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Christmas Tree Economics: Establishing and Producing Noble Fir Christmas Trees in Western Oregon

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Introduction

Nationwide, Christmas tree growers harvested 17.4 million trees in 2007, down from 20.8 million in 2002 (USDA Census of Agriculture, 2007). Oregon's share was 6.9 million trees in 2007, up from 6.5 million trees in 2002. Oregon led the nation in Christmas tree production accounting for 39 percent of the 2007 volume up from 31 percent from 2002.

In 2007 Oregon's Christmas tree production and sales were as follows: acres in Christmas tree production 61,850; number of trees harvested – 6.9 million; and value of sales - \$109 million. Trees are grown in several Oregon Counties, but four; Clackamas, Marion, Polk and Benton counties produce over 80% of the states total.

Two tree species, Douglas-fir and noble fir, account for over 90% of the tree sales among the various species grown. In 2007, as over the past three decades Douglas-fir accounted for the largest percentage of trees sold. In 2008, noble fir is expected to occupy that position for the first time. Noble fir is a popular Christmas tree commanding a higher market price. Over the last 10 years, noble fir planted acres have increased and recently, surpassed Douglas-fir and are beginning to be harvested.

Noble fir has a more restricted growing area than Douglas-fir. While most sites that grow noble well can also grow Douglas-fir, the reverse is not true. Good noble fir sites tend to be upland areas with 40-90 inches of rain yearly. In addition to high rainfall, the best sites are well-drained deep soils not prone to high summer temperatures. This is not to say that noble can not be grown in valley bottoms, but there tend to be more problems associated with growing this species in lowland sites.

Noble fir has excellent needle "keepability" and can ship well into other climate areas. The species is more challenging to grow than Douglas-fir and has a longer harvest rotation length. Also, generally speaking, noble has a higher planting mortality and fewer trees per acre will make the top grades as compared to Douglas-fir. Rotation lengths vary widely depending on the site, seed source used at planting, and desired market tree height and density. Major problems encountered in growing noble fir are root rots, aphids, mites and current season needle necrosis.

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This cost of production study provides growers with a tool for financial management and decision making. It was conducted in cooperation with growers, field representatives, researchers, and farm suppliers and provides typical costs and returns to a well managed noble fir

Christmas tree farm in the Willamette Valley of Oregon. Growers are encouraged to substitute their own costs to get an accurate accounting of their costs.

Assumptions

In the preparation of this publication, the following assumptions were made to provide a basis for Christmas tree production analysis.

1. Typical acreage for Christmas tree production in Oregon is 10 acres of non-irrigated land.
2. 1,500 trees are transplanted per acre (5.5' x 5.5' spacing)
3. Prices for 6 to 7 ft noble fir Christmas trees are \$20 for Grade #1 and \$15 for Grade #2 per tree. Prices based upon 2005 to 2007 average per tree prices listed by USDA National Agricultural Statistic Service (http://www.nass.usda.gov/Statistics_by_State/Oregon/Publications/Horticulture/09_12xt.pdf; (Table 2) accessed 9/09). Price per tree for study derived from listed average price by assuming average tree is 7ft. The price of Grade 2 trees are 25% of Grade 1 trees.
4. Noble fir Christmas tree harvest begins in year 7 and continues through year 10 with 90 percent of planted trees harvestable.
5. All labor is hired at a rate of \$14.00 per hour, which includes worker's compensation, unemployment insurance, and other labor overhead expenses, or is paid a piece rate for some operations.
6. The machinery and equipment used in the budget reflects the typical machinery complement of a 10 acre noble fir Christmas tree farm. A detailed breakdown of machinery values is shown in Table 1. Table 2 provides estimated machinery costs from the American Society of Agricultural Engineers. Table 3 lists the estimated cost of each operation.
7. Gasoline and diesel costs per gallon are \$2.00 and \$2.50, respectively.
8. 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 six-month period.
9. Machinery and land are owned by the operator and assessed 8.5 and 8 percent interest rates, respectively, as opportunity costs (a non-cash cost for the use of the asset). Land is valued at \$5,000 per acre.
10. Previous year's establishment costs are funded by the operator at a charge of 10 percent interest and are considered an opportunity cost.
11. Additional assumptions are listed for variable, fixed cash, and fixed non-cash costs in Table 4.
12. Price inflation for the time period of this study is ignored.
13. Owner management, family living, State and Federal income tax consequences are also ignored for this study

Table 1. Machinery Cost Assumptions, Noble Fir Christmas Tree Production

Machine	Size	Market Value	Hours or Miles of Annual Use	Expected Life (yrs)	Salvage Value
Tractor	2 WD 35hp, Older	\$12,000	300	20	\$1,540
Fertilizer Spreader	40' Broadcast	1,500	4	15	144
Airblast Sprayer	300 gal	15,000	100	15	1,440
Pickup*	3/4 Ton 4X4	8,000	4,000	10	3,025
Backpack Sprayer		150	N/A	7	0
Elevator		2,000	N/A	15	192
Tree Baler		3,000	N/A	15	288
Shop/Shed	25' x 50'	25,000	N/A	35	0

* Pickup for Christmas tree production is 1/3 of total cost.

Table 2. Machinery Cost Calculations, Noble Fir Christmas Tree Production

Machine	Size	--- Variable Costs ---		--- Fixed Costs ---		Total Cost
		Fuel & Lube	Repairs & Maint.	Depr. & Interest	Insurance	
----- Costs per Hour -----						
Tractor	2 WD 35hp, Older	\$14.38	\$0.50	\$3.66	\$0.20	\$18.74
Fertilizer Spreader	40' Broadcast	0.00	0.26	40.07	1.23	41.56
Airblast Sprayer	300 gal	0.00	6.95	16.03	0.49	23.47
----- Costs per Mile -----						
Pickup*	3/4 Ton 4X4	\$0.19	\$0.15	\$0.24	\$0.08	\$0.66
----- Costs per Acre -----						
Backpack Sprayer		\$0.00	\$2.14	\$2.78	\$0.00	\$4.92
Elevator		0.00	12.05	21.83	0.00	33.89
Tree Baler		0.00	18.08	32.75	0.00	50.83
Shop/Shed	25' x 50'	0.00	71.43	177.68	0.00	249.11

* Pickup for Christmas tree production is 1/3 of total cost.

Table 3. Estimated Cost of Each Operation with Power-Unit, Noble Fir Christmas Tree Production

Operation	Tractor	Miles per Hr	Acres per Hr	----- Machine Costs -----			
				Labor Cost per Acre	Variable Cost per Acre	Fixed Cost per Acre	Total Cost per Acre
Fertilizer Spreader	2WD 35hp	6.0	3.00	\$4.67	\$5.05	\$15.05	\$24.77
Airblast Sprayer	2WD 35hp	6.0	3.00	\$4.67	\$7.27	\$6.79	\$18.73

Table 4. Noble Fir Christmas Tree Production 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>
Prices per 6-7' Grade #1 Tree, (\$/Tree)	\$20.00	\$20.00	\$20.00	\$20.00	\$20.00
Prices per 6-7' Grade #2 Tree, (\$/Tree)	\$15.00	\$15.00	\$15.00	\$15.00	\$15.00
Trees Harvested (Grade #1), per Acre	0.00	0.00	0.00	0.00	0.00
Trees Harvested (Grade #2), per Acre	0.00	0.00	0.00	0.00	0.00
Cost of Labor, per Hour	\$14.00	\$14.00	\$14.00	\$14.00	\$14.00
Cost to Plant Trees, per Tree	\$0.40	\$0.60	\$0.00	\$0.00	\$0.00
Cost of Foliar Testing	\$0.00	\$0.00	\$0.00	\$5.00	\$5.00
Cost of Culturing/Top Working, per Tree	\$0.00	\$0.00	\$0.00	\$0.25	\$0.30
Cost of Basal Pruning, per Tree	\$0.00	\$0.00	\$0.25	\$0.25	\$0.00
Cost of Fertilizer, per Acre	\$0.00	\$0.00	\$0.00	\$0.00	\$200.00
Cost of Insecticide, per Acre	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Cost of Fungicide, per Acre	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Cost of Herbicide, per Acre	\$25.00	\$25.00	\$25.00	\$25.00	\$25.00
Cost for Tagging Trees, per Tree	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Cost for Shagging, per Tree	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Cost for Shake & Baling Trees, per Tree	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Cost for Loading Trees, per Tree	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Cost to Cutting Trees, per Tree	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Time for IPM Scouting, Hours	0.50	0.50	0.50	0.50	0.50
Time to Fertilize, Hand Appl., Hours	0.00	0.00	0.00	0.00	0.00
Time for Spot Herbicide Sprays, Hours	1.60	1.60	1.60	1.60	1.60
	----- Fixed Input Costs -----				
Property Taxes	\$15.00	\$15.00	\$15.00	\$15.00	\$15.00
Property Insurance	\$25.00	\$25.00	\$25.00	\$25.00	\$25.00
Land Values	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
Tree Cost	\$0.50	\$0.50	\$0.00	\$0.00	\$0.00
Gasoline Price	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00
Diesel Fuel Price	\$2.50	\$2.50	\$2.50	\$2.50	\$2.50
Operating Interest Rate	8.50%	8.50%	8.50%	8.50%	8.50%
Machinery Interest Rate	8.50%	8.50%	8.50%	8.50%	8.50%
Land Interest Rate	8.00%	8.00%	8.00%	8.00%	8.00%
Establishment Interest Rate	10.00%	10.00%	10.00%	10.00%	10.00%
Overhead Charge	8.00%	8.00%	8.00%	8.00%	8.00%
% of Operating Capital Borrowed	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
Planted Trees	1,500	225	0	0	0

Table 4. Noble Fir Christmas Tree Production Input Assumptions for Variable, Harvest, and Fixed Costs, (con't).

	Year 6	Year 7	Year 8	Year 9	Year 10
Prices per 6-7' Grade #1 Tree, (\$/Tree)	\$20.00	\$20.00	\$20.00	\$20.00	\$20.00
Prices per 6-7' Grade #2 Tree, (\$/Tree)	\$15.00	\$15.00	\$15.00	\$15.00	\$15.00
Trees Harvested (Grade #1), per Acre	0.00	60.00	420.00	190.00	80.00
Trees Harvested (Grade #2), per Acre	0.00	40.00	280.00	135.00	70.00
Cost of Labor, per Hour	\$14.00	\$14.00	\$14.00	\$14.00	\$14.00
Cost to Plant Trees, per Tree	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Cost of Foliar Testing	\$5.00	\$5.00	\$5.00	\$5.00	\$5.00
Cost of Culturing/Top Working, per Tree	\$0.35	\$0.40	\$0.45	\$0.50	\$0.55
Cost of Basal Pruning, per Tree	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Cost of Fertilizer, per Acre	\$200.00	\$200.00	\$200.00	\$100.00	\$50.00
Cost of Insecticide, per Acre	\$20.00	\$20.00	\$20.00	\$20.00	\$20.00
Cost of Fungicide, per Acre	\$25.00	\$25.00	\$25.00	\$25.00	\$0.00
Cost of Herbicide, per Acre	\$25.00	\$25.00	\$25.00	\$25.00	\$25.00
Cost for Tagging Trees, per Tree	\$0.00	\$0.30	\$0.30	\$0.30	\$0.30
Cost for Shagging, per Tree	\$0.00	\$0.90	\$0.90	\$0.90	\$0.90
Cost for Shake & Baling Trees, per Tree	\$0.00	\$0.85	\$0.85	\$0.85	\$0.85
Cost for Loading Trees, per Tree	\$0.00	\$0.65	\$0.65	\$0.65	\$0.65
Cost to Cutting Trees, per Tree	\$0.00	\$0.40	\$0.40	\$0.40	\$0.40
Time for IPM Scouting, Hours	0.50	0.50	0.50	0.50	0.50
Time to Fertilize, Hand Appl., Hours	0.00	0.00	2.00	1.50	1.00
Time for Spot Herbicide Sprays, Hours	1.60	1.60	1.60	1.60	1.60
	----- Fixed Input Costs -----				
Property taxes	\$15.00	\$15.00	\$15.00	\$15.00	\$15.00
Property insurance	\$25.00	\$25.00	\$25.00	\$25.00	\$25.00
Land values	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
Tree cost	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Gasoline price	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00
Diesel fuel price	\$2.50	\$2.50	\$2.50	\$2.50	\$2.50
Operating interest rate	8.50%	8.50%	8.50%	8.50%	8.50%
Machinery interest rate	8.50%	8.50%	8.50%	8.50%	8.50%
Land interest rate	8.00%	8.00%	8.00%	8.00%	8.00%
Establishment interest rate	10.00%	10.00%	10.00%	10.00%	10.00%
Overhead charge	8.00%	8.00%	8.00%	8.00%	8.00%
% of Operating capital borrowed	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
Planted trees	0	0	0	0	0

Results of establishing and producing Noble Fir Christmas trees in Western Oregon

Cash flow analysis

Table 5 contains a cash flow analysis for a 10 acre noble fir Christmas tree farm. A cash flow analysis shows the cash costs required to produce noble fir Christmas trees. Cash costs include labor, trees, fertilizer, chemicals, machinery repairs, fuel, lube, and oil, operating (short-term) interest, machinery and property taxes. The income, variable costs and cash fixed costs are shown for each of the four establishment years and at full production. Harvest begins in year 7 with 100 trees (60 Grade 1 and 40 Grade 2) and increases to 750 trees (420 Grade 1 and 280 Grade 2) in year 8. In year 9, 325 trees (190 Grade 1 and 135 Grade 2) are harvested with a final harvest of 150 trees (80 Grade 1 and 70 Grade 2) in year 10. Total variable costs are \$2,154 in the first year with an additional \$47 of cash fixed costs for a total cash cost of \$2,201 per acre.

The farm projects a positive cash flow beginning in year 7 with gross income exceeding total cash costs by \$60 per acre. In year 8, the farm returns sufficient gross income to pay all previous years' cash costs with a surplus \$2,281 over prior costs.

Figure 1 shows the major cost components in relation to total cash costs. Hired labor costs are the largest cash expense representing 29 percent of the total cash costs followed by harvest costs with 26 percent. Machine costs, which include fuel, oil, and repairs, are next with 11 percent. Fertilizer and chemicals, overhead expenses and Christmas trees accounted for 9, 7 and 6 percent for total cash costs respectively. The remaining cost items account for 12 percent of the total cash costs.

Economic costs and returns

Table 6 details the economic costs and returns for a Christmas tree farm. Economic costs include all the cash costs listed in Table 5. The ownership costs that are either an opportunity cost to the owner or dollars borrowed from a financial institution are also included in Table 6. These ownership costs include the principal and interest payments or a return on investment to the grower, or both, for machinery, and land, and funds to pay for previous year's costs.

Gross income exceeds variable and fixed costs in Year 8 with a \$6,473 per acre return to the grower. Gross income also exceeds costs in years 9 and 10 by \$2,054 and \$71 respectively. However, this Christmas tree farm does not generate enough revenue to cover cumulative production costs and at the end of the production cycle has a deficit of \$7,320 per acre.

Figure 2 shows the cost components in relation to total economic costs. When all economic costs are included, interest costs are the largest component at 27 percent of total costs. Hired labor costs are the next largest item at 15 percent of total costs. This is followed by harvest and land costs, each accounting for 13 percent of the total. Machine costs (fuel, oil, repairs, depreciation, and interest charges) and Chemical and fertilizer costs represent 9 and 5 percent of the total costs, respectively. The remaining cost items account for 18 percent of the total economic costs.

The net projected economic returns for a 10 acre noble fir Christmas tree farm are shown in Figure 3. Both the cumulative cash and economic cost and returns are represented. The projected returns for this Christmas tree farm will cover all cash costs of establishment in 8 years. With the assumptions in this study, this farm will not, however, generate sufficient gross income to

cover all economic costs. However, if the owner is willing to accept a 5.4% rate of return on invested capital, this farm breaks even at the end of the production cycle, covering all previous costs (Figure 4). A sensitivity analysis of the change in price necessary to make this Christmas tree farm a

prudent business investment indicates profitability, under assumed interest rates, could be achieved by increasing the Christmas tree prices by 28 percent from \$20.00 and \$15.00 to \$25.60 and \$19.20 for grade 1 and 2 trees, respectfully (Figure 4).

Table 5. Cash Flow Analysis for Producing Noble Fir Christmas Trees in Western Oregon

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Income:										
Trees Harvested (Grade #1), per Acre	0.00	0.00	0.00	0.00	0.00	0.00	60.00	420.00	190.00	80.00
Trees Harvested (Grade #2), per Acre	0.00	0.00	0.00	0.00	0.00	0.00	40.00	280.00	135.00	70.00
Prices per 6-7' Grade #1 Tree, (\$/Tree)	0.00	0.00	0.00	0.00	0.00	0.00	20.00	20.00	20.00	20.00
Prices per 6-7' Grade #2 Tree, (\$/Tree)	<u>0.00</u>	<u>0.00</u>	<u>0.00</u>	<u>0.00</u>	<u>0.00</u>	0.00	<u>15.00</u>	<u>15.00</u>	<u>15.00</u>	<u>15.00</u>
Gross Income(\$ per Acre)	0.00	0.00	0.00	0.00	0.00	0.00	1800.00	12600.00	5825.00	2650.00
Variable Costs:										
Field Preparation	352.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trees	750.00	112.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chemicals	8.25	8.25	8.25	8.25	8.25	53.25	103.25	103.25	103.25	8.25
Fertilizer	0.00	0.00	0.00	0.00	200.00	200.00	200.00	200.00	100.00	50.00
Hired Labor (non-harvest)	643.40	164.40	216.90	591.90	484.07	568.40	643.40	696.73	409.73	242.65
Harvest Cost	0.00	0.00	0.00	0.00	0.00	0.00	310.00	2170.00	1007.50	465.00
Equipment	138.81	138.81	138.81	138.81	143.86	158.40	202.13	197.08	197.08	168.94
Shop	71.43	71.43	71.43	71.43	71.43	71.43	71.43	71.43	71.43	71.43
Miscellaneous and Overhead	145.11	39.63	34.83	70.23	78.01	89.52	127.82	280.48	156.52	85.90
Interest: Operating Capital	<u>44.82</u>	<u>11.37</u>	<u>9.99</u>	<u>18.71</u>	<u>20.94</u>	<u>24.25</u>	<u>35.23</u>	<u>79.03</u>	<u>43.47</u>	<u>23.21</u>
Total Variable Costs	2153.82	546.39	480.21	899.33	1006.55	1165.25	1693.25	3798.00	2088.98	1115.38
Gross Income minus VC	(2153.82)	(546.39)	(480.21)	(899.33)	(1006.55)	(1165.25)	106.75	8802.00	3736.02	1534.62
Fixed Cash Costs										
Insurance	31.97	31.97	31.97	31.97	31.97	31.97	31.97	31.97	31.97	31.97
Property Taxes	<u>15.00</u>									
Total Fixed Cash Costs	46.97	46.97	46.97	46.97	46.97	46.97	46.97	46.97	46.97	46.97
Total Cash Cost	2200.79	593.36	527.18	946.31	1053.53	1212.22	1740.23	3844.97	2135.95	1162.35
Annual Cash Flow	(2200.79)	(593.36)	(527.18)	(946.31)	(1053.53)	(1212.22)	59.77	8755.03	3689.05	1487.65
Cumulative Cash Flow	(2200.79)	(2794.15)	(3321.33)	(4267.64)	(5321.17)	(6533.39)	(6473.61)	2281.42	5970.47	7458.11

Table 6. Economic Costs and Returns of Producing Noble Fir Christmas Trees in Western Oregon

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Income:										
Trees Harvested (Grade #1), per Acre	0.00	0.00	0.00	0.00	0.00	0.00	60.00	420.00	190.00	80.00
Trees Harvested (Grade #2), per Acre	0.00	0.00	0.00	0.00	0.00	0.00	40.00	280.00	135.00	70.00
Prices per 6-7' Grade #1 Tree, (\$/Tree)	0.00	0.00	0.00	0.00	0.00	0.00	20.00	20.00	20.00	20.00
Prices per 6-7' Grade #2 Tree, (\$/Tree)	0.00	0.00	0.00	0.00	0.00	0.00	<u>15.00</u>	<u>15.00</u>	<u>15.00</u>	<u>15.00</u>
Gross Income(\$ per Acre)	0.00	0.00	0.00	0.00	0.00	0.00	1,800.00	12,600.00	5,825.00	2,650.00
Variable Costs:										
Field Preparation	352.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trees	750.00	112.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chemicals	8.25	8.25	8.25	8.25	8.25	53.25	103.25	103.25	103.25	8.25
Fertilizer	0.00	0.00	0.00	0.00	200.00	200.00	200.00	200.00	100.00	50.00
Hired Labor (non-harvest)	643.40	164.40	216.90	591.90	484.07	568.40	643.40	696.73	409.73	242.65
Harvest Cost	0.00	0.00	0.00	0.00	0.00	0.00	310.00	2,170.00	1,007.50	465.00
Equipment	138.81	138.81	138.81	138.81	143.86	158.40	202.13	197.08	197.08	168.94
Shop	71.43	71.43	71.43	71.43	71.43	71.43	71.43	71.43	71.43	71.43
Miscellaneous and Overhead	145.11	39.63	34.83	70.23	78.01	89.52	127.82	280.48	156.52	85.90
Interest: Operating Capital	<u>44.82</u>	<u>11.37</u>	<u>9.99</u>	<u>18.71</u>	<u>20.94</u>	<u>24.25</u>	<u>35.23</u>	<u>79.03</u>	<u>43.47</u>	<u>23.21</u>
Total Variable Costs	2,153.82	546.39	480.21	899.33	1,006.55	1,165.25	1,693.25	3,798.00	2,088.98	1,115.38
Gross Income minus VC	(2,153.82)	(546.39)	(480.21)	(899.33)	(1,006.55)	(1,165.25)	106.75	8,802.00	3,736.02	1,534.62
Fixed Costs:										
Insurance	31.97	31.97	31.97	31.97	31.97	31.97	31.97	31.97	31.97	31.97
Property Taxes	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
Machine Costs	99.39	99.39	99.39	99.39	99.39	128.03	128.03	112.97	112.97	99.39
Shop	177.68	177.68	177.68	177.68	177.68	177.68	177.68	177.68	177.68	177.68
Land Interest Cost	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>287.79</u>	<u>443.61</u>	<u>608.39</u>	<u>831.57</u>	<u>1,087.78</u>	<u>1,388.35</u>	<u>1,591.78</u>	<u>944.52</u>	<u>739.14</u>
Total Fixed Cost	724.04	1,011.82	1,167.64	1,332.43	1,555.60	1,840.46	2,141.03	2,329.41	1,682.15	1,463.17
Total Cost	2,877.85	1,558.21	1,647.85	2,231.76	2,562.16	3,005.71	3,834.28	6,127.40	3,771.12	2,578.55
Net Projected Returns	(2,877.85)	(1,558.21)	(1,647.85)	(2,231.76)	(2,562.16)	(3,005.71)	(2,034.28)	6,472.60	2,053.88	71.45
Cumulative Returns	(2,877.85)	(4,436.06)	(6,083.92)	(8,315.68)	(10,877.84)	(13,883.55)	(15,917.83)	(9,445.23)	(7,391.36)	(7,319.91)

Figure 1. Cash Costs per Acre to Produce Noble Fir Christmas Trees in Western Oregon, by Percent.

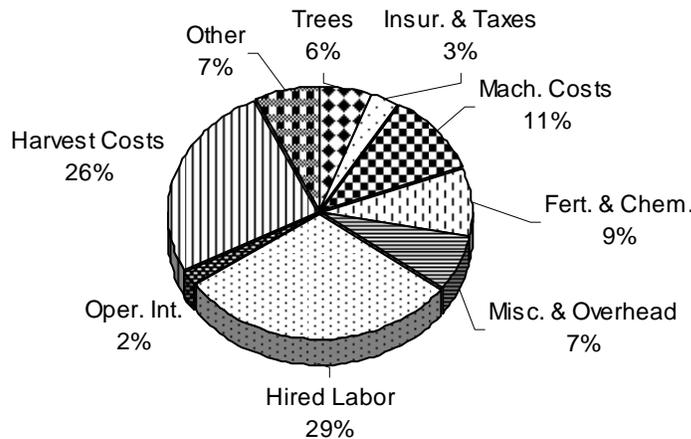


Figure 2. Economic Costs per Acre to Produce Noble Fir Christmas Trees in Western Oregon, by Percent.

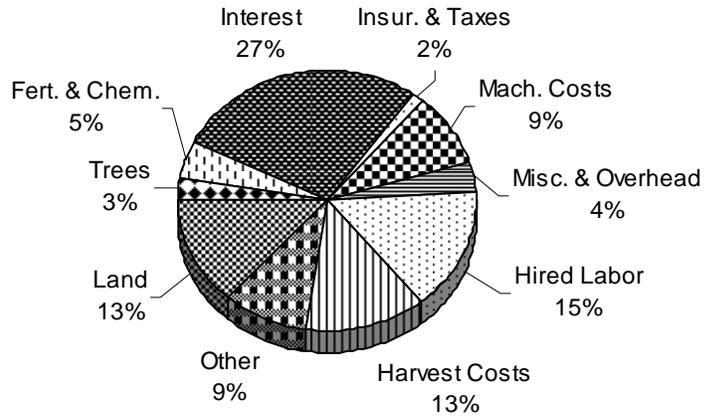
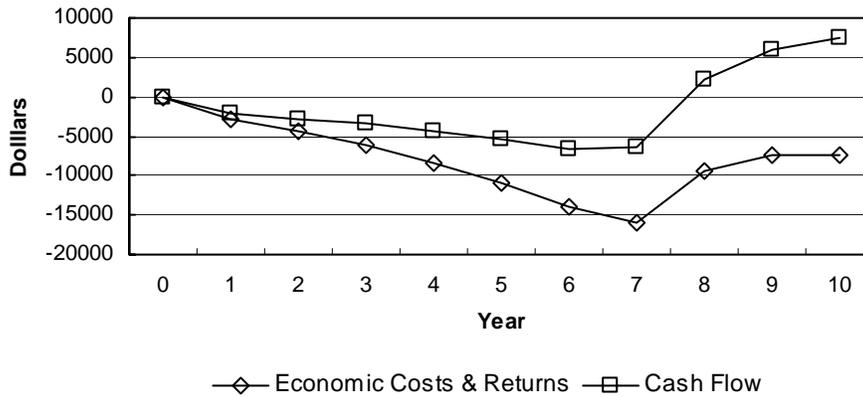
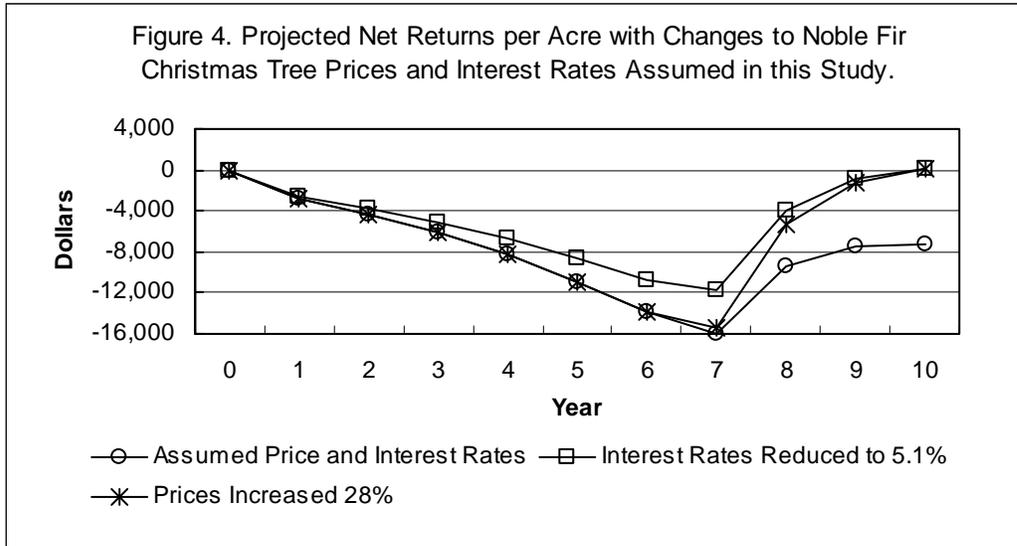


Figure 3. Comparing Cash and Economic Net Returns per Acre to Produce Noble Fir Christmas Trees in Western Oregon





Discussion

The Christmas tree markets tend to move through wide cycles in production and supply that influence price and demand for trees. Grower planting surveys may help better inform perspective growers about these cycles and adjust planting to meet the static or declining product demand.

Since the majority of Christmas trees produced in Oregon are destined for markets outside the state, regulations and restrictions can influence potential market size. For example, restrictions on pests in certain domestic and international markets require producers to carefully monitor their fields and submit to inspections which can cause disruptions. However, without these procedures growers would lose access to important markets.

During the time required to grow a noble fir, there are inevitably a number of unplanned and unknown events that will come along. These can have significant impacts on the planned costs and returns of your enterprise. New diseases, a severe

frost event, export restrictions and so on can influence your production plans through no fault of your own. No doubt growers can and will make a number of “mistakes” during a production cycle that may not be reflected in this cost budget.

Many agricultural products have a value added component which increases profitability to the producer. If Christmas tree growers are able to share in the value-added processes such as U-Cut production or sales of ancillary products or services they may be more likely to profit financially.

This cost of establishment study is meant to provide useful information to Christmas tree producers and investors who are considering planting Christmas trees. However, as with all enterprise budgets, putting your own current costs in the budget will make it more meaningful. Many tools are available to assist in budgeting such as templates from university farm management specialists and computer software programs such as “*Agricultures Profitability*

Tool”(*AgProfitTM*). This program is free for download at the *AgtoolsTM* website www.agtools.org. Talk with your local Extension agent to find the latest in Christmas tree production tools and budget information.

Growers must not forget the importance that a particular enterprise such as a Christmas tree farm can have in the overall financial stability of the farm business. Financial managers can recommend planting Christmas trees to improve profitability, but

the financial requirements to complete the planting could jeopardize cash flows, increase the debt-to-asset ratio and diminish the solvency of the farm. There are many economic and financial considerations to review before such decisions are made. Seeking advice from university Extension and research faculty, industry representatives, or consultants can help in those decisions and keep your farm profitable.

APPENDIX A

Enterprise Budgets for Noble Fir Christmas Tree Production in Western Oregon

Table 7. Nobel Fir Christmas Tree Production, Year 1, Economic Costs and Returns, \$/Acre

<u>VARIABLE CASH COSTS</u>	<u>Description</u>	<u>Labor</u>	<u>Machinery</u>	<u>Materials</u>	<u>Total</u>
Field Preparation, Custom		0.00	0.00	150.00	150.00
Stump Removal, Custom		0.00	0.00	200.00	200.00
Soil Test		0.00	0.00	2.00	2.00
Field Layout	1.0 hour	14.00	0.00	0.00	14.00
Plant Trees		600.00	0.00	750.00	1,350.00
IPM Scouting	0.5 hours	7.00	0.00	0.00	7.00
Spot Spraying, Herbicide, 1/3 Acre	1.6 hour	22.40	2.14	8.25	32.79
Pickup		0.00	136.67	0.00	136.67
Shop		0.00	0.00	71.43	71.43
Miscellaneous and Overhead		0.00	0.00	145.11	145.11
Interest: Operating Capital	6.0 mons	<u>0.00</u>	<u>0.00</u>	<u>44.82</u>	<u>44.82</u>
Total VARIABLE COSTS		643.40	138.81	1,371.61	2,153.82
 <u>FIXED COSTS</u>				<u>Unit</u>	<u>Total</u>
CASH Costs					
Pickup Insurance				acre	31.97
Property Taxes				acre	<u>15.00</u>
Total CASH Fixed Costs					46.97
NON-CASH Costs					
Machinery and Equip - Dep., Int., & Ins.				acre	2.78
Pickup - Depreciation & Interest				acre	96.60
Shop				acre	177.68
Land Interest Charge				acre	400.00
Interest on Establishment Costs				acre	<u>0.00</u>
Total NON-CASH Fixed Costs					677.06
Total FIXED COSTS					724.04
Total of All Costs Per Acre					(2,877.85)

Table 8. Nobel Fir Christmas Tree Production, Year 2, Economic Costs and Returns, \$/Acre

<u>VARIABLE CASH COSTS</u>	<u>Description</u>	<u>Labor</u>	<u>Machinery</u>	<u>Materials</u>	<u>Total</u>
Replant Trees		135.00	0.00	112.50	247.50
IPM Scouting	0.5 hours	7.00	0.00	0.00	7.00
Spot Spraying, Herbicide, 1/3 Acre	1.6 hour	22.40	2.14	8.25	32.79
Pickup		0.00	136.67	0.00	136.67
Shop		0.00	0.00	71.43	71.43
Miscellaneous and Overhead		0.00	0.00	39.63	39.63
Interest: Operating Capital	6.0 mons	0.00	0.00	11.37	11.37
Total VARIABLE COSTS		164.40	138.81	243.18	546.39
<u>FIXED COSTS</u>				<u>Unit</u>	<u>Total</u>
CASH Costs					
Pickup Insurance				acre	31.97
Property Taxes				acre	15.00
Total CASH Fixed Costs					46.97
NON-CASH Costs					
Machinery and Equip - Dep., Int., & Ins.				acre	2.78
Pickup - Depreciation & Interest				acre	96.60
Shop				acre	177.68
Land Interest Charge				acre	400.00
Interest on Establishment Costs				acre	287.79
Total NON-CASH Fixed Costs					964.85
Total FIXED COSTS					1,011.82
Total of All Costs Per Acre					(1,558.21)

Table 9. Nobel Fir Christmas Tree Production, Year 3, Economic Costs and Returns, \$/Acre

<u>VARIABLE CASH COSTS</u>	<u>Description</u>	<u>Labor</u>	<u>Machinery</u>	<u>Materials</u>	<u>Total</u>
IPM Scouting	0.5 hours	7.00	0.00	0.00	7.00
Spot Spraying, Herbicide, 1/3 Acre	1.6 hour	22.40	2.14	8.25	32.79
Basal Pruning		187.50	0.00	0.00	187.50
Pickup		0.00	136.67	0.00	136.67
Shop		0.00	0.00	71.43	71.43
Miscellaneous and Overhead		0.00	0.00	34.83	34.83
Interest: Operating Capital	6.0 mons	0.00	0.00	9.99	9.99
Total VARIABLE COSTS		216.90	138.81	124.50	480.21
 <u>FIXED COSTS</u>					
				<u>Unit</u>	<u>Total</u>
CASH Costs					
Pickup Insurance				acre	31.97
Property Taxes				acre	15.00
Total CASH Fixed Costs					46.97
NON-CASH Costs					
Machinery and Equip - Dep., Int., & Ins.				acre	2.78
Pickup - Depreciation & Interest				acre	96.60
Shop				acre	177.68
Land Interest Charge				acre	400.00
Interest on Establishment Costs				acre	443.61
Total NON-CASH Fixed Costs					1,120.67
Total FIXED COSTS					1,167.64
Total of All Costs Per Acre					(1,647.85)

Table 10. Nobel Fir Christmas Tree Production, Year 4, Economic Costs and Returns, \$/Acre

<u>VARIABLE CASH COSTS</u>	<u>Description</u>	<u>Labor</u>	<u>Machinery</u>	<u>Materials</u>	<u>Total</u>
IPM Scouting	0.5 hours	7.00	0.00	0.00	7.00
Foliar Testing		0.00	0.00	5.00	5.00
Basal Pruning		187.50	0.00	0.00	187.50
Spot Spraying, Herbicide, 1/3 Acre	1.6 hour	22.40	2.14	8.25	32.79
Culturing & Top Working		375.00	0.00	0.00	375.00
Pickup		0.00	136.67	0.00	136.67
Shop		0.00	0.00	71.43	71.43
Miscellaneous and Overhead		0.00	0.00	65.23	65.23
Interest: Operating Capital	6.0 mons	0.00	0.00	18.71	18.71
Total VARIABLE COSTS		591.90	138.81	168.62	899.33
<u>FIXED COSTS</u>				<u>Unit</u>	<u>Total</u>
CASH Costs					
Pickup Insurance				acre	31.97
Property Taxes				acre	15.00
Total CASH Fixed Costs					46.97
NON-CASH Costs					
Machinery and Equip - Dep., Int., & Ins.				acre	2.78
Pickup - Depreciation & Interest				acre	96.60
Shop				acre	177.68
Land Interest Charge				acre	400.00
Interest on Establishment Costs				acre	608.39
Total NON-CASH Fixed Costs					1,285.46
Total FIXED COSTS					1,332.43
Total of All Costs Per Acre					(2,231.76)

Table 11. Nobel Fir Christmas Tree Production, Year 5, Economic Costs and Returns, \$/Acre

<u>VARIABLE CASH COSTS</u>	<u>Description</u>	<u>Labor</u>	<u>Machinery</u>	<u>Materials</u>	<u>Total</u>
IPM Scouting	0.5 hours	7.00	0.00	0.00	7.00
Foliar Testing		0.00	0.00	5.00	5.00
Fertilize with Spreader	1.0 appl.	4.67	5.05	200.00	209.71
Spot Spraying, Herbicide, 1/3 Acre	1.6 hour	22.40	2.14	8.25	32.79
Culturing & Top Working		450.00	0.00	0.00	450.00
Pickup		0.00	136.67	0.00	136.67
Shop		0.00	0.00	71.43	71.43
Miscellaneous and Overhead		0.00	0.00	73.01	73.01
Interest: Operating Capital	6.0 mons	0.00	0.00	20.94	20.94
Total VARIABLE COSTS		484.07	143.86	378.63	1,006.55
<u>FIXED COSTS</u>				<u>Unit</u>	<u>Total</u>
CASH Costs					
Pickup Insurance				acre	31.97
Property Taxes				acre	15.00
Total CASH Fixed Costs					46.97
NON-CASH Costs					
Machinery and Equip - Dep., Int., & Ins.				acre	2.78
Pickup - Depreciation & Interest				acre	96.60
Shop				acre	177.68
Land Interest Charge				acre	400.00
Interest on Establishment Costs				acre	831.57
Total NON-CASH Fixed Costs					1,508.63
Total FIXED COSTS					1,555.60
Total of all costs per acre					(2,562.16)

Table 12. Nobel Fir Christmas Tree Production, Year 6, Economic Costs and Returns, \$/Acre

<u>VARIABLE CASH COSTS</u>	<u>Description</u>	<u>Labor</u>	<u>Machinery</u>	<u>Materials</u>	<u>Total</u>
IPM Scouting	0.5 hours	7.00	0.00	0.00	7.00
Foliar Testing		0.00	0.00	5.00	5.00
Fertilize with Spreader	1.0 appl.	4.67	5.05	200.00	209.71
Spot Spraying, Herbicide, 1/3 Acre	1.6 hour	22.40	2.14	8.25	32.79
Spray, Fungicide	1.0 appl.	4.67	7.27	\$25.00	36.94
Spray, Insecticide	1.0 appl.	4.67	7.27	\$20.00	31.94
Culturing & Top Working		525.00	0.00	0.00	525.00
Pickup		0.00	136.67	0.00	136.67
Shop		0.00	0.00	71.43	71.43
Miscellaneous and Overhead		0.00	0.00	84.52	84.52
Interest: Operating Capital	6.0 mons	0.00	0.00	24.25	24.25
Total VARIABLE COSTS		568.40	158.40	438.44	1,165.25
 <u>FIXED COSTS</u>				<u>Unit</u>	<u>Total</u>
CASH Costs					
Pickup Insurance				acre	31.97
Property Taxes				acre	15.00
Total CASH Fixed Costs					46.97
 NON-CASH Costs					
Machinery and Equip - Dep., Int., & Ins.				acre	\$31.42
Pickup - Depreciation & Interest				acre	96.60
Shop				acre	177.68
Land Interest Charge				acre	400.00
Interest on Establishment Costs				acre	1,087.78
Total NON-CASH Fixed Costs					1,793.49
 Total FIXED COSTS					 1,840.46
 Total of All Costs Per Acre					 (3,005.71)

Table 13. Nobel Fir Christmas Tree Production, Year 7, Economic Costs and Returns, \$/Acre

<u>GROSS INCOME</u>		<u>Quantity</u>	<u>Unit</u>	<u>\$/Unit</u>	<u>Total</u>	<u>Price/Tree*</u>
Nobel-fir Christmas trees, Grade #1		60	Trees	\$20.00	1,200.00	20.00
Nobel-fir Christmas trees, Grade #2		40	Trees	\$15.00	600.00	15.00
Total GROSS Income		100			1,800.00	18.00
<u>VARIABLE CASH COSTS</u>	<u>Description</u>	<u>Labor</u>	<u>Machinery</u>	<u>Materials</u>	<u>Total</u>	<u>Cost/Tree*</u>
IPM Scouting	0.5 hours	7.00	0.00	0.00	7.00	0.07
Foliar Testing		0.00	0.00	5.00	5.00	0.05
Fertilize with Spreader	1.0 appl.	4.67	5.05	200.00	209.71	2.10
Spot Spraying, Herbicide, 1/3 Acre	1.6 hour	22.40	2.14	8.25	32.79	0.33
Spray, Fungicide	1.0 Appl.	4.67	14.07	\$45.00	63.73	0.64
Spray, Insecticide	1.0 Appl.	4.67	14.07	\$50.00	68.73	0.69
Culturing & Top Working		600.00	0.00	0.00	600.00	6.00
Tagging		30.00	0.00	0.00	30.00	0.30
Cut Trees		40.00	0.00	0.00	40.00	0.40
Shagging		90.00	0.00	0.00	90.00	0.90
Baling		85.00	12.05	0.00	97.05	0.97
Loading		65.00	18.08	0.00	83.08	0.83
Pickup		0.00	136.67	0.00	136.67	1.37
Shop		0.00	0.00	71.43	71.43	0.71
Miscellaneous and Overhead		0.00	0.00	122.82	122.82	1.23
Interest: Operating Capital	6.0 mons	0.00	0.00	35.23	35.23	0.35
Total VARIABLE COSTS		953.40	202.13	537.73	1,693.25	16.93
<u>FIXED COSTS</u>				<u>Unit</u>	<u>Total</u>	<u>Cost/Tree*</u>
CASH Costs						
Pickup Insurance				acre	31.97	0.32
Property Taxes				acre	15.00	0.15
Total CASH Fixed Costs					46.97	0.47
GROSS INCOME minus VARIABLE AND FIXED CASH COSTS					59.77	0.60
NON-CASH Costs						
Machinery and Equip - Dep., Int., & Ins.				acre	\$31.42	0.31
Pickup - Depreciation & Interest				acre	96.60	0.97
Shop				acre	177.68	1.78
Land Interest Charge				acre	400.00	4.00
Interest on Establishment Costs				acre	1,388.35	13.88
Total NON-CASH Fixed Costs					2,094.06	20.94
Total FIXED COSTS					2,141.03	21.41
Total of All Costs Per Acre					3,834.28	38.34
Net Projected Returns					(2,034.28)	(20.34)

Table 14. Nobel Fir Christmas Tree Production, Year 8, Economic Costs and Returns, \$/Acre

<u>GROSS INCOME</u>		<u>Quantity</u>	<u>Unit</u>	<u>\$/Unit</u>	<u>Total</u>	<u>Price/Tree*</u>
Nobel-fir Christmas trees, Grade #1		420	Trees	\$20.00	8,400.00	20.00
Nobel-fir Christmas trees, Grade #2		280	Trees	\$15.00	4,200.00	15.00
Total GROSS Income		700			12,600.00	18.00
<u>VARIABLE CASH COSTS</u>	<u>Description</u>	<u>Labor</u>	<u>Machinery</u>	<u>Materials</u>	<u>Total</u>	<u>Cost/Tree*</u>
IPM Scouting	0.5 hours	7.00	0.00	0.00	7.00	0.01
Foliar Testing		0.00	0.00	5.00	5.00	0.01
Fertilizer, Hand Application	2.0 hours	28.00	0.00	200.00	228.00	0.33
Spot Spraying, Herbicide, 1/3 Acre	1.6 hour	22.40	2.14	8.25	32.79	0.05
Spray, Fungicide	1.0 Appl.	4.67	14.07	\$45.00	63.73	0.09
Spray, Insecticide	1.0 Appl.	4.67	14.07	\$50.00	68.73	0.10
Culturing & Top Working		630.00	0.00	0.00	630.00	0.90
Tagging		210.00	0.00	0.00	210.00	0.30
Cut Trees		280.00	0.00	0.00	280.00	0.40
Shagging		630.00	0.00	0.00	630.00	0.90
Baling		595.00	12.05	0.00	607.05	0.87
Loading		455.00	18.08	0.00	473.08	0.68
Pickup		0.00	136.67	0.00	136.67	0.20
Shop		0.00	0.00	71.43	71.43	0.10
Miscellaneous and Overhead		0.00	0.00	275.48	275.48	0.39
Interest: Operating Capital	6.0 mons	0.00	0.00	79.03	79.03	0.11
Total VARIABLE COSTS		2,866.73	197.08	734.19	3,798.00	5.43
<u>FIXED COSTS</u>				<u>Unit</u>	<u>Total</u>	<u>Cost/Tree*</u>
CASH Costs						
Pickup Insurance				acre	31.97	0.05
Property Taxes				acre	15.00	0.02
Total CASH Fixed Costs					46.97	0.07
GROSS INCOME minus VARIABLE AND FIXED CASH COSTS					8,755.03	12.51
NON-CASH Costs						
Machinery and Equip - Dep., Int., & Ins.				acre	\$16.37	0.02
Pickup - Depreciation & Interest				acre	96.60	0.14
Shop				acre	177.68	0.25
Land Interest Charge				acre	400.00	0.57
Interest on Establishment Costs				acre	1,591.78	2.27
Total NON-CASH Fixed Costs					2,282.43	3.26
Total FIXED COSTS					2,329.41	3.33
Total of All Costs Per Acre					6,127.40	8.75
Net Projected Returns					6,472.60	9.25

* Based on trees harvested

Table 15. Nobel Fir Christmas Tree Production, Year 9, Economic Costs and Returns, \$/Acre

<u>GROSS INCOME</u>					
	<u>Quantity</u>	<u>Unit</u>	<u>\$/Unit</u>	<u>Total</u>	<u>Price/Tree*</u>
Nobel-fir Christmas trees, Grade #1	190	Trees	\$20.00	3,800.00	20.00
Nobel-fir Christmas trees, Grade #2	135	Trees	\$15.00	2,025.00	15.00
Total GROSS Income	325			5,825.00	17.92
<u>VARIABLE CASH COSTS</u>					
<u>Description</u>	<u>Labor</u>	<u>Machinery</u>	<u>Materials</u>	<u>Total</u>	<u>Cost/Tree*</u>
IPM Scouting 0.5 hours	7.00	0.00	0.00	7.00	0.02
Foliar Testing	0.00	0.00	5.00	5.00	0.02
Fertilizer, Hand Application 1.5 hours	21.00	0.00	100.00	121.00	0.37
Spot Spraying, Herbicide, 1/3 Acre 1.6 hour	22.40	2.14	8.25	32.79	0.10
Spray, Fungicide 1.0 Appl.	4.67	14.07	\$45.00	63.73	0.20
Spray, Insecticide 1.0 Appl.	4.67	14.07	\$50.00	68.73	0.21
Culturing & Top Working	350.00	0.00	0.00	350.00	1.08
Tagging	97.50	0.00	0.00	97.50	0.30
Cut Trees	130.00	0.00	0.00	130.00	0.40
Shagging	292.50	0.00	0.00	292.50	0.90
Baling	276.25	12.05	0.00	288.30	0.89
Loading	211.25	18.08	0.00	229.33	0.71
Pickup	0.00	136.67	0.00	136.67	0.42
Shop	0.00	0.00	71.43	71.43	0.22
Miscellaneous and Overhead	0.00	0.00	151.52	151.52	0.47
Interest: Operating Capital 6.0 mons	0.00	0.00	43.47	43.47	0.13
Total VARIABLE COSTS	1,417.23	197.08	474.66	2,088.98	6.43
<u>FIXED COSTS</u>					
			<u>Unit</u>	<u>Total</u>	<u>Cost/Tree*</u>
CASH Costs					
Pickup Insurance			acre	31.97	0.10
Property Taxes			acre	15.00	0.05
Total CASH Fixed Costs				46.97	0.14
GROSS INCOME minus VARIABLE AND FIXED CASH COSTS				3,689.05	11.35
NON-CASH Costs					
Machinery and Equip - Dep., Int., & Ins.			acre	\$16.37	0.05
Pickup - Depreciation & Interest			acre	96.60	0.30
Shop			acre	177.68	0.55
Land Interest Charge			acre	400.00	1.23
Interest on Establishment Costs			acre	944.52	2.91
Total NON-CASH Fixed Costs				1,635.18	5.03
Total FIXED COSTS				1,682.15	5.18
Total of All Costs Per Acre				3,771.12	11.60
Net Projected Returns				2,053.88	6.32

* Based on trees harvested

Table 16. Nobel Fir Christmas Tree Production, Year 10, Economic Costs and Returns, \$/Acre

<u>GROSS INCOME</u>		<u>Quantity</u>	<u>Unit</u>	<u>\$/Unit</u>	<u>Total</u>	<u>Price/Tree*</u>	
Nobel-fir Christmas trees, Grade #1		80	Trees	20.00	1,600.00	20.00	
Nobel-fir Christmas trees, Grade #2		70	Trees	15.00	1,050.00	15.00	
Total GROSS Income		150			2,650.00	17.67	
<u>VARIABLE CASH COSTS</u>		<u>Description</u>	<u>Labor</u>	<u>Machinery</u>	<u>Materials</u>	<u>Total</u>	<u>Cost/Tree*</u>
Culturing & top working			206.25	0.00	0.00	206.25	1.38
Foliar Testing			0.00	0.00	5.00	5.00	0.03
Fertilizer, Hand Application	1.0 hours		14.00	0.00	50.00	64.00	0.43
Spot Spraying, Herbicide, 1/3 Acre	1.6 hour		22.40	2.14	8.25	32.79	0.22
Tagging			45.00	0.00	0.00	45.00	0.30
Cut trees			60.00	0.00	0.00	60.00	0.40
Shagging			135.00	0.00	0.00	135.00	0.90
Baling			127.50	12.05	0.00	139.55	0.93
Loading			97.50	18.08	0.00	115.58	0.77
Pickup			0.00	136.67	0.00	136.67	0.91
Shop			0.00	0.00	71.43	71.43	0.48
Miscellaneous and Overhead			0.00	0.00	80.90	80.90	0.54
Interest: Operating Capital	6.0 mons		0.00	0.00	23.21	23.21	0.15
Total VARIABLE COSTS			707.65	168.94	238.79	1,115.38	7.44
<u>FIXED COSTS</u>				<u>Unit</u>	<u>Total</u>	<u>Cost/Tree*</u>	
CASH Costs							
Pickup Insurance				acre	31.97	0.21	
Property Taxes				acre	15.00	0.10	
Total CASH Fixed Costs					46.97	0.31	
GROSS INCOME minus VARIABLE AND FIXED CASH COSTS					1,487.65	9.92	
NON-CASH Costs							
Machinery and Equip - Dep., Int., & Ins.				acre	\$2.78	0.02	
Pickup - Depreciation & Interest				acre	96.60	0.64	
Shop				acre	177.68	1.18	
Land Interest Charge				acre	400.00	2.67	
Interest on Establishment Costs				acre	739.14	4.93	
Total NON-CASH Fixed Costs					1,416.20	9.44	
Total FIXED COSTS					1,463.17	9.75	
Total of all costs per acre					2,578.55	17.19	
Net Projected Returns					71.45	0.48	

* Based on trees harvested