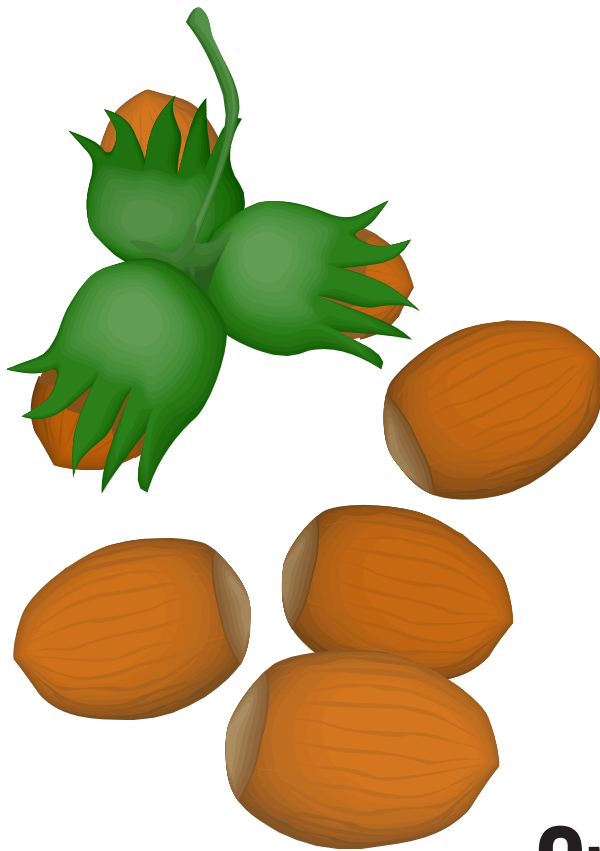


EM 8748-E
revised June 2008

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

James W. Julian, Clark F. Seavert, and Jeff L. Olsen



Oregon State | Extension
UNIVERSITY | Service

CONTENTS

Introduction	1
Assumptions	1
Table 1. Machinery Cost Assumptions	3
Table 2. Machinery Cost Calculations	3
Table 3. Estimated Cost of Each Operation with Power Unit.....	4
Table 4. Input Assumptions for Variable, Harvest, and Fixed Costs	5
Results of Establishing an Eastern Filbert Blight Resistant Standard-Density Hazelnut Orchard	7
Cash Flow Analysis	7
Economic Costs and Returns	7
Table 5. Cash Flow Analysis for Establishing a Hazelnut Orchard in the Willamette Valley, 20ft x 20ft Spacing.....	8
Table 6. Economic Costs and Returns of Establishing a Hazelnut Orchard in the Willamette Valley, 20ft x 20ft Spacing.....	9
Figure 1. Cash Costs to Establish a Hazelnut Orchard for the First 12 Years of Establishment	10
Figure 2. Comparing Projected Net Returns: Interest Rates Assumed in This Study vs. 5.1% Interest Rate on All Owner Investments, in Dollars per Acre, over 25 Years of Production	10
Figure 3. Economic Costs (All Costs Including Return on Owners' Investment) to Establish a Hazelnut Orchard for the First 12 Years of Establishment	10
Double-Density Planting: Economic Costs and Returns and Cash Flow Analyses	11
Table 7. Cash Flow Analysis for Establishing a Double-Density Hazelnut Orchard in the Willamette Valley, 10ft x 20ft spacing.	12
Table 8. Economic Costs and Returns of Establishing a Double-Density Hazelnut Orchard in the Willamette Valley, 10ft x 20ft spacing.	13
Table 9. Comparing Cumulative Total Cash Costs and Returns Between the Standard and Double-Density Hazelnut Orchard in the 12 th Year.....	14
Figure 4. Hazelnut Orchard Establishment Cost Comparison: Standard vs. Double-Density	14
Figure 5. Comparing Cumulative Projected Net Returns: Interest Rates Assumed in this Study vs. 6.2% Interest Rate on All Owner Investments, in Dollars per Acre, over 25 Years of Production	14
Eastern Filbert Blight Management Costs	15
Table 10. Calibrating Reduced Fungicide Rates for Younger, Smaller Trees	15
Table 11. Cost for Scouting and Pruning Eastern Filbert Blight Infections in Standard-Density Hazelnut Orchard	15
Table 12. Average Costs of Four Common Eastern Filbert Blight Spray	15
Conclusions	16
Appendix A. Enterprise Budgets	17
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
Appendix B. Cash Flow and Economic Analyses of Hazelnut Orchard Establishment	
at 18ft x18ft and 9ft x 18ft Spacing	31
Table 25. Cash Flow Analysis of Establishing 18ft x 18ft spacing Hazelnut Orchard in the Willamette Valley	32
Table 26. Economic Costs and Returns of Establishing 18ft x 18ft spacing Hazelnut Orchard in the Willamette Valley	33
Table 27. Cash Flow Analysis of Establishing 9ft x 18ft spacing Hazelnut Orchard in the Willamette Valley	34
Table 28. Economic Costs and Returns of Establishing 9ft x 18ft spacing Hazelnut Orchard in the Willamette Valley	35

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

James W. Julian, Clark F. Seavert, and Jeff L. Olsen¹

INTRODUCTION

Oregon's Willamette Valley is the home of the United States hazelnut industry. Growers produce around 29,000 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 released its first cultivar with complete resistance to EFB 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 data 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

¹ James W. Julian, Faculty Research Assistant, Clark F. Seavert, Extension Economist, North Willamette Research and Extension Center, Aurora, and Jeff L. Olsen, Extension Horticulturist, Yamhill, Polk and Marion Counties, Oregon State University.

The assistance provided by hazelnut producers, field representatives, farm suppliers, and researchers in developing this budget is greatly appreciated.

- compensation, unemployment insurance, and other labor overhead expenses. All labor is treated as a cash variable expense.
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 for harvesting, 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 \$3.00 and \$3.30, 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 \$0.70 per pound or \$1,400 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 harvest of nuts.
 11. The fertilizer program includes the urea form of nitrogen applied at an annual rate that varies with the age and size of tree.
- Applications begin in year 2 with 1/11th of full application and increase by 1/11th until full rate (2lb/tree) application during full production.
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: Soil tests are conducted every 5 years beginning in Year 1 at \$25 each, followed by a lime application estimated to be 2 tons per acre. Foliar analysis is conducted every third year beginning in Year 4 at \$20 each.
 14. All of the 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 and leaf-tier. The cost of filbertworm trapping is included.
 15. Fall copper applications for common filbert blight were made for the first 3 years. The time needed to spray the 20 acres is 8 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 in tree rows.
 17. One soil-residual material and one contact spray are used each year. A boom sprayer is used for both grass and sucker control. There are four sucker sprays yearly beginning in Year 2, and beginning in 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. Income tax consequences also are ignored for this study.

Table 1. Machinery cost assumptions

Machine	Size	Market Value	Hours or Miles of Annual Use	Expected Life (yrs)	Salvage Value
Tractor	4 Wheel Dr 75hp, New	\$30,000	238	10	\$8,862
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		20,000	120	15	2,048
Filbert Harvester w/Cart		30,000	71	10	4,952
Sweeper		22,500	95	10	4,244
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		6,000	N/A	20	313
Shop/Shed	40' x 80'	25,000	N/A	35	0

Table 2. Machinery cost calculations

Machine	Size	--- Variable Costs ---		--- Fixed Costs ---		Total Cost
		Fuel & Lube	Repairs & Maint.	Depr. & Interest	Insurance	
----- Costs per Hour -----						
Tractor	4 Wheel Dr 75hp, New	\$ 22.77	\$ 0.21	\$ 15.84	\$ 0.74	\$ 39.56
Tractor and Loader	2 Wheel Dr 50hp, Older	18.98	0.16	7.82	0.36	27.32
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		7.59	5.69	17.78	0.83	31.89
Filbert Harvester w/Cart		0.00	3.65	56.44	1.48	61.57
Sweeper		11.39	4.37	31.12	1.26	48.14
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		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	-- Machine Costs --			Total Cost per Acre
				Labor Cost per Acre	Variable Cost per Acre	Fixed Cost per Acre	
Filbert Harvester w/Cart	4WD 75hp	1.25	2.12	\$6.60	\$12.56	\$35.11	\$54.27
Sweeper	Self-Propelled	1.6	1.58	8.88	10.00	20.55	39.43
Brush Rake	2WD 50hp	2.0	4.12	3.40	4.67	2.84	10.91
Air-Blast Spray	4WD 75hp	3.0	3.64	3.85	8.48	12.18	24.51
Flail Chopper	4WD 75hp	4.0	4.12	3.40	5.96	6.29	15.65
Weed Sprayer w/Boom	2WD 50hp	6.0	5.46	2.57	3.59	1.72	7.88
Fertilizer Spreader	2WD 50hp	8.0	16.49	0.85	1.19	2.15	4.19

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>
Prices per Pound	\$ 0.70	\$ 0.70	\$ 0.70	\$ 0.70	\$ 0.70	\$ 0.70
Pounds per Acre	0.00	0.00	75.00	285.00	440.00	600.00
Cost of Labor, per Hour	14.00	14.00	14.00	14.00	14.00	14.00
Hours of Production Pruning Labor	0.00	2.50	2.50	0.00	0.00	0.00
Hours of Maint. Pruning Labor	0.00	0.00	0.00	0.00	0.00	0.00
Hours of Hand Fertilizing Labor	0.00	0.50	0.50	0.60	0.00	0.00
Fertilizer - Urea	0.00	8.63	12.95	17.26	21.58	25.89
Fertilizer - Potash	137.59	0.00	0.00	0.00	0.00	0.00
Fertilizer - Lime	121.00	0.00	0.00	0.00	0.00	121.00
Fertilizer - Boron	0.00	0.00	0.48	0.96	1.92	2.88
Fungicide - Fall Copper Spray	2.25	4.51	9.02	0.00	0.00	0.00
Herbicide Strip Sprays	5.10	5.10	5.10	5.10	5.10	5.10
Sucker Control	0.00	9.50	9.50	9.50	9.50	9.50
Filbertworm Spray	0.00	0.00	1.37	2.73	5.46	8.19
Aphid/Leafroller & Leaf-tier Spray	0.42	0.83	1.66	3.32	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, hours	0.00	0.00	1.00	1.00	1.00	1.00
Nutrient Analysis	1.25	0.00	0.00	1.00	0.00	1.25
Drying Costs per Pound	0.05	0.05	0.05	0.05	0.05	0.05
Times for Herbicide Strip Spray	1.00	1.00	1.00	1.00	1.00	1.00
Times for Sucker Control	0.00	4.00	4.00	4.00	4.00	4.00
Times for Boron Spray	0.00	0.00	0.00	0.50	0.50	0.50
Times for Filbertworm Spray	0.00	0.00	0.00	1.50	1.50	1.50
Times for Flailing Orchard	0.00	0.00	5.00	5.00	5.00	5.00
Times for Aphid/Leafroller Spray	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
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	3.00	3.00	3.00	3.00	3.00	3.00
Diesel Fuel Price	3.30	3.30	3.30	3.30	3.30	3.30
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	5	0	0	0	0

Table 4. Input assumptions for variable, harvest and fixed costs, (con't).

	<u>Year 7</u>	<u>Year 8</u>	<u>Year 9</u>	<u>Year 10</u>	<u>Year 11</u>	<u>Full Prod</u>
Prices per Pound	\$ 0.70	\$ 0.70	\$ 0.70	\$ 0.70	\$ 0.70	\$ 0.70
Pounds per Acre	1,100.00	1,200.00	1,600.00	2,000.00	2,300.00	2,800.00
Cost of Labor, per Hour	14.00	14.00	14.00	14.00	14.00	14.00
Hours of Production Pruning Labor	0.00	0.00	0.00	0.00	0.00	1.20
Hours of Maint. Pruning Labor	1.50	1.50	1.50	1.50	1.50	1.50
Hours of Hand Fertilizing Labor	0.00	0.00	0.00	0.00	0.00	0.00
Fertilizer - Urea	30.21	34.52	38.84	43.16	47.47	51.79
Fertilizer - Potash	0.00	137.59	0.00	0.00	0.00	19.66
Fertilizer - Lime, Custom	0.00	0.00	0.00	0.00	121.00	24.20
Fertilizer - Boron	3.84	4.80	4.80	4.80	4.80	4.80
Fertilizer - Fall Copper Spray	0.00	0.00	0.00	0.00	0.00	0.00
Herbicide Strip Sprays	5.10	5.10	5.10	5.10	5.10	5.10
Sucker Control	9.50	9.50	9.50	9.50	9.50	9.50
Filbertworm Spray	10.92	13.65	13.65	13.65	13.65	13.65
Aphid/Leafroller & Leaf-tier Spray	0.00	16.62	0.00	0.00	0.00	4.16
Rodent Control 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, hours	1.00	1.00	1.00	1.00	1.00	1.00
Nutrient Analysis	1.00	0.00	0.00	1.00	1.25	0.58
Drying Costs per Pound	0.05	0.05	0.05	0.05	0.05	0.05
Times for Herbicide Strip Spray	1.00	1.00	1.00	1.00	1.00	1.00
Times for Sucker Control	4.00	4.00	4.00	4.00	4.00	4.00
Times for Boron Spray	0.50	0.50	0.50	0.50	0.50	0.50
Times for Filbertworm Spray	1.50	1.50	1.50	1.50	1.50	1.50
Times for Flailing Orchard	3.00	3.00	3.00	3.00	3.00	3.00
Times for Aphid/Leafroller Spray	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
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	3.00	3.00	3.00	3.00	3.00	3.00
Diesel Fuel Price	3.30	3.30	3.30	3.30	3.30	3.30
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 \$1,495 in the first year with an additional \$22 of cash fixed costs for a total cash cost of \$1,517 per acre.

A positive sustainable cash flow begins in year 7 with gross income exceeding total cash costs by \$361 per acre. In year 11 the orchard returns a sufficient amount of gross income to pay all previous years' costs of establishment with \$541 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 25 percent of the cash costs. Fertilizer and chemicals are the second largest cost item with 20 percent of the total cash costs. Labor represents 19 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 25 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 costs are included as well. Again, gross income exceeds variable costs beginning in Year 7. However, Figure 2

shows that this orchard will not generate sufficient gross incomes to cover all economic costs for the 25-year period, with the assumed interest rates in this study (see page 2, assumptions 6 and 7). It is not until the grower reduces expectations to 5.1 percent interest rate for their investment in fixed machinery costs, shop depreciation and interest, land interest costs, and interest for previous establishment costs that this orchard will be an economic investment (i.e., recovers all economic costs including opportunity costs of investments).

Figure 3 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 40 percent of the total costs for the first 12 years of establishment. Land charges are the second largest cost item at 20 percent of the total costs. Machine costs (fuel, oil, repairs, depreciation, and interest charges) are third at 18 percent of the total costs, and both hired labor and fertilizer and chemicals are 6 percent of the total costs. The remaining cost items are only 10 percent of the total economic costs. Figure 3 shows the importance of achieving early yields so that interest costs can be reduced.

While growers often focus on reducing the costs of trees, 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 a more intensive orchard.

Table 5. Cash flow analysis for establishing a 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>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>
Gross Income(\$ per Acre)	0.00	0.00	52.50	199.50	308.00	420.00	770.00	840.00	1,120.00	1,400.00	1,610.00	1,960.00
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	32.50	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	9.50	9.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fertilizer	258.59	8.63	12.95	17.26	21.58	146.89	30.21	172.12	38.84	43.16	168.47	95.64
Chemicals	7.77	19.94	25.28	21.61	21.98	25.67	29.36	49.67	33.05	33.05	33.05	37.21
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	1.25	0.00	0.00	1.00	0.00	1.25	1.00	0.00	0.00	1.00	1.25	0.58
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	208.32	97.41	116.14	96.09	84.69	84.69	98.90	103.59	98.90	98.90	98.90	117.51
Harvest:Wash & Dry Nuts	0.00	0.00	3.45	13.11	20.24	27.60	50.60	55.20	73.60	92.00	105.80	128.80
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	141.38	80.31	166.94	163.12	155.83	155.83	143.90	153.57	143.90	143.90	143.90	163.15
Misc. & Overhead	108.46	21.02	27.24	26.29	25.66	36.67	29.64	44.05	32.38	34.28	45.43	44.75
Operating Interest	<u>31.11</u>	<u>6.03</u>	<u>7.81</u>	<u>7.54</u>	<u>7.36</u>	<u>10.52</u>	<u>8.50</u>	<u>12.64</u>	<u>9.29</u>	<u>9.83</u>	<u>13.03</u>	<u>12.84</u>
Total Variable Costs	1,495.32	289.81	373.72	362.52	353.82	505.61	408.58	607.32	446.44	472.59	626.31	616.95
Gross Income minus VC	-1,495.32	-289.81	-321.22	-163.02	-45.82	-85.61	361.42	232.68	673.56	927.41	983.69	1,343.05
Cash Fixed Costs:												
Insurance	16.54	16.54	16.54	16.54	16.54	16.54	16.54	16.54	16.54	16.54	16.54	17.53
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	21.54	21.54	21.54	21.54	21.54	21.54	21.54	21.54	21.54	21.54	21.54	21.54
Total Cash Cost	1,516.86	311.35	395.26	384.06	375.36	527.15	430.12	628.86	467.98	494.13	647.85	638.49
Annual Cash Flow	-1,516.86	-311.35	-342.76	-184.56	-67.36	-107.15	339.88	211.14	652.02	905.87	962.15	1,321.51
Cumulative Cash Flow	-1,516.86	-1,828.22	-2,170.98	-2,355.54	-2,422.90	-2,530.05	-2,190.17	-1,979.03	-1,327.01	-421.14	541.01	1,862.52

Table 6. Economic costs and returns of establishing a 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>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>
Gross Income(\$ per Acre)	0.00	0.00	52.50	199.50	308.00	420.00	770.00	840.00	1,120.00	1,400.00	1,610.00	1,960.00
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	32.50	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	9.50	9.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fertilizer	258.59	8.63	12.95	17.26	21.58	146.89	30.21	172.12	38.84	43.16	168.47	95.64
Chemicals	7.77	19.94	25.28	21.61	21.98	25.67	29.36	49.67	33.05	33.05	33.05	37.21
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	1.25	0.00	0.00	1.00	0.00	1.25	1.00	0.00	0.00	1.00	1.25	0.58
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	208.32	97.41	116.14	96.09	84.69	84.69	98.90	103.59	98.90	98.90	98.90	117.51
Harvest:Wash & Dry Nuts	0.00	0.00	3.45	13.11	20.24	27.60	50.60	55.20	73.60	92.00	105.80	128.80
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	141.38	80.31	166.94	163.12	155.83	155.83	143.90	153.57	143.90	143.90	143.90	163.15
Misc. & Overhead	108.46	21.02	27.24	26.29	25.66	36.67	29.64	44.05	32.38	34.28	45.43	44.75
Operating Interest	<u>31.11</u>	<u>6.03</u>	<u>7.81</u>	<u>7.54</u>	<u>7.36</u>	<u>10.52</u>	<u>8.50</u>	<u>12.64</u>	<u>9.29</u>	<u>9.83</u>	<u>13.03</u>	<u>12.84</u>
Total Variable Costs	1,495.32	289.81	373.72	362.52	353.82	505.61	408.58	607.32	446.44	472.59	626.31	616.95
Gross Income minus VC	-1,495.32	-289.81	-321.22	-163.02	-45.82	-85.61	361.42	232.68	673.56	927.41	983.69	1,343.05
Fixed Costs:												
Insurance	16.54	16.54	16.54	16.54	16.54	16.54	16.54	16.54	16.54	16.54	16.54	17.53
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	200.47	200.47	200.47	200.47	200.47	200.47	200.47	200.47	200.47	200.47	200.47	221.80
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>213.45</u>	<u>327.69</u>	<u>456.68</u>	<u>582.56</u>	<u>709.32</u>	<u>852.72</u>	<u>965.77</u>	<u>1,102.99</u>	<u>1,209.85</u>	<u>1,302.01</u>	<u>1,539.88</u>
Total Fixed Cost	639.15	852.59	966.84	1,095.83	1,221.71	1,348.46	1,491.87	1,604.92	1,742.14	1,849.00	1,941.16	2,201.36
Total Cost	2,134.47	1,142.41	1,340.56	1,458.34	1,575.53	1,854.07	1,900.45	2,212.24	2,188.58	2,321.59	2,567.47	2,818.31
Net Projected Returns	-2,134.47	-1,142.41	-1,288.06	-1,258.84	-1,267.53	-1,434.07	-1,130.45	-1,372.24	-1,068.58	-921.59	-957.47	-858.31
Cumulative Returns	-2,134.47	-3,276.88	-4,564.94	-5,823.78	-7,091.32	-8,525.39	-9,655.84	-11,028.08	-12,096.66	-13,018.25	-13,975.72	-14,834.02

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

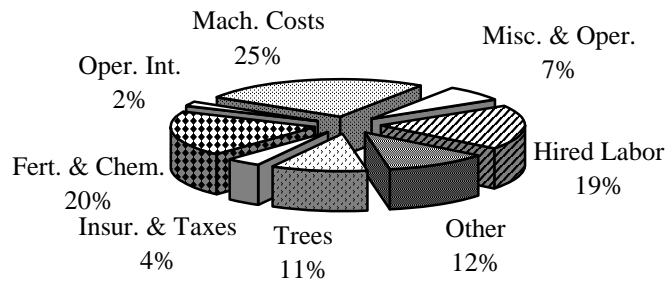


Figure 2. Comparing cumulative projected net returns, interest rates assumed in study vs. 5.1% interest rate on all owner investments, in dollars per acre, over 25 years of production

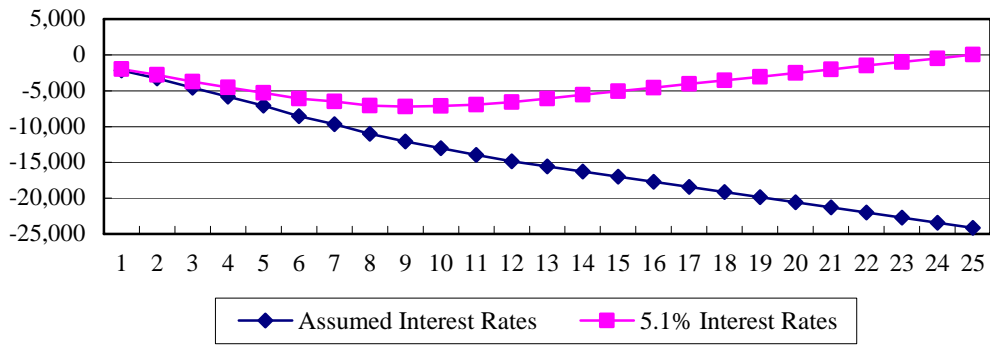
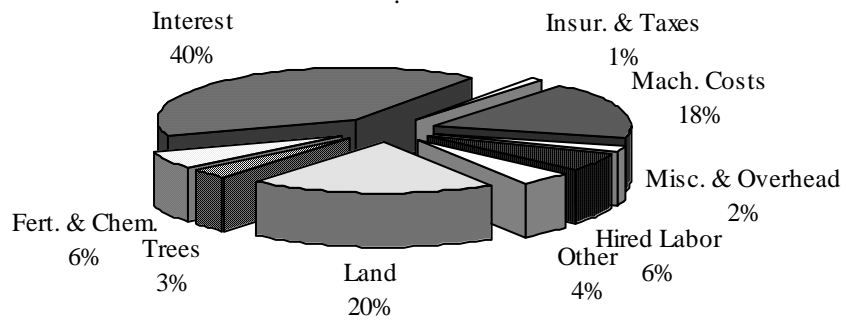


Figure 3. Economic costs (all costs including return on owners investment) to establish a hazelnut orchard for the first 12 years of establishment



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

Tables 7 and 8 show that planting a double-density orchard, 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 show a positive return in year 4 of \$31 per acre, compared to \$361 in year 7 for a standard density. A comparison of the cumulative cash flow shows the double-density orchard covers all cash costs in year 9 with a surplus of \$684 per acre while the standard density orchard shows a positive \$541 per acre in year 11. 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. At the end of the establishment period, the double-density orchard returns \$4,085 per acre over cash costs to the grower, as compared to the standard planting of \$1,863.

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 \$2,308 at the end of the 12th year of establishment (-\$14,834 minus -\$12,526) over the standard 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 \$1,487 per acre and additional revenues are \$3,710 resulting in a net gain to the grower of \$2,223 per acre. This is the additional return generated by planting a double-density hazelnut orchard during the first 12

years of establishment. 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. At the end of the fifth year, the standard orchard costs the grower \$389 less to establish than the double-density planting, -\$2,422 compared to -\$2,812 per acre. However, Figure 4 shows in the sixth year the additional revenues from the double-density orchard exceed those of the standard orchard and that holds true through the 12th year.

Interest costs decrease to 42 percent of the total economic costs of establishment when compared to the 46 percent of the standard orchard planting. The increase in revenues from the increase in costs of doubling the tree count reduced interest costs significantly. However, Figure 5 shows the double-density orchard is not an economic investment using the assumed interest rates in this study. It is not until the grower reduces expectations to 6.2 percent interest rate for their investment in fixed machinery costs, shop depreciation and interest, land interest costs, and interest for previous years, establishment costs that this double-density orchard will be an economic investment. This is a 1.1 percent interest rate increase from planting the standard hazelnut orchard. Planting a double-density orchard results in a higher economic benefit to the grower and therefore illustrates the usefulness of using this economic principle in hazelnut production to generate a greater return on investment.

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

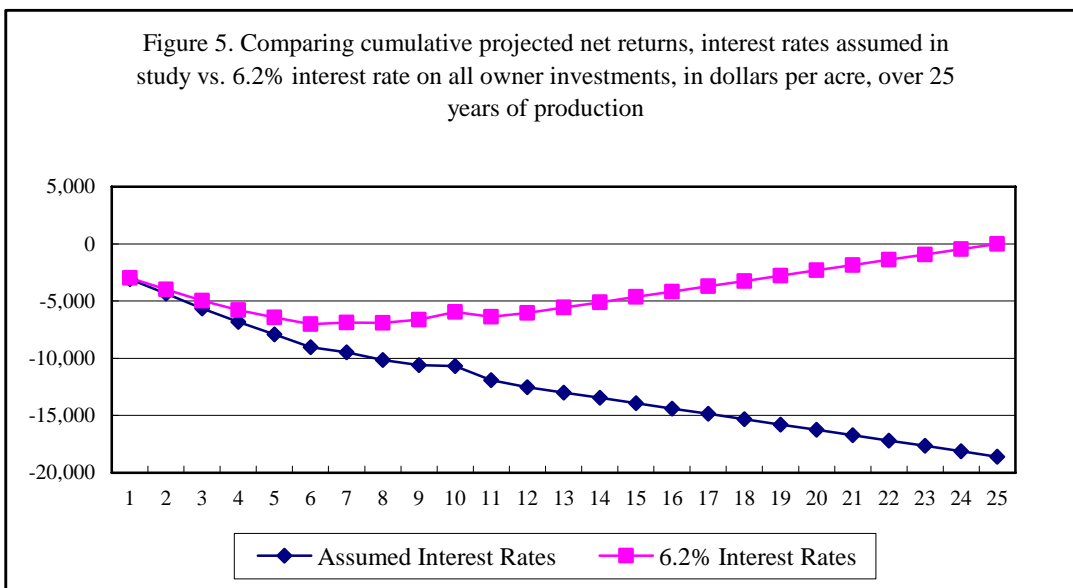
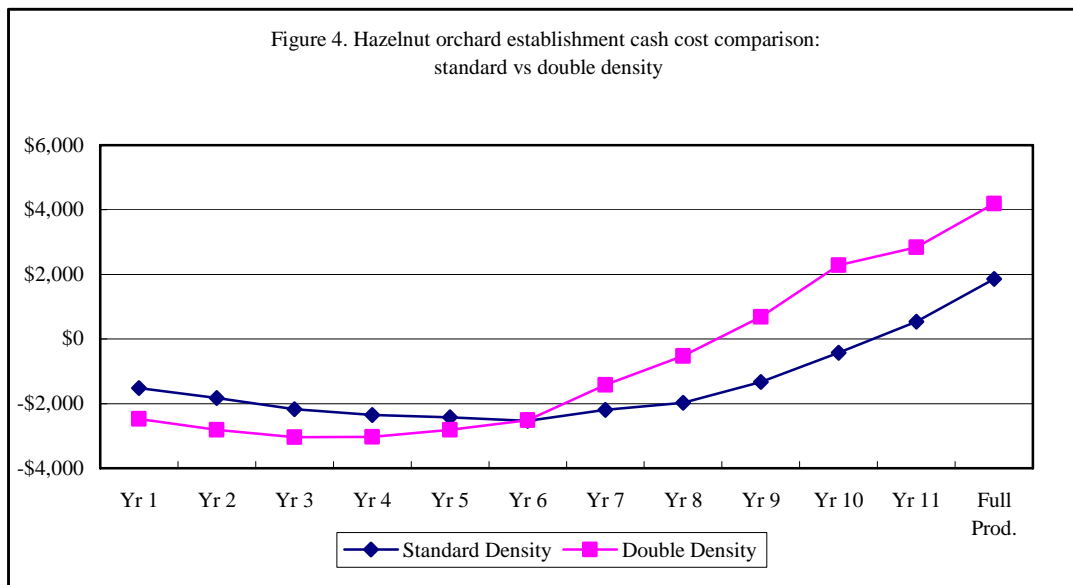
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Full Prod
Income:												
Yield (Lbs per Acre)	0	0	150	570	880	1,200	2,200	2,200	2,400	3,000	2,300	2,800
Price (\$ per Lb)	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>
Gross Income(\$ per Acre)	0.00	0.00	105.00	399.00	616.00	840.00	1,540.00	1,540.00	1,680.00	2,100.00	1,610.00	1,960.00
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	396.18	17.26	25.89	34.52	43.16	172.79	60.42	206.64	77.68	86.31	215.94	147.43
Chemicals	7.77	19.94	25.28	21.61	21.98	25.67	29.36	49.67	33.05	33.05	33.05	37.21
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	1.00	0.00	1.25	1.00	0.00	0.00	1.00	1.25	0.58
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	72.63	64.06	85.00	85.35	71.42	85.63	89.55	85.63	85.63	535.63	103.46
Harvest:Wash & Dry Nuts	0.00	0.00	3.38	12.83	19.80	27.00	49.50	49.50	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	141.38	80.31	149.97	163.12	154.64	155.83	143.90	153.57	143.90	143.90	187.07	163.15
Misc. & Overhead	177.61	23.17	22.60	26.77	27.31	37.64	30.90	45.23	32.86	34.71	78.72	42.50
Operating Interest	<u>47.30</u>	<u>6.15</u>	<u>6.00</u>	<u>7.11</u>	<u>7.25</u>	<u>10.00</u>	<u>8.21</u>	<u>12.02</u>	<u>8.73</u>	<u>9.22</u>	<u>20.90</u>	<u>11.29</u>
Total Variable Costs	2,449.73	318.93	311.09	368.44	375.97	518.07	425.40	622.66	452.33	477.80	1,140.79	585.10
Gross Income minus VC	-2,449.73	-318.93	-206.09	30.56	240.03	321.93	1,114.60	917.34	1,227.67	1,622.20	469.21	1,374.90
Cash Fixed Costs:												
Insurance	16.54	16.54	16.54	16.54	16.54	16.54	16.54	16.54	16.54	16.54	16.54	17.53
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	21.54	21.54	21.54	21.54	21.54	21.54	21.54	21.54	21.54	21.54	21.54	21.54
Total Cash Cost	2,471.26	340.47	332.63	389.98	397.51	539.61	446.94	644.20	473.87	499.34	1,162.33	606.64
Annual Cash Flow	-2,471.26	-340.47	-227.63	9.02	218.49	300.39	1,093.06	895.80	1,206.13	1,600.66	447.67	1,353.36
Cumulative Cash Flow	-2,471.26	-2,811.73	-3,039.37	-3,030.35	-2,811.86	-2,511.47	-1,418.41	-522.61	683.52	2,284.18	2,731.85	4,085.21

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	2,200	2,400	3,000	2,300	2,800
Price (\$ per Lb)	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>
Gross Income(\$ per Acre)	0.00	0.00	105.00	399.00	616.00	840.00	1,540.00	1,540.00	1,680.00	2,100.00	1,610.00	1,960.00
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	396.18	17.26	25.89	34.52	43.16	172.79	60.42	206.64	77.68	86.31	215.94	147.43
Chemicals	7.77	19.94	25.28	21.61	21.98	25.67	29.36	49.67	33.05	33.05	33.05	37.21
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	1.00	0.00	1.25	1.00	0.00	0.00	1.00	1.25	0.58
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	72.63	64.06	85.00	85.35	71.42	85.63	89.55	85.63	85.63	535.63	103.46
Harvest:Wash & Dry Nuts	0.00	0.00	3.38	12.83	19.80	27.00	49.50	49.50	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	141.38	80.31	149.97	163.12	154.64	155.83	143.90	153.57	143.90	143.90	187.07	163.15
Misc. & Overhead	177.61	23.17	22.60	26.77	27.31	37.64	30.90	45.23	32.86	34.71	78.72	42.50
Operating Interest	<u>47.30</u>	<u>6.15</u>	<u>6.00</u>	<u>7.11</u>	<u>7.25</u>	<u>10.00</u>	<u>8.21</u>	<u>12.02</u>	<u>8.73</u>	<u>9.22</u>	<u>20.90</u>	<u>11.29</u>
Total Variable Costs	2,449.73	318.93	311.09	368.44	375.97	518.07	425.40	622.66	452.33	477.80	1,140.79	585.10
Gross Income minus VC	-2,449.73	-318.93	-206.09	30.56	240.03	321.93	1,114.60	917.34	1,227.67	1,622.20	469.21	1,374.90
Fixed Costs:												
Insurance	16.54	16.54	16.54	16.54	16.54	16.54	16.54	16.54	16.54	16.54	16.54	17.53
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	200.47	200.47	200.47	200.47	200.47	200.47	200.47	200.47	200.47	200.47	200.47	221.80
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>309.01</u>	<u>435.72</u>	<u>574.32</u>	<u>692.61</u>	<u>801.78</u>	<u>913.68</u>	<u>957.50</u>	<u>1,025.44</u>	<u>1,069.13</u>	<u>1,077.73</u>	<u>1,320.17</u>
Total Fixed Cost	639.15	948.16	1,074.87	1,213.46	1,331.76	1,440.93	1,552.83	1,596.65	1,664.58	1,708.27	1,716.88	1,981.65
Total Cost	3,088.87	1,267.09	1,385.96	1,581.91	1,707.73	1,959.00	1,978.23	2,219.31	2,116.91	2,186.07	2,857.67	2,566.75
Net Projected Returns	-3,088.87	-1,267.09	-1,280.96	-1,182.91	-1,091.73	-1,119.00	-438.23	-679.31	-436.91	-86.07	-1,247.67	-606.75
Cumulative Returns	-3,088.87	-4,355.96	-5,636.92	-6,819.83	-7,911.56	-9,030.56	-9,468.79	-10,148.10	-10,585.01	-10,671.08	-11,918.76	-12,525.51

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)	\$8,680	\$12,390	\$3,710
Total Variable Costs	\$6,559	\$8,046	\$1,487
Total Non-Cash Fixed Costs	\$258	\$258	-
Total Cost	\$6,817	\$8,305	\$1,487
Net Projected Returns	\$1,863	\$4,085	\$2,223



EASTERN FILBERT BLIGHT MANAGEMENT COSTS

The costs for managing eastern filbert blight vary with the age of the orchard. Tables 10 shows the material costs for a fully mature orchard and the fraction of full-rate material costs for younger, smaller trees by year. Tables 11 shows the costs of

scouting and pruning EFB infections, which also vary with the age of the tree. The time estimates 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 and pruning eastern filbert blight infections in a standard-density hazelnut orchard			
Year	<u>Fraction of Full-Rate</u> Material Costs	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	Rate per Acre	Material Cost per Acre	Variable Mach Costs and Labor	Total Cost per Application
Bravo	\$ 46.06/gal	4 Pints	\$ 23.00	\$ 12.33	\$ 35.33
Gem	6.24/oz	6 fl oz	37.44	12.33	49.77
Orbit	91.22/qt	6 fl oz	34.20	12.33	46.53
Procure	98.82/qt	5 fl oz	15.44	12.33	27.77

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 choice of new cultivars. The Pacific Northwest hazelnut industry is faced with the challenge of managing EFB. New cultivars being released by the OSU hazelnut breeding program are highly or completely resistant to EFB. They have additional desirable traits such as earlier bearing, earlier nut maturity, uniform nut maturity, higher kernel quality, high percent kernel, and extra large nuts which can bring price premiums to the grower. These beneficial traits have had a positive impact on the Oregon economy, rural communities, and environment through greater returns to the growers and reduced pesticide use.

This cost of establishment study is meant to provide 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 for establishing a standard hazelnut orchard, respectively. Growers can expect to break even on a cash flow basis in hazelnut orchard establishment in year 7 and pay back all previous cash costs of establishment in year 11. But, when all economic costs are included, the break-even year shifts to 25 years to pay back all previous establishment costs when a 5.1 percent interest rate on owner investments is assumed.

Tables 7 and 8 show the impacts of planting twice as many trees to increase

earlier yields and thus reduce interest costs. This technique results in an earlier break-even year for cash and total economic costs. Growers who are willing to invest the additional dollars to double tree density and remove every other tree 11 years later will gain about \$2,223 per acre over cash expenses by the end establishment period. When economic costs are included, the grower's net gain is \$2,308 per acre over the standard hazelnut orchard by the end establishment period.

As new varieties enter the market, growers may also consider increasing planting density to 18ft x 18ft or 9ft x 18ft because the growth habit of current releases is different from that of 'Barcelona', currently the predominant variety. These new varieties have a higher yield efficiency. The tree size is around 25% less than 'Barcelona', with comparable yields per acre. Establishing an orchard at these higher densities, while requiring greater upfront cash investment, has a greater return over the traditional planting density at 20ft x 20ft spacing. Cash flow from a planting density of 18ft x 18ft covers annual expenses in year 5 and cumulative cash cost in year 10, earlier than the traditional 20ft x 20ft planting density. Orchards with planting densities of 9ft x 18ft have similar cash flows to those with 10ft x 20ft spacing. In overall economic terms, including interest and equipment replacement costs, a 9ft x 18ft planting spacing has from \$1,946 to \$4,254 lower costs per acre than other planting spacing discussed in this report. Appendix B presents economic and cash flow analyses for 18ft x 18ft and 9ft x 18ft spacing orchard establishment.

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	1.5 hours	21.00	0.00	9.50	30.50
Potash		0.85	1.19	137.59	139.63
Nutrient Analysis		0.00	0.00	1.25	1.25
Lime		0.00	0.00	121.00	121.00
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	3.75	0.00	6.02
Herbicide Strip Spray	1.0 appl.	3.85	8.48	5.10	17.43
Spring Tooth	2.0 appl.	4.24	4.65	0.00	8.89
Aphid/Leafroller & Leaf-tier Spray	1.00 appl.	3.85	8.48	0.42	12.75
Fall Copper Spray	1.0 appl.	3.85	8.48	2.25	14.59
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	108.46	108.46
Interest: Operating Capital	6.0 mons	0.00	0.00	31.11	31.11
Total VARIABLE COSTS		208.32	141.38	1,145.62	1,495.32
<u>FIXED CASH COSTS</u>				<u>Unit</u>	<u>Total</u>
CASH Costs					
Machinery and Equipment Insurance				acre	6.55
Pickup Insurance				acre	9.99
Property Taxes				acre	5.00
Total CASH Costs					21.54
<u>NON-CASH Costs</u>					
Machinery and Equip - Deprec. & Interest				acre	170.28
Pickup - Depreciation & Interest				acre	30.19
Shop				acre	17.14
Land Interest Charge				acre	400.00
Interest on Establishment Costs				acre	0.00
Total NON-CASH Costs					617.61
Total FIXED COSTS					639.15
Total of All Costs Per Acre					(2,134.47)

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>
Fertilize by Hand - Urea	0.5 hours	7.00	0.00	8.63	15.63
Painting Trees	1.5 hours	21.00	0.00	9.50	30.50
Replant Trees	0.8 hours	11.20	0.00	32.50	43.70
Stake Trees	0.1 hours	1.40	0.00	0.55	1.95
Tree Shaping, Pruning	2.5 hours	35.00	0.00	0.00	35.00
Rodent Control		0.00	0.00	7.00	7.00
Sucker Control	4.0 appl.	10.27	14.36	9.50	34.13
Herbicide Strip Spray	1.0 appl.	3.85	8.48	5.10	17.43
Fall Copper Spray	1.0 appl.	3.85	8.48	4.51	16.84
Aphid/Leafroller & Leaf-tier Spray	1.00 appl.	3.85	8.48	0.83	13.16
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	21.02	21.02
Interest: Operating Capital	6.0 mons	0.00	0.00	6.03	6.03
Total VARIABLE COSTS		97.41	80.31	112.09	289.81
 <u>FIXED CASH COSTS</u>				<u>Unit</u>	<u>Total</u>
CASH Costs					
Machinery and Equipment Insurance				acre	6.55
Pickup Insurance				acre	9.99
Property Taxes				acre	5.00
Total CASH Costs					21.54
 <u>NON-CASH Costs</u>					
Machinery and Equip - Deprec. & Interest				acre	170.28
Pickup - Depreciation & Interest				acre	30.19
Shop				acre	17.14
Land Interest Charge				acre	400.00
Interest on Establishment Costs				acre	213.45
Total NON-CASH Costs					831.06
Total FIXED COSTS					852.59
Total of All Costs Per Acre					(1,142.41)

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	0.70	52.50	0.70	
Total GROSS Income				52.50	0.70	
<u>VARIABLE CASH COSTS</u>						
<u>Description</u>	<u>Labor</u>	<u>Machinery</u>	<u>Materials</u>	<u>Total</u>	<u>Cost/Lb</u>	
Fertilize by Hand - Urea	0.5 hours	7.00	0.00	12.95	19.95	0.266
Tree Shaping, Pruning	2.5 hours	35.00	0.00	0.00	35.00	0.467
Herbicide Strip Spray	1.0 appl.	3.85	8.48	5.10	17.43	0.232
Sucker Control	4.0 appl.	10.27	14.36	9.50	34.13	0.455
Fall Copper Spray	1.0 appl.	3.85	8.48	9.02	21.35	0.285
Flailing Orchard	5.0 times	16.98	29.82	0.00	46.81	0.624
Aphid/Leafroller & Leaf-tier Spray	1.0 appl.	3.85	8.48	1.66	13.99	0.187
Boron Spray	0.5 appl.	1.92	4.24	0.48	6.65	0.089
Filbertworm Spray	1.5 appl.	5.77	12.72	1.37	19.86	0.265
Rodent Control		0.00	0.00	7.00	7.00	0.093
Leveling Orchard		2.26	3.75	0.00	6.02	0.080
Harvesting Costs						
Harvesting Nut		6.60	12.56	0.00	19.16	0.255
Sweeping Floor		8.88	10.00	0.00	18.88	0.252
Loading Totes		9.90	13.53	0.00	23.43	0.312
Wash & Dry Nuts	75 Lbs	0.00	0.00	3.45	3.45	0.046
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	27.24	27.24	0.363
Interest: Operating Capital	6.0 mons	0.00	0.00	7.81	7.81	0.104
Total VARIABLE COSTS		116.14	166.94	92.49	375.57	5.008
<u>FIXED CASH COSTS</u>						
			<u>Unit</u>	<u>Total</u>	<u>Cost/Lb</u>	
CASH Costs						
Machinery and Equipment Insurance			acre	6.55	0.087	
Pickup Insurance			acre	9.99	0.133	
Property Taxes			acre	5.00	0.067	
Total CASH Costs				21.54	0.287	
GROSS INCOME minus VARIABLE AND FIXED CASH COSTS				(344.61)	(4.595)	
<u>NON-CASH Costs</u>						
					<u>Cost/Lb</u>	
Machinery and Equip - Deprec. & Interest			acre	170.28	2.270	
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	327.69	4.369	
Total NON-CASH Costs				945.30	12.604	
Total FIXED COSTS				966.84	12.891	
Total of All Costs Per Acre				1,342.40	17.899	
Net Projected Returns				(1,289.90)	(17.199)	

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	0.70	199.50	0.70
Total GROSS Income					199.50	0.70
<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	1.0 times	3.40	4.67	0.00	8.07	0.028
Fertilize by Hand - Urea	0.6 hours	8.40	0.00	17.26	25.66	0.090
Herbicide Strip Spray	1.0 appl.	3.85	8.48	5.10	17.43	0.061
IPM Scouting		14.00	0.00	2.57	16.57	0.058
Nutrient Analysis		0.00	0.00	1.00	1.00	0.004
Sucker Control	4.0 appl.	10.27	14.36	9.50	34.13	0.120
Boron Spray	0.5 appl.	1.92	4.24	0.96	7.13	0.025
Filbertworm Spray	1.5 appl.	5.77	12.72	2.73	21.23	0.074
Flailing Orchard	5.0 times	16.98	29.82	0.00	46.81	0.164
Aphid/Leafroller Spray	1.00 appl.	3.85	8.48	3.32	15.66	0.055
Rodent Control		0.00	0.00	7.00	7.00	0.025
Leveling Orchard		2.26	3.75	0.00	6.02	0.021
Harvesting Costs						
Harvesting Nut		6.60	12.56	0.00	19.16	0.067
Sweeping Floor		8.88	10.00	0.00	18.88	0.066
Loading Totes		9.90	13.53	0.00	23.43	0.082
Wash & Dry Nuts	285 Lbs	0.00	0.00	13.11	13.11	0.046
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	26.29	26.29	0.092
Interest: Operating Capital	6.0 mons	<u>0.00</u>	<u>0.00</u>	<u>7.54</u>	<u>7.54</u>	<u>0.026</u>
Total VARIABLE COSTS		96.09	163.12	103.31	362.52	1.272
<u>FIXED CASH COSTS</u>				<u>Unit</u>	<u>Total</u>	<u>Cost/Lb</u>
CASH Costs						
Machinery and Equipment Insurance				acre	6.55	0.023
Pickup Insurance				acre	9.99	0.035
Property Taxes				acre	<u>5.00</u>	<u>0.018</u>
Total CASH Costs					21.54	0.076
GROSS INCOME minus VARIABLE AND FIXED CASH COSTS					(184.56)	(0.648)
<u>NON-CASH Costs</u>						
Machinery and Equip - Deprec. & Interest				acre	170.28	0.597
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	<u>456.68</u>	<u>1.602</u>
Total NON-CASH Costs					1,074.29	3.769
Total FIXED COSTS					1,095.83	3.845
Total of All Costs Per Acre					1,458.34	5.117
Net Projected Returns					(1,258.84)	(4.417)

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	0.70	308.00	0.70
Total GROSS Income					308.00	0.70
<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		3.40	4.67	0.00	8.07	0.018
Fertilizer - Urea		0.85	1.19	21.58	23.62	0.054
Herbicide Strip Spray	1.0 appl.	3.85	8.48	5.10	17.43	0.040
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.	10.27	14.36	9.50	34.13	0.078
Boron Spray	0.5 appl.	1.92	4.24	1.92	8.09	0.018
Filbertworm Spray	1.5 appl.	5.77	12.72	5.46	23.96	0.054
Flailing Orchard	5.0 times	16.98	29.82	0.00	46.81	0.106
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	3.75	0.00	6.02	0.014
Harvesting Costs						
Harvesting Nut		6.60	12.56	0.00	19.16	0.044
Sweeping Floor		8.88	10.00	0.00	18.88	0.043
Loading Totes		9.90	13.53	0.00	23.43	0.053
Wash & Dry Nuts	440 Lbs	0.00	0.00	20.24	20.24	0.046
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	25.66	25.66	0.058
Interest: Operating Capital	6.0 mons	<u>0.00</u>	<u>0.00</u>	<u>7.36</u>	<u>7.36</u>	<u>0.017</u>
Total VARIABLE COSTS		84.69	155.83	113.31	353.82	0.804
<u>FIXED CASH COSTS</u>				<u>Unit</u>	<u>Total</u>	<u>Cost/Lb</u>
CASH Costs						
Machinery and Equipment Insurance				acre	6.55	0.015
Pickup Insurance				acre	9.99	0.023
Property Taxes				acre	<u>5.00</u>	<u>0.011</u>
Total CASH Costs					21.54	0.049
GROSS INCOME minus VARIABLE AND FIXED CASH COSTS					(67.36)	(0.153)
<u>NON-CASH Costs</u>						
Machinery and Equip - Deprec. & Interest				acre	170.28	0.387
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	<u>582.56</u>	<u>1.324</u>
Total NON-CASH Costs					1,200.17	2.728
Total FIXED COSTS					1,221.71	2.777
Total of All Costs Per Acre					1,575.53	3.581
Net Projected Returns					(1,267.53)	(2.881)

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	0.70	420.00	0.70
Total GROSS Income					420.00	0.70
<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		3.40	4.67	0.00	8.07	0.013
Fertilizer - Urea		0.85	1.19	25.89	27.93	0.047
Lime		0.00	0.00	121.00	121.00	0.202
Herbicide Strip Spray	1.0 appl.	3.85	8.48	5.10	17.43	0.029
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.	10.27	14.36	9.50	34.13	0.057
Boron Spray	0.5 appl.	1.92	4.24	2.88	9.05	0.015
Filbertworm Spray	1.5 appl.	5.77	12.72	8.19	26.69	0.044
Flailing Orchard	5.0 times	16.98	29.82	0.00	46.81	0.078
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	3.75	0.00	6.02	0.010
Harvesting Costs						
Harvesting Nut		6.60	12.56	0.00	19.16	0.032
Sweeping Floor		8.88	10.00	0.00	18.88	0.031
Loading Totes		9.90	13.53	0.00	23.43	0.039
Wash & Dry Nuts	600 Lbs	0.00	0.00	27.60	27.60	0.046
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	36.67	36.67	0.061
Interest: Operating Capital	6.0 mons	0.00	0.00	10.52	10.52	0.018
Total VARIABLE COSTS		84.69	155.83	265.09	505.61	0.843
<u>FIXED CASH COSTS</u>				<u>Unit</u>	<u>Total</u>	<u>Cost/Lb</u>
CASH Costs						
Machinery and Equipment Insurance				acre	6.55	0.011
Pickup Insurance				acre	9.99	0.017
Property Taxes				acre	5.00	0.008
Total CASH Costs					21.54	0.036
GROSS INCOME minus VARIABLE AND FIXED CASH COSTS					(107.15)	(0.179)
<u>NON-CASH Costs</u>						
Machinery and Equip - Deprec. & Interest				acre	170.28	0.284
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	709.32	1.182
Total NON-CASH Costs					1,326.92	2.212
Total FIXED COSTS					1,348.46	2.247
Total of All Costs Per Acre					1,854.07	3.090
Net Projected Returns					(1,434.07)	(2.390)

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	0.70	770.00	0.70
Total GROSS Income					770.00	0.70
<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		3.40	4.67	0.00	8.07	0.007
Fertilizer - Urea		0.85	1.19	30.21	32.25	0.029
Herbicide Strip Spray	1.0 appl.	3.85	8.48	5.10	17.43	0.016
IPM Scouting		14.00	0.00	2.57	16.57	0.015
Nutrient Analysis		0.00	0.00	1.00	1.00	0.001
Sucker Control	4.0 appl.	10.27	14.36	9.50	34.13	0.031
Boron Spray	0.5 appl.	1.92	4.24	3.84	10.01	0.009
Filbertworm Spray	1.5 appl.	5.77	12.72	10.92	29.42	0.027
Flailing Orchard	3.0 times	10.19	17.89	0.00	28.08	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	3.75	0.00	6.02	0.005
Harvesting Costs						
Harvesting Nut		6.60	12.56	0.00	19.16	0.017
Sweeping Floor		8.88	10.00	0.00	18.88	0.017
Loading Totes		9.90	13.53	0.00	23.43	0.021
Wash & Dry Nuts	1100 Lbs	0.00	0.00	50.60	50.60	0.046
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	29.64	29.64	0.027
Interest: Operating Capital	6.0 mons	0.00	0.00	8.50	8.50	0.008
Total VARIABLE COSTS		98.90	143.90	165.79	408.58	0.371
<u>FIXED CASH COSTS</u>				<u>Unit</u>	<u>Total</u>	<u>Cost/Lb</u>
CASH Costs						
Machinery and Equipment Insurance				acre	6.55	0.006
Pickup Insurance				acre	9.99	0.009
Property Taxes				acre	5.00	0.005
Total CASH Costs					21.54	0.020
GROSS INCOME minus VARIABLE AND FIXED CASH COSTS					339.88	0.309
<u>NON-CASH Costs</u>						
Machinery and Equip - Deprec. & Interest				acre	170.28	0.155
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	852.72	0.775
Total NON-CASH Costs					1,470.33	1.337
Total FIXED COSTS					1,491.87	1.356
Total of All Costs Per Acre					1,900.45	1.728
Net Projected Returns					(1,130.45)	(1.028)

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	0.70	840.00	0.70
Total GROSS Income					840.00	0.70
<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		3.40	4.67	0.00	8.07	0.007
Fertilizer - Urea		0.85	1.19	34.52	36.56	0.030
Potash		0.85	1.19	137.59	139.63	0.116
Herbicide Strip Spray	1.0 appl.	3.85	8.48	5.10	17.43	0.015
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.	10.27	14.36	9.50	34.13	0.028
Boron Spray	0.5 appl.	1.92	4.24	4.80	10.97	0.009
Filbertworm Spray	1.5 appl.	5.77	12.72	13.65	32.15	0.027
Flailing Orchard	3.0 times	10.19	17.89	0.00	28.08	0.023
Aphid/Leafroller Spray	1.00 appl.	3.85	8.48	16.62	28.95	0.024
Rodent Control		0.00	0.00	7.00	7.00	0.006
Leveling Orchard		2.26	3.75	0.00	6.02	0.005
Harvesting Costs						
Harvesting Nut		6.60	12.56	0.00	19.16	0.016
Sweeping Floor		8.88	10.00	0.00	18.88	0.016
Loading Totes		9.90	13.53	0.00	23.43	0.020
Wash & Dry Nuts	1200 Lbs	0.00	0.00	55.20	55.20	0.046
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	44.05	44.05	0.037
Interest: Operating Capital	6.0 mons	0.00	0.00	12.64	12.64	0.011
Total VARIABLE COSTS		103.59	153.57	350.16	607.32	0.506
<u>FIXED CASH COSTS</u>				<u>Unit</u>	<u>Total</u>	<u>Cost/Lb</u>
CASH Costs						
Machinery and Equipment Insurance				acre	6.55	0.005
Pickup Insurance				acre	9.99	0.008
Property Taxes				acre	5.00	0.004
Total CASH Costs					21.54	0.018
GROSS INCOME minus VARIABLE AND FIXED CASH COSTS					211.14	0.176
<u>NON-CASH Costs</u>						
Machinery and Equip - Deprec. & Interest				acre	170.28	0.142
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	965.77	0.805
Total NON-CASH Costs					1,583.38	1.319
Total FIXED COSTS					1,604.92	1.337
Total of All Costs Per Acre					2,212.24	1.844
Net Projected Returns					(1,372.24)	(1.144)

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	0.70	1,120.00	0.70
Total GROSS Income					1,120.00	0.70
<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		3.40	4.67	0.00	8.07	0.005
Fertilizer - Urea		0.85	1.19	38.84	40.88	0.026
Herbicide Strip Spray	1.0 appl.	3.85	8.48	5.10	17.43	0.011
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.	10.27	14.36	9.50	34.13	0.021
Boron Spray	0.5 appl.	1.92	4.24	4.80	10.97	0.007
Filbertworm Spray	1.5 appl.	5.77	12.72	13.65	32.15	0.020
Flailing Orchard	3.0 times	10.19	17.89	0.00	28.08	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	3.75	0.00	6.02	0.004
Harvesting Costs						
Harvesting Nut		6.60	12.56	0.00	19.16	0.012
Sweeping Floor		8.88	10.00	0.00	18.88	0.012
Loading Totes		9.90	13.53	0.00	23.43	0.015
Wash & Dry Nuts	1600 Lbs	0.00	0.00	73.60	73.60	0.046
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	32.38	32.38	0.020
Interest: Operating Capital	6.0 mons	0.00	0.00	9.29	9.29	0.006
Total VARIABLE COSTS		98.90	143.90	203.64	446.44	0.279
<u>FIXED CASH COSTS</u>				<u>Unit</u>	<u>Total</u>	<u>Cost/Lb</u>
CASH Costs						
Machinery and Equipment Insurance				acre	6.55	0.004
Pickup Insurance				acre	9.99	0.006
Property Taxes				acre	5.00	0.003
Total CASH Costs					21.54	0.013
GROSS INCOME minus VARIABLE AND FIXED CASH COSTS					652.02	0.408
<u>NON-CASH Costs</u>						
Machinery and Equip - Deprec. & Interest				acre	170.28	0.106
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	1,102.99	0.689
Total NON-CASH Costs					1,720.60	1.075
Total FIXED COSTS					1,742.14	1.089
Total of All Costs Per Acre					2,188.58	1.368
Net Projected Returns					(1,068.58)	(0.668)

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	0.70	1,400.00	0.70
Total GROSS Income					1,400.00	0.70
<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
Brush Removal		3.40	4.67	0.00	8.07	0.004
Fertilizer - Urea		0.85	1.19	43.16	45.19	0.023
Herbicide Strip Spray	1.0 appl.	3.85	8.48	5.10	17.43	0.009
IPM Scouting		14.00	0.00	2.57	16.57	0.008
Nutrient Analysis		0.00	0.00	1.00	1.00	0.001
Sucker Control	4.0 appl.	10.27	14.36	9.50	34.13	0.017
Boron Spray	0.5 appl.	1.92	4.24	4.80	10.97	0.005
Filbertworm Spray	1.5 appl.	5.77	12.72	13.65	32.15	0.016
Flailing Orchard	3.0 times	10.19	17.89	0.00	28.08	0.014
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	3.75	0.00	6.02	0.003
Harvesting Costs						
Harvesting Nut		6.60	12.56	0.00	19.16	0.010
Sweeping Floor		8.88	10.00	0.00	18.88	0.009
Loading Totes		9.90	13.53	0.00	23.43	0.012
Wash & Dry Nuts	2000 Lbs	0.00	0.00	92.00	92.00	0.046
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	34.28	34.28	0.017
Interest: Operating Capital	6.0 mons	0.00	0.00	9.83	9.83	0.005
Total VARIABLE COSTS		98.90	143.90	229.80	472.59	0.236
<u>FIXED CASH COSTS</u>				<u>Unit</u>	<u>Total</u>	<u>Cost/Lb</u>
CASH Costs						
Machinery and Equipment Insurance				acre	6.55	0.003
Pickup Insurance				acre	9.99	0.005
Property Taxes				acre	5.00	0.003
Total CASH Costs					21.54	0.011
GROSS INCOME minus VARIABLE AND FIXED CASH COSTS					905.87	0.453
<u>NON-CASH Costs</u>						
Machinery and Equip - Deprec. & Interest				acre	170.28	0.085
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	1,209.85	0.605
Total NON-CASH Costs					1,827.46	0.914
Total FIXED COSTS					1,849.00	0.924
Total of All Costs Per Acre					2,321.59	1.161
Net Projected Returns					(921.59)	(0.461)

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	0.70	1,610.00	0.70
Total GROSS Income					1,610.00	0.70
<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		3.40	4.67	0.00	8.07	0.004
Fertilizer - Urea		0.85	1.19	47.47	49.51	0.022
Lime		0.00	0.00	121.00	121.00	0.053
Herbicide Strip Spray	1.0 appl.	3.85	8.48	5.10	17.43	0.008
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.	10.27	14.36	9.50	34.13	0.015
Boron Spray	0.5 appl.	1.92	4.24	4.80	10.97	0.005
Filbertworm Spray	1.5 appl.	5.77	12.72	13.65	32.15	0.014
Flailing Orchard	3.0 times	10.19	17.89	0.00	28.08	0.012
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	3.75	0.00	6.02	0.003
Harvesting Costs						
Harvesting Nut		6.60	12.56	0.00	19.16	0.008
Sweeping Floor		8.88	10.00	0.00	18.88	0.008
Loading Totes		9.90	13.53	0.00	23.43	0.010
Wash & Dry Nuts	2300 Lbs	0.00	0.00	105.80	105.80	0.046
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	45.43	45.43	0.020
Interest: Operating Capital	6.0 mons	0.00	0.00	13.03	13.03	0.006
Total VARIABLE COSTS		98.90	143.90	383.51	626.31	0.272
<u>FIXED CASH COSTS</u>				<u>Unit</u>	<u>Total</u>	<u>Cost/Lb</u>
CASH Costs						
Machinery and Equipment Insurance				acre	6.55	0.003
Pickup Insurance				acre	9.99	0.004
Property Taxes				acre	5.00	0.002
Total CASH Costs					21.54	0.009
GROSS INCOME minus VARIABLE AND FIXED CASH COSTS					962.15	0.418
<u>NON-CASH Costs</u>						
Machinery and Equip - Deprec. & Interest				acre	170.28	0.074
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	1,302.01	0.566
Total NON-CASH Costs					1,919.62	0.835
Total FIXED COSTS					1,941.16	0.844
Total of All Costs Per Acre					2,567.47	1.116
Net Projected Returns					(957.47)	(0.416)

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	0.70	1,960.00	0.70
Total GROSS Income					1,960.00	0.70
<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	15.94	0.00	32.74	0.012
Maintainance Pruning	1.5 hours	21.00	0.00	0.00	21.00	0.008
Brush Removal		3.40	4.67	0.00	8.07	0.003
Fertilizer - Urea		0.85	1.19	51.79	53.82	0.019
Potash		0.85	1.19	19.66	21.69	0.008
Lime		0.00	0.00	24.20	24.20	0.009
Herbicide Strip Spray	1.0 appl.	3.85	8.48	5.10	17.43	0.006
IPM Scouting		14.00	0.00	2.57	16.57	0.006
Nutrient Analysis		0.00	0.00	0.58	0.58	0.000
Sucker Control	4.0 appl.	10.27	14.36	9.50	34.13	0.012
Boron Spray	0.5 appl.	1.92	4.24	4.80	10.97	0.004
Filbertworm Spray	1.5 appl.	5.77	12.72	13.65	32.15	0.011
Flailing Orchard	3.0 times	10.19	17.89	0.00	28.08	0.010
Aphid/Leafroller Spray	0.25 appl.	0.96	2.12	4.16	7.24	0.003
Rodent Control		0.00	0.00	7.00	7.00	0.003
Leveling Orchard		2.26	3.75	0.00	6.02	0.002
Harvesting Costs						
Harvesting Nut		6.60	12.56	0.00	19.16	0.007
Sweeping Floor		8.88	10.00	0.00	18.88	0.007
Loading Totes		9.90	13.53	0.00	23.43	0.008
Wash & Dry Nuts	2800 Lbs	0.00	0.00	128.80	128.80	0.046
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	44.75	44.75	0.016
Interest: Operating Capital	6.0 mons	0.00	0.00	12.84	12.84	0.005
Total VARIABLE COSTS		117.51	163.15	336.30	616.95	0.220
<u>GROSS INCOME minus VARIABLE COSTS</u>					1,343.05	0.480

Table 24. Hazelnut orchard establishment, full production years, \$/acre economic costs and returns, (con't)

<u>FIXED CASH COSTS</u>	<u>Unit</u>	<u>Total</u>	<u>Cost/Lb</u>
<u>CASH Costs</u>			
Machinery and Equipment Insurance	acre	7.54	0.003
Pickup Insurance	acre	9.99	0.004
Property Taxes	acre	5.00	0.002
Total CASH Costs		22.53	0.008
GROSS INCOME minus VARIABLE AND FIXED CASH COSTS		1,320.52	0.472
<u>NON-CASH Costs</u>			
Machinery and Equip - Deprec. & Interest	acre	191.61	0.068
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	\$1,539.88	0.550
Total NON-CASH Costs		2,178.83	0.778
Total FIXED COSTS		2,201.36	0.786
Total of All Costs Per Acre		2,818.31	1.007
Net Projected Returns		(858.31)	(0.307)

APPENDIX B

**CASH FLOW AND ECONOMIC ANALYSES OF HAZELNUT ORCHARD
ESTABLISHMENT AT 18FT X 18FT AND 9FT X 18FT SPACING**

Table 25. Cash flow analysis for establishing 18ft x 18ft spacing hazelnut orchard in the Willamette Valley.

	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	95	350	545	745	1,365	1,490	1,985	2,480	2,855	3,470
Price (\$ per Lb)	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>
Gross Income(\$ per Acre)	0.00	0.00	66.50	245.00	381.50	521.50	955.50	1,043.00	1,389.50	1,736.00	1,998.50	2,429.00
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	871.00	45.50	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	9.50	9.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fertilizer	291.72	10.71	16.06	21.42	26.77	153.13	37.48	213.55	48.19	53.54	179.90	112.84
Chemicals	7.77	19.94	25.28	21.61	21.98	25.67	29.36	49.67	33.05	33.05	33.05	37.21
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	1.25	0.00	0.00	1.00	0.00	1.25	1.00	0.00	0.00	1.00	1.25	0.58
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	208.32	97.41	116.14	96.09	84.69	84.69	98.90	103.59	98.90	98.90	98.90	117.51
Harvest:Wash & Dry Nuts	0.00	0.00	4.37	16.10	25.07	34.27	62.79	68.54	91.31	114.08	131.33	159.62
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	141.38	80.31	166.94	163.12	155.83	155.83	143.90	153.57	143.90	143.90	143.90	163.15
Misc. & Overhead	124.63	22.23	27.56	26.87	26.47	37.71	31.19	48.43	34.55	36.88	48.38	48.59
Operating Interest	<u>35.75</u>	<u>6.38</u>	<u>7.91</u>	<u>7.71</u>	<u>7.59</u>	<u>10.82</u>	<u>8.95</u>	<u>13.89</u>	<u>9.91</u>	<u>10.58</u>	<u>13.88</u>	<u>13.94</u>
Total Variable Costs	1,718.26	306.44	378.18	370.40	364.88	519.84	430.05	667.74	476.28	508.41	667.07	669.91
Gross Income minus VC	-1,718.26	-306.44	-311.68	-125.40	16.62	1.66	525.45	375.26	913.22	1,227.59	1,331.43	1,759.09
Cash Fixed Costs:												
Insurance	16.54	16.54	16.54	16.54	16.54	16.54	16.54	16.54	16.54	16.54	16.54	17.53
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	21.54	21.54	21.54	21.54	21.54	21.54	21.54	21.54	21.54	21.54	21.54	21.54
Total Cash Cost	1,739.79	327.98	399.72	391.94	386.42	541.38	451.59	689.28	497.82	529.95	688.61	691.45
Annual Cash Flow	-1,739.79	-327.98	-333.22	-146.94	-4.92	-19.88	503.91	353.72	891.68	1,206.05	1,309.89	1,737.55
Cumulative Cash Flow	-1,739.79	-2,067.78	-2,400.99	-2,547.93	-2,552.85	-2,572.73	-2,068.82	-1,715.10	-823.42	382.63	1,692.52	3,430.07

Table 26. Economic costs and returns of establishing 18ft x 18ft spacing hazelnut orchard in the Willamette Valley.

	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	95	350	545	745	1,365	1,490	1,985	2,480	2,855	3,470
Price (\$ per Lb)	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>
Gross Income(\$ per Acre)	0.00	0.00	66.50	245.00	381.50	521.50	955.50	1,043.00	1,389.50	1,736.00	1,998.50	2,429.00
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	871.00	45.50	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	9.50	9.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fertilizer	291.72	10.71	16.06	21.42	26.77	153.13	37.48	213.55	48.19	53.54	179.90	112.84
Chemicals	7.77	19.94	25.28	21.61	21.98	25.67	29.36	49.67	33.05	33.05	33.05	37.21
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	1.25	0.00	0.00	1.00	0.00	1.25	1.00	0.00	0.00	1.00	1.25	0.58
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	208.32	97.41	116.14	96.09	84.69	84.69	98.90	103.59	98.90	98.90	98.90	117.51
Harvest:Wash & Dry Nuts	0.00	0.00	4.37	16.10	25.07	34.27	62.79	68.54	91.31	114.08	131.33	159.62
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	141.38	80.31	166.94	163.12	155.83	155.83	143.90	153.57	143.90	143.90	143.90	163.15
Misc. & Overhead	124.63	22.23	27.56	26.87	26.47	37.71	31.19	48.43	34.55	36.88	48.38	48.59
Operating Interest	<u>35.75</u>	<u>6.38</u>	<u>7.91</u>	<u>7.71</u>	<u>7.59</u>	<u>10.82</u>	<u>8.95</u>	<u>13.89</u>	<u>9.91</u>	<u>10.58</u>	<u>13.88</u>	<u>13.94</u>
Total Variable Costs	1,718.26	306.44	378.18	370.40	364.88	519.84	430.05	667.74	476.28	508.41	667.07	669.91
Gross Income minus VC	-1,718.26	-306.44	-311.68	-125.40	16.62	1.66	525.45	375.26	913.22	1,227.59	1,331.43	1,759.09
Fixed Costs:												
Insurance	16.54	16.54	16.54	16.54	16.54	16.54	16.54	16.54	16.54	16.54	16.54	17.53
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	200.47	200.47	200.47	200.47	200.47	200.47	200.47	200.47	200.47	200.47	200.47	221.80
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>235.74</u>	<u>353.87</u>	<u>484.53</u>	<u>609.44</u>	<u>732.63</u>	<u>869.64</u>	<u>967.98</u>	<u>1,091.16</u>	<u>1,172.87</u>	<u>1,231.32</u>	<u>1,415.90</u>
Total Fixed Cost	639.15	874.89	993.02	1,123.68	1,248.58	1,371.78	1,508.79	1,607.12	1,730.31	1,812.02	1,870.46	2,077.38
Total Cost	2,357.40	1,181.33	1,371.20	1,494.08	1,613.46	1,891.62	1,938.84	2,274.86	2,206.60	2,320.43	2,537.53	2,747.29
Net Projected Returns	-2,357.40	-1,181.33	-1,304.70	-1,249.08	-1,231.96	-1,370.12	-983.34	-1,231.86	-817.10	-584.43	-539.03	-318.29
Cumulative Returns	-2,357.40	-3,538.73	-4,843.43	-6,092.51	-7,324.47	-8,694.59	-9,677.93	-10,909.79	-11,726.89	-12,311.31	-12,850.35	-13,168.64

Table 27. Cash flow analysis for establishing 9ft x 18ft spacing hazelnut orchard in the Willamette Valley.

	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	180	650	1,050	1,480	2,600	2,700	3,200	3,600	2,855	3,470
Price (\$ per Lb)	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>
Gross Income(\$ per Acre)	0.00	0.00	126.00	455.00	735.00	1,036.00	1,820.00	1,890.00	2,240.00	2,520.00	1,998.50	2,429.00
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	1,742.00	91.00	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	462.43	21.42	32.13	42.84	53.54	185.25	74.96	223.26	96.38	107.09	238.80	172.36
Chemicals	7.77	19.94	25.28	21.61	21.98	25.67	29.36	49.67	33.05	33.05	33.05	37.21
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	1.00	0.00	1.25	1.00	0.00	0.00	1.00	1.25	0.58
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	72.63	64.06	85.00	85.35	71.42	85.63	89.55	85.63	85.63	685.63	103.46
Harvest:Wash & Dry Nuts	0.00	0.00	4.05	14.63	23.63	33.30	58.50	60.75	72.00	81.00	64.24	78.08
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	141.38	80.31	149.97	163.12	154.64	155.83	143.90	153.57	143.90	143.90	187.07	163.15
Misc. & Overhead	209.95	25.58	23.15	27.57	28.45	39.14	32.79	47.46	35.80	37.45	78.72	45.71
Operating Interest	<u>55.89</u>	<u>6.79</u>	<u>6.15</u>	<u>7.32</u>	<u>7.56</u>	<u>10.40</u>	<u>8.71</u>	<u>12.61</u>	<u>9.51</u>	<u>9.95</u>	<u>20.90</u>	<u>12.14</u>
Total Variable Costs	2,894.90	352.14	318.70	379.58	391.63	538.74	451.33	653.36	492.74	515.55	1,326.13	629.16
Gross Income minus VC	-2,894.90	-352.14	-192.70	75.42	343.37	497.26	1,368.67	1,236.64	1,747.26	2,004.45	672.37	1,799.84
Cash Fixed Costs:												
Insurance	16.54	16.54	16.54	16.54	16.54	16.54	16.54	16.54	16.54	16.54	16.54	17.53
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	21.54	21.54	21.54	21.54	21.54	21.54	21.54	21.54	21.54	21.54	21.54	21.54
Total Cash Cost	2,916.44	373.68	340.24	401.12	413.17	560.28	472.87	674.90	514.28	537.09	1,347.67	650.70
Annual Cash Flow	-2,916.44	-373.68	-214.24	53.88	321.83	475.72	1,347.13	1,215.10	1,725.72	1,982.91	650.83	1,778.30
Cumulative Cash Flow	-2,916.44	-3,290.12	-3,504.36	-3,450.48	-3,128.64	-2,652.92	-1,305.79	-90.69	1,635.03	3,617.94	4,268.77	6,047.07

Table 28. Economic costs and returns of establishing 9ft x 18ft spacing hazelnut orchard in the Willamette Valley.

	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	180	650	1,050	1,480	2,600	2,700	3,200	3,600	2,855	3,470
Price (\$ per Lb)	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>	<u>0.70</u>
Gross Income(\$ per Acre)	0.00	0.00	126.00	455.00	735.00	1,036.00	1,820.00	1,890.00	2,240.00	2,520.00	1,998.50	2,429.00
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	1,742.00	91.00	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	462.43	21.42	32.13	42.84	53.54	185.25	74.96	223.26	96.38	107.09	238.80	172.36
Chemicals	7.77	19.94	25.28	21.61	21.98	25.67	29.36	49.67	33.05	33.05	33.05	37.21
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	1.00	0.00	1.25	1.00	0.00	0.00	1.00	1.25	0.58
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	72.63	64.06	85.00	85.35	71.42	85.63	89.55	85.63	85.63	685.63	103.46
Harvest:Wash & Dry Nuts	0.00	0.00	4.05	14.63	23.63	33.30	58.50	60.75	72.00	81.00	64.24	78.08
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	141.38	80.31	149.97	163.12	154.64	155.83	143.90	153.57	143.90	143.90	187.07	163.15
Misc. & Overhead	209.95	25.58	23.15	27.57	28.45	39.14	32.79	47.46	35.80	37.45	78.72	45.71
Operating Interest	<u>55.89</u>	<u>6.79</u>	<u>6.15</u>	<u>7.32</u>	<u>7.56</u>	<u>10.40</u>	<u>8.71</u>	<u>12.61</u>	<u>9.51</u>	<u>9.95</u>	<u>20.90</u>	<u>12.14</u>
Total Variable Costs	2,894.90	352.14	318.70	379.58	391.63	538.74	451.33	653.36	492.74	515.55	1,326.13	629.16
Gross Income minus VC	-2,894.90	-352.14	-192.70	75.42	343.37	497.26	1,368.67	1,236.64	1,747.26	2,004.45	672.37	1,799.84
Fixed Costs:												
Insurance	16.54	16.54	16.54	16.54	16.54	16.54	16.54	16.54	16.54	16.54	16.54	17.53
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	200.47	200.47	200.47	200.47	200.47	200.47	200.47	200.47	200.47	200.47	200.47	221.80
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>353.53</u>	<u>488.01</u>	<u>632.60</u>	<u>752.23</u>	<u>857.03</u>	<u>956.92</u>	<u>979.66</u>	<u>1,017.88</u>	<u>1,008.86</u>	<u>973.21</u>	<u>1,173.19</u>
Total Fixed Cost	639.15	992.68	1,127.16	1,271.75	1,391.38	1,496.18	1,596.07	1,618.81	1,657.03	1,648.00	1,612.36	1,834.67
Total Cost	3,534.05	1,344.82	1,445.86	1,651.32	1,783.00	2,034.92	2,047.40	2,272.17	2,149.77	2,163.55	2,938.49	2,463.83
Net Projected Returns	-3,534.05	-1,344.82	-1,319.86	-1,196.32	-1,048.00	-998.92	-227.40	-382.17	90.23	356.45	-939.99	-34.83
Cumulative Returns	-3,534.05	-4,878.87	-6,198.73	-7,395.05	-8,443.05	-9,441.97	-9,669.37	-10,051.53	-9,961.30	-9,604.85	-10,544.84	-10,579.68