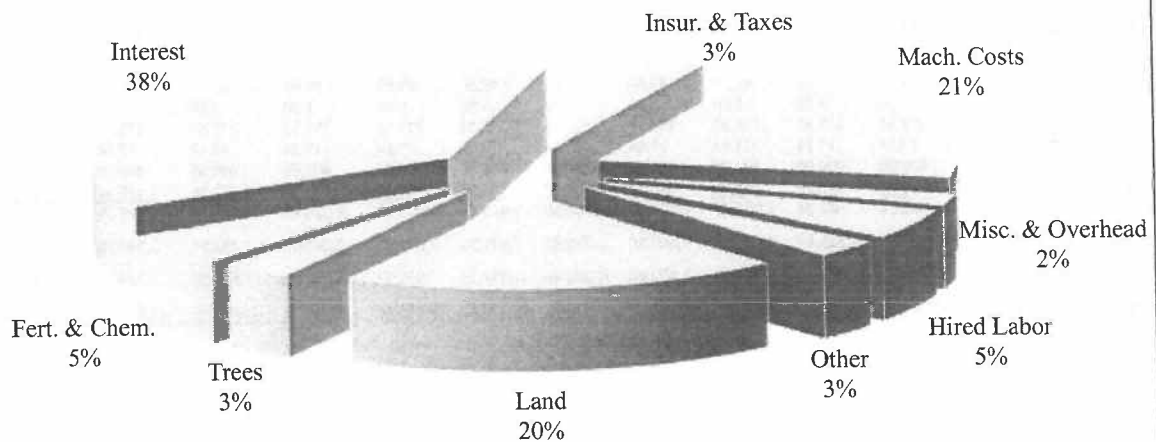


Figure 2. Economic costs to establish a standard-density hazelnut orchard for the first 12 years of establishment.



Double-Density Planting: Economic Costs and Returns and Cash Flow Analysis

Tables 7 and 8 show that planting a double-density orchard of 216 trees per acre increases the net projected returns to the grower. In Table 7, cash flow analyses, the gross income minus the variable costs, shows a positive return in year 4 of \$94 per acre, compared to \$30 in year 5 for a standard-density orchard. A comparison of the cumulative cash flow show the double-density orchard covers all cash costs in year 8 with a surplus of \$1,242 per acre while the standard-density orchard shows a positive \$189 per acre in year 9. In double-density plantings, the temporary tree must be removed, usually between the 10th and 12th years after planting. This allows the permanent trees to grow without being overly shaded and maintains high yields. In this budget, the costs of tree removal were accounted for after the 11th year. The cost to remove every other tree is \$450 per acre, which includes labor, machinery, and interest costs. The planting should return to a full production yield 2 to 3 years following temporary tree removal. At the end of the establishment period, the double-density

orchard returns \$8,591 per acre over cash costs to the grower, as compared to the standard-density planting of \$5,427.

The economic costs for the double-density planting in Table 8 follow a similar pattern to the cash flow analysis as the inclusion of interest costs changes only the magnitude of the outcome. The grower will gain \$3,781 at the end of the 12th year of establishment (-\$11,929 minus -\$8,148) over the standard-density hazelnut orchard if a double-density orchard is planted.

Based on total cash costs and gross incomes in Table 9, the additional cash costs to plant a double-density orchard are \$2,169 per acre and additional revenues are \$5,400 resulting in a net gain to the grower of \$3,231 per acre. This is the additional return generated by planting a double-density hazelnut orchard during the first 12 years of establishment. Figure 3 shows the additional revenues offset the additional costs by year 6. This is the year that additional revenues generate sufficient income to make the double-density planting advantageous over the standard orchard planting.

Table 7. Cash flow analysis for establishing a double-density hazelnut orchard in the Willamette Valley, 10ft x 20ft spacing.

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Full Prod
Income:												
Yield (Lbs per Acre)	0	0	150	570	880	1,200	2,200	2,300	2,400	3,000	2,300	2,800
Price (\$ per Lb)	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>
Gross Income(\$ per Acre)	0.00	0.00	150.00	570.00	880.00	1,200.00	2,200.00	2,300.00	2,400.00	3,000.00	2,300.00	2,800.00
Variable Costs:												
Field Preparation	9.22	0.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trees	1,404.00	65.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sawdust Mulch	3.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paint Trees	20.00	20.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fertilizer	134.66	27.57	41.36	55.14	68.93	141.92	96.50	176.31	124.08	137.86	210.85	262.36
Chemicals	12.15	27.32	34.87	26.45	26.36	29.66	32.95	53.17	36.25	36.25	36.25	40.48
IPM Scouting	0.00	0.00	0.00	2.57	2.57	2.57	2.57	2.57	2.57	2.57	2.57	2.57
Nutrient Analysis	0.00	0.00	0.00	2.25	0.00	1.25	2.25	0.00	0.00	2.25	1.25	1.15
Rodent Materials	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
Hired Labor	228.55	221.03	218.76	96.20	71.35	71.42	85.63	89.55	85.63	85.63	535.59	103.46
Harvest:Wash & Dry Nuts	0.00	0.00	3.38	12.83	19.80	27.00	49.50	51.75	54.00	67.50	51.75	63.00
Shop	6.92	6.92	6.92	6.92	6.92	6.92	6.92	6.92	6.92	6.92	6.92	6.92
Machine Costs	142.84	82.32	177.47	173.55	164.67	165.93	153.32	163.45	153.32	153.32	187.07	175.16
Misc. & Overhead	157.15	36.62	39.18	30.63	29.41	36.29	34.93	44.06	37.58	39.94	78.72	52.97
Operating Interest	<u>41.87</u>	<u>9.73</u>	<u>10.41</u>	<u>8.14</u>	<u>7.81</u>	<u>9.64</u>	<u>9.28</u>	<u>11.70</u>	<u>9.98</u>	<u>10.61</u>	<u>20.90</u>	<u>14.07</u>
Total Variable Costs	2,168.16	504.05	539.33	421.66	404.82	499.59	480.84	606.47	517.32	549.84	1,138.86	729.14
Gross Income minus VC	-2,168.16	-504.05	-389.33	148.34	475.18	700.41	1,719.16	1,693.53	1,882.68	2,450.16	1,161.14	2,070.86
Cash Fixed Costs:												
Insurance	49.09	49.09	49.09	49.09	49.09	49.09	49.09	49.09	49.09	49.09	49.09	50.35
Property Taxes	<u>5.00</u>	<u>5.00</u>	<u>5.00</u>	<u>5.00</u>	<u>5.00</u>	<u>5.00</u>	<u>5.00</u>	<u>5.00</u>	<u>5.00</u>	<u>5.00</u>	<u>5.00</u>	<u>5.00</u>
Total Cash Fixed Cost	54.09	54.09	54.09	54.09	54.09	54.09	54.09	54.09	54.09	54.09	54.09	54.09
Total Cash Cost	2,222.25	558.14	593.42	475.75	458.90	553.68	534.93	660.56	571.40	603.93	1,192.95	783.23
Annual Cash Flow	-2,222.25	-558.14	-443.42	94.25	421.10	646.32	1,665.07	1,639.44	1,828.60	2,396.07	1,107.05	2,016.77
Cumulative Cash Flow	-2,222.25	-2,780.39	-3,223.81	-3,129.56	-2,708.46	-2,062.14	-397.08	1,242.36	3,070.96	5,467.02	6,574.08	8,590.85

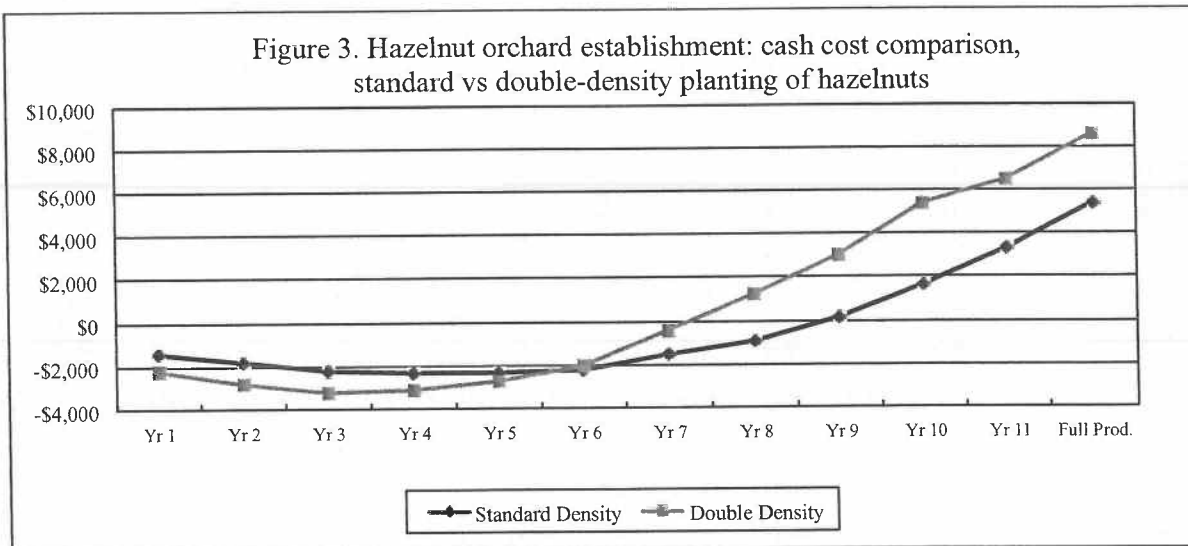
Table 8. Economic costs and returns of establishing a double-density hazelnut orchard in the Willamette Valley, 10ft x 20ft spacing.

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Full Prod
Income:												
Yield (Lbs per Acre)	0.00	0.00	150	570	880	1,200	2,200	2,300	2,400	3,000	2,300	2,800
Price (\$ per Lb)	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>
Gross Income(\$ per Acre)	0.00	0.00	150.00	570.00	880.00	1,200.00	2,200.00	2,300.00	2,400.00	3,000.00	2,300.00	2,800.00
Variable Costs:												
Field Preparation	9.22	0.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trees	1,404.00	65.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sawdust Mulch	3.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paint Trees	20.00	20.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fertilizer	134.66	27.57	41.36	55.14	68.93	141.92	96.50	176.31	124.08	137.86	210.85	262.36
Chemicals	12.15	27.32	34.87	26.45	26.36	29.66	32.95	53.17	36.25	36.25	36.25	40.48
IPM Scouting	0.00	0.00	0.00	2.57	2.57	2.57	2.57	2.57	2.57	2.57	2.57	2.57
Nutrient Analysis	0.00	0.00	0.00	2.25	0.00	1.25	2.25	0.00	0.00	2.25	1.25	1.15
Rodent Materials	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
Hired Labor	228.55	221.03	218.76	96.20	71.35	71.42	85.63	89.55	85.63	85.63	535.59	103.46
Harvest: Wash & Dry Nuts	0.00	0.00	3.38	12.83	19.80	27.00	49.50	51.75	54.00	67.50	51.75	63.00
Shop	6.92	6.92	6.92	6.92	6.92	6.92	6.92	6.92	6.92	6.92	6.92	6.92
Machine Costs	142.84	82.32	177.47	173.55	164.67	165.93	153.32	163.45	153.32	153.32	187.07	175.16
Misc. & Overhead	157.15	36.62	39.18	30.63	29.41	36.29	34.93	44.06	37.58	39.94	78.72	52.97
Operating Interest	<u>41.87</u>	<u>9.73</u>	<u>10.41</u>	<u>8.14</u>	<u>7.81</u>	<u>9.64</u>	<u>9.28</u>	<u>11.70</u>	<u>9.98</u>	<u>10.61</u>	<u>20.90</u>	<u>14.07</u>
Total Variable Costs	2,168.16	504.05	539.33	421.66	404.82	499.59	480.84	606.47	517.32	549.84	1,138.86	729.14
Gross Income minus VC	-2,168.16	-504.05	-389.33	148.34	475.18	700.41	1,719.16	1,693.53	1,882.68	2,450.16	1,161.14	2,070.86
Fixed Costs:												
Insurance	49.09	49.09	49.09	49.09	49.09	49.09	49.09	49.09	49.09	49.09	49.09	50.35
Property Taxes	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Machine Costs	275.55	275.55	275.55	275.55	275.55	275.55	275.55	275.55	275.55	275.55	275.55	302.76
Shop	17.14	17.14	17.14	17.14	17.14	17.14	17.14	17.14	17.14	17.14	17.14	17.14
Land Interest Cost	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00
Interest on Estab. Costs	<u>0.00</u>	<u>291.62</u>	<u>445.86</u>	<u>619.06</u>	<u>740.81</u>	<u>842.05</u>	<u>930.90</u>	<u>926.75</u>	<u>924.75</u>	<u>903.63</u>	<u>823.66</u>	<u>949.03</u>
Total Fixed Cost	746.78	1,038.40	1,192.65	1,365.84	1,487.60	1,588.84	1,677.68	1,673.53	1,671.53	1,650.42	1,570.44	1,724.28
Total Cost	2,914.94	1,542.45	1,731.98	1,787.51	1,892.41	2,088.43	2,158.52	2,280.01	2,188.85	2,200.26	2,709.30	2,453.42
Net Projected Returns	-2,914.94	-1,542.45	-1,581.98	-1,217.51	-1,012.41	-888.43	41.48	19.99	211.15	799.74	-409.30	346.58
Cumulative Returns	-2,914.94	-4,457.39	-6,039.37	-7,256.88	-8,269.29	-9,157.72	-9,116.24	-9,096.25	-8,885.10	-8,085.36	-8,494.66	-8,148.08

Table 9. Comparing cumulative total cash costs and returns between the standard and double-density hazelnut orchard through the 12th Year.

	Standard	Double-Density	Difference
Gross Income (\$ per acre)	\$12,400	\$17,800	\$5,400
Total Variable Costs	\$6,324	\$8,493	\$2,169
Total Cash Fixed Costs	<u>\$649</u>	<u>\$649</u>	-
Total Cost	\$6,973	\$9,142	\$2,169
Net Projected Returns	\$5,427	\$8,658	\$3,231

Figure 3. Hazelnut orchard establishment: cash cost comparison, standard vs double-density planting of hazelnuts



EASTERN FILBERT BLIGHT MANAGEMENT COSTS

The costs for managing Eastern Filbert Blight vary with the age of the orchard. Tables 10 and 11 show the costs of materials for a fully mature orchard and the fraction of full-rate material costs for younger, smaller trees. The costs for scouting and pruning out

EFB infections also vary with the age of the tree. The labor estimates times are based on 108 trees per acre. Table 12 shows the average cost of chemicals used to control EFB on a per acre and per application basis.

Table 10. Calibrating Reduced Fungicide Rates for Younger, Smaller Trees.		Table 11. Cost for Scouting & Pruning Out Eastern Filbert Blight Infections (assuming 108 trees per acre and \$14/hour)			
Year	<u>Fraction of Full-Rate Material Costs</u>	Year	Min/Tree	Hrs/Acre	Cost/Acre
1	0.025	1	0.5	0.9	\$ 12.60
2	0.050	2	1.0	1.8	25.20
3	0.100	3	1.5	2.7	37.80
4	0.200	4	2.0	3.6	50.40
5	0.400	5	2.5	4.5	63.00
6	0.600	6	3.0	5.4	75.60
7	0.800	7	3.5	6.3	88.20
8	1.000	8	4.0	7.2	100.80
9	1.000	9	4.5	8.1	113.40
10	1.000	10	5.0	9.0	129.00
11	1.000	11	5.5	9.9	138.60
12	1.000	12	6.0	10.8	151.20

Table 12. Average Costs of Four Common Eastern Filbert Blight Sprays					
Material	Cost	Applied Rate per acre	Material Cost per Acre	Variable Machine Costs & Labor	Total Cost per Application
Bravo	\$32.77/gal	4 Pints	\$ 16.38	\$ 12.72	\$ 29.10
Gem	8.18/oz	2.85 oz	23.31	12.72	36.03
Orbit	105.36/gal	6.5 fl oz	5.35	12.72	18.07
Cabrio EG	36.45/lb	9.5 oz	21.64	12.72	34.36

CONCLUSIONS

Most orchard industries renew themselves through new plantings. The marketplace and the availability of more disease resistant varieties can fuel interest in establishing new orchards as well as influence the selection of new varieties. The Pacific Northwest hazelnut industry is faced with the challenge of managing EFB. New EFB resistant and immune varieties are the result of research and plant breeding efforts that have also produced other beneficial traits such as earlier bearing, early harvest, and uniform maturity of hazelnut. These beneficial traits have greater returns to the growers and reduce pesticide use.

This cost of establishment study provides useful information to hazelnut producers considering or planning to plant new orchards. As with any other enterprise budget, putting your own current costs into

the budget will make it more meaningful for you.

Tables 5 and 6 show the cash flow analysis and total economic costs and returns from establishing a standard-density hazelnut orchard. Growers can expect to break-even on a cash flow basis in year 5 and pay back all previous cash costs of establishment in year 9. Tables 7 and 8 show the impacts of planting twice as many trees to increase earlier yields and thus reduce interest costs. This investment strategy can result in a cash flow break-even in year 4 and pay back all previous cash costs of establishment in year 8. Growers who are willing to invest the additional dollars in planting a double-density orchard and then removing every other tree in 11 years will gain about \$3,231 per acre over cash expenses.

APPENDIX A
ENTERPRISE BUDGETS

Table 13. Hazelnut orchard establishment, year 1, \$/acre economic costs and returns.

<u>VARIABLE CASH COSTS</u>	<u>Description</u>	<u>Labor</u>	<u>Machinery</u>	<u>Materials</u>	<u>Total</u>
Field Preparation		9.33	38.81	5.97	54.11
Mark Fields	3.0 hours	42.00	0.00	3.25	45.25
Plant Trees	6.0 hours	84.00	7.23	702.00	793.23
Sawdust Mulch	2.0 hours	28.00	11.47	3.80	43.27
Painting Trees	3.0 hours	42.00	0.00	20.00	62.00
Potash		0.07	1.26	37.73	39.06
Nutrient Analysis		0.00	0.00	1.25	1.25
Lime		0.00	0.00	59.20	59.20
Rodent Control		0.00	0.00	7.00	7.00
Disk	2.0 appl.	5.09	8.33	0.00	13.42
Leveling Orchard		2.26	3.98	0.00	6.24
Herbicide Strip Spray	1.0 appl.	3.85	8.87	8.38	21.10
Spring Tooth	2.0 appl.	4.24	4.65	0.00	8.89
Aphid/Leafroller & Leafier Spray	1.00 appl.	3.85	8.87	0.42	13.14
Fall Copper Spray	1.0 appl.	3.85	8.87	3.35	16.07
Pickup		0.00	40.50	0.00	40.50
Shop		0.00	0.00	6.92	6.92
Miscellaneous and Overhead		0.00	0.00	97.98	97.98
Interest: Operating Capital	6.0 mons	<u>0.00</u>	<u>0.00</u>	<u>26.15</u>	<u>26.15</u>
Total VARIABLE COSTS		228.55	142.84	983.39	1,354.78
<u>FIXED CASH COSTS</u>				<u>Unit</u>	<u>Total</u>
<u>CASH Costs</u>					
Machinery and Equipment Insurance				acre	9.10
Pickup Insurance				acre	9.99
Property Insurance				acre	30.00
Property Taxes				acre	<u>5.00</u>
Total CASH Costs					54.09
<u>NON-CASH Costs</u>					
Machinery and Equip - Deprec. & Interest				acre	245.36
Pickup - Depreciation & Interest				acre	30.19
Shop				acre	17.14
Land Interest Charge				acre	400.00
Interest on Establishment Costs				acre	<u>0.00</u>
Total NON-CASH Costs					692.69
Total FIXED COSTS					746.78
Total of All Costs Per Acre					(2,101.57)

Table 14. Hazelnut orchard establishment, year 2, \$/acre economic costs and returns.

<u>VARIABLE CASH COSTS</u>	<u>Description</u>	<u>Labor</u>	<u>Machinery</u>	<u>Materials</u>	<u>Total</u>
Maintainance Pruning	2.5 hours	35.00	0.00	0.00	35.00
Fertilize by Hand	0.5 hours	7.00	0.00	13.79	20.79
Painting Trees	3.0 hours	42.00	0.00	20.00	62.00
Replant Trees	0.8 hours	11.20	0.00	65.00	76.20
Stake Trees	0.1 hours	1.40	0.00	0.55	1.95
Rodent Control		0.00	0.00	7.00	7.00
Sucker Control	4.0 appl.	0.88	15.21	11.39	27.48
Flailing Orchard	0.0 times	0.00	0.00	0.00	0.00
Herbicide Strip Spray	1.0 appl.	3.85	8.87	8.38	21.10
Fall Copper Spray	1.0 appl.	3.85	8.87	6.70	19.43
Aphid/Leafroller & Leaf-tier Spray	1.00 appl.	3.85	8.87	0.85	13.57
Pickup		0.00	40.50	0.00	40.50
Shop		0.00	0.00	6.92	6.92
Miscellaneous and Overhead		0.00	0.00	26.55	26.55
Interest: Operating Capital	6.0 mons	<u>0.00</u>	<u>0.00</u>	<u>7.05</u>	<u>7.05</u>
Total VARIABLE COSTS		109.03	82.32	174.18	365.53
 <u>FIXED CASH COSTS</u>					
<u>CASH Costs</u>					
Machinery and Equipment Insurance				acre	9.10
Pickup Insurance				acre	9.99
Property Insurance				acre	30.00
Property Taxes				acre	<u>5.00</u>
Total CASH Costs					54.09
 <u>NON-CASH Costs</u>					
Machinery and Equip - Deprec. & Interest				acre	245.36
Pickup - Depreciation & Interest				acre	30.19
Shop				acre	17.14
Land Interest Charge				acre	400.00
Interest on Establishment Costs				acre	<u>210.16</u>
Total NON-CASH Costs					902.85
Total FIXED COSTS					956.94
Total of All Costs Per Acre					(1,322.47)

Table 15. Hazelnut orchard establishment, year 3, \$/acre economic costs and returns.

<u>GROSS INCOME</u>						
	<u>Quantity</u>	<u>Unit</u>	<u>\$/Unit</u>	<u>Total</u>	<u>Price/Lb</u>	
Hazelnuts	75	Pounds	1.00	75.00	1.000	
Total GROSS Income				75.00	1.000	
<u>VARIABLE CASH COSTS</u>						
<u>Description</u>		<u>Labor</u>	<u>Machinery</u>	<u>Materials</u>	<u>Total</u>	<u>Cost/Lb</u>
Production Pruning	2.5 hours	35.00	0.00	0.00	35.00	0.018
Fertilize by Hand/prune	0.5 hours	7.00	0.00	20.68	27.68	0.369
Herbicide Strip Spray	1.0 appl.	3.85	8.87	8.38	21.10	0.281
Sucker Control	4.0 appl.	0.88	15.21	11.39	27.48	0.366
Fall Copper Spray/bor./Fil. Worm	3.0 appl.	11.55	26.62	13.41	51.57	0.688
Flailing Orchard	5.0 times	16.98	31.54	0.00	48.52	0.647
Aphid/Leafroller & Leaf-tier Spray	1.0 appl.	3.85	8.87	1.69	14.41	0.192
Rodent Control		0.00	0.00	7.00	7.00	0.093
Leveling Orchard		2.26	3.98	0.00	6.24	0.083
Harvesting Costs						
Sweeping Floor		6.60	14.95	0.00	21.55	0.287
Harvesting Nut		8.88	12.59	0.00	21.47	0.286
Loading Totes		9.90	14.34	0.00	24.24	0.323
Wash & Dry Nuts	75 Lbs	0.00	0.00	1.69	1.69	0.023
Pickup		0.00	40.50	0.00	40.50	0.540
Shop		0.00	0.00	6.92	6.92	0.092
Miscellaneous and Overhead		0.00	0.00	28.43	28.43	0.379
Interest: Operating Capital	6.0 mons	0.00	0.00	7.55	7.55	0.101
Total VARIABLE COSTS		106.76	177.47	107.13	391.36	5.218
<u>FIXED CASH COSTS</u>						
				<u>Unit</u>	<u>Total</u>	<u>Cost/Lb</u>
CASH Costs						
Machinery and Equipment Insurance				acre	9.10	0.121
Pickup Insurance				acre	9.99	0.133
Property Insurance				acre	30.00	0.400
Property Taxes				acre	5.00	0.067
Total CASH Costs					54.09	0.721
GROSS INCOME minus VARIABLE AND FIXED CASH COSTS					(370.45)	(4.939)
<u>NON-CASH Costs</u>						
						<u>Cost/Lb</u>
Machinery and Equip - Deprec. & Interest				acre	245.36	3.271
Pickup - Depreciation & Interest				acre	30.19	0.403
Shop				acre	17.14	0.229
Land Interest Charge				acre	400.00	5.333
Interest on Establishment Costs				acre	342.40	4.565
Total NON-CASH Costs					1,035.10	13.801
Total FIXED COSTS					1,089.19	14.522
Total of All Costs Per Acre					(1,480.54)	(19.741)

Table 16. Hazelnut orchard establishment, year 4, \$/acre economic costs and returns.

<u>GROSS INCOME</u>		<u>Quantity</u>	<u>Unit</u>	<u>\$/Unit</u>	<u>Total</u>	<u>Price/Lb</u>
Hazelnuts		285	Pounds	1.00	285.00	1.000
Total GROSS Income					285.00	1.000
<u>VARIABLE CASH COSTS</u>	<u>Description</u>	<u>Labor</u>	<u>Machinery</u>	<u>Materials</u>	<u>Total</u>	<u>Cost/Lb</u>
Brush Removal		0.29	4.95	0.00	5.24	0.018
Fertilize by Hand/prune		0.6 hours	8.40	0.00	27.57	0.126
Herbicide Strip Spray		1.0 appl.	3.85	8.87	8.38	0.074
IPM Scouting		14.00	0.00	2.57	16.57	0.058
Nutrient Analysis		0.00	0.00	2.25	2.25	0.008
Sucker Control		4.0 appl.	0.88	15.21	11.39	0.096
Boron Spray		0.5 appl.	1.92	4.44	1.41	0.027
Filbertworm Spray		1.5 appl.	5.77	13.31	1.89	0.074
Flailing Orchard		5.0 times	16.98	31.54	0.00	48.52
Aphid/Leafroller Spray		1.00 appl.	3.85	8.87	3.38	16.11
Rodent Control		0.00	0.00	7.00	7.00	0.025
Leveling Orchard		2.26	3.98	0.00	6.24	0.022
Harvesting Costs						
Sweeping Floor		6.60	14.95	0.00	21.55	0.076
Harvesting Nut		8.88	12.59	0.00	21.47	0.075
Loading Totes		9.90	14.34	0.00	24.24	0.085
Wash & Dry Nuts		285 Lbs	0.00	0.00	6.41	6.41
Pickup		0.00	40.50	0.00	40.50	0.142
Shop		0.00	0.00	6.92	6.92	0.024
Miscellaneous and Overhead		0.00	0.00	26.90	26.90	0.094
Interest: Operating Capital		6.0 mons	0.00	0.00	7.15	7.15
Total VARIABLE COSTS		83.60	173.55	113.22	370.36	1.300
<u>FIXED CASH COSTS</u>				<u>Unit</u>	<u>Total</u>	<u>Cost/Lb</u>
CASH Costs						
Machinery and Equipment Insurance				acre	9.10	0.032
Pickup Insurance				acre	9.99	0.035
Property Insurance				acre	30.00	0.105
Property Taxes				acre	5.00	0.018
Total CASH Costs					54.09	0.190
GROSS INCOME minus VARIABLE AND FIXED CASH COSTS					(139.45)	(0.489)
<u>NON-CASH Costs</u>						
Machinery and Equip - Deprec. & Interest				acre	245.36	0.861
Pickup - Depreciation & Interest				acre	30.19	0.106
Shop				acre	17.14	0.060
Land Interest Charge				acre	400.00	1.404
Interest on Establishment Costs				acre	490.46	1.721
Total NON-CASH Costs					1,183.15	4.151
Total FIXED COSTS					1,237.24	4.341
Total of All Costs Per Acre					1,607.60	5.641
Net Projected Returns					(1,322.60)	(4.641)

Table 17. Hazelnut orchard establishment, year 5, \$/acre economic costs and returns.

<u>GROSS INCOME</u>		<u>Quantity</u>	<u>Unit</u>	<u>\$/Unit</u>	<u>Total</u>	<u>Price/Lb</u>	
Hazelnuts		440	Pounds	1.00	440.00	1.000	
Total GROSS Income					440.00	1.000	
<u>VARIABLE CASH COSTS</u>		<u>Description</u>	<u>Labor</u>	<u>Machinery</u>	<u>Materials</u>	<u>Total</u>	<u>Cost/Lb</u>
Brush Removal			0.29	4.95	0.00	5.24	0.012
Fertilize by Hand		0.0 hours	0.00	0.00	34.47	34.47	0.078
Herbicide Strip Spray		1.0 appl.	3.85	8.87	8.38	21.10	0.048
IPM Scouting			14.00	0.00	2.57	16.57	0.038
Nutrient Analysis			0.00	0.00	0.00	0.00	0.000
Sucker Control		4.0 appl.	0.88	15.21	11.39	27.48	0.062
Boron Spray		0.5 appl.	1.92	4.44	2.82	9.18	0.021
Filbertworm Spray		1.5 appl.	5.77	13.31	3.77	22.86	0.052
Flailing Orchard		5.0 times	16.98	31.54	0.00	48.52	0.110
Aphid/Leafroller Spray		0.00 appl.	0.00	0.00	0.00	0.00	0.000
Rodent Control			0.00	0.00	7.00	7.00	0.016
Leveling Orchard			2.26	3.98	0.00	6.24	0.014
Harvesting Costs							
Sweeping Floor			6.60	14.95	0.00	21.55	0.049
Harvesting Nut			8.88	12.59	0.00	21.47	0.049
Loading Totes			9.90	14.34	0.00	24.24	0.055
Wash & Dry Nuts		440 Lbs	0.00	0.00	9.90	9.90	0.023
Pickup			0.00	40.50	0.00	40.50	0.092
Shop			0.00	0.00	6.92	6.92	0.016
Miscellaneous and Overhead			0.00	0.00	25.86	25.86	0.059
Interest: Operating Capital		6.0 mons	0.00	0.00	6.87	6.87	0.016
Total VARIABLE COSTS			71.35	164.67	119.94	355.96	0.809
<u>FIXED CASH COSTS</u>				<u>Unit</u>	<u>Total</u>	<u>Cost/Lb</u>	
CASH Costs							
Machinery and Equipment Insurance				acre	9.10	0.021	
Pickup Insurance				acre	9.99	0.023	
Property Insurance				acre	30.00	0.068	
Property Taxes				acre	5.00	0.011	
Total CASH Costs					54.09	0.123	
GROSS INCOME minus VARIABLE AND FIXED CASH COSTS					29.95	0.068	
<u>NON-CASH Costs</u>							
Machinery and Equip - Deprec. & Interest				acre	245.36	0.558	
Pickup - Depreciation & Interest				acre	30.19	0.069	
Shop				acre	17.14	0.039	
Land Interest Charge				acre	400.00	0.909	
Interest on Establishment Costs				acre	622.72	1.415	
Total NON-CASH Costs					1,315.41	2.990	
Total FIXED COSTS					1,369.50	3.113	
Total of All Costs Per Acre					1,725.46	3.921	
Net Projected Returns					(1,285.46)	(2.921)	

Table 18. Hazelnut orchard establishment, year 6, \$/acre economic costs and returns.

<u>GROSS INCOME</u>		<u>Quantity</u>	<u>Unit</u>	<u>\$/Unit</u>	<u>Total</u>	<u>Price/Lb</u>
Hazelnuts		600	Pounds	1.00	600.00	1.000
Total GROSS Income					600.00	1.000
<u>VARIABLE CASH COSTS</u>	<u>Description</u>	<u>Labor</u>	<u>Machinery</u>	<u>Materials</u>	<u>Total</u>	<u>Cost/Lb</u>
Brush Removal		0.29	4.95	0.00	5.24	0.009
Fertilizer		0.07	1.26	41.36	42.69	0.071
Lime		0.00	0.00	59.20	59.20	0.099
Herbicide Strip Spray	1.0 appl.	3.85	8.87	8.38	21.10	0.035
IPM Scouting		14.00	0.00	2.57	16.57	0.028
Nutrient Analysis		0.00	0.00	1.25	1.25	0.002
Sucker Control	4.0 appl.	0.88	15.21	11.39	27.48	0.046
Boron Spray	0.5 appl.	1.92	4.44	4.23	10.59	0.018
Filbertworm Spray	1.5 appl.	5.77	13.31	5.66	24.74	0.041
Flailing Orchard	5.0 times	16.98	31.54	0.00	48.52	0.081
Aphid/Leafroller Spray	0.00 appl.	0.00	0.00	0.00	0.00	0.000
Rodent Control		0.00	0.00	7.00	7.00	0.012
Leveling Orchard		2.26	3.98	0.00	6.24	0.010
<u>Harvesting Costs</u>						
Sweeping Floor		6.60	14.95	0.00	21.55	0.036
Harvesting Nut		8.88	12.59	0.00	21.47	0.036
Loading Totes		9.90	14.34	0.00	24.24	0.040
Wash & Dry Nuts	600 Lbs	0.00	0.00	13.50	13.50	0.023
Pickup		0.00	40.50	0.00	40.50	0.068
Shop		0.00	0.00	6.92	6.92	0.012
Miscellaneous and Overhead		0.00	0.00	31.90	31.90	0.053
Interest: Operating Capital	6.0 mons	0.00	0.00	8.47	8.47	0.014
Total VARIABLE COSTS		71.42	165.93	201.83	439.18	0.732
<u>FIXED CASH COSTS</u>				<u>Unit</u>	<u>Total</u>	<u>Cost/Lb</u>
<u>CASH Costs</u>						
Machinery and Equipment Insurance				acre	9.10	0.015
Pickup Insurance				acre	9.99	0.017
Property Insurance				acre	30.00	0.050
Property Taxes				acre	5.00	0.008
Total CASH Costs					54.09	0.090
GROSS INCOME minus VARIABLE AND FIXED CASH COSTS					106.73	0.178
<u>NON-CASH Costs</u>						
Machinery and Equip - Deprec. & Interest				acre	245.36	0.409
Pickup - Depreciation & Interest				acre	30.19	0.050
Shop				acre	17.14	0.029
Land Interest Charge				acre	400.00	0.667
Interest on Establishment Costs				acre	751.26	1.252
Total NON-CASH Costs					1,443.96	2.407
Total FIXED COSTS					1,498.05	2.497
Total of All Costs Per Acre					1,937.23	3.229
Net Projected Returns					(1,337.23)	(2.229)

Table 19. Hazelnut orchard establishment, year 7, \$/acre economic costs and returns.

<u>GROSS INCOME</u>						
	<u>Quantity</u>	<u>Unit</u>	<u>\$/Unit</u>	<u>Total</u>	<u>Price/Lb</u>	
Hazelnuts	1,100	Pounds	1.00	1,100.00	1.000	
Total GROSS Income				1,100.00	1.000	
<u>VARIABLE CASH COSTS</u>						
<u>Description</u>		<u>Labor</u>	<u>Machinery</u>	<u>Materials</u>	<u>Total</u>	<u>Cost/Lb</u>
Maintainance Pruning	1.5 hours	21.00	0.00	0.00	21.00	0.019
Brush Removal		0.29	4.95	0.00	5.24	0.005
Fertilizer		0.07	1.26	48.25	49.58	0.045
Herbicide Strip Spray	1.0 appl.	3.85	8.87	8.38	21.10	0.019
IPM Scouting		14.00	0.00	2.57	16.57	0.015
Nutrient Analysis		0.00	0.00	2.25	2.25	0.002
Sucker Control	4.0 appl.	0.88	15.21	11.39	27.48	0.025
Boron Spray	0.5 appl.	1.92	4.44	5.64	12.00	0.011
Filbertworm Spray	1.5 appl.	5.77	13.31	7.55	26.63	0.024
Flailing Orchard	3.0 times	10.19	18.92	0.00	29.11	0.026
Aphid/Leafroller Spray	0.00 appl.	0.00	0.00	0.00	0.00	0.000
Rodent Control		0.00	0.00	7.00	7.00	0.006
Leveling Orchard		2.26	3.98	0.00	6.24	0.006
<u>Harvesting Costs</u>						
Sweeping Floor		6.60	14.95	0.00	21.55	0.020
Harvesting Nut		8.88	12.59	0.00	21.47	0.020
Loading Totes		9.90	14.34	0.00	24.24	0.022
Wash & Dry Nuts	1100 Lbs	0.00	0.00	24.75	24.75	0.023
Pickup		0.00	40.50	0.00	40.50	0.037
Shop		0.00	0.00	6.92	6.92	0.006
Miscellaneous and Overhead		0.00	0.00	29.09	29.09	0.026
Interest: Operating Capital	6.0 mons	0.00	0.00	7.73	7.73	0.007
Total VARIABLE COSTS		85.63	153.32	161.51	400.45	0.364
<u>FIXED CASH COSTS</u>						
<u>CASH Costs</u>						
Machinery and Equipment Insurance				acre	9.10	0.008
Pickup Insurance				acre	9.99	0.009
Property Insurance				acre	30.00	0.027
Property Taxes				acre	5.00	0.005
Total CASH Costs					54.09	0.049
GROSS INCOME minus VARIABLE AND FIXED CASH COSTS					645.46	0.587
<u>NON-CASH Costs</u>						
Machinery and Equip - Deprec. & Interest				acre	245.36	0.223
Pickup - Depreciation & Interest				acre	30.19	0.027
Shop				acre	17.14	0.016
Land Interest Charge				acre	400.00	0.364
Interest on Establishment Costs				acre	884.99	0.805
Total NON-CASH Costs					1,577.68	1.434
Total FIXED COSTS					1,631.77	1.483
Total of All Costs Per Acre					2,032.22	1.847
Net Projected Returns					(932.22)	(0.847)

Table 20. Hazelnut orchard establishment, year 8, \$/acre economic costs and returns.

<u>GROSS INCOME</u>		<u>Quantity</u>	<u>Unit</u>	<u>\$/Unit</u>	<u>Total</u>	<u>Price/Lb</u>
Hazelnuts		1,200	Pounds	1.00	1,200.00	1.000
Total GROSS Income					1,200.00	1.000
<u>VARIABLE CASH COSTS</u>	<u>Description</u>	<u>Labor</u>	<u>Machinery</u>	<u>Materials</u>	<u>Total</u>	<u>Cost/Lb</u>
Maintainance Pruning	1.5 hours	21.00	0.00	0.00	21.00	0.018
Brush Removal		0.29	4.95	0.00	5.24	0.004
Fertilizer		0.07	1.26	55.14	56.48	0.047
Potash		0.07	1.26	66.02	67.36	0.056
Herbicide Strip Spray	1.0 appl.	3.85	8.87	8.38	21.10	0.018
IPM Scouting		14.00	0.00	2.57	16.57	0.014
Nutrient Analysis		0.00	0.00	0.00	0.00	0.000
Sucker Control	4.0 appl.	0.88	15.21	11.39	27.48	0.023
Boron Spray	0.5 appl.	1.92	4.44	7.05	13.41	0.011
Filbertworm Spray	1.5 appl.	5.77	13.31	9.44	28.52	0.024
Flailing Orchard	3.0 times	10.19	18.92	0.00	29.11	0.024
Aphid/Leafroller Spray	1.00 appl.	3.85	8.87	16.92	29.64	0.025
Rodent Control		0.00	0.00	7.00	7.00	0.006
Leveling Orchard		2.26	3.98	0.00	6.24	0.005
Harvesting Costs						
Sweeping Floor		6.60	14.95	0.00	21.55	0.018
Harvesting Nut		8.88	12.59	0.00	21.47	0.018
Loading Totes		9.90	14.34	0.00	24.24	0.020
Wash & Dry Nuts	1200 Lbs	0.00	0.00	27.00	27.00	0.023
Pickup		0.00	40.50	0.00	40.50	0.034
Shop		0.00	0.00	6.92	6.92	0.006
Miscellaneous and Overhead		0.00	0.00	37.67	37.67	0.031
Interest: Operating Capital	6.0 mons	0.00	0.00	10.00	10.00	0.008
Total VARIABLE COSTS		89.55	163.45	265.49	518.49	0.432
<u>FIXED CASH COSTS</u>				<u>Unit</u>	<u>Total</u>	<u>Cost/Lb</u>
CASH Costs						
Machinery and Equipment Insurance				acre	9.10	0.008
Pickup Insurance				acre	9.99	0.008
Property Insurance				acre	30.00	0.025
Property Taxes				acre	5.00	0.004
Total CASH Costs					54.09	0.045
GROSS INCOME minus VARIABLE AND FIXED CASH COSTS					627.42	0.523
<u>NON-CASH Costs</u>						
Machinery and Equip - Deprec. & Interest				acre	245.36	0.204
Pickup - Depreciation & Interest				acre	30.19	0.025
Shop				acre	17.14	0.014
Land Interest Charge				acre	400.00	0.333
Interest on Establishment Costs				acre	978.21	0.815
Total NON-CASH Costs					1,670.90	1.392
Total FIXED COSTS					1,724.99	1.437
Total of All Costs Per Acre					2,243.48	1.870
Net Projected Returns					(1,043.48)	(0.870)

Table 21. Hazelnut orchard establishment, year 9, \$/acre economic costs and returns.

<u>GROSS INCOME</u>						
	<u>Quantity</u>	<u>Unit</u>	<u>\$/Unit</u>	<u>Total</u>	<u>Price/Lb</u>	
Hazelnuts	1,600	Pounds	1.00	1,600.00	1.000	
Total GROSS Income				1,600.00	1.000	
<u>VARIABLE CASH COSTS</u>						
<u>Description</u>		<u>Labor</u>	<u>Machinery</u>	<u>Materials</u>	<u>Total</u>	<u>Cost/Lb</u>
Maintainance Pruning	1.5 hours	21.00	0.00	0.00	21.00	0.013
Brush Removal		0.29	4.95	0.00	5.24	0.003
Fertilizer		0.07	1.26	62.04	63.37	0.040
Herbicide Strip Spray	1.0 appl.	3.85	8.87	8.38	21.10	0.013
IPM Scouting		14.00	0.00	2.57	16.57	0.010
Nutrient Analysis		0.00	0.00	0.00	0.00	0.000
Sucker Control	4.0 appl.	0.88	15.21	11.39	27.48	0.017
Boron Spray	0.5 appl.	1.92	4.44	7.05	13.41	0.008
Filbertworm Spray	1.5 appl.	5.77	13.31	9.44	28.52	0.018
Flailing Orchard	3.0 times	10.19	18.92	0.00	29.11	0.018
Aphid/Leafroller Spray	0.00 appl.	0.00	0.00	0.00	0.00	0.000
Rodent Control		0.00	0.00	7.00	7.00	0.004
Leveling Orchard		2.26	3.98	0.00	6.24	0.004
<u>Harvesting Costs</u>						
Sweeping Floor		6.60	14.95	0.00	21.55	0.013
Harvesting Nut		8.88	12.59	0.00	21.47	0.013
Loading Totes		9.90	14.34	0.00	24.24	0.015
Wash & Dry Nuts	1600 Lbs	0.00	0.00	36.00	36.00	0.023
Pickup		0.00	40.50	0.00	40.50	0.025
Shop		0.00	0.00	6.92	6.92	0.004
Miscellaneous and Overhead		0.00	0.00	31.18	31.18	0.019
Interest: Operating Capital	6.0 mons	0.00	0.00	8.28	8.28	0.005
Total VARIABLE COSTS		85.63	153.32	190.23	429.17	0.268
<u>FIXED CASH COSTS</u>						
<u>CASH Costs</u>				<u>Unit</u>	<u>Total</u>	<u>Cost/Lb</u>
Machinery and Equipment Insurance				acre	9.10	0.006
Pickup Insurance				acre	9.99	0.006
Property Insurance				acre	30.00	0.019
Property Taxes				acre	5.00	0.003
Total CASH Costs					54.09	0.034
GROSS INCOME minus VARIABLE AND FIXED CASH COSTS					1,116.74	0.698
<u>NON-CASH Costs</u>						
Machinery and Equip - Deprec. & Interest				acre	245.36	0.153
Pickup - Depreciation & Interest				acre	30.19	0.019
Shop				acre	17.14	0.011
Land Interest Charge				acre	400.00	0.250
Interest on Establishment Costs				acre	1,082.56	0.677
Total NON-CASH Costs					1,775.25	1.110
Total FIXED COSTS					1,829.34	1.143
Total of All Costs Per Acre					2,258.51	1.412
Net Projected Returns					(658.51)	(0.412)

Table 22. Hazelnut orchard establishment, year 10, \$/acre economic costs and returns.

<u>GROSS INCOME</u>		<u>Quantity</u>	<u>Unit</u>	<u>\$/Unit</u>	<u>Total</u>	<u>Price/Lb</u>
Hazelnuts		2,000	Pounds	1.00	2,000.00	1.000
Total GROSS Income					2,000.00	1.000
<u>VARIABLE CASH COSTS</u>	<u>Description</u>	<u>Labor</u>	<u>Machinery</u>	<u>Materials</u>	<u>Total</u>	<u>Cost/Lb</u>
Maintainance Pruning	1.5 hours	21.00	0.00	0.00	21.00	0.011
Tree removal	0.0 hours	0.00	0.00	0.00	0.00	0.000
Brush Removal	0.0 hours	0.29	4.95	0.00	5.24	0.003
Fertilizer		0.07	1.26	68.93	70.26	0.035
Herbicide Strip Spray	1.0 appl.	3.85	8.87	8.38	21.10	0.011
IPM Scouting		14.00	0.00	2.57	16.57	0.008
Nutrient Analysis		0.00	0.00	2.25	2.25	0.001
Sucker Control	4.0 appl.	0.88	15.21	11.39	27.48	0.014
Boron Spray	0.5 appl.	1.92	4.44	7.05	13.41	0.007
Filbertworm Spray	1.5 appl.	5.77	13.31	9.44	28.52	0.014
Flailing Orchard	3.0 times	10.19	18.92	0.00	29.11	0.015
Aphid/Leafroller Spray	0.00 appl.	0.00	0.00	0.00	0.00	0.000
Rodent Control		0.00	0.00	7.00	7.00	0.004
Leveling Orchard		2.26	3.98	0.00	6.24	0.003
<u>Harvesting Costs</u>						
Sweeping Floor		6.60	14.95	0.00	21.55	0.011
Harvesting Nut		8.88	12.59	0.00	21.47	0.011
Loading Totes		9.90	14.34	0.00	24.24	0.012
Wash & Dry Nuts	2000 Lbs	0.00	0.00	45.00	45.00	0.023
Pickup		0.00	40.50	0.00	40.50	0.020
Shop		0.00	0.00	6.92	6.92	0.003
Miscellaneous and Overhead		0.00	0.00	32.63	32.63	0.016
Interest: Operating Capital	6.0 mons	0.00	0.00	8.67	8.67	0.004
Total VARIABLE COSTS		85.63	153.32	210.21	449.15	0.225
<u>FIXED CASH COSTS</u>				<u>Unit</u>	<u>Total</u>	<u>Cost/Lb</u>
CASH Costs						
Machinery and Equipment Insurance				acre	9.10	0.005
Pickup Insurance				acre	9.99	0.005
Property Insurance				acre	30.00	0.015
Property Taxes				acre	5.00	0.003
Total CASH Costs					54.09	0.027
GROSS INCOME minus VARIABLE AND FIXED CASH COSTS					1,496.76	0.748
<u>NON-CASH Costs</u>						
Machinery and Equip - Deprec. & Interest				acre	245.36	0.123
Pickup - Depreciation & Interest				acre	30.19	0.015
Shop				acre	17.14	0.009
Land Interest Charge				acre	400.00	0.200
Interest on Establishment Costs				acre	1,148.41	0.574
Total NON-CASH Costs					1,841.10	0.921
Total FIXED COSTS					1,895.19	0.948
Total of All Costs Per Acre					2,344.35	1.172
Net Projected Returns					(344.35)	(0.172)

Table 23. Hazelnut orchard establishment, year 11, \$/acre economic costs and returns.

<u>GROSS INCOME</u>						
	<u>Quantity</u>	<u>Unit</u>	<u>\$/Unit</u>	<u>Total</u>	<u>Price/Lb</u>	
Hazelnuts	2,300	Pounds	1.00	2,300.00	1.000	
Total GROSS Income				2,300.00	1.000	
<u>VARIABLE CASH COSTS</u>						
<u>Description</u>		<u>Labor</u>	<u>Machinery</u>	<u>Materials</u>	<u>Total</u>	<u>Cost/Lb</u>
Maintainance Pruning	1.5 hours	21.00	0.00	0.00	21.00	0.009
Brush Removal		0.29	4.95	0.00	5.24	0.002
Fertilizer		0.07	1.26	75.82	77.16	0.034
Lime		0.00	0.00	59.20	59.20	0.026
Herbicide Strip Spray	1.0 appl.	3.85	8.87	8.38	21.10	0.009
IPM Scouting		14.00	0.00	2.57	16.57	0.007
Nutrient Analysis		0.00	0.00	1.25	1.25	0.001
Sucker Control	4.0 appl.	0.88	15.21	11.39	27.48	0.012
Boron Spray	0.5 appl.	1.92	4.44	7.05	13.41	0.006
Filbertworm Spray	1.5 appl.	5.77	13.31	9.44	28.52	0.012
Flailing Orchard	3.0 times	10.19	18.92	0.00	29.11	0.013
Aphid/Leafroller Spray	0.00 appl.	0.00	0.00	0.00	0.00	0.000
Rodent Control		0.00	0.00	7.00	7.00	0.003
Leveling Orchard		2.26	3.98	0.00	6.24	0.003
Harvesting Costs						
Sweeping Floor		6.60	14.95	0.00	21.55	0.009
Harvesting Nut		8.88	12.59	0.00	21.47	0.009
Loading Totes		9.90	14.34	0.00	24.24	0.011
Wash & Dry Nuts	2300 Lbs	0.00	0.00	51.75	51.75	0.023
Pickup		0.00	40.50	0.00	40.50	0.018
Shop		0.00	0.00	6.92	6.92	0.003
Miscellaneous and Overhead		0.00	0.00	38.38	38.38	0.017
Interest: Operating Capital	6.0 mons	0.00	0.00	10.19	10.19	0.004
Total VARIABLE COSTS		85.63	153.32	289.33	528.27	0.230
<u>FIXED CASH COSTS</u>						
				<u>Unit</u>	<u>Total</u>	<u>Cost/Lb</u>
CASH Costs						
Machinery and Equipment Insurance				acre	9.10	0.004
Pickup Insurance				acre	9.99	0.004
Property Insurance				acre	30.00	0.013
Property Taxes				acre	5.00	0.002
Total CASH Costs					54.09	0.024
GROSS INCOME minus VARIABLE AND FIXED CASH COSTS					1,717.64	0.747
<u>NON-CASH Costs</u>						
Machinery and Equip - Deprec. & Interest				acre	245.36	0.107
Pickup - Depreciation & Interest				acre	30.19	0.013
Shop				acre	17.14	0.007
Land Interest Charge				acre	400.00	0.174
Interest on Establishment Costs				acre	1,182.84	0.514
Total NON-CASH Costs					1,875.54	0.815
Total FIXED COSTS					1,929.63	0.839
Total of All Costs Per Acre					2,457.90	1.069
Net Projected Returns					(157.90)	(0.069)

Table 24. Hazelnut orchard establishment, full production years, \$/acre economic costs and returns.

<u>GROSS INCOME</u>		<u>Quantity</u>	<u>Unit</u>	<u>\$/Unit</u>	<u>Total</u>	<u>Price/Lb</u>
Hazelnuts		2,800	Pounds	1.00	2,800.00	1.000
Total GROSS Income					2,800.00	1.000
<u>VARIABLE CASH COSTS</u>	<u>Description</u>	<u>Labor</u>	<u>Machinery</u>	<u>Materials</u>	<u>Total</u>	<u>Cost/Lb</u>
Production Pruning	1.2 hours	16.80	18.37	0.00	35.17	0.013
Maintainance Pruning	1.5 hours	21.00	0.00	0.00	21.00	0.008
Brush Removal		0.29	4.95	0.00	5.24	0.002
Fertilizer		0.07	1.26	82.72	84.05	0.030
Potash		0.07	1.26	37.73	39.06	0.014
Lime		0.00	0.00	59.20	59.20	0.021
Herbicide Strip Spray	1.0 appl.	3.85	8.87	8.38	21.10	0.008
IPM Scouting		14.00	0.00	2.57	16.57	0.006
Nutrient Analysis		0.00	0.00	1.15	1.15	0.000
Sucker Control	4.0 appl.	0.88	15.21	11.39	27.48	0.010
Boron Spray	0.5 appl.	1.92	4.44	7.05	13.41	0.005
Filbertworm Spray	1.5 appl.	5.77	13.31	9.44	28.52	0.010
Flailing Orchard	3.0 times	10.19	18.92	0.00	29.11	0.010
Aphid/Leafroller Spray	0.25 appl.	0.96	2.22	4.23	7.41	0.003
Rodent Control		0.00	0.00	7.00	7.00	0.003
Leveling Orchard		2.26	3.98	0.00	6.24	0.002
Harvesting Costs						
Sweeping Floor		6.60	14.95	0.00	21.55	0.008
Harvesting Nut		8.88	12.59	0.00	21.47	0.008
Loading Totes		9.90	14.34	0.00	24.24	0.009
Wash & Dry Nuts	2800 Lbs	0.00	0.00	63.00	63.00	0.023
Pickup		0.00	40.50	0.00	40.50	0.014
Shop		0.00	0.00	6.92	6.92	0.002
Miscellaneous and Overhead		0.00	0.00	46.35	46.35	0.017
Interest: Operating Capital	6.0 mons	0.00	0.00	12.31	12.31	0.004
Total VARIABLE COSTS		103.46	175.16	359.42	638.05	0.228
GROSS INCOME minus VARIABLE COSTS					2,161.95	0.772
<u>FIXED CASH COSTS</u>			<u>Unit</u>	<u>Total</u>	<u>Cost/Lb</u>	
CASH Costs						
Machinery and Equipment Insurance			acre	10.36	0.004	
Pickup Insurance			acre	9.99	0.004	
Property Insurance			acre	30.00	0.011	
Property Taxes			acre	5.00	0.002	
Total CASH Costs				55.35	0.020	
GROSS INCOME minus VARIABLE AND FIXED CASH COSTS					2,106.60	0.752
<u>NON-CASH Costs</u>						
Machinery and Equip - Deprec. & Interest			acre	272.57	0.097	
Pickup - Depreciation & Interest			acre	30.19	0.011	
Shop			acre	17.14	0.006	
Land Interest Charge			acre	400.00	0.143	
Amortized Establishment Costs			acre	1,320.51	0.472	
Total NON-CASH Costs				2,040.41	0.729	
Total FIXED COSTS					2,095.76	0.748
Total of All Costs Per Acre					2,733.81	0.976
Net Projected Returns					66.19	0.024